

Flora of India  
Series-2

# FLORA OF MANIPUR

VOLUME 1

(Ranunculaceae — Asteraceae)



BOTANICAL SURVEY OF INDIA

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Editors

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**BOTANICAL SURVEY OF INDIA**

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Front Cover Photo : A view of Sirohee hills

Back Cover Photo : A view of Loktak lake

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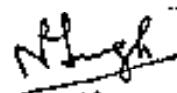
## FOREWORD

The state of Manipur is situated in North Eastern India bordering with Myanmar and harbours interesting flora. It offers a rich, scenic grandeur and panorama of contrasting landscape and many picturesque spots. The state is nature's paradise for its wild fauna and flora. It harbours over 3000 species of higher plants within an area of 22,327 sq. km and contributes an important source for germplasm. A number of wild relatives of cultivated plants, endemics, rare and threatened plants, medicinal and other ethnobotanically important plant species etc. occur in this state.

The old literature, epics and myths, etc. speak about the richness in biodiversity and culture of its people. A large number of different tribal population inhabit forest areas in this state and depend on the forest wealth for day to day needs. They have lived in complete harmony with the nature since time immemorial. However, due to biotic pressure, shifting cultivation, socio-economic development, hydroelectric projects, development of communication network, transformation of forest land for rehabilitation and agricultural purposes, etc. have contributed a lot for depletion of the floral wealth of this part of the country. The forest areas are shrinking day by day due to population expulsion and live-stock pressure as well as increasing demand on forest resources for sustenance of the human at large. As a result, several species are facing threat of survival in their natural habitats and many may disappear before the inventorisation, assessment and utilisation of their economic potentialities for better human survival. Therefore, sustainable utilisation and conservation must be practiced to save the phytodiversity of this area.

The Botanical Survey of India is publishing the flora of the country under four series viz., (1) National Flora of India, (2) State Flora of State Flora Analysis, (3) District Flora of flora of some rich biodiversity hotspot area of the country and (4) Monographs and revisionary studies etc. Flora of Manipur is being published under state flora series. The publication of the Flora of Manipur was a long felt need and was overdue. In recent years it has assumed special importance due to increased progress of scientific activities with several new economic species. The present publication embodies plant resources available at this very moment in this state. The preservation and conservation of plant diversity will not only be helpful for the state policy planning of forest based industries but also to take measures to protect this natural heritage so that it can be handed over to posterity.

I hope this publication would be very interesting for students, scientists, conservationists and industrial houses dealing with plant resources as raw material. The authors have done a commendable job in completing this work.



(N. P. Singh)

Director

Botanical Survey of India

8th May, 2000

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8th May, 2000

Authors

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## INTRODUCTION

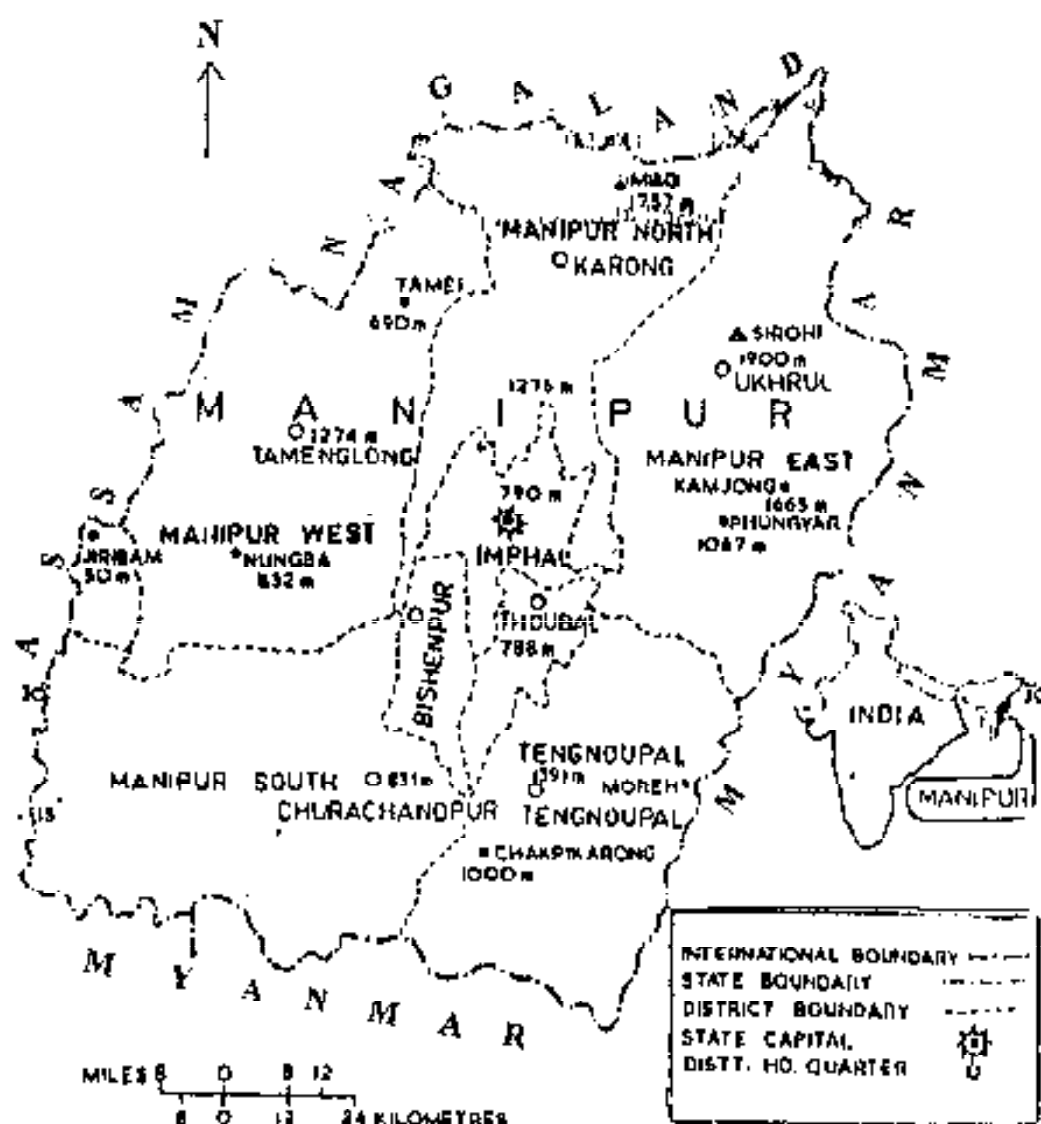
(A. S. Chauhan)

The state of Manipur is situated in North-east India bordering with Myanmar and harbours an interesting flora. It offers a rich scenic grandeur and a panorama of contrasting landscape with many picturesque spots and mountain slopes which are more rugged and inaccessible. Late Prime Minister Pandit Jawaharlal Nehru described it as, "Jewel of India", as the state is nature's paradise for its wild fauna and flora in general and rich heritage of wild orchids in particular. The first botanical exploration of Manipur was made by G. Watt, who was deputed as a Botanist member of the boundary commission of 1881-82 set up by the British Govt. Since then the flora of this state attracted the attention of many western explorers like C.B. Clarke, 1885; A. Meebold, 1906-1907; Sir Anandale., 1921; D. C. Kaith, 1932; N. L. Bor, 1938, 1942, 1948, 1960; F. Kingdonward., 1927, 1935, 1945) from time to time. Later U. N. Kanjilal, a forest officer made extensive collections through forest officials from the whole of Assam and Manipur for the publication of Flora of Assam (Kanjilal et al., 1934-1940) forms a land mark in the history of botanical studies in North-eastern region, but this flora is incomplete in the study of monocots.

With the reorganisation of Botanical Survey of India in 1954, a separate regional circle was set up in Shillong to explore the botanically rich area of North eastern region and to write a detailed flora. The note worthy publication on the floristic account of Manipur State is by Deb 1961. Besides, sporadic contributions have appeared on the floristic accounts of Manipur (Mukerjee, 1953; Jain & Shukla, 1979; Shukla & Baishya, 1979; Kataki, Jain and Sastry, 1984 (a, b); A. S. Rao & Verma 1982; Deb 1956 & 1957; Kataki, 1987; Rao, 1968 & 1974; Sastry & Hajra, 1983; Malik & Safui, 1987; Phukan, 1999). The establishment of Manipur University, Imphal has further accelerated the floristic studies on the flora of the state subsequently, a number of papers have been published on various aspects (Sharma, 1986; Singh & Singh, 1983; Singh & Singh, 1985; Sinha, 1986, 1987; Sharma, 1987; Singh, 1990, Singh, 1999). But none of these studies have given a comprehensive detailed account of the state flora and only checklist of plants of Manipur has been provided. Besides, till several far off areas which were difficult to approach, especially bordering Myanmar were left out. During the recent past, the natural forests, which are playing key role for economic upliftment of the people of the state are being destroyed extensively either for age old practice of shifting cultivation by the local people or in the name of developmental activities. All these have resulted in depletion of the genetic wealth of the state considerably. The population of several species are facing threat of survival in their natural habitats, while few are already on the verge of extinction. The situation has reached an alarming stage and it would worsen

if immediate conservation measures are not undertaken. Moreover, for socioeconomic development of the state on scientific lines, it is a prerequisite to have a detailed flora with complete inventory of all plant wealth before we loose many of these species.

Keeping these aspects in a view, the present work has been undertaken so that a long felt need for a detailed flora of the state could be met. This flora of Manipur, based on intensive survey as well as critical study of herbarium specimens housed at different herbaria in the country is presented here.



Map of Manipur

### Physical Geography and Location

Manipur, a small land-locked hilly state just north of Tropic of Cancer, lies between 23° 50' and 25° 41' north latitudes and 93° 6' and 94° 47' east longitudes. The state is bounded on the north by Nagaland, on the south by Mizoram and Chin Hills of Myanmar, on the east by Chindwin districts of Myanmar and on the west by Cachar and North Cachar districts of Assam. The state has an area of ca 22327 sq. km. The arm of the Himalayas, which sweeps round the southern side of the Assam valley divides Cachar from Upper Myanmar and further south, Chittagong and Arakan from lower Myanmar. The major portion of the state consists of hill ranges with a north and south general trend. A central stream has been blocked by some convulsion of nature just below the points at which two streams join, alluvium has been deposited instead of being carried off, and the flat and elevated valley of an area of about 1545 sq km has been formed (central valley). The state has an elevation ranging from 550—3,600 m above the mean sea level.

### Topography

The major portion of the territory is covered by hill ranges. In the centre lies the valley which is ca 48.5 km in length and 32.2 km in breadth. Series of low hills crop-up here and there within the valley. The hills are generally of irregular serrated ridges, occasionally rising into conical peaks and flattened cliffs. The hill ranges attain their greatest height towards the north-east, about 80 km from the valley rising about 3.6 km above the level of the sea. From this point south, until the sea is reached towards Chittagong and Arakan, there is a steady decrease in the height of the hilly ranges. In the north again, until the Assam valley is reached, there is same gradual decrease in height.

Of the numerous peaks of the notable ones are (1) Surma 2938 m (2) Chekka 2845 m (3) Kasom 2681 m (4) Khayang Phung 2832 m (5) Khumbo 2681 m (6) Kopa medza 2553 m (7) Koupru 2564 m (8) Langol 1136 m (9) Maram 1867 m (10) Nongmaiching 1564 m (11) Sirohee furar 2566 m (12) Surma north peak 3061 m and (13) Tusom 2516 m.

### Geology and Soil

Geologically the state is of recent origin. Greater part of the state is occupied by a series of slate and stones. The upper tertiary continues through Mapum and passes through the Kopamedza range in the Angami Nagaland. Lime stone of Kasom range and Nungshongkhong valley are of cretaceous age. Soil is recent alluvium in the valley. At the base of the hills it is derived from sandstone rocks. At Langol it is ferruginous clay to clayey loam. A lot of work has been done on the geology of the state.

The earliest geological work carried out in North Eastern India was that by Middicott (1865). Thereafter, Mallet (1876) published a valuable geological document of his extensive reconnaissance in North Eastern Region, which laid down the foundation of the stratigraphy of Upper Assam and its adjoining areas including Manipur-Nagaland and still remains a standard reference of any stratigraphic studies of these areas. In later years Godwin Austen (1874), Hughes (1874), La Touche (1883), Oldham (1883), Smith (1898), Maclaren (1904), Simpson (1906), Hayden (1910), Pascoe (1912), Goggin Brown (1912), Stuart (1922) and Palmer (1924) had worked from time to time in Assam and adjoining Manipur-Nagaland in limited areas of economic interest mainly for coal and oil, and added further knowledge to the geological and stratigraphic understanding of North East Region. Evans (1932) had brought out an extensive account of the tertiary succession in Assam and adjacent areas mainly based on the work done by the geologists of the then Burma Oil Company during the year 1913 to 1915.

The Tertiary sedimentary units cover about 90% of the area of Manipur are documented. The stratigraphy of the ophiolite belt is discussed separately as it constitutes a distinct geological entity. The detailed discussion about the Disang, Barail Groups and ophiolitic sediments which are exposed in eastern part of Manipur and Chandul district is given.

#### *Disang Group*

It was first described by Mallet (1876) as Disang series which consists of a great thickness of splintery grey shales interbedded with fine grained sandstones. Towards upper part, it passes into a sequence of thinly bedded sandstones. A large tract of the interior hills of Manipur is occupied by the Disang Group rocks. The Disang rocks are not yet known from NW of Haflong — Disang thrust (Evans, 1932).

In Manipur the Disang rock consists of monotonous sequence of dark grey, splintery shales (Pascoe, 1912) and subdivided into Lower Disang and Upper Disang formations. The Disang have a thickness approximately 3000 m (Mathur and Evans, 1964) though it is difficult to estimate the exact thickness because of tightly and repeatedly folded nature of its strata and due to intermittent dissection by a series of faults. The Lower Disang formation is constituted mainly of argillaceous lithounits such as phyllitic shales, phyllites, slates and slaty shales with interbedded minor sandstones/siltstones. It is usually devoid of any mega biota but leaflets and broken impressions of Poaceae are quite common and represents the rock types originating in a distal shelf facies. The Upper Disang formation which lies over the Lower Disang comprises a rhythmic sequence of alternate shale/ siltstone and sandstone beds.

The Disang Group is overlain by the Laisong Formation (sandstones) of Barail Group.

### *Barail Group*

The name Barail was taken from the Barail range which forms the backbone of North Cachar Hills. The Barail rocks overlying the Disang occur mainly in the Kohima synclinorium, in the Schuppen belt as tectonic slices and in the inner Palaeogene fold belt along the cherts of synclinal ridges in Manipur. The sandstones of Manipur are divided into three formations.

*Laisong Formation* : It is the lowest subdivision of the Barail, about 200 m to 2500 m in thickness, and consists largely of very hard, thin bedded, indurated, grey sandstones alternating with hard sandy shales. In eastern Naga Hills and Manipur, the Laisong is at places underlying by a ferruginous nodules bearing horizon of Upper Disang Formation.

*Jenam Formation* : The Laisong Formation passes upward into a more argillaceous lithoformation known as Jenam Formation which consists of shale, sandy shale and carbonaceous shale with a relatively thin bed of sandstones. There are occasional streaks, lenses, and beds of coal associated with this formation. The Jenam is not recorded from the inner Palaeogene fold belt of Nagaland and Manipur. It is found that the development of workable coal seams is restricted to the Jenam Formation in the northern part of the Schuppen belt.

*Renji Formation* : Above the soft Jenam beds there occurs a great thickness of hard, ferruginous, massive to thick bedded, multistoreyed sandstone with small proportion of shale/sandy shale known as Renji Formation. The formation constitutes the hills known as Renji hill to the north of Badarpur in Cachar (Assam). Well developed section of Renji sandstone occur in Changkikong range in the Schuppen belt, Kohima synclinorium including the Japvo range, and Phcrima—Piphima road section of N.H 39. The outcrops of Japvo range extend southwards along the eastern limb of the Kohima synclinorium into the hills of northern and western Manipur.

### *Surma Group*

In the Surma valley, and parts of Naga-Manipur Hills the Barail Group of rocks is found to be unconformably overlain by a thick sequence of alternate beds of shale, sandy shale, mudstone, siltstone, and sandstone having thickness of about 3500 m and as a whole being known as the Surma Group. In western Manipur they occur forming a part of the eastern limb of the Kohima synclinorium. The unconformity at the base of the Surma has a characteristic basal conglomerate. It has been divided into two formations.

*Bhuban Formation* : The Bhuban Formation as a whole consists of alternation of shales, siltstone, shaley sandstone and sandstone beds. The lower Bhuban is not represented in Manipur Hills where the Surma sedimentation starts with

the deposition of middle Bhuban represented by a conspicuous rhythmic sequence of shale/siltstone and fine grained sandstone with ripple marks, cross laminations and intraformational grit beds. It is exposed in western Manipur along the eastern limb of the Kohima synclinorium. In Naga Hills, the Bokabil has much less thickness compared to its large thickness of 900 to 1200 m in the Surma valley.

*Bokabil Formation* : The formation is made up of sandy shale and alternation of clay/shale and ferruginous sandstones. Sandy shale often grades into finely laminated siltstone. As a whole, this formation forms a sort of transition zone from the Bhuban to Tipam sandstone.

### *Tipam Group*

This group of rocks was first described by Mallet (1876) as Tipam Series consisting of coarse grained, ferruginous sandstones with partings of sandy shale and a sequence of mottled clays at the top. The Tipam Group has been subdivided into broad formations, namely the Tipam sandstone Formation and Girujan clay Formation.

*Tipam Sandstone Formation* : The Tipam Sandstone Formation was first identified in the Tipam river section of upper Assam by Mallet (1876). It consists mainly of coarse grained massive to thick bedded, occasionally gritty, ferruginous sandstones, on weathering it changes to orange, brown, yellowish-brown and reddish-brown with elephant— skin texture on the surface. The sandstone beds are sometimes interbanded with thin partings of sandy shale. Thin streaks of coal and medium to large size sand balls do also occur in this formation.

*Girujan Clay Formation* : Above the Tipam Sandstone Formation there occurs a distinct group of rocks in which mottled clays are predominant. It is an argillaceous group of rocks consisting of mottled clays with alternation of minor mottled sandstone bands. Red brown, purple and blue mottled clays are most common. At places, characteristic pink and white clays are also present. The formation is about 1500 m in thickness. The coarse, ferruginous sandstones occurring in the lower part of the Girujan Clay Formation closely resemble the Tipam sandstones. The formation is unconformably overlain by a group of sandstone, coal (lignite), conglomerate and grit beds known as Namsang.

### *Namsang Formation / Dupitila Beds*

Dupitila beds were first described by Mallet (1876) from the Jaintiapur hills of Sylhet district (now in Bangladesh) for a group of rocks consisting of coarse, ferruginous sandstones with numerous layers of quartz and coal pebbles bearing channel conglomerates and grit beds overlying the Girujan clays. In Naga Hills,

these beds have been referred to as Namsang Formations while in Upper Assam the name Dupitila is retained.

The Namsang Formation consists of quartz and lignite pebble conglomerate, grit, ferruginous sandstone and intermittent, mottled, sandy clay bed. In Surma valley, however, the Dupitilas are not marked by distinctive lignite pebbles as observed in Naga Hills and Upper Assam.

#### *Quaternary Group*

The Pleistocene to recent alluvial deposits consisting of partially consolidated to unconsolidated boulders, pebbles, sands, silt and clay which had undergone various degrees of oxidation occur in different topographic levels and places of Naga Hills and Manipur. There are atleast three Quaternary terraces of alluvial deposits encountered at different levels of altitude. Many of the low hills in the intermountain valley areas are completely made up of alluvial deposits. The Quaternary alluvial deposits lie unconformably over the older group of rocks like Ditung, Namsang, Tipam, Surma and Barail. In Imphal valley, they rest over Disang and Barail Groups.

#### *Oceanic Pelagic Sediments*

A group of pelagic sediments represented by siltstone, shale, fine grained sandstone, chert and limestone often occur in association with the ophiolite masses and these have been designated as oceanic pelagic sediments (OPS) to differentiate them from the adjacent Disang sediments which do also occur in the vicinity. The association cherts are rich with radiolarias and the limestones with microforaminiferas. This group of sediments is extensively developed in Ukhrul and Chandel districts of Manipur. The OPS are quite distinct in its associated rock types, fossil contents, and relatively deep water environment of deposition which is in contrast with the plant fossils bearing conglomerate - sandstone shale beds of Pokphur Formation deposited in a nearshore, open marine to paralic environment.

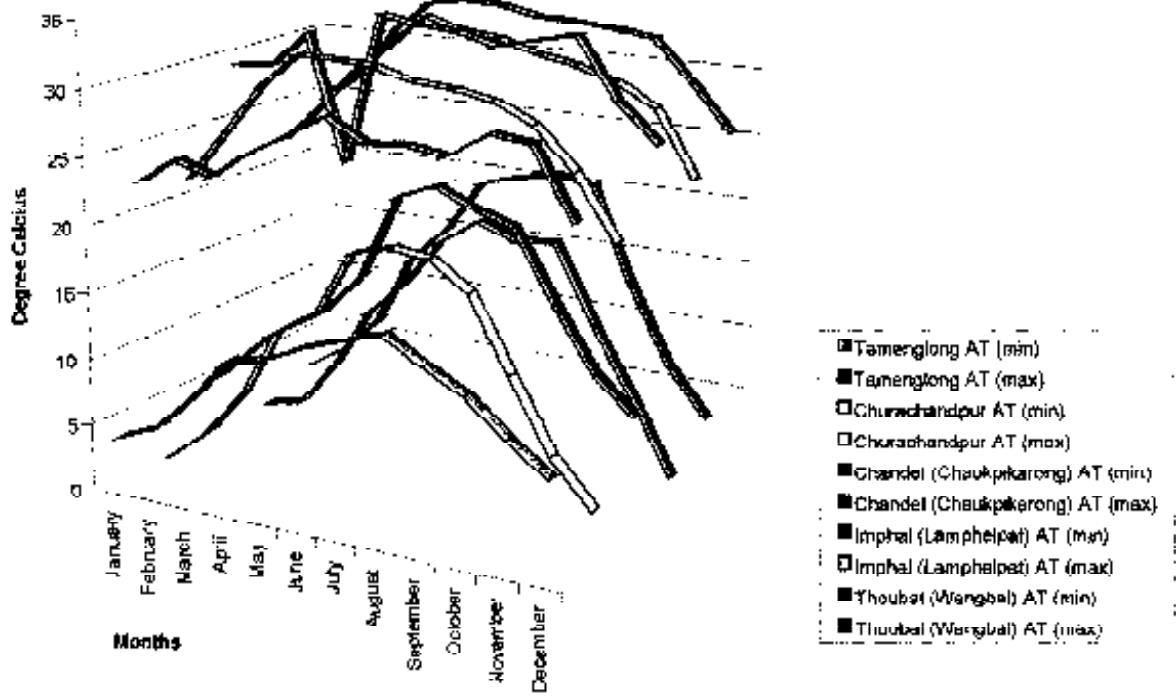
#### *Ophiolite Cover Sediments*

The rock types are conglomerate, gritty sandstone, sandstone and chocolate-brow shale. Minor pockets of coaly and carbonaceous matter do also occur associated with this formation. This formation is correlatable with the Mithakhari Group of rocks of Palaeocene-Eocene age, which lies unconformably over the ophiolites of the Andaman-Nicobar islands.

#### *Drainage*

The natural drainage system is maintained by numerous streams, rivers and

Monthly air temperature (AT) pattern (1983-1990) derived from various recording stations in different districts of Manipur





lakes & jheels. All the rivers in the Imphal valley take their origin in the hills to the North-west and are insignificant in size and breadth, although carrying a large body of water with a rapid current during the rainy seasons. The main rivers are Imphal, Iril, Thoubal, Nambal and Nambol. The first three, rising in the hills to the north, flow eastward to the Loktak and do not fall into it; while other two rise north and North-west, fall into the Loktak. The hill river Barak and its tributaries, on the western parts of the state are very deep and swift during the rains. The rivers on the North are not so swift and large and do not contain the masses of large boulders, but flow easily in almost uniformly shingly beds. In the eastern hills there are minimum small streams which drain the Ya and then into the Chindwin.

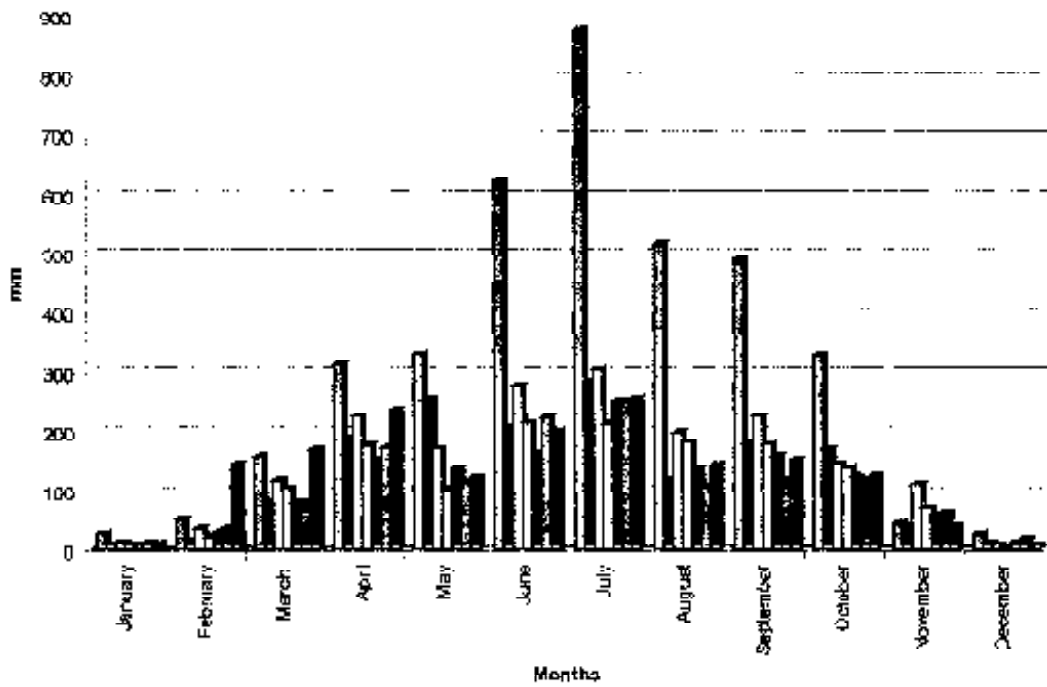
The Loktak is the largest lake, having an area of about 100sq km and is one of the chief and most striking feature of Manipur. The edges are swampy or are floating beds of reeds and aquatic plants. Towards the southern end, there are some small islands which rise steeply from the water. The largest is named Thanga. The surface is every where dotted with floating islands, composed of matted roots of aquatic plants, which are used by the local people for fishing purposes. Besides, there are numerous jheels or beels in the valley, many of which dry up completely during winter.

### **Climate**

*Temperature* : At Imphal the capital of the state of Manipur, the mercury touches the lowest degree during the month of January. It ranges from 1—3°C, rarely it goes down to -1°C. In other places e.g. Senapati, Tamenglong, Churachandpur, Chandel and Thoubal districts the minimum temperature remains bit higher. The monthly mean temperature rises steadily and reaches the maximum i.e. 32-38°C during the months of August and September then goes down and reaches the minimum in January. The mean monthly temperature is almost the same from April to September and fluctuates just the fraction of a degree or so. At Ukhrul the mean monthly temperature is least in January then it increases and reaches the highest during August—September, then it again decreases and reaches the lowest in January. Similarly at Ukhrul the mean monthly temperature is lowest in January then it steadily increases and reaches the highest in August—September.

*Rainfall* : Though a small territory Manipur, experiences a remarkably erratic distribution of rainfall. This can be explained by considering the mountain ranges of the surrounding areas which controls its rainfall. Normal annual rainfall at Imphal is 2040 mm, at Kongpokpi, 1600 mm; at Ukhrul it is 1780 mm; at Tamenglong ca 1602 mm; at Moreh ca 2010 mm; at Chandel, 3430 mm; at Churachandpur, 3055 mm and at Jiribam, 3430 mm. A little rainfall is received at the end of February every year and it gradually increases and reaches the peak during the months

Monthly rainfall pattern (1983-1990) derived from various recording stations in different districts of Manipur



□ Tamenglong □ Senapati (Kangpokpi) □ Churachandpur □ Chandel (Chasukpikarong) □ Imphal (Lampheip) □ Thoubal (Wingba) □ Ukhrul (Litan)

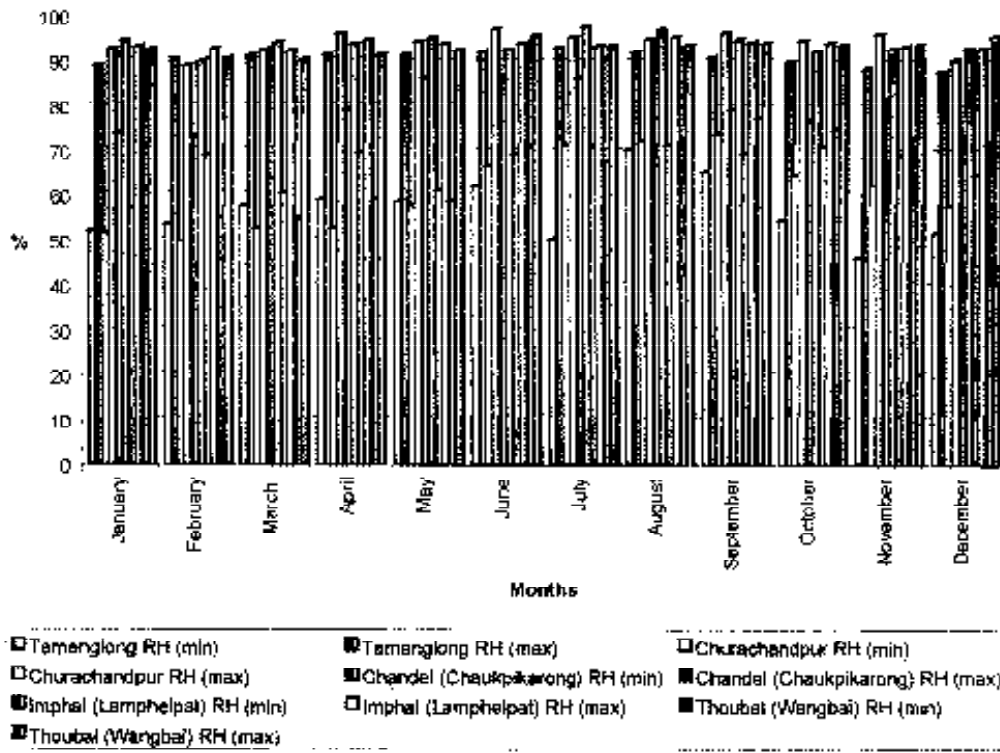
of June or July. Sometimes it extends up to August also and then gradually decreases up to October. In December it is less than 50 mm at almost every place of the state.

**Humidity** : The mean of the daily humidity is highest during the months of July—September, which varies from 80—96% and differs, place to place. The humidity at Churachandpur remains highest during the year, while other places, e.g. Tamenglong, Senapati and sometimes at Jiri and Moreh it goes down and varies from 80%—92% depending upon other factors. Generally, it has been observed that humidity goes down to lowest in March (45%). The low humidity combined with an easterly wind, which often reaches the force of a gale, results in a period during which grassland and deciduous forests dry up and forest fires are a common feature at this time of the year.

### **Botanical Exploration in Manipur**

The first person to begin a systematic collection of Manipur plants was G. Watt (1881-82), who was deputed as botanist member to the boundary commission between Manipur and Burma by the then British Government of India. Watt marched from Golaghat, Assam via Kohima and Manipur to Cachar in spring. He made a huge number of collection of herbarium specimens, the exact number is not known. One set each of his collection was deposited to the herbarium Royal Botanical garden, Kew, Royal Botanical Garden, Edinburgh and the Indian Botanical garden, Howrah. The detailed account of Watt's botanical collection of Manipur was not published. Later, *Watt* (1890) published a series of articles in *Indian Forester* on Forests of Manipur, in these articles, he himself named a number of species from these collections and classified the state in 3 well marked regions, viz. The Western Wall, the Central Undulating region of Low hills and valley, and the Eastern Wall. Later on, several of his new species were described by Bailey and Balfour (1920), Smith and Cowan (1936) and others. The second plant explorer of Manipur plants was C.B. Clarke (1885), who traversed through the same route as Watt and Clarke (1889) published his account as *Plants of Kohima and Munnecypore* in the *Journal of Linnean Society* and observed. "On comparing my own plants in the Kew Herbarium, I have on several occasions found that Watt had named in manuscript the same species which I collected. In these cases, I have accepted Watt's names for the species, if undescribed. Dr. Watt's collections being distributed in the Kew herbarium, I have not compared it thoroughly. So far as I have seen it, I should infer that collecting along the same routes, have collected mainly the same plants". He described in his publication altogether 1050 species of flowering plants and ferns spread over 533 genera in 114 different families, which also includes the description of about 87 new taxa from that area. In that list he recorded 422 species from Manipur, of which ferns are represented by 60 species distributed over 15 families, while dicots by 248 species embracing 57 families. These plants show great affinity to Khasia and Sikkim flora and only 13 additional species could be

Monthly relative humidity (RH) pattern (1983-1990) derived from various recording stations in different districts of Manipur



added from Manipur State, while the Chinese and Malayan elements have been represented very poorly. Meebold (1906—1907) explored Manipur and made large number of collections, which are mainly housed in the Central National Herbarium, Calcutta and few duplicate herbarium sheets are also lying in Assam herbarium at Shillong. Most probably, he followed the same route of his predecessors. Neither did he publish any account of his collections from Manipur nor did he keep any tabulation of the same. Sir J.D. Hooker (1906) in his phytogeographical divisions of India, placed Manipur in Subzone Northern Burma of his 8th division, which includes the Garo, Khasi, Jaintia, Nowgong, Naga, Patkoi and Manipur hills. Besides, he made sporadic mention about the plants of Manipur in his *Flora of British India*.

As far as the aquatic flora is concerned, Sir Anandale (1921) made the first collection of plants from the Loktak lake for the Botanical Survey of India, which created interest among Indian Botanists towards the flora of Manipur. Biswas (1930) visited Manipur and made a good collection from different parts in general and from the Loktak lake in particular.

In 1932, D. C. Kaith, of Assam Forest Service, was deputed to report on the working plan of Manipur Forests. He identified about 200 species in the field itself and published an account of Manipur forests in 1934, dividing the state into four botanical regions, viz., Cachar border forest, Imphal valley forests, North-eastern Khasia Pine forests and Burma border forests. Subsequently, with the enthusiastic encouragements from Sir Archdale Earle, then Chief Commissioner of Assam, U. N. Kanjilal began extensive collections with a view to bring out a *Flora of Assam*. But this *Flora of Assam* (1934-40) refers to only about 300 species of Manipur. N.L. Bor (1938-45) visited Manipur and collected the specimens which were presented to the Forest Research Institute, Dehradun and Forest Herbarium, Shillong. Some of his collections were published as new species or records from time to time by Bor (1940), Raizada & Chatterjee, (1948) and Chatterjee (1939, 1962).

F. Kingdon Ward, the famous plant explorer visited Manipur several times on different occasions during 1927, 1935, 1945 and 1948. "Plant hunter in Manipur" Kingdon-Ward (1952), is the embodiment of his vast experience in Manipur. Besides, Botanical exploration in Manipur, he published number of papers from time to time in the *Journal of the Royal Horticultural Society* (1946, 1948 and 1949). S. K. Mukerjee of the Indian Botanic Garden, Calcutta accompanied Kingdon-Ward in 1948 and explored the flora of Ukhrul subdivision bordering Myanmar and made a collection of plants especially orchids. "An enumeration of the orchids of Ukhrul" in *Notes Royal Botanical Garden, Edinburgh* in 1953, is the result of this exploration where he enumerated 73 species of Orchids.

In recent past, D. B. Deb made a more or less thorough collection from tropical, subtropical forests as well as aquatic flora of water bodies, especially Loktak, other Jheels and riverine vegetation. His publication on the floristic account of the state of Manipur was published in Bulletin Botanical Survey of India in 1961, where he enumerated in all 2013 taxa (dicots 1573 and monocots 440), which included all previous collections of G. Watt, C. B. Clarke, A. Meebold, F. Kingdon Ward, S. K. Mukerjee, N. L. Bor and all earlier published species from Manipur in addition to his own. He contributed some new and important findings from Manipur viz. *Aldrovanda vasiculosa* L. and *Sapria himalayana* Griffith and also added few novelties to science from that state.

An effort to complete the hitherto incomplete "Flora of Assam" with special reference to monocots, plant collections from different parts of North-Eastern Region including Manipur were augmented in the Assam herbarium at Shillong and in several instances live collection brought together in the experimental garden for their critical studies. Based on these, a study of the Cyperaceae, has been completed by D. M. Verma, while several other monocot families have been worked out and published by A. S. Rao and D. M. Verma. One or two short exploration tours to the Manipur state were also taken by S. K. Jain, U. Shukla and A. K. Baishya. As a result they published "A notes on grasses of Manipur" and "A Contribution to the Flora of Manipur" in 1979. K. C. Malik collected plants from the Jiribam subdivision and Tamenglong district besides Nungba, Kangpokpi and adjacent forests of Imphal valley in 1973 and enumerated 173 species and 3 varieties as addition to the Flora of Manipur in 1987. Recently, Th. Priyobar Singh published a book entitled, "Orchids of Manipur, preserved at Orchid Preservation Centre, Khonghampat", in 1999.

### Vegetation Types

Phytogeographically, C. B. Clarke (1898) classified the whole of North eastern India in two distinct regions, i.e. Assam and Eastern Himalayas. Hooker (1906) in his botanical division of India, included major parts of Assam with the Gangetic plains, treating the Eastern Himalayas as a separate area by itself and considered the hill areas of Assam including Shillong plateau, Patkoi, Nagaland, Manipur, Mizoram and Tripura as an integral part of Burma. Chatterjee (1962) followed C. B. Clarke (*l.c.*) and treated Assam as an area distinct from the eastern Himalayas because of its unique flora. Ridley (1942) emphasized that a definite conclusion can not be drawn till the full knowledge of plant distribution of the present and the past are not fully understood. However, the forests of Manipur have been classified by different authors based on various criteria. Kaith (1936) classified the forests of Manipur into four regions. Deb (1961) also classified the forests depending upon the Clementsian system. The earlier workers have laid more emphasis on floristic composition in their classifications. Based on the ecological classification of Clumpion and Seth (1968) the forests of Manipur have been classified

into (i) Tropical wet evergreen (ii) Tropical moist deciduous (iii) Sub-tropical broad leaved hill (iv) sub-tropical pine and (v) Montane temperate forests (Singh, 1971). So far as the botanical regions are concerned, there is usually a distinct correlation between altitude and vegetation. From this point of view, the vegetation of whole North-eastern region may be broadly classified into three major types, viz. (a) Tropical (b) Temperate and (c) Alpine with their intermediate types. Sahni (1969, 1981) while highlighting the floral wealth of Eastern Himalaya mainly followed Champion and Seth (1968) to describe the forest types, viz. (1) Tropical evergreen (2) Sub-tropical (3) Temperate (4) Sub-alpine and (5) Alpine to arctic. Later, Mehra (1983) also followed the same system of classification. However, their observations are based on the floristic studies of some selected forest areas of North-eastern region, with special reference to Assam and Eastern Himalayas and not of Manipur. Based on all previous works on classification of the vegetation types and the present observations, the forests of Manipur can be classified into the following types :

- i) Tropical moist deciduous forests
- ii) Tropical evergreen and semi evergreen forests
- iii) Sub-tropical mixed forests
- iv) Sub-tropical pine forests
- v) Sub-tropical and temperate grasslands, and
- vi) Temperate forests

#### *Tropical Moist Deciduous Forests*

The tropical moist deciduous forests are confined up to an altitude of 900 m. Besides the Imphal valley, such forests are also met at Senapati in North-west, at Vangoi, Bishenpur in South-west, and at Moreh and Chandel in South-east Manipur, where the annual rain-fall is 150-225 cm, having a definite dry period with less than 5 cm of rainfall for 2-3 months. The temperature is comparatively high during the summer with a definite cold weather also. Frost is occasional at Imphal in the valley and occurs between the third week of December and the first week of February. Humidity is high during the monsoon and is ca 80% in the month of July and August but falls to 45% during February-March. It is imperative to mention here that typical natural deciduous forests do not occur any where in the state of Manipur but are only sub-climax or man made forests. These forests are characterised by seasonal leaf shedding and profuse flowering of the trees. These man made deciduous forests are much extensive in their distribution and include many economically important tree species like *Acacia decurrens* Willd., *Albizia lucidior* (Steud.) Nielsen, *A. procera* (Roxb.) Benth., *Artocarpus chama* Buch.-Ham., *Ailanthus integrifolia* Lam. subsp. *calycina* (Pierre) Nootcb., *Alstonia scholaris* (L.) R. Br., *Bischofia javanica* Blume, *Bombax ceiba* L., *Dipterocarpus*

*tuberculatus* Roxb., *D. turbinatus* Gaertn. f., *Drinycarpus racemosus* (Roxb.) Hook. f. & Benth, *Duabanga grandiflora* (Roxb. ex DC.) Walp., *Garuga pinnata* Roxb., *Gmelina arborea* Roxb., *Haldina cordifolia* (Roxb.) Ridsdale., *Kydia calycina* Roxb., *Lagerstroemia parviflora* Roxb., *L. speciosa* (L.) Pers., *Neolamarckia cadamba* (Roxb.) Bosser, *Spondias pinnata* (L. f.) Kurz., *Sterculia villosa* Roxb. ex Smith; *Tectona grandis* L.f., *Tetradium fraxinifolium* (Hook.) T. G. Hartley *Tetrameles nudiflora* R. Br., etc.

The second storey is composed of *Aglaia spectabilis* (Miq.), S. S. Jain & Bennet, *Aphananixis polystachya* (Wallich) R. N. Parker, *Bauhinia purpurea* L., *B. variegata* L., *Callicarpa arborea* Roxb., *Canarium strictum* Roxb., *Careya arborea* Roxb., *Chukrassia tabularis* A. Juss., *Cryptocarya amygdalinna* Nees, *Dalbergia sissoo* Roxb. ex DC., *D. stipulacea* Roxb., *Dillenia pentagyna* Roxb., *Dysoxylum alliarium* (Buch. -Ham.) Balakr., *D. binectariferum* Hook. f. ex Beddome, *Macaranga denticulata* (Blume) Muell.-Arg. *Melia* spp., *Persea villosa* (Roxb.) Kosterm., *Stereospermum personatum* Chatterjee and *Turpinia pomifera* (Roxb.) DC., etc. The shrubby layer is often gregarious and forms an impenetrable thicket during rainy season. The chief component of this layer are *Allophylus cobbe* (L.) Rausch., *Buddleja asiatica* Lour., *Carex baccans* Nees, *Clerodendrum kaempferi* (Jacq.) Siebold, ex Steud., *Desmodium oblongum* Wallich ex Benth., *D. laxiflorum* DC., *D. triangulare* (Retz.) Merr., *Hedychium villosum* Wallich, *Indigofera cassioides* Rottl. ex DC., *Leea asiatica* (L.) Ridsdale, *L. crispa* Willd., *L. indica* (Burm. f.) Merr., *Licuala peltata* Roxb., *Micromelum integerrimum* (Roxb. ex DC.) M. Roem., *Murroya paniculata* (L.) Jack. Lianas are fewer but scandent shrubs viz. *Aspidopterys*, *Bridelia*, *Combretum*, *Entada*, *Hiptage*, *Mussaenda*, *Phanera*, *Spatholobus*, *Tinospora*, etc., along with the species belonging to the families Vitaceae and Menispermaceae are frequent. The under growth of these forests vary from place to place according to changes in rainfall and soil composition. In most of the places species of *Desmodium*, *Licuala*, *Phlogacanthus*, *Impatiens*, *Mimosa*, *Oxalis*, etc. form dominant under growth. In open areas *Eupatorium*, *Lantana* and *Mikania* grow profusely without any competition. Bamboo thickets are also found every where in these forests as successional vegetation in jhum abundant areas. Avenue trees viz. *Acacia melanoxylon* R. Br. and *Parkia timoriana* (A. DC.) Merr., are commonly seen on the both side of roads in the valley. The young fruits of *Parkia* are eaten as vegetable and chutney also.

It would not be out of the place to mention here that species composition differ at different ecological niches, based on the geology, soil and topography as well as climatic conditions etc. For example in the forests along the Myanmar border in Manipur on the foot hills of Kabaw valley, the species composition of *Dipterocarpus tuberculatus* Roxb., *D. turbinatus* Gaertn. f., *Melanorrhoea usitata* Wallich *Melocanna bambusoides* Trin. and *Tectona grandis* L. f. etc. predominate, while in the Jiri sub-divisional forest areas species of *Bauhinia*, *Flaeucarpus*, *Ficus*, *Ixora*, *Kydia*, *Mussaenda*, *Pterospermum*, *Saraca*, *Saurauia*



and *Thespesia*, etc. are commonly seen. In the reserve forests of Langool, Sepramaina, Senapati and adjoining areas *Castanopsis tribuloides* (Smith) A.DC., *Lithocarpus elegans* (Blume) Soepadmo, *L. fenestrata* (Roxb.) Rehder, *Quercus serrata* non Thunb. form conspicuous flora of that area in addition to *Careya arborea* Roxb., *Lagerstroemia*, *Garuga*, *Terminalia*, etc. These species are generally not met in corresponding forests in other parts of eastern India.

There are several lakes, but the great one to the south and east of Bisenpur, the Loktak needs a special mention. The lake is surrounded by high hills on all the side with only one outlet for the water. Thus the saucer like, the valley of Manipur is hemmed in on all the sides, and bears abundant evidence that the Loktak is perhaps but the remains of a lake of inland sea that once covered the whole area. Besides Loktak, numerous salt springs also exist, from which the local inhabitants manufacture salt for their daily use. The Loktak lake is studded with immense floating islands of weeds that are gradually subsiding under the accumulation of drift soil and decaying vegetable matter which seem to have taken no inconsiderable part in drying up of the lakes. In the lake the American duck weed, along with *Azolla pinnata*, *Lemna*, *Pistia* and *Salvinia*, etc. form so dense a scum that boating is often impossible excepting along the channels kept clear by the fisherman. The graceful leaves of *Nelumbo nucifera* Gaertn. form dense expanses within which thousands of duck and teal sport themselves. *Euryale ferox* and *Trapa bispinosa* Roxb. form the predominant aquatic vegetation of the lake. The fruits of these plants are edible and sold in the market. Besides, the species of *Acorus*, *Alisma*, *Carax*, *Caldesia*, *Colocasia*, *Butomopsis*, *Cyperus*, *Clinogyne*, *Hydrilla*, *Hydrocharis*, *Elchhornia*, *Juncus*, *Monochoria*, *Najas*, *Lemna*, *Potamogeton*, *Fimbristylis*, *Ottelia*, *Typha* and *Vallisneria*, etc. are growing on its subsiding islands floating or submerged or on shallow margins on the lake. Various species of chlorophycean algae like *Chara* and *Nitella*, etc. are also growing on the shallow edges. *Callitropa*, *Quercus*, *Cycas*, *Phoenix* and pine etc. form a rich arborescent vegetation, which greatly enlivens this tropical lake scenery. It is interesting to add that *Cycas* occurs only on these humid island-peaks while alpine date palm reappears on the mountain region of the state of Manipur.

It is interesting to mention that dispersed among the indigenous plants there occur many of the invading exotic elements that are claiming so much of tropical vegetation of rest of the country, such as *Argemone mexicana* L., *Bixa orellana* L., *Jatropha curcas* L., and *Nicotiana tabacum* L., etc. The other introduced hedge plant *Brugmansia suaveolens* (H.B. ex Willd.) Bercht. & Presl., with its long pendulous white flowers is much appreciated by the local people.

#### *Tropical Evergreen and Semi-evergreen Forests*

The tropical evergreen and semi-evergreen forests are confined up to an elevation of ca 1200 m above sea level with an average annual rainfall of 300—500 cm coupled with high relative humidity. Due to the effect of physiographic,

edaphic and other exogenous factors, these forests seldom form continuous belts in the state of Manipur, but harbours rich species diversity. Such forests are now restricted to inaccessible hills as well as near catchment areas, unsuitable for cultivation or to areas protected as reserved forests. These forests display a close canopy of trees with a dense and rather impenetrable herbaceous growth. The bewildering wealth of species of these forests are not all often common to all these areas, even the dominant species also differ area wise.

The top canopy of vegetation is composed of the trees like *Acrocarpus fraxinifolius* Arn. ex Wight, *Aglata spectabilis* (Miq.) S. S. Jain & Bennet, *Ailanthus integrifolia* Lam. subsp. *calycina* (Pierre.) Nootb., *Artocarpus chama* Buch. Ham., *A. heterophyllus* Lam., *Canarium strictum* Roxb., *Castanopsis echinocarpa* Miq., *C. kurzii* (Hance) Biswas, *C. tribuloides* (Smith) DC., *Celtis tetrandra* Roxb., *Cinnamomum glaucascens* (Nees) Hand-Mazz, *Duabanga grandiflora* (Roxb. ex DC.) Walp., *Elaeocarpus serratus* L., *E. tectorius* (Lour.) Poir., *Endospermium diadenum* (Miq.) Airy Shaw, *Maniltoa polyandra* (Roxb.) Harms, *Mesua ferrea* L., *Neolamarckia cadamba* (Roxb.) Bosser, *Polyalthia longifolia* Benth & Hook. f., *Premna benghalensis* C.B. Clarke, *Spondias pinnata* (L.f.) Kurz, *Stereospermum colais* (Dillw.) Mabblerley, *Terminalia bellirica* (Gaertn.) Roxb., *T. citrina* (Gaertn.) Roxb. ex Fleming, *T. myriocarpa* Van Heurck & Muell.-Arg., *Tetrameles nudiflora* R. Br., *Vitex pinnata* L., and *Xerospermum glabratum* (Kurz) Radlk., etc. The middle storey which is almost obscure comprises of *Alstonia scholaris* (L.) R. Br., *Aporosa dioica* (Roxb.) Muell.-Arg., *Antidesma acuminatum* Wallich, *Bischofia javanica* Blume, *Bridelia monoica* (Lour.) Merr., *Castanopsis indica* (Roxb.) DC., *Cryptocarya andersonii* King ex Hook. f., *Dalbergia assamica* Benth., *Dillenia indica* L., *D. pentagyna* Roxb., *Dysoxylum binectariferum* (Roxb.) Hook. f. & Beddome, *D. gobarum* (Buch.-Ham) Merr., *Ficus racemosa* L., *Garcinia cowa* Roxb. ex DC., *Gynocardia odorata* R. Br., *Magnolia griffithii* Hook. f. & Thomson, *Mangifera sylvatica* Roxb., *Michelia champaca* L., *Phoebe attenuata* Nees, *P. goalparensis* Hutch., *Premna bracteata* Wallich ex C.B. Clarke, *Pterospermum lancifolium* DC., *Sapium baccatum* Roxb., *Schinus wallichii* (DC.) Korth., *Syzygium cumini* (L.) Skeels, *S. jambos* (L.) Alston, *Sterculia hamiltonii* (O. Kuntze) Adelb. and *Vatica lanceaefolia* (Roxb.) Blume, etc. The lowermost storey of trees in these forests is represented by the plant species like *Actephila excelsa* (Dalz.) Muell. -Arg., *Alangium chinense* (Lour.) Harms, *Alchornea tiliaefolia* Muell. -Arg., *Antidesma buntus* (L.) Spreng., *Boehmeria hamiltoniana* Wedd., *Brassiopsis glomerulata* (Blume) Regel, *Callicarpo arborea* Roxb., *Cinnamomum glaucescens* (Nees) Hand-Mazz, *Goniothalamus sesquipedalis* (Wallich) Hook. f. & Thomson, *Litsea cubeba* (Lour.) Pers., *Macaranga denticulata* (Blume) Muell.-Arg., *Macropanax undulotus* (Wallich ex G. Don) Seem, *Styrax hookeri* C. B. Clarke, etc.

Of the various large shrubs or small trees which inhabit these forests, the predominant are *Abrus augusta* (L.) L. f., *Acacia farnesiana* (L.) Willd., *Aralia aruata* (G. Don) Seem, *Ardisia floribunda* Wallich, *A. paniculata* Roxb., *A. thomsonii*

(C. B. Clarke) Mez., *Boehmeria macrophylla* D. Don, *Callicarpa macrophylla* Vahl, *Camellia sinensis* (L.) O. Kuntze var. *sinensis*, *Canthium angustifolium* Roxb., *Coffea khasiana* Hook. f., *Lasianthus sikkimensis* Hook. f., *Leea asiatica* (L.) Ridsdale, *Maesa indica* (Roxb.) Wallich, *Microtropis discolor* (Wallich) Arn., *Mimosa rubiculis* Lam. subsp. *himalayana* (Gamble) Ohashi, *Murraya paniculata* (L.) Jack, *Phlogacanthus thyrsoiflorus* (Roxb.) Nees, *Solanum anguivi* Lam. and *Zanthoxylum oxyphyllum* Edgew., etc. The conspicuous lianas intertwining the trees in these forests are *Acacia pennata* (L.) Willd., *Ampelocissus divaricata* (M. Lawson) Planch., *Beaumontia grandiflora* (Roxb.) Wallich, *Cayratia japonica* (Thunb.) Gagnepain, *Cissus assamica* (M. Lawson) Craib, *Dioscorea* spp., *Combretum dasystachyum* Kurz, *Entada rheedei* Spreng., *Hodgsonia macrocarpa* (Blume) Cogn., *Lasiobema scandens* (L.) De Wit, *Millettia extensa* (Benth.) Baker, *Mucuna imbricata* DC. ex Baker, *Paeteria scandens* (Lour.) Merr., *Spatholobus parviflorus* (Roxb.) O. Kuntze, *Tetrastigma* spp., and *Thunbergia grandiflora* Roxb., etc.

The ground in these forests is dark and moist due to lofty trees with thick canopy and has a thick layer of undisturbed humus, and has many fleshy fungi as well as saprophytic flowering plants. The common herbs in these forests are *Allophyllus cobbe* (L.) Rausch., *Alpinia nigra* (Gaertn.) Burt, *Andrographis paniculata* Nees, *Anomium aromaticum* Roxb., *Blumea fistulosa* (Roxb.) Kurz, *Costus speciosus* (Koenig) Smith, *Crassocephalum crepidioides* (Benth.) S. Moore, *Curcuma* spp., *Glycosmis pentaphylla* (Retz.) DC., *Hedychium* spp., *Hedyotis auricularia* L., *Ophiorrhiza nutans* C. B. Clarke ex Hook. f., *Panax pseudoginseng* Wallich and species belonging to the families Acanthaceae, Asteraceae, Balsaminaceae, Begoniaceae, Fabaceae, Lauraceae, Oxalidaceae and Poaceae, etc. Besides, *Apostasia wallichii* R. Br., *Galeola falconeri* Hook. f., *Paphiopedilum* spp., *Pharus flavus* (Blume) Lindley, *P. tankervilleae* (Aiton) Blume, *Tropidia angulosa* (Lindley) Blume and *Zeuxine* spp., etc. are scattered in the ground layer

Epiphytes and other climbers are *Aeschynanthes acuminatus* Wallich, *A. bracteatus* Wallich ex DC., *A. superba* C.B. Clarke, *Agapeles variegata* (Roxb.) D. Don ex G. Don, *Piper* spp., *Pothos cathcartii* Schott., *P. scandens* L., *Procris crenata* Roxb., *Rhaphidophora decursiva* (Roxb.) Schott, *R. hookeri* Schott, *R. lancifolia* Schott, etc. and the stem parasites viz. *Cuscuta reflexa* Roxb., *Dendrophthoe umbellata* (Blume) Miq., *Heltzianthera parasitica* Lour., *Scurrula parasitica* L., *Taxillus* spp., etc. Besides, the tree trunks in these forests are moss-laden and host multitudes of epiphytic orchids, ferns, fern-allies, bryophytes and lichens.

#### Sub-tropical Mixed Forests

Sub-tropical broad leaved forests are confined at the altitude from 1000-1800 m. Rainfall also varies from 200-450 cm or more in certain areas. Such forests are

spread over in different parts of the state of Manipur, with a quite varied floral constituents from place to place based on the local climatic and edaphic conditions. These climatic climax forests are soon scattered and never form a continuous stretch of vegetation not only in Manipur state but also in the entire North-eastern region. The trees are generally dwarf and of a bushy appearance as compared to the tropical zone. Plants with buttresses are rare in these forests. Shrubs and herbaceous layer are well marked and form impenetrable thickets in certain places. The height of the trees in general are up to 20 m, with evergreen to semi evergreen appearance depends on the multitude of rainfall in that area. The trees of upper storey are *Alnus nepalensis* D. Don, *Albizia chinensis* (Obs.) Merr., *Artocarpus* spp., *Betula alnoides* Buch.-Ham. ex D. Don, *Castanopsis purpureila* (Miq.), Balakr., *C. tribuloides* (Smith) A. DC., *Cinnamomum bejolghota* (Buch. Ham.) Sweet, *C. glaucescens* (Nees) Hand-Mazz, *Cryptocarya amygdalina* Nees, *Dysoxylum binectariferum* Hook. f. & Beddome, *Elaeocarpus* spp., *Engelhardtia spicata* Leschen ex Blume, *Erythrina stricta* Roxb., *Magnolia insignis* Wallich, *Mitchelia cathcartii* Hook. f. & Thomson, *Randia wallichii* Hook. f., and *Terminalia myriocarpa* Van Heurck & Muell.-Arg. and *Tetradium fraxinifolium* (Hook.) T. G. Hartley, etc. Occasionally, *Schima wallichii* (DC.) Korth., can also be seen in certain forests. The second storey is composed of *Acer oblongum* Wallich, *Alangium chinense* (Lour.) Harms., *Albizia odoratissima* (L.f.) Benth., *Bischofia javanica* Blume, *Brucea mollis* Wallich ex Kurz, *Corylopsis himalayana* Griffith, *Dysoxylum goharum* (Buch. -Ham.) Merr., *Itea chinensis* Hook. f., *I. macrophylla* Wallich, *Ixora subsessilis* Wallich ex G. Don, *Micromelum integerrimum* (Roxb. ex DC.) M. Roem., *Lithocarpus elegans* (Blume) Hatus ex Soepadmo, *Litsea monopetala* (Roxb.) Pers, *Neolitsea umbrosa* (Nees) Gamble, *Persea parviflora* (Meissner) Haridasan & Rao, *Rhus semiolata* Murray, *Picrasma javanica* Blume, *Styrax hookeri* C. B. Clarke., *Syzygium jambos* (L.) Alston, *Toddalia asiatica* (L.) Lam., etc. *Annestea fragrans* Wallich is confined only to Manipur and Nagaland areas in India.

These forests are especially rich in shrubby and herbaceous layers. The common shrubby species are *Ardisia depressa* C. B. Clarke, *A. japonica* (Hom.) Blume, *Baliospermum meeholdii* Pax ex Hoffm., *Breynia retusa* (Dennst.) Alston, *Camelia* spp., *Clerodendrum viscosum* Vent., *Crotalaria* spp., *Debregeasia longifolia* (Burm. f.) Wedd., *Eurya nitida* Korth., *Goniothalamus sesquipetalis* (Wallich) Hook. f. & Thomson, *Leucosceptum canum* Smith, *Maesa indica* (Roxb.) Wallich, *Micromelum integerrimum* (Roxb. ex DC.) M. Roem., *Mussaenda glabra* Vahl, *Neillia thyrsoiflora* D. Don, *Rubus himanticus* Hook. f., *R. ellipticus* Smith, and *Zanthoxylum oxyphyllum* Edgew., and various species of Acanthaceae and Araliaceae, etc. The forest floor is densely covered with fungi, mosses and various herbaceous angiosperms belonging to the families Araceae, Balsaminaceae, Begoniaceae, Commelinaceae, Zingiberaceae, etc.

### *Sub-Tropical Pine Forests*

Such forests occur at an elevation of 900-1800m, with moderate rainfall areas of the state. These pine forests are interspersed by a few tree species such as *Cinnamomum* spp., *Engelhardtia spicata* Leschen. ex Blume, *Erythrina orientalis* L., *Lithocarpus dealbata* (Miq.) Rehder, *Myrica esculenta* Buch.-Ham. ex D. Don, *Persea odoratissima* (Nees) Koslerm., *Quercus griffithii* Hook. f. & Thomson ex DC., *Schinus wallichtii* (DC.) Korth. var.  *khasiana* (Dyer) Bloem., *Symplocos* spp. etc. *Pinus kesiya* Royle ex Gordon (Khasi pine) occurs in pure patches with under growth of broad leaved species viz., *Cassia floribunda* Cav., *Eupatorium adenophorum* Spreng., *Daphne papyracea* Wallich ex Steud., *Lyonia ovalifolia* (Wallich) Drude, *Myrsine semiserrata* Wallich, *Rhus* spp., *Rubus ellipticus* Smith, *R. rosifolius* Smith, *Viburnum* spp., etc. *Pinus kesiya* Royle ex Gordon, being one of the fast growing tree of this region, the state forest department has introduced it at high altitude at suitable climatic conditions.

The floor with a thick carpet of pine needles is devoid of any plant growth except in small clearings where *Agrimonia pilosa* Ledeb. var. *nepalensis* (D. Don) Nakai, *Anemone rivularis* Buch.-Ham. ex DC., *Artemisia nlagirica* (C.B. Clarke) Pamp., *Elsholtzia blanda* Benth., *Potentilla fulgens* Wallich ex Hook., *Ranunculus cantoniensis* DC., etc. grow profusely during rainy season. Besides, plants like *Crotalaria ferruginea* R. Graham ex Benth., *Desmodium heterocarpum* (L.) DC. subsp. *heterocarpum* Ohashi, *Smithia blanda* Wallich ex Wight & Arn., *Tephrosia candida* (Roxb.) DC., etc. add to the nitrogen content of the soil in these forests. Most of this herbaceous flora either perish or lie dormant during winter. The orchid species belonging to *Bulbophyllum*, *Cymbidium*, *Dendrobium*, *Eria*, *Luisia*, *Otochilus*, *Pholidota*, *Vanda* and others are quite common in these forests. Several terrestrial and epiphytic ferns also form gregarious patches, some of them are *Dicranopteris linearis* (Burm. f.) Underw., *Lepisorus excavatus* (Willd.) Ching, *L. thunbergianus* (Kaulf.) Ching, *Lycopodium japonicum* Thunb., *Selaginella chrysocaulos* (Hku. & Grev.) Spring, *Blechnum orientale* L., *Cyclosorus flacculosum* (D. Don) C. Chr., *Pteridium aquilinum* (L.) Kuhn, *Pyrrrosia mannii* (Gies.) Ching and *P. mollis* (Kuntze) Ching etc. Grasslands of savanahs that occur in riparian flats and slopes are not of a climax type, these grasslands have developed only as a result of removal of original forests cover. In some places *Rhododendron* spp. are also seen sporadically.

### *Sub-Tropical and Temperate Grassland*

The grasslands wherever present are a biotic climax due to removal of original forest cover. The rolling grasslands around Limatol, Chingmairong, Mao, Shugnu, Litan, Ukhrul, Thoubal and Chandel areas can be seen sporadically. The effect of denuding of forest is every where, even today large herds of cattle may be seen grazing on these rich grassy slopes. Most of the rounded hillocks within

the Imphal valley rise up exposing their barren red dry heads, which on closer inspection are often seen to bear the stumps of old pine trees, ruthlessly chopped down for fuel wood, followed by excessive grazing transformed into barren land, which is fully devoid of forest cover. The dominant grasses in these grasslands are *Arundinella bengalensis* (Spreng.) Druce, *Chrysopogon aciculatus* (Retz.) Triu., *Imperata cylindrica* (L.) P. Beauv., *Neyraudia reynaudiana* (Kunth) King ex Hitchc., *Opismenus burmannii* P. Beauv., *Panicum atosanguianum* R. Rich., *P. khasianum* Hook. f., *Pennisetum glaucum* (L.) R. Br., *Saccharum* spp. and *Thysanolaena maxima* (Roxb.) O. Kuntze, etc. In other places, the association of *Agrostis micrantha* Steud., *Brachypodium sylvaticum* (Huds.) P. Beauv., *Coelorachis striata* (Nees ex Steud.) A. Camus, *Cymbopogon khasianus* Stapf ex Bor., *Eragrostis nigra* Nees ex Steud. and *Phacelurus zea* (C. B. Clarke) Clayton, etc. are seen in the state of Manipur. These grasses are associated with sedges like *Carex speciosa* Kunth, *C. phacota* Spreng., *C. jedia* Nees, *Fimbristylis dichotoma* (L.) Vahl, *Cyperus rotundus* L., *C. tenuiculmis* Boeck., *Pycreus flavidus* (Retz.) T. Koyama, *Scleria terrestris* (L.) Fass, and species of Burmanniaceae, Eriocaulaceae, Juncaceae, Liliaceae and Zingiberaceae, etc., with a few species of Asteraceae, Balsaminaceae, Melastomataceae, Polygonaceae, etc. Apart from these, some insectivorous plants viz. *Drosera peltata* Thunb. var. *lunata* (DC.) C. B. Clarke and *Utricularia* spp. also grow in these grassland, *Lilium mackliniae* Sealy, a rare and endemic species of Liliaceae, is found growing profusely on the top of the Sirohee hills amongst the rolling grasslands in the Ukhrul district of Manipur, which shows a restricted range of distribution.

### *Temperate Forests*

The temperate vegetation is usually found above an altitude of 1500 m to 2500 m (M.S.L.), and are confined to small pockets at Ukhrul, Chingsaw, Maoching, Koupru, Japvo areas in the Manipur. These are close evergreen forests with trees of medium height and trees more than 20 m in height are rarely met within these forests. Large and old trunks are festooned with mosses, ferns and other epiphytic growth. At lower elevation, the forests show an intermixing of elements from tropical and sub-tropical zones and species composition changes gradually with the increase in the altitude. It is pertinent to point out that sub-tropical vegetation and temperate vegetation sometimes appear side by side under apparently similar environmental conditions where sub-tropical and temperate zones are not well defined as in other parts of North-eastern region. The dominant species are *Acer oblongum* Wallich ex DC., *Alnus nepalensis* D. Don, *Beilschmiedia assamica* Meisn., *Betula alnoides* Buch.-Ham. ex D. Don, *Castanopsis armata* Spach., *C. castanicaarpa* Spach., *C. purpurella* (Miq.) Balakr., *Cinnamomum bejolghata* (Buch.-Ham.) Sweet., *Echinocarpus dasysearpus* Benth., *Elaeocarpus braceanus* G. Watt ex C.B. Clarke, *Engelhardtia spicata* Leschn. ex Blume, *Eurya acuminata* DC., *E. nitida* Korth., *Exbucklandia populnea* (R. Br. ex Griffith) R. W. Brown, *Ilex umbellulata* (Wallich) Loesn., *Lithocarpus dealbata* (Miq.) Rehdet, *Magnolia insignis* Wallich, *Myrica*

*esculenta* Buch.-Ham. ex D. Don, *Persea odoratissima* (Ness) Kost., *Pinus kesiya* Royle ex Gordon, *Prunus cerasoides* D. Don, *P. domestica* L. subsp. *domestica* Ghora & Panigr., *P. nepaulensis* (Seringe) Steud., *Quercus griffithii* Hook. f. & Thomson ex DC., *Rhododendron arboreum* Smith, *R. johnstoneanum* G. Watt ex Hutch., *R. triflorum* Hook. f., *R. vaccinioides* Hook. f. and *Symplocos* spp., etc. In some places, species of *Albizia*, *Cinnamomum*, *Juglans*, *Magnolia*, *Mischelia*, *Persea*, *Quercus*, *Rubus*, etc. along with *Ehretia acuminata* R. Br., *Erythroxylon kunthianum* Wallich ex Kuntz, *Euonymus hamiltonianus* Wallich, *Helicia nilagirica* Beddome, *Ilex khasiana* Purkay., *I. embelioides* Hook. f., *Ligustrum* spp., *Lindera nacusua* (D. Don) Merr. and *Viburnum* spp., are present. There is a gradual change in the composition and diversity of the species with increase in altitude. At higher elevations, *Rhododendron* spp. predominate with *Eriobotrya*, *Prunus*, *Spiraea* and other members of Rosaceae. The mountain bamboo *Yushania naling* (Gamble) R. Majumdar are found throughout the moist temperate forests. A rare and interesting species *Sorbus polycarpa* (Hook. f.) Rehder has been collected recently from the Sirohee forest.

In the shrubby layer predominant taxa are *Ardisia depressa* C. B. Clarke, *Clerodendrum wallichii* Merr., *Celastrus paniculatus* Willd., *Illicium griffithii* Hook. f. & Thomson, *Euonymus theifolius* Wallich ex M. Lawson, *Luculia pinceana* Hooker, *Maesa Indica* (Roxb.) Wallich, *Macropanax dispermus* (Blume) O. Kuntze, *Panax assamica* R. N. Banerjee., *P. pseudo-ginseng* A. DC., etc. The herbaceous layer comprises of *Begonia roxburghii* A. DC., *B. thomsonii* A. DC., *Brachystemma calycinum* D. Don, *Galium elegans* Wallich ex Roxb., *Hedyotis pinifolia* Wallich ex G. Don, *Ophiopogon dracaenoides* Hook. f., *Pilea hookeriana* Wedd., *Peperomia pellucida* (L.) Kunth, and *Strobilanthes maculatus* Nees, etc. The other fascinating group of plants, because of their beautiful, long lasting ornamental flowers are orchids. About 249 species of Orchids flourish in this state of Manipur, which include many highly ornamentals like *Aerides*, *Bulbophyllum*, *Coelogyne*, *Cymbidium*, *Dendrobium*, *Paphiopeditum*, *Phaius*, *Pleione*, *Renanthera*, *Rhynchostylis* and *Vanda* species, etc.

The ferns and fern allies like *Asplenium laciniatum* D. Don, *Athyrium drepanopterum* (Kuntze) A. Br. ex Nilde, *Lycopodium japonicum* Thunb., *Selaginella chrysocaulos* (Hook. & Grev.) Spring, *Lygodium japonicum* (Thunb.) Sw., *Pteris baurita* L., *Microsorium* spp., *Dryopteris* spp., *Plagiogyria* spp., etc. *Sapria himalayana* Griffith, a parasite on *Cissus* species, collected from temperate forests of Koupru hills of Manipur. At the elevation more than 2500 m in Dzuko valley, Koupru, Maoching and Sirohee hill forest areas, the vegetation shows a typical dense growth of small crooked gnarled and stunted trees and shrubs. The dominant species are *Acunium elwesii* Stapf, *A. nagarum* Stapf, *Agapetes nitrarioides* Hook. f., *Berberis manipurana* Ahrendt, *Berberis sublevis* W. Smith var. *sublevis*, *B. sublevis* W. Smith var. *microcarpa* (Hook. f. & Thomson) Ahrendt., *Corydalis*

*chaerophylla* DC., *Dichroa febrifuga* Lour., *Mahonia manipurensis* Takeda, *M. roxburghii* (DC.) Takeda, *Rhododendron elliottii* G. Watt ex Brandis, *R. macabeaman* G. Watt ex Balfour, f., *R. maddenti* Hook. subsp. *crassum* (Franchet) Cullen, *R. wattii* Cowan, *Selinum striatum* C.B. Clarke, and *Carex manipurensis* C.B. Clarke, etc. Three species of rare and interesting gymnosperm i.e. *Cephalotaxus griffithii* Hook. f., *C. mannii* Hook. f. and *Taxus wallichiana* Zucc. have also been collected from the Manipur state. Besides, other economic plants eg. *Gaultheria*, *Gentiana* and *Swertia* spp. are also occurring in this zone. The forest floor is covered by a few herbaceous members of the families Ranunculaceae, Caryophyllaceae, Papaveraceae, Fumariaceae, Brassicaceae, Rosaceae, Primulaceae, Gentianaceae, Polygonaceae, Asteraceae, Saxifragaceae, and Poaceae etc. as small or sometimes stunted clumps.

### Floristic Diversity

Hooker (1906) recognized the following ten as the most dominant families of flowering plants in India, based on the total number of species: Orchidaceae, Leguminosae (*sensu lato*), Poaceae, Asteraceae, Rubiaceae, Acanthaceae, Euphorbiaceae, Lamiaceae, Cyperaceae and Scrophulariaceae. In comparison to this, the first ten families in the Manipur state are :

**Table 1 : Ten dominant families of Phanerogams**

S.No	Families	Genera	Species
1.	Orchidaceae	69	249
2.	Poaceae	87	200
3.	Leguminosae ( <i>sensu lato</i> )	65	168
4.	Asteraceae	63	84
5.	Rubiaceae	35	84
6.	Euphorbiaceae	25	52
7.	Acanthaceae	22	50
8.	Cyperaceae	10	49
9.	Rosaceae	14	48
10.	Lamiaceae	32	43

**Table-2 : 10 Dominant families of Dicots**

S.No	Families	Genera	Species
1.	Leguminosae ( <i>sensu lato</i> )	65	168
2.	Asteraceae	63	84
3.	Rubiaceae	35	84
4.	Urticaceae	21	82



5.	Euphorbiaceae	25	52
6.	Acanthaceae	22	50
7.	Rosaceae	14	48
8.	Lamiaceae	32	43
9.	Lauraceae	10	39
10.	Scrophulariaceae	18	36

**Table-3 : Ten dominant families of Monocots**

S.No	Families	Genera	Species
1.	Orchidaceae	69	249
2.	Poaceae	87	200
3.	Cyperaceae	10	49
4.	Zingiberaceae	12	29
5.	Liliaceae	14	27
6.	Araceae	12	25
7.	Commelinaceae	8	17
8.	Arecaceae	9	16
9.	Dioscoreaceae	1	8
10.	Smilacaceae	2	8

Orchidaceae (ca 249 species), Poaceae (ca 200 species) Leguminosae (ca 168 species), Asteraceae (ca 84 species), Rubiaceae (ca 84 species), Euphorbiaceae (ca 52 species), Acanthaceae (ca 50 species), Cyperaceae (ca 49 species), Rosaceae (ca 48 species) and Lamiaceae (ca 43 species (Please see Table 1-3). The single largest genus is *Dendrobium* with 43 species, *Polygonum* with 23 species, *Impatiens* with 17 species and 4 varieties, *Ficus* with 18 species, *Coelogyne* with 16 species, *Carax* with 15 species, *Crotalaria* with 14 species, *Cyperus*, *Cymbidium* and *Jasminium* with 13 species each. About 2380 species belonging to 1052 different genera spread over 205 families are have already been recorded in the state of Manipur. In the state of Manipur the dicot flora is spread over 172 families. Not a single angiosperm family is endemic to this state. Though it is beyond the scope at this juncture to give detailed family wise statistical analysis, as part

of the state bordering Myanmar is not explored well, however, the details of some families are given below. The dicot families Nelumbonaceae, Bixaceae, Tamaricaceae, Actinidiaceae, Geraniaceae, Tropaeolaceae, Erythropalaceae, Moringaceae, Saxifragaceae, Rhizophoraceae, Sonneratiaceae, Punicaceae, Caricaceae, Daisicaceae, Aizoaceae, Nyssaceae, Dipsacaceae, Sphenocleaceae, Pyrolaceae, Monotropaceae, Sarcospermaceae, Polemoniaceae, Hydrophyllaceae, Pedaliaceae, Cuscutaceae, Baseliaceae, Phytolaccaceae, Podostemaceae, Rafflesiaceae, Saururaceae, Proteaceae, Elaeagnaceae, Buxaceae, Cannabaceae, Myricaceae, Salicaceae, Ceratophyllaceae are represented by a single genus having a single species each. Some of the other poorly represented species are Lardizabalaceae, Trapaceae, Schizandraceae, Pittosporaceae, Portulacaceae, Crassulaceae, Cactaceae, Alangiaceae, Buddlejaceae, Plantaginaceae and Chloranthaceae, which have been represented by a single genus and two species each. Each of the families Simaroubaceae, Droseraceae, Hamamelidaceae, Molluginaceae, Orobanchaceae, Aristolochiaceae, Juglandaceae and Betulaceae have been represented by two genera and two species each.

The herbaceous family Ranunculaceae is well represented in this state with endemic species like *Aconitum elwesii* Stapf, *A. nagarium* Stapf and *Clematis apiculata* Hook. f. & Thomson along with other nine species of *Clematis*, etc. Primitive families Annonaceae, Chloranthaceae, Hamamelidaceae, Lardizabalaceae, Lauraceae, Magnoliaceae and Schizandraceae, etc. show their maximum concentration in the state along with neighbouring states of North eastern region of India. *Berberis* and *Mahonia* are also well represented. Besides the *Dipterocarpus* (Dipterocarpaceae) an important timber yielding genus is now confined only the Moreh area of the state.

The family Balsaminaceae have been represented by 17 species and four varieties out of ca 200 species reported from India. Several species of *Impatiens* like *Impatiens gibbiseptala* Hook. f., *I. laevigata* Hook. f. & Thomson, *I. longiviana* Hook. f., *I. odontoseptala* Hook. f., *I. spissiflora* Hook. f., etc. are endemic to this state. The family Rosaceae is well represented by the species of *Agrimonia*, *Docynia*, *Fragaria*, *Neillia*, *Photinia*, *Potentilla*, *Prunus*, *Pyrus*, *Rosa*, *Rubus*, *Sorbus* and *Spiraea* etc. *Sorbus polycarpa* (Hook. f.) Rehder a rare and endemic species to Meghalaya has been recently collected from the Sirohee hills. The family Begoniaceae is represented by eight species, few species of *Begonia* are also endemic. Similarly, the family Cucurbitaceae has been represented by over 30 species and family Rubiaceae by 84 species. The family Ericaceae including Vacciniaceae are also well represented with showy flowers of different colours and attractive foliage of *Rhododendron*, few species of which are endemic to this state. Families Fagaceae, Moraceae and Urticaceae are also very well represented in Manipur.

In the Manipur state, monocots are represented by 33 families. The family Orchidaceae is the largest one, not only amongst the monocots but also among the phanerogams as a whole. This is followed by Poaceae and Cyperaceae. The

family Zingiberaceae is another richly represented by 29 species in the State. The genus *Hedychlorium* has been represented by 9 species, out of which few are endemic. Several genera of this family e.g. *Anomum*, *Curcuma*, *Hedychlorium*, *Kaempferia* and *Zingiber* are of great medicinal value. The family Arecaceae is represented by 16 species, of which *Areca*, *Borassus*, *Calamus*, *Caryota*, *Licuala*, *Phoenix*, *Pinanga* and *Wallichia*, etc. are prominent. Some poorly represented families are Bromeliaceae, Taccaceae, Xyridaceae, Pandanaceae and Typhaceae, which have been represented by single genus and single species each. Burmanniaceae, Cannaceae, Najadaceae and Potamogetonaceae are having a single genus and two species each, while families like Juncaceae and Eriocaulaceae have also been represented by a single genus and three species each. Iridaceae, Pontederiaceae, Smilacaceae and Stemonaceae have two genera each, Alismataceae, Amaryllidaceae, Hypoxidaceae, Lennaceae and Marantaceae are the families with three genera each. Hydrocharitaceae with five genera, Commelinaceae with eight genera, Araceae with twelve genera and Cyperaceae with ten genera are found in the state. The family Liliaceae is well represented by fourteen genera with beautiful ornamental flowers, a few are endemic to Manipur.

**Primitive angiosperms:** The Manipur state also harbours a good number of primitive flowering plants. According to Takhtajan (1969) the North eastern region including Manipur with the maximum number of primitive flowering plants is to be considered the centre of origin of angiosperms. If this view is accepted, one has to believe that the flora of this region is quite primitive and indigenous. Smith (1970) on the other hand indicated the countries bordering Pacific ocean as the centre of origin of angiosperms based on the presence of few primitive families, along the shores of the Pacific ocean countries. He is of the opinion that the South-east Asian flora which is part of the Gondwana land flora brought through the Burmese and Malaysian portion of Indian block joining with the Asian main land and the inaccessible terrain of Himalayas helped in the preservation of the remnants of few primitive families. Hence, according to him it is appropriate to consider south east Asian plexus with numerous folds of mountains a "refugium" and not a "Cradle of flowering plants" as considered by Takhtajan.

**Table-4 : Some primitive flowering plants occurring in Manipur state are given below.**

Name of Species	Family	Distribution
1. <i>Actinodaphne angustifolia</i> Nees	Lauraceae	North east India & Indo Malaya
2. <i>Actinodaphne obovata</i> (Nees) Blume	Lauraceae	North east India, Eastern Himalayas and Bangladesh
3. <i>Alseodaphne sikkimensis</i> Meisner	Lauraceae	North east India, Sikkim

Name of Species	Family	Distribution
4. <i>Alseodaphne ovidenii</i> Parker	Lauraceae	North east India, Sikkim and Bhutan
5. <i>Artabotrys cubittii</i> Chatterjee	Annonaceae	Manipur, Assam, Meghalaya & Myanmar
6. <i>Artabotrys hexapetalus</i> (L.f.) Bhandari	Annonaceae	North East India, Myanmar, Malasia
7. <i>Beilschmiedia assamica</i> Meisn.	Lauraceae	Manipur, N.E. India and Myanmar
8. <i>Beilschmiedia fagifolia</i> Nees	Lauraceae	Manipur, N.E. India
9. <i>Beilschmiedia roxburghiana</i> Nees	Lauraceae	Manipur, N.E. India
10. <i>Betula alnoides</i> Buch.-Ham.	Betulaceae	Himalayas, N.E. India and Myanmar
11. <i>Chloranthus elatior</i> Link	Chloranthaceae	Manipur, N.E. India Himalayas, Andaman and Indo-Malaya.
12. <i>Chloranthus glaber</i> (Thunb.) Makino	Chloranthaceae	N.E. India, Indo-Malaya
13. <i>Corylopsis himalayana</i> Griffith var. <i>himalayana</i>	Hamamelidaceae	N.E. India and Indo-China
14. <i>Cryptocarya amygdalina</i> Nees	Lauraceae	N.E. India, E.Himalayas and Andamans
15. <i>Desmos longiflorus</i> (Roxb.)Saff.	Annonaceae	N.E. India and Indo-Malaya
16. <i>Exbucklandia populnea</i> (R. Br. ex Griffith) R.W. Brown	Hamamelidaceae	N.E. India, Eastern Himalaya and Indonesia
17. <i>Fissistigma bicolor</i> (Roxb.)Merr.	Annonaceae	N.E. India, West Bengal, Myanmar
18. <i>Fissistigma polyanthum</i> (Hook.f. & Thomson) Merr.	Annonaceae	N.E. India, Bhutan and Bangladesh
19. <i>Goniothalamus sesquipedalis</i> (Wallich) Hook. f. & Thomson	Annonaceae	N.E. India, Indo-Malaya, Myanmar
20. <i>Halboellia latifolia</i> Wallich	Lardizabalaceae	N.E. India
21. <i>Horsfieldia amygdalina</i> (Wallich) Warb.	Myristicaceae	N.E. India, Bangladesh and Myanmar
22. <i>Illicium griffithii</i> Hook. f. & Thomson	Illiciaceae	N.E. India, Eastern Himalaya and Myanmar
23. <i>Illicium manipurensense</i> G. Watt ex King	Illiciaceae	Endemic to Manipur

Name of Species	Family	Distribution
24. <i>Illicium simonsii</i> Maxim.	Illiciaceae	N.E. India, E. Himalaya & China
25. <i>Kadsura heteroclita</i> (Roxb.) Craib	Schizandraceae	N.E. India, Eastern Himalayas & Bangladesh
26. <i>Kadsura watti</i> C.B. Clarke	Schizandraceae	Endemic to Manipur
27. <i>Knema erratica</i> (Hook. f. & Thomson) Sinclair	Myristicaceae	N.E. India
28. <i>Knema linifolia</i> (Roxb.) Warb.	Myristicaceae	N.E. India, Bangla- desh Myanmar and Malaysia
29. <i>Knema tenuinervis</i> Wilde.	Myristicaceae	N.E. India, Eastern Himalaya, Myanmar and Thailand
30. <i>Magnolia campbellii</i> Hook. f. & Thomson	Magnoliaceae	N.E. India, Eastern Himalaya Myanmar and China
31. <i>Magnolia griffithii</i> Hook. f. & Thomson	Magnoliaceae	Endemic to N.E. India
32. <i>Magnolia hodgsonii</i> (Hook. f. & Thomson) Keng	Magnoliaceae	N.E. India, Eastern Himalayas and Bangladesh
33. <i>Magnolia hookeri</i> (Cubitt & Smith) Raju & Nayar	Magnoliaceae	N.E. India & Myanmar
34. <i>Magnolia insignis</i> Wallich	Magnoliaceae	N.E. India, E. Hima- layas
35. <i>Michelia cathcartii</i> Hook. f. & Thomson	Magnoliaceae	Manipur, Meghalaya, Nagaland and Sikkim
36. <i>Michelia doltsopa</i> Buch.-Ham ex DC	Magnoliaceae	N.E. India & Eastern Himalaya
37. <i>Michelia glabra</i> Parm	Magnoliaceae	Endemic to N.E. India and Himalayas
38. <i>Michelia punduana</i> Hook. f. & Thomson	Magnoliaceae	Endemic to N.E. India and Eastern Himalayas
39. <i>Michelia velutina</i> DC	Magnoliaceae	N.E. India and West Bengal and Nepal

Name of Species	Family	Distribution
40) <i>Polyalthia jenkinsii</i> Benth. ex Hook. f.	Annonaceae	N.E. India and Indo-Malaya
41. <i>Tetracera sarmentosa</i> (L.) Vahl subsp. <i>andamanica</i> (Hoogl.) Hoogl.	Dilleniaceae	N.E. India, West Bengal, Andamans, Myanmar and Malesia.

### Bamboos

The state of Manipur has also large population of bamboos, which are well known for their multipurpose economic uses. Bamboos are used in house making, preparation of baskets, brooms, mats, hats, poles, fencing, water pipes, bows and arrows as well as in other cottage industries etc. Besides, the tender shoots are eaten as vegetable by the local inhabitants. Out of ca 126 taxa of bamboos reported from India, over 41 species (*Arundinaria* ca 7 species, *Bambusa* ca 15 species, *Chimnobambusa* 1 species, *Dendrocalamus* ca 8 species, *Dinorchloa* 1 species, *Melocanna* 1 species, *Schizostachyum* ca 7 species and *Thyrsostachys* 1 species, etc. are known from Manipur. Some of the important bamboo species of common use are *Arundinaria clarkii* Gamble, *A. maling* Gamble, *A. rolleana* Gamble, *Bambusa balcooa* Roxb., *B. burmanica* Gamble, *B. griffithiana* Munro, *B. pallida* Munro, *B. tulda* Roxb., *B. vulgaris* Schrader, *Chimnobambusa khasiana* (Munro) Nakai, *Dendrocalamus giganteus* Munro, *D. hamiltonii* Nees & Arn. ex Munro, *D. strictus* (Roxb.) Nees, *Melocanna baccifer* Kurz, *Schizostachyum pallidum* (Munro) Majumdar, *S. mannii* Majumdar, *S. dullooa* (Gamble) Majumdar, *S. firschanum* (Gamble) Majumdar and *Thyrsostachys oliveri* Gamble, etc.

### Orchids

People, generally are very much fascinated by orchids because of their beautiful long lasting ornamental flowers. The state of Manipur is prolific in many epiphytic and terrestrial orchids of immense horticultural value. Some of these are progenitors of the modern commercial hybrids and deserve multiplication and protection for future hybridisation programme. About 249 species belonging to 69 different genera of the family Orchidaceae have been reported from Manipur state. Some of the major components of this highly ornamental group of plants are as follows: *Dendrobium* 43 species, *Coelogyne* 16 species, *Cymbidium* 13 species, *Bulbophyllum* 12 species, *Eria* and *Habenaria* 8 species each, *Catantbe*, *Liparis*, *Oberonia* and *Vanda* 7 species each, *Plectone* 4 species and other interesting orchids viz. *Anoectochilus*, *Ascocentrum*, *Epigeneium*, *Galeola*, *Phaius* and *Vanilla* are met in this state.

Some of the important ornamental species which are prized all over the world

are *Aeridis multiflora* Roxb., *A. odorata* Lour., *Anoectochilus grandiflorus* Lindley, *Arundina graminifolia* (D. Don) Hochr., *Calanthe densiflora* Lindley, *C. massuca* (D. Don) Lindley, *Coelogyne barbata* Griffith, *C. flaccida* Lindley, *Cymbidium cyperifolium* Wallich ex Lindley, *C. devonianum* Paxt, *C. elegans* Lindley, *C. iridioides* D. Don, *C. mastersii* Griffith ex Lindley, *Dendrobium hensoniae* Reichb. f., *D. chrysanthum* Wallich ex Lindley, *D. chrysotoxum* Lindley, *D. densiflorum* Lindley, *D. devonianum* Paxt, *D. fimbriatum* Hook., *D. nobile* Lindley, *Hygrochilus parishii* (Veitch & Reichb. f.) Pfitz., *Paphiopeditum hirsutissimum* (Lindley ex Hook.) Stein, *P. spicerianum* (Reichb. f.) Pfitz., *Phaius flavus* (Blume) Lindley, *P. mishuensis* (Lindley) Reichb. f., *Pleione humilis* (Swartz.) D. Don, *P. praecox* (Smith) D. Don, *Renanthera inschootiana* Rolf., *Rhynchostylis retusa* (Lindley) Blume, *Schoenorchis fragrans* (Par. & Reichb.f.) Scidenf. & Smith and *Vanda coerulea* Griffith ex Lindley etc. Due to over exploitation, most of the orchids have already been depleted considerably and several are seen only in orchidaria.

#### Primitive Cultivars and Land Races

Manipur also abounds a rich genepool of primitive cultivars and land races. There are enormous gene pool of rice, maize, coix, etc. Besides these crops, there are numerous wild relatives of cultivated plants, mention may be made of *Alpinia*, *Alocasia*, *Amonum*, *Mucuna*, *Pyrus*, *Prunus*, *Rubus* and *Sorbus* etc. The genus *Dioscorea* is represented by 8 species and *Piper* with ca 21 species. Several wild species of banana viz. *Ensete glaucum* (Roxb.) Cheesm., *Musa cheesmanni* Simmonds, *M. nagenium* Prain, *M. bahisiana* Colla, etc. have been recorded from this state. some of them are endemic to North eastern region. The genus *Citrus* is represented by *Citrus indica* Tanaka L., *C. latipes* (Swirgie) Tanaka, *C. maxima* (Burm. f.) Merr., *C. medica* L. and their varieties, etc. So far the fibre crops are concerned, mention may be made of *Bauhinia*, *Butea*, *Connabis*, *Corchorus*, *Crotalaria*, *Sesbania*, *Sida* and their varieties. Other important taxa like, *Costus*, *Curcuma*, *Hedychium*, *Lilium*, *Saccharum* and *Zingiber*, etc. show rich diversity.

#### Phytogeography

Though the flora of Manipur exhibits an Indo Malayan affinity, the floral elements of other parts of India, neighbouring and far off countries has also contributed to its richness and diversity. These affinity are best illustrated by an enumeration of some of common elements. The Tibet, China, Bhutan and Nepal genera are *Acanthopanax*, *Actinidia*, *Neolamarckia*, *Arisaema*, *Berberis*, *Rubrophyllum*, *Camellia*, *Cymbidium*, *Eulalia*, *Epigeneium*, *Helwingia*, *Kadsura* and *Mahonia*, etc. Of the Malayan elements occurring in this state are genera like *Balanophora*, *Engelhardtia*, *Exbucklandia*, *Millusa*, *Rubus*, *Vaccinium*, etc. Besides, some of the common species having the affinities with Sikkim and Tibet are *Arisaema tortuosum* (Wallich) Schott. *Apocopsis puleacea* (Trin.) Hochr. *Luzula effusa* Buchenau, *Saccharum procerum* Roxb., *Trachycarpus martianus*

(Wallich) Wendl., *Hebrugia himalaica* Hook. f. & Thomson ex C.B. Clarke and species of *Anemone*, *Agapetes*, *Globba*, *Hypoxis*, *Holboelia*, *Maesa*, *Ophiopogon*, *Smilacina* and *Tupistra* etc. *Desmodium griffithianum* Benth., *Bauhinia glauca* (Wallich ex Benth.) Benth. subsp. *teniflora* (G. Watt ex C.B. Clarke) K. & S. Larsen, *Ardisia virens* Kurz, *Aerides odorata* Lour. var. *alba* Kamemod & Sagarik, *Coelogyne dayana* Reichb. f., *Dendrobium hensoniae* var. *xanthinum* Reichb. f., *D. brymerianum* Reichb. f., *D. linguella* Reichb. f., *Gastrochilus bellinus* (Reichb. f.) O. Kuntze, *Luisia antennifera* Blume and *Luisia jonesii* J.J. Smith show their range of distribution through Philippines and Thailand to Borneo and Indonesia. The floristic elements of peninsular India are *Dillenia indica* L., *D. pentagyna* Roxb., *Eurya acuminata* DC., *Mahonia pycnophylla* (Fedde) Takeda, *Heliconia nilagirica* Beddome, *Habenaria malintana* (Blanco) Merr. and *Nervilia prainiana* King & Pandl. Seidenf. & Smitin. etc. The African elements next within are *Elatostema sessile* Forst., *Phoenix humilis* Royle, *Melinis minutiflora* P. Beauv. and species of *Eragrostis*, *Eteusine* and *Digitaria* etc. The American elements in Manipur are not very common. They are exhibited generally by weeds of agricultural lands e.g. *Eichhornia crassipes* (Mart.) Solms. *Eupatorium adenophorum* Sprengel, *E. odoratum* L., *Lantana camara* L., *Mikania micrantha* Kunth, etc. While *Mangifera sylvatica* Roxb. ex Wallich and *Nauclea griffithii* Hav. show their range of distribution up to Andamans. The taxa like *Aeschynanthes superba* C.B. Clarke, *Ardisia khasiana* C.B. Clarke, *A. virens* Kurz, *Chirita brevipes* C.B. Clarke, *Justicia khasiana* C.B. Clarke, *Senecio linifolius* C.B. Clarke, *Prunus jenkinsii* Hook. f. & Thomson, *Rubus burkillii* Rolfe, *Cinnamomum pauciflorum* Nees, *Polysolenia wallichii* Hook.f., *Strobilanthes acrocephalus* T. Anderson and *Synotis nagensium* (C.B. Clarke) Jeffery & Chen, etc. to occur only in the neighbouring states of North-eastern India.

Besides, a number of exotics have been introduced on Indian soil and have become permanent denizens. Some of them viz. *Abelmoschus moschatus* Medic., *Abrus precatorius* L., *Cleome viscosa* L., *Euphorbia prostrata* Ait., *Peperomia pallucida* H.B. & K., have not only masked the native elements, but also have replaced them probably because of their allelopathic effects.

### Endemics

The term 'endemic' is generally applied to taxon viz. species, genus or other group confined to a small area. Some authors designate even the species restricted to larger areas as endemics. These endemics may be of two types i.e. paleo-endemics and neo-endemics. When a taxon is the survivor of widely distributed group of the past that is now in the process of gradual extinction e.g. *Ginkgo biloba* L. etc is known as paleoendemic, while neoendemics is a taxon which is new or recent forms of gradual extending group e.g. *Orchid*, *Primula*, etc. The factors responsible for the creation of endemic species are mutation, natural crossing over amongst allied species, isolation etc. That's why the oceanic



Islands are having a higher percentage of endemic flora. For example 82 % of species in Hawaii Islands, 72 % in Newzealand and 50 % in Fiji Islands are endemic. The state of Manipur, although having the dominance of Malayan elements and some floristic elements of other contiguous as well as far off places, has also a good number of endemic elements. Chatterjee (1939) has emphasized the richness of the flora of the Eastern Himalayas and North-eastern India, including British Burma and estimated that 3169 out of a total of 6850 endemics in India endemic to this region. But later on several species which were described as endemic to this region have also been collected from other parts of the country and neighbouring countries. Even the several species appears to be endemic to Manipur and adjacent states of the North-eastern India. A list of some of the endemic species is given below:

Table-5 : Some endemic plants

Name of Species	Family	Distribution
<i>Aconitum ehresii</i> Stapf	Ranunculaceae	Manipur, Nagaland and Arunachal Pradesh
<i>Aconitum nagarum</i> Stapf	Ranunculaceae	Manipur, Nagaland and Arunachal Pradesh
<i>Actinodaphne obovata</i> Blume var. <i>wattii</i> King	Lauraceae	Manipur
<i>Agapetes lobhii</i> C.B. Clarke	Vacciniaceae	Manipur, Meghalaya and Nagaland
<i>Agapetes mannii</i> Hemsl	Vacciniaceae	Manipur, Meghalaya and N.E. India
<i>Arisaema wattii</i> Hook. f.	Araceae	Manipur.
<i>Artobotrys cubittii</i> Chatterjee	Annonaceae	N.E. India & Myanmar
<i>Aster ageratoides</i> Turcz.	Asteraceae	Manipur
<i>Asystasia pusilla</i> C.B. Clarke	Acanthaceae	Manipur and Nagaland
<i>Baliospermum suffruticosum</i> Pax & Hoffm.	Euphorbiaceae	Manipur
<i>Beaumontia longituba</i> Craib	Apocynaceae	Manipur
<i>Begonia obversa</i> C.B. Clarke	Begoniaceae	Manipur
<i>Berberis manipurana</i> Ahrendt	Berberidaceae	Manipur
<i>Berberis sublevis</i> W.W. Smith var. <i>sublevis</i>	Berberidaceae	Manipur
<i>Carex manipurensis</i> C.B. Clarke	Cyperaceae	Manipur
<i>Clematis apiculata</i> Hook. f. & Thomson.	Ranunculaceae	Manipur & Meghalaya
<i>Clanatis wattii</i> J.R. Drumon & Craib	Ranunculaceae	Manipur

Name of Species	Family	Distribution
<i>Colquhounia elegans</i> Wallich ex Benth.	Lamiaceae	Manipur
<i>Craibiodendron stellatum</i> (Pierre) W. W. Smith	Ericaceae	Manipur
<i>Dalbergia wattii</i> C.B. Clarke	Fabaceae	Manipur
<i>Dischidia nicholitzii</i> N.E. Brown	Asclepiadaceae	Manipur
<i>Elatostema ciliatum</i> C.B. Clarke	Urticaceae	Manipur
<i>Elaeagnus loureirii</i> Champion	Elaeagnaceae	Manipur
<i>Epipremnum meeboldii</i> Krause	Araceae	Manipur
<i>Euphorbia serrulata</i> Reinw. ex Blume	Euphorbiaceae	Manipur
<i>Garcinia laniceroides</i> T. Anderson	Clusiaceae	Manipur & Nagaland
<i>Gleadowia banerjiana</i> Deb	Orchaneaceae	Manipur
<i>Hedychium greenii</i> var. <i>urophyllum</i> W.W. Smith	Zingiberaceae	Manipur
<i>Hedychium speciosum</i> Wallich ex Roxb.	Zingiberaceae	N.E. India
<i>Hedychium wardii</i> Fisher	Zingiberaceae	N.E. India
<i>Ilex embelioides</i> Hook. f. & Thomson	Aquifoliaceae	Manipur & Meghalaya
<i>Ilex khasiana</i> Purkay.	Aquifoliaceae	N.E. India
<i>Ilex wattii</i> Loes.	Aquifoliaceae	Manipur
<i>Illicium manipurense</i> G. Watt ex Roxb.	Illiciaceae	Manipur
<i>Impatiens gibbisekala</i> Hook. f.	Balsaminaceae	Manipur
<i>Impatiens longirama</i> Hook. f.	Balsaminaceae	Manipur
<i>Impatiens rubro-lineata</i> Hook. f.	Balsaminaceae	Manipur
<i>Impatiens spissiflora</i> Hook. f.	Balsaminaceae	Manipur
<i>Impatiens teneriflora</i> Hook. f.	Balsaminaceae	Manipur
<i>Iris bakeri</i> Wallich	Iridaceae	Manipur
<i>Iris wattii</i> Baker	Iridaceae	Manipur
<i>Justicia anfractuosa</i> C.B. Clarke	Acanthaceae	Manipur
<i>Kadsura wattii</i> C.B. Clarke	Schizandraceae	Manipur
<i>Kalanchoe rosea</i> C.B. Clarke	Crassulaceae	Manipur
<i>Mahonia feddei</i> Ahrendt	Berberidaceae	Manipur
<i>Mahonia magnifica</i> Ahrendt	Berberidaceae	Manipur
<i>Mahonia manipurensis</i> Takeda	Berberidaceae	Manipur
<i>Mantista saltatoria</i> Sims	Zingiberaceae	Manipur & Mizoram
<i>Musa itinerans</i> Cheesman	Musaceae	Manipur
<i>Phacellaria compressa</i> Benth.	Santalaceae	Arunachal Pradesh and Manipur
<i>Pilea minuta</i> C.B. Clarke	Urticaceae	Manipur
<i>Pimpinella flaccida</i> C.B. Clarke	Apiaceae	Manipur & Nagaland
<i>Piper aurorubrum</i> C. DC.	Piperaceae	Manipur

Name of Species	Family	Distribution
<i>Piper gamblei</i> C.B. Clarke	Piperaceae	Manipur, Mizoram and Nagaland
<i>Piper kapricornum</i> C. DC.	Piperaceae	Manipur
<i>Piper lainatakornum</i> C. DC.	Piperaceae	Manipur
<i>Piper makruense</i> C. DC.	Piperaceae	Manipur
<i>Piper meeboldii</i> C. DC.	Piperaceae	Manipur
<i>Piper minicyporensis</i> C. DC.	Piperaceae	Manipur
<i>Piper nagense</i> C. DC.	Piperaceae	Manipur & Nagaland
<i>Polygonum stellato-tomentosum</i> Smith & Ranaswami	Polygonaceae	Manipur
<i>Potentilla manipurensis</i> G. Watt	Rosaceae	Manipur
<i>Prunus wattii</i> Ghora & Panigr.	Rosaceae	Manipur
<i>Pyrus wattii</i> (Kochme) Bennet	Rosaceae	Manipur
<i>Rosa clinopylla</i> Thury var. <i>parvifolia</i> Ghora & Panigr.	Rosaceae	Manipur
<i>Sorbus polycarpa</i> (Hook. f.) Rehder	Rosaceae	Manipur & Meghalaya
<i>Spodiopogon tacei</i> (Torr.) Torr.	Poaceae	Manipur
<i>Strychnos nux-blonda</i> A.W. Hill	Loganiaceae	Manipur
<i>Swertia wattii</i> C.B. Clarke	Gentianaceae	Manipur & Nagaland
<i>Synotis rhabdos</i> (C.B. Clarke) Jeffery & Chen	Asteraceae	Manipur & Nagaland
<i>Vaccinium lamellatum</i> Stevens	Vacciniaceae	Manipur
<i>Vaccinium manipurensis</i> (G. Watt ex Brandis) Sleumer	Vacciniaceae	Manipur & Arunachal Pradesh
<i>Vernonia clivorum</i> Hance	Asteraceae	Manipur
<i>Vernonia cylindriceps</i> C.B. Clarke	Asteraceae	Manipur & Nagaland
<i>Zanthoxylum pseudoxyphyllum</i> Babu	Rutaceae	Manipur

### Economic Uses of Plants

It is imperative to mention here that Manipur has always served as store house of medicinal and aromatic plants. The local tribals inhabit in different parts of the state solely depend upon these plants for the cure of diseases. In spite of the influx and encroachment of modern civilisation and missionary activities to provide modern medical facilities to these people, the rural folk to a great extent have their faith in the indigenous type of medication. Mention may be made of some important plant species such as *Abroma augusta* (L.) L.f., *Acorus calamus* L., *Alpinia nigra* (Gaertn.) Burtl., *Anomum* spp., *Aquilaria malaccensis* Lam., *Berberis* spp., *Brucea mollis* Kurz, *Clerodendron colebrookianum* Walp., *Costus speciosus* (Koen.) Smith, *Dioscorea* spp., *Equisetum diffusum* D. Don,

*Lycopodium* spp., *Paedaria foetida* L., *Plantago erosa* Wallich, *Viscum album* L. and *Rhododendron arboreum* Smith, etc. being used by these tribals to cure different ailments. Besides, the leaves, petioles and young shoots of *Eurale ferox* Salisb., *Houttuynia cordata* Thunb., *Ipomoea aquatica* Forst., *Panicum hydrogiper* (L.) Spach, *Sesbania sesban* (L.) Merr. and *Stellaria media* (L.) Vill. etc are eaten cooked or raw.

The plants like *Ceratophyllum demersum* L., *Hydrilla verticillata* (L.f.) Royle and *Myriophyllum tuberculatum* Roxb. are used for covering fishes and other collected aquatic plants in basket during transport to the market. The grasses eg. *Apluda mutica* L., *Cynodon dactylon* (L.) Pers., *Dichanthium annulatum* (Forssk.) Stapf, *D. caricosum* (L.) A. Camus, *Echinochloa colonum* (L.) Link, *Isachne albens* Trin., *I. globosa* Trin. etc. are good fodder species, while *Eulaliopsis binata* (Retz.)-C.F. Hubb. is an important grass used for the paper industry. The leaves of *Imperata cylindrica* (L.) P. Beauv. and *Saccharum spontaneum* L. are used for thatching by local people. *Melinis minutiflora* P. Beauv., a rare grass of Manipur has strong odour of cumine, the smell and vicious hairs on the leaves are stated to have insecticidal and mosquito-repellant properties. Few other ethnobotanically important plant viz. *Acacia oxyphylla* Grah., the extract of bark and fruits are used for dandruff, young shoots of *Bambusa tulda* Roxb. after crushing is applied to cure dandruff and the leaves extract of *Mussaenda frondosa* L. mixed with milk is given in jaundice. Some other interesting plants e.g. *Iris bakeri* Wallich (locally called Konbirei) the flowers of this plant are considered sacred and very much associated in the local festivals. The mature stems of *Schoenoplectus lacustris* (L.) Palla and *Schoenoplectus mucronatus* (L.) Palla subsp. *mucronatus* etc. are used for making mats and mattresses.

#### Rare, Threatened taxa and major threat to diversity

The rich plant diversity of the Manipur state is at present in great danger of alteration and depauperisation due to several biotic as well as abiotic factors. The climatic fluctuations, evolutionary changes and the introduction or extinction of species etc. have contributed to some extent for this. But major threat for the depletion of flora and vegetation is the drastic environmental changes brought about by man himself in these forests. By far the most important cause of destruction is the increased pressure on land for "jhum cultivation" "Shifting cultivation" Besides, over grazing, excessive use of fuel wood, forest fire and various socio-economic development activities are bringing about the destruction of natural forests at a great pace. The biotic pressure due to population explosion, the period of jhum cycle has come down considerably, providing practically no chance for natural regeneration of soil fertility. Jhumias prefer the secondary growth of bamboos over primary or secondary wooded forests, as these can be cut, dried and finally burnt easily, there by getting plenty of ashes rich in potassium suitable for a better and healthy growth of crops. But with

shorter jhum cycle, obnoxious weeds like *Eupatorium*, *Lantana* and *Mikania*, etc. spread widely. Besides in the afforestation programmes, emphasis has been given either to monoculture or to mixed forests, comprising mostly exotic species, as a result primary forests are dwindling and close canopied indigenous tree species are being replaced by straight boled *Alnus*, *Cryptomeria*, *Eucalyptus*, *Pinus*, etc. All these factors have resulted in major qualitative as well as quantitative changes in the flora of the state. A comparison of the forest cover of the state as per 1995 and 1997 assessment reveals that the total forest cover of the state has decreased from 17,558 sq. km to 17,418 sq. km thus showing a net loss of ca 140 sq. km (Forest Survey of India, 1997). Consequently, many taxa of the Manipur state viz. *Acer laevigatum* Wallich, *Aconitum ewesii* Stapf, *Aconitum nagarum* Stapf, *Alongium* spp., *Annestea fragrans* Wallich, *Anoetochilus tetrapterus* Hook. f., *Aquilaria malaccensis* Lam., *Aldrovanda vasiculosa* L., *Aseocentrum ampullaceum* Lindley ex Wallich, *A. miniatum* (Lindley) Schltr., *Begonia obversa* C.B. Clarke, *Canarium strictum* Roxb., *Clematis apiculata* Hook. f. & Thomson, *Dalhausstea bracteata* Grah., *Dendrobium bensonae* Reichb. f., *D. draconis* Reichb. f., *D. heterocarpum* Wallich ex Lindley, *D. wardianum* Waroer, *Epigeneium amplum* (Lindley) Summerh., *Hedychium greenii* Smith, *H. marginatum* C.B. Clarke, *Ilex embelioides* Hook. f., *I. khasiana* Purkays., *Ophiorrhiza wattii* Fischer, *Phoebe hainiana* Brandis, *Sapria himalayana* Griffith, *Sheffera shweliensis* W.W. Smith, *Psychotria symplocifolia* Kurz and *Trachelospermum auritum* Sch., etc. are facing threat of survival in their natural habitats, probably few of them have already been exterminated.

### Conservation

In recent years, the importance of conservation of tropical rain forests and biodiversity for survival of humanity is well recognised, and is discussed everywhere. But the goal still remains a far cry not only in Manipur but also for the entire north eastern region. The major cause is the age old primitive agricultural practice known as "Jhum cultivation", which is an integral part of the culture of the hill people of Manipur and can not be given up overnight. However, intricate relationship between tribals and their environment revealed many interesting informations. These people have a sensitive understanding of forest ecology and know how to exploit it without damaging eco-system. The instincts for preservation of forests which provided them with plants of their daily use was part of their religious faith and culture. Even today the forest lands in Manipur are mostly under the control of village Chiefs and clans etc. There are a number of sacred forests (groves) in the state which represent relict types of vegetation and conserve many rare and threatened plants. These were protected due to the fear of ruling diety. But of late, there has been a change in the outlook of these people due to education and diminishing of belief in the supernatural powers and modernisation. Besides, the changed life styles, comforts and luxuries have resulted in intensified destruction

of forests turning and several areas into barren lands. There is an urgency and growing realisation for sustainable utilization of forest wealth. In this direction Government departments and Non Government organisations (N. G. O.s) are working hand in hand in the state to overcome this problem by educating and creating awareness among people for proper and effective conservation of plant diversity.

However some of these adverse effects of unplanned exploitation have been minimized by large scale plantation of common crops, social and legislative measures undertaken by the Central and State Governments. Two well known approaches for conservation of species are viz., *in situ* and *ex situ*. *In situ* conservation permits species maintenance within natural ecosystems and is the most ideal system, as this permits natural evolution to take place. In this context, the declaration of Keibul Lamjao National Park for protection of Brow antlered deer (Sangai) the most threatened deer species in the world and five wild life sanctuaries viz., Vangoupokpi Lokch (ca 184 sq. km), Bunning (ca 115.8 sq. km), Zeiland (ca 21 sq. km), Keilam (ca 157.8 sq. km) and Jiri Makro (ca 198 sq. km) are the best examples for the conservation of rich flora and fauna. It is pertinent to mention here that forest cover of ca 17,418 sq. km constitute 78.0% of the total geographical area of the state. Owing to rich biodiversity in the state few more National Parks can be established at Sirohee Kasoin hills and Dzuko valley, as these area still harbour pristine vegetation with minimum human interference.

Another viable means for preservation of selected taxa is their *ex situ* conservation through biotechnology and multiplication in botanical/experimental gardens not only for future research and rehabilitation in natural habitats but also for commercial exploitation.

The state government has already established Manipur zoological garden and Arboretum and has already initiated efforts to develop a Botanical Garden at Koirengci, Imphal to conserve genetic diversity of the state in general and rare, threatened and endemic taxa in particular. Besides, a good number of orchid species have been preserved at orchid preservation centre, Khonghampat.

The Botanical Survey of India, the apex organisation concerned with floristic resources of the country and its conservation is actively engaged an exhaustive inventorisation. Several rare and threatened species from Manipur have been identified and brought undercultivation at Wood lands, Shillong and Barapani. A few species of orchids from the state are also being multiplied by tissue culture techniques. It may be emphasised here that necessary efforts should also be made to involve local people in joint forest management programmes to safeguard the plant genetic resource of the state. Only sustainable utilisation of bioresources will help us in the long run in improving the welfare of humanity and conserving the

green heritage for posterity.

### Materials and Presentation

The Specimens deposited in the herbarium of the Botanical Survey of India, Eastern Circle, Shillong, Central National Herbarium, Howrah and Industrial Section of Indian Museum, Calcutta have been the main source of material for writing the present flora. In addition to these, the authors have also consulted herbarium of D.M. College and Botany Department, Manipur University, Imphal. These have in general added in some distribution data and economic uses of the plants. It is well known fact that the changing pattern in the floristic composition of any area is mainly due to biotic pressure and several other environmental stresses as well as plant migration, besides there is always a possibility of missing some plants during the plant collection trips. All these available specimens have been studied critically. There have been also a few taxa, which have been reported from Manipur by earlier works but of which the specimens have not been seen by the authors. Such taxa have been included giving reference to the publication.

The introductory chapter to this volume includes general information about physiography, geology and soil, climate, vegetation, floristic diversity, etc. This is followed by key to the families of Angiosperms and Gymnosperms occurring in the state. This volume deals with the systematic account of 975 species belonging to 464 genera in 102 families from Ranunculaceae Asteraceae. The families are arranged as per Bentham and Hooker's (1862-63) system of classification where as the genera within a family and the species within a genus are arranged alphabetically. Similarly key to the genera in a family and that of species under a genus have also been provided to facilitate easy identification. Each species has been provided with up to date nomenclature, with original citation including that of basionyms and selected synonyms; a brief taxonomic description; phenology and herbarium reference of specimens examined during the course of this study. Local vernacular names of the plants and their economic uses, if any, have been provided. At the end, index to both botanical as well as local names have also been provided.

## SELECTED REFERENCES

- Anonymous, 1974 . Geology and Mineral Resources of the State of India pt. 4: 115 -124. Calcutta.
- Babu, C.R. 1977. *Herbaceous Flora of Dehradun and adjacent regions*, New Delhi.
- Balakrishnan, N.P. 1981, 1983. *Flora of Jowai & Vicinity*. Vols. 1 & 2. Botanical Survey of India. Howrah.
- Bennet, S.S. R. 1987. *Name Changes in Flowering Plants of India and adjacent regions*, Triseas Publishers, Dohradun.
- Benthani, G. & J.D. Hooker, 1862-83. *Genera Plantarum*. Vols. 1 - 3, London.
- Bhandari, M.M. 1978. *Flora of Indian Desert*. Jodhpur.
- Bor, N.L. 1938. A Sketch of vegetation of the Aka Hills Assam - a synecological study. *Indian For. Rec. (N.S) Bot.* 1(4): i-ix, 103 - 222.
- Bor, N.L. 1939. Some remarks on the geology and the flora of the Naga and Khasi Hills. 10th Ann. Vol. *R. Bot. Gard, Calcutta* 129 - 135.
- Bor, N.L. 1940. Graminae. In Kanjilal *et. al.*, *Flora of Assam*, Vol. 5. Calcutta .
- Bor, N.L. 1960. *Grasses of Burma, Ceylon, India and Pakistan*. Pergamun Press. Oxford.
- Buchanan - Hamilton, F. 1820. *An account of Assam, with some natives concerning the neighbouring territories*. London.
- Burkill, J.H. 1965. *Chapters on the history of botany in India*. Manager of Publication, Govt. of India, Delhi.
- Champion, H.G. 1936. A preliminary survey of the Forest Types of India and Burma. *Indian For. Rec. N.S.* 1(1): 1 - 286.
- Champion, H.G. & S.K. Seth, 1968. *A Revised survey of the Forests Types of India*. Govt. of India. Delhi.
- Chatterjee, D. 1939. Studies on the endemic flora of India and Burma. *J. Roy. Asiat. Soc. Bengal* 11, 5(3): 19 - 67.
- Chatterjee, D. 1962. Floristic patterns of Indian vegetation. In P. Maheshwari (ed.) *Proc. Summer School Bot.* (June, 1960). Darjeeling. 32 - 42. New Delhi.
- Chauhan, A.S. 1984. Dwindling taxa of Meghalaya. Jain S. K. & R. R. Rao (ed.) *Howrah, An Assesment of Threatened Plants of India*. pp 142 - 145.
- Chauhan, A. S. 1984. *Impatiens* L. of North Eastern India . *J. Meghalaya Sci. Soc.* 5 & 6: 1 - 7.
- Chauhan, A.S. 1984. Deplating plants of Meghalaya. *ibid* 39 - 43.
- Chauhan, A.S. 1987. Notes on Two rare orchis of Meghalaya. *Bull. Bot. Surv. India* 27 (1-4): 26 - 128.
- Chauhan, A.S. 1987. Distributional notes on six endemic taxa. *Bull. Bot. Surv. India* 27 (1-4) 237 - 238
- Chauhan, A. S. & Pal, T.K. 1993. Family Theaceae in India. *Flora India. Vol. 3*: 152 - 193.
- Chauhan, A. S. 1996. Flowering plants of Eastern India and North Bengal. *Flora India Introductory Vol. 1*: 251-294.
- Chauhan, A. S. 1997. A contribution to the Flora of Namdapha. Arunachal Pradesh. Botanical Survey of India Calcutta, p.p. 1 - 422.



- Chauhan, A.S. 1997. Plant diversity in Manipur. In Hajra, P.K. & V. Mudgal (ed.) *Plant Diversity in India* Botanical Survey of India 1153 - 1187.
- Chauhan, A.S. 1997. Green Heritage in North Eastern India and its Conservation. *Bull. Bot. Surv. India* 36 (1-4): 135 - 141.
- Chauhan, A.S. & P. Singh. 1998. An overview of Plant Diversity of Sikkim. *Sikkim Prospectives for Planning and Development*. Sikkim Science Society. 219 - 231.
- Clarke, C.B. 1898. Sub-subareas of British India. *J. Linn. Soc.* 34: 1 - 146.
- Clarke, C.B. 1889. On the plants of Kohima and Mumeypore. *J. Linn. Soc. Bot.* 25: 1-107.
- Clements, F.E. 1909. Plant Formation and forest types. *Soc. Amer. For. Proc.* 4: 50 - 63.
- Cowan, J.M. 1936. The Rhododendrons of Ceylon, South India and Manipur. *J. Linn. Soc.* 15 - 93.
- Cronquist, A. 1981. An integrated system of Classification of flowering plants. Columbia University Press. New York.
- Dansescau, P. 1957. *Biogéographyan ecological pererspective*. New York.
- Deb, D.B. 1955. A new species of *Hoya* from Manipur. *J. Indian Bot. Soc.* 32(1): 50 - 52.
- Deb, D.B. 1957. Studies of the Flora of Manipur. *Bull. Bot. Soc. Bengal.* 11 (1): 15 - 24.
- Deb, D.B. 1958. Endemism and outside influence on the Flora of Manipur. *J. Bot. Nat. Hist. Soc.* 5(2): 313 - 317.
- Deb, D.B. 1960. Forest Types Studies in Manipur. *Indian Forester.* 86 (2): 94 - 111.
- Deb, D.B. 1961a. Monocotyledonous plants of Manipur Territory. *Bull. Bot. Surv. India* 3(2): 115- 138.
- Deb, D.B. 1961b. Dicotyledonous plants of Manipur Territory. *ibid* 3(3 & 4): 253 - 350.
- Deb, D.B. 1981, 1983. *Flora of Tripura State*. Vol. 1 & 2. Today & Tommorrow's Printer and Publishers New Delhi.
- Devi, R.K.J. & J. Ghatak. 1984. A preliminary note on Orchid of Manipur. *Proc. 5th ASEAN Orchid Congress*, Singapore.
- Evans, P. 1964. The tectonic frame work of Assam. *J. Geol. Soc. India.* 5: 80 - 96.
- Fisher, C.E. 1938. The Flora of Lushai Hills. *Rec. Bot. Surv. India* 12(2): 75 - 161.
- Gait, E. 1926. A history of Assam. Calcutta.
- Gomez- Pompa. A. 1967. Some problems of tropical plant ecology. *J. Arn. Arb.* 48: 105 - 121.
- Ghatak, J. & R.K. J. Devi. 1986. Orchids of Manipur. Viz., S.P. (ed.) *Biology Conservation and Culture of Orchids*. Delhi, p.p. 357 - 562.
- Greuter, W. *et al.*, (ed.) 1988. *International Code of Botanical Nomenclature*. Germany.
- Griffith, W. 1848. *Itinerary notes of plants collected in Khasyah and Bootan mountains*. 1837 - 38. Calcutta.
- Hara, H. *et al.*, 1966. *The Flora of Eastern Himalaya*. Tokyo.
- Haridasan, K & R.R. Rao. 1985. 1987. *Forest Flora of Meghalaya*. Vols. 1 & 2. Dehradun.
- Hooker, J.D. 1854. *Himalayan Journals*. 1 & 2 Vols. London.
- Hooker, J.D. 1872 - 97. *The Flora of British India*. Vols. 1 - 7., London.
- Hooker, J.D. 1906. *A sketch of the flora of British India*. London.
- Hooker, J.D. 1909. The Indian Empire (Descriptive) Imp. Gaz. India.

- Hutchinson, 1919. The Maddeni series of *Rhododendron*. *Notes Roy. Bot. Garden, Edinburgh*. 12. 56.
- Jain, S.K. & A.R.K. Sastry. 1980. *Threatened plants of India, A state of the Art. Report*. New Delhi.
- Jain, S.K. & U. Shukla, 1979. A note on grasses of Manipur. *Indian Forester* 105(12): 880-885.
- Joseph, J. 1982. Flora of Nongpoh and vicinity. Forest Dept. Govt. of Meghalaya, Shillong. pp. 1-376 & 21-86.
- Kaith, D.C. 1932. *Reports on the working of Manipur Forests*. Forest Department Government of Manipur.
- Kaith, D.C. 1936. Manipur Forests Part. I. *Indian Forester*. 62 (9): 361-369.
- Kaith, D.C. 1936. Manipur Forests Part II. *ibid* 62 (10): 409-414.
- King, G. & R. Pandling, 1898. The Orchids of the Sikkim Himalaya. *Ann. Roy. Bot. Gard. Calcutta* 81: 1-342. pp. 1-444.
- Kanjilal, U.N. *et al.*, 1934-40. *Flora of Assam*. Vols. 1 - V (V by N.L. Bor.) Shillong.
- Kataki, S.K., S.K. Jain & A.R.K. Sastry 1984a. *Threatened and endemic orchids of Sikkim and North Eastern India*. Botanical Survey of India.
- Kataki, S.K., S.K. Jain & A. R.K. Sastry 1984 b. Distribution of Orchids in Sikkim and North Eastern India. *Pl. Cons. Bull.* 5: 1-38.
- Kingdon Ward, F. 1946. Journey to Manipur. *Gardn. Chronicle*. 150-154.
- Kingdon Ward, F. 1948. Botanical Exploration in Manipur. *J. Roy. Hort. Soc.* 37-43.
- Kingdon Ward, F. 1949. *Plant Hunter in Manipur*. 74. London.
- Kingdon Ward, F. 1960. *Pilgrimage for plants*. London.
- Kurz, W.S. 1877. *Forest Flora of British Burma*. Vols. 1 & 2 Calcutta.
- Josheph, J. & A. S. Chauhan, 1983. Nandapha Wildlife Sanctuary. in *Botany of Some Tiger Habitats in India*, 26-29. Howrah.
- Josheph, J. & K.M. Josheph, 1986. *Insectivorous Plants of Khasi & Jaintia Hills, Meghalaya, India*. pp 1-40. Calcutta.
- Malick, K.C. & B. Safui. 1987. Addition to the Flora of Manipur state. *J. Eco. Tax. Bot.* 10: 1-19.
- Mani, M.S. 1974. *Ecology and Biology in India*. Dr. W. Junk b. V. Publisher, The Hague.
- Minthai, R.S. 1968. The Physiological and Structural evolution of the Himalaya. B.C. Law (ed.) - *Mountains and rivers of India, Calcutta*. 41-81.
- Mukerjee, S.K. 1953. An enumeration of the Orchids of Ukhrul, Manipur. *Notes Roy. Bot. Gard. Edin.* 21(3): 149-154.
- Murthy, M.V.N. 1969. An outline of geomorphological evolution of the Assam region. *Proc. 21st Intern. Cong. India. Proc. Symp. Phys. Geogr. E. Himal. & Meghalaya*. 10-15.
- Nayar, M.P. & A. R. K. Sastry. 1987-90. *Red Data Book of Indian Plants* Vols. 1-3, Calcutta.
- Oldham, R.D. 1887. Geology of parts of Manipur and Naga Hills. *Mem. Geol. Surv. India*. 19(4).
- Pascoe, E.H. 1950. *A Manual of Geology of India and Burma*, Vol. 1, Calcutta.

- Phukan, S., 1999. Addition to the Indian Orchid Flora. *Orchid Review* 107: 28 - 29.
- Puri, G.S. 1960. *Indian Forest Ecology*. Vol. I. Calcutta.
- Riazada and Chatterjee. 1948. New or little known plants from Assam, India. *Indian Forester* 74(1): 385 - 392.
- Rajkhowa, S. 1961. Forest types of Assam with special reference to the evergreen and semievergreen forests. *Indian Forester*. 87: 520 - 541.
- Rao, A.S. 1963. The vegetation of Khasi and Jaintia Hills. *Proc. 21st Intern. Geogr. Congr. Proc. Symp. Phys. Geogr. E. Himal. & Meghalaya* 95 - 102.
- Rao, A.S. 1974. Vegetation and phytogeography of Assam - Burma in M.S. Mani (ed.) *Ecology and biogeography in India*. 204 - 246. Hague.
- Rao, A.S. & D.M. Verma. 1972 - 1979. Materials Towards a monocot flora of Assam: I. *Bull. Bot. Surv. India* 12: 139 - 142; 14: 114 - 143. 1975; III. 15: 189 - 203. 1976; IV. 16: 1 - 20. 1977; V. 18: 1 - 48. 1979.
- Rao, A. S. & D.M. Verma. 1982. *Cyperaceae of North east India*. Calcutta.
- Rao, R.S. 1959. Studies on the Indian Flora (Eastern India) - 5. Vegetational notes on Southern Forests of Tripura State. *Proc. Indian Sci. Cong.* part. III. Abstract. Soc. VI, Bot, no. 51. 287 - 288.
- Rao, R.S. & G. Panigrahi 1961. Distribution of Vegetation types and their dominant species in Eastern India. *J. Indian. bot. Soc.* 40: 274 - 285.
- Robinson, W. 1841. *A description account of Assam*, London.
- Roxburgh, W. (ed. N. Wallich) 1820 - 24. *Flora India. or description of Indian plants* by late W. Roxburgh. Vols. 1 & 2. Serampore.
- Roxburgh, (ed. W. Carey) 1832. *Flora Indica: or description of India plants*. 3 Vols. Serampore.
- Saldanha, C.J. & D.H. Nicolson. 1976. *Flora of Hassan District*. New Delhi.
- Santapu, H. 1958. *History of botanical researches in India, Burma & Ceylon*. Part. II. *Systematic Botany of Angiosperms*, Bangalore.
- Sastry, A.R.K. & P.K. Hajra. 1983. Rare and endemic species of *Rhododendron* in India - a preliminary study. Jain S. K. & R. R. Rao (ed.) *An Assessment of Threatened plants of India*, Howrah, p.p. 222 - 231.
- Sastry, A.R.K., S.K. Katakji & A. S. Chauhan 1983. Enumeration list of Rare and Threatened plants of N.E. India. *Material for a catalogue of Threatened Plants of India. Botanical Survey of India*. Howrah, pp. 61 - 69.
- Shukla, U. & A. K. Baishy 1979. A contribution to the Flora of Manipur. *J. Bombay. Nat. Hist. Soc.* 76: 224 - 229.
- Shrama, B.M. 1987. Ecological studies of the Flora of Manipur. *Front. Bot.* 1: 52 - 68.
- Singh, K.S. & W.M. Singh. 1983. Manipuri hidak hannaba pambising. *Bull. Manipur Sci. Assn.* 1: 1 - 7.
- Singh, N. Kunja. 1971. Working plan for reserved forests and protected forests of Eastern Forest Division, Manipur. Forests Deptt., Government of Manipur p.p. 1 - 47.
- Singh, Priyobor Th. 1999. *Orchids of Manipur. Preserved in Orchid Preservation Centre. Khonghampet*. Forest Deptt. Government of manipur, Imphal, p.p. 1 - 45. plate I. 20.

- Singh, R.P. 1968. Geomorphology of the Shillong Plateau in Assam. *Proc. 2nd Intern. Geogr. Cong. India. Proc. Symp. Phys. Geogr. E. Himal. & Meghalaya*, 1-9.
- Singh, S.R. & N.I. Singh, 1985. A preliminary study of wild edible plants in the markets of Manipur. *J. Eco. Tax. Bot.* 6: 699 - 703.
- Sinha, S.C. 1986. Ethnomedicinal plants of Manipur and their conservation " Green cross " approach. Regional seminar on medicinal plants ( Eastern region) Gauhati. Organised by the Ministry of Health and Family Welfare, Govt. of India.
- Sinha, S.C. 1987. Ethnobotanical Study of Manipur. Ph. D. Thesis, Manipur University.
- Sinha, S.C. 1996. *Medicinal Plants of Manipur, Imphal*, p.p. 1 - 238.
- Stafleu, F.A. (ed.) 1972. *International code of Botanical Nomenclature*. Utrecht.
- Stafleu, F.A. & R.S. Cowan. 1988. *Taxonomic literature Regnum Veg.* 166: 1 - 653.
- Takhtajan, A. 1969. *Flowering plants : Origin and dispersal* ( Transl. By, C. Jeffery) Edinburgh.
- Takhtajan, A. 1986. *Floristic regions of the World* ( Indian Edn. ) Dehradun.
- Turill, W.B. 1953. *Poiner plant Geography*. Hague.
- Tutin, T.G. *et al.*, 1964 & 1968. *Flora Europea* 2 Vols. Cambridge.
- Van Steenis, C.G.G.J. 1962. The landbridge theory in Botany. *Blumea* 11: 235 - 372.
- Wallich, N. 1820. Description of some rare Indian Plants. *Asiat. Res.* 13: 369 - 415, tt. 12.
- Wallich, N. 1829 - 32. *Plantae asiaticae rariiores* 3 Vols. London.
- Watt, G. 1889 - 1896. *Dictionary of Economic products of India*, Calcutta. Cosmos Publication.
- Watt, G. 1890. Forests of Manipur. *Ind. For.* 14: 291 - 339 & 387.
- Watt, G. 1888. Forests of Manipur. *ibid* 14: 291 - 299, 339 - 334 & 387 - 394.
- Wegener, A. 1924. The origin of continents and oceans ( trans. by J.G.A. Skerl.) London.
- Willis, J.C. 1973. *A dictionary of the Flowering Plants and Ferns* 7th Ed. revised by H.K. Airyshaw. Cambridge University Press.

**KEY TO THE FAMILIES**

(B.M. Wadhwah & A.S. Chanthan)

1a.	Ovules enclosed in carpels crowded by styles and stigma .....	2
b.	Ovules naked, not enclosed in carpels .....	222
2a.	Stems with central pith surrounded by concentric rings of woody tissue; venation usually reticulate; flowers usually 4-5 merous; cotyledons 2 .....	3
b.	Stems without a central pith, woody portion in scattered bundles; flowers usually 3-merous; venation usually striate; cotyledon 1 .....	190
3a.	Perianth usually biseriate or multiseriate .....	4
b.	Perianth uniseriate or absent .....	157
4a.	Petals free .....	5
b.	Petals united, at least at base .....	115
5a.	Sepals free; ovary superior or immersed in a disc .....	6
b.	Sepals more or less connate; gynoecium usually enclosed in the calyx tube or interior, not immersed in disc .....	80
6a.	Sepals imbricate in bud, rarely valvate, free .....	7
b.	Sepals valvate, more or less united at base .....	32
7a.	Stamens many .....	8
b.	Stamens 10 or less .....	16
8a.	Aquatic plants .....	9
b.	Terrestrial plants .....	80
9a.	Plants with rhizomatic creeping stems; flowers up to 20 cm across; thalamus fleshy .....	11. <i>Nelumbonaceae</i>
b.	Plants with root stock; flowers not exceeding 15 cm in diam.; thalamus not fleshy .....	10. <i>Nymphaeaceae</i>
10a.	Fruits enveloped by thickened fleshy calyx .....	2. <i>Dilleniaceae</i>
b.	Fruits not as above .....	11
11a.	Carpels free .....	1. <i>Ranunculaceae</i>
b.	Carpels united .....	12
12a.	Placenta free-central; plants prostrate, fleshy herbs .....	22. <i>Portulacaceae</i>
b.	Placenta not free-central; plants otherwise .....	13
13a.	Leaves opposite or whorled .....	14
b.	Leaves alternate .....	15
14a.	Trees with resinous juice .....	24. <i>Clusiaceae</i>
b.	Spinous shrubs without resinous juice; ovary inferior .....	82. <i>Punicaceae</i>
15a.	Ovary usually on gynophore .....	15. <i>Capparaceae</i>

- b. Ovary sessile, not on gynophore;  
anthers horse-shoe shaped ..... 17. *Bixaceae*
- 16a. Flowers unisexual ..... 17
- b. Flowers bisexual ..... 19
- 17a. Flowers trimerous ..... 18
- b. Flowers not trimerous; showy; ovaries  
many; ovules- 2 ..... 5. *Schizandraceae*
- 18a. Leaves digitate, 3-7 foliate ..... 9. *Lardizabalaceae*
- b. Leaves simple; flowers minute, ovule solitary..... 7 *Menispermaceae*
- 19a. Flowers usually with a few large conspicuous  
sterile outer flowers in corymbs ..... 71. *Hydrangeaceae*
- b. Flowers without sterile conspicuous outer  
flowers; inflorescence varied ..... 20
- 20a. Petals 4; stamens 6 ..... 14. *Brassicaceae*
- b. Petals 5; stamens as many as twice the petals ..... 21
- 21a. Ovary 1-celled; stamens 3-5; sepals persistent ..... 22
- b. Ovary 2-many-celled; sepals usually deciduous,  
rarely persistent ..... 23
- 22a. Petals unequal ..... 16. *Violaceae*
- b. Petals equal ..... 21. *Caryophyllaceae*
- 23a. Flowers regular or nearly regular ..... 24
- b. Flowers zygomorphic; dorsal sepal spurred..... 42. *Balsaminaceae*
- 24a. Sepals adnate to the ovary below ..... 67. *Saxifragaceae*
- b. Sepals free ..... 25
- 25a. Style single; leaves compound, fruit an  
inflated membranous capsule ..... 57. *Staphyleaceae*
- b. Styles 2-7 ..... 26
- 26a. Leaves simple ..... 27
- b. Leaves compound or lobate: ..... 28
- 27a. Petals absent; stamens fasciculate ..... 92. *Molluginaceae*
- b. Petals present; stamens free or connate at base ..... 29
- 28a. Flowers actinomorphic; spur absent ..... 30
- b. Flowers zygomorphic; spur present ..... 31
- 29a. Herbs or shrubs; sepals quinquefoliate; stamens  
5-10, connate at base ..... 35. *Linaceae*
- 30a. Stipules absent; petals contorted ..... 39. *Oxalidaceae*
- 31a. Leaves peltate, digitately nerved; ovule  
1 in each loculus ..... 41. *Tropaeolaceae*
- b. Leaves not peltate, pinnately nerved;  
ovules several in each loculus ..... 42. *Balsaminaceae*
- 32a. Flowers 3-merous ..... 6. *Annonaceae*
- b. Flowers 4-5 merous ..... 34
- 33a. Plants succulents with minute leaves ..... 90. *Cactaceae*
- b. Plants not succulents ..... 34

34a.	Placenta usually parietal; some times axile.....	35
b.	Placenta otherwise. not parietal .....	38
35a.	Ovary stipitate; seeds winged.....	61. <i>Moringaceae</i>
b.	Ovary 3 superior not stipitate; seed not winged .....	36
36a.	Stamens numerous, opposite the petals.....	18. <i>Flacourtiaceae</i>
b.	Stamens few, alternating the petals .....	37
37a.	Stipules present; ovary inferior or semi-inferior.....	74. <i>Hamamelidaceae</i>
b.	Stipules & petals absent; ovary superior.....	161. <i>Buxaceae</i>
38a.	Stamens monadelphous .....	39
b.	Stamens free of polyadelphous .....	47
39a.	Leaves opposite .....	25. <i>Hypericaceae</i>
b.	Leaves alternate .....	40
40a.	Sepals 2 or 3 .....	<i>Papaveraceae</i>
b.	Sepals 4 or 5 .....	41
41a.	Anthers 1-loculed .....	42
b.	Anthers 2-loculed .....	43
42a.	Carpels many, separating from axis at maturity.....	30. .... <i>Malvaceae</i>
b.	Carpels 2-5. not detaching from axis at maturity .....	31. <i>Bombacaceae</i>
43a.	Staminode present; fruit a dehiscent woody capsule; seeds winged.....	32. <i>Sterculiaceae</i>
b.	Staminode absent; fruit not as above .....	44
44a.	Anthers basifixed; seeds few .....	45
b.	Anthers dorsifixed, versatile; seeds many .....	46
45a.	Petals contorted; stamens united into a tube .....	46. <i>Meliaceae</i>
b.	Petals imbricate; stamens not united into a tube .....	26. <i>Theaceae</i>
46a.	Climbers; flowers unisexual; anther-cells opening by lateral slits .....	27. <i>Actinidiaceae</i>
b.	Trees or shrubs; flowers bisexual; anther-cells opening by terminal pores or slits .....	28. <i>Saurauiceae</i>
47a.	Tendrils present; inflorescence leaf-opposed .....	53. <i>Vitaceae</i>
b.	Tendrils absent; inflorescence axillary terminal .....	48
48a.	Leaves pellucid, gland-dotted, stamens obdiplostaminous .....	43. <i>Rutaceae</i>
b.	Leaves not as above: stamens free.....	49
49a.	Sepals persistent in fruits, often accrescent .....	29. <i>Dipterocarpaceae</i>
b.	Sepals deciduous, when persistent not accrescent .....	50
50a.	Leaves opposite.....	51
b.	Leaves alternate .....	52
51a.	Stamens 8, monadelphous; seeds strophiolate .....	20. <i>Polygalaceae</i>
b.	Stamens 10, free, seeds estrophiolate .....	37. <i>Malpighiaceae</i>
52a.	Leaves scale-like; stamens not more than 10.....	23. <i>Tamaricaceae</i>

b.	Leaves broad, not scale-like .....	53
53a.	Ovules numerous in each cell .....	19. Pittosporaceae
b.	Ovules 1 or 2 in each cell .....	54
54a.	Stamens numerous .....	55
b.	Stamens less than 10 .....	57
55a.	Venation palmate .....	33. Tiliaceae
b.	Venation pinnate; sepals imbricate in buds .....	56
56a.	Stipules present; stamens flat .....	3. Magnoliaceae
b.	Stipules absent; stamens terete .....	4. Illiciaceae
57a.	Flowers trimerous; erect shrubs; leaf-margin and tips spinous .....	8. Berberidaceae
b.	Flowers 4-5 merous; shrubs or trees; leaf-margins or lip not spinous .....	58
58a.	Leaves with 2-glands at base .....	44. Simaroubaceae
b.	Leaves without such glands .....	59
59a.	Stamens alternate to petals .....	60
b.	Stamens opposite to petals .....	67
60a.	Plants with resinous juice .....	59. Anacardiaceae
b.	Plants without resinous juice .....	61
61a.	Stamens 3 .....	51. Hippocrateaceae
b.	Stamens as many as or twice the petals .....	62
62a.	Stamens twice the number of petals .....	63
b.	Stamens as many as petals .....	65
63a.	Fruit a double samara with membranous 1-seeded winges .....	56. Aceraceae.
b.	Fruit otherwise, not a samara .....	64
64a.	Fruit a drupe .....	36. Erythroxylaceae
b.	Fruit a capsule; leaves scale-like .....	23. Tamaricaceae
65a.	Stamens 4-angled; ovary 1-celled .....	60. Cortariaceae
b.	Stamens cylindric; ovary more than 1-celled .....	66
66a.	Flowers in umbels or in umbellules; disc absent .....	49. Aquifoliaceae
b.	Flowers not in umbels or in umbellules; disc present, annular or of separate glands .....	50. Celastraceae
67a.	Fruits capsular, pod-like, torulose; stamens 6; leaves decomposed .....	13. Fumariaceae
b.	Fruits variously-shaped .....	68
68a.	Leaves simple .....	69
b.	Leaves compound .....	73
69a.	Stipular spines present; calyx valvate; free from the ovary; capsules separating into 1-seeded cocci .....	52. Rhannaceae
b.	Stipular spines absent .....	70
70a.	Petals imbricate .....	58. Sabiaceae



b.	Petals valvate .....	71
71a.	Petals cucullate .....	52. <i>Rhamnaceae</i>
b.	Petals not cucullate .....	72
72a.	Lianas: tendrils present: leaf-base peltate or subpeltate .....	48. <i>Erythropalaceae</i>
b.	Trees or erect shrubs: tendrils absent: leaf-base epeltate .....	47. <i>Oleaceae</i>
73a.	Fruit a deeply 5-lobed berry .....	40. <i>Averrhoaceae</i>
b.	Fruit baccate or capsule rarely drupe, not deeply 5-lobed: disc present .....	74
74a.	Leaflets entire .....	75
b.	Leaflets serrate or crenate .....	77
75a.	Stamens 5; filaments connate with the disc .....	46. <i>Meliaceae</i>
b.	Stamens 8-14; filaments: free .....	76
76a.	Ovules 1- pendulous: fruits drupaceous .....	59. <i>Anacardiaceae</i>
b.	Ovules 1-2 on axile placenta, not pendulous; fruits other wise .....	55. <i>Sapindaceae</i>
77a.	Petioles dilated at the base into sheathing stipules .....	54. <i>Leeaceae</i>
b.	Petioles not dilated at the base into sheathing stipules .....	78
78a.	Fruits winged .....	44. <i>Simaroubaceae</i>
b.	Fruits not winged .....	79
79a.	Fruit a capsule .....	46. <i>Meliaceae</i>
b.	Fruit a drupe .....	45. <i>Burseraceae</i>
80a.	Fruit a legume or lomentum .....	81
b.	Fruit not a legume or lomentum .....	83
81a.	Corolla papilionaceous .....	63. <i>Fabaceae</i>
b.	Corolla not papilionaceous .....	82
82a.	Flowers in racemes or panicles; petals imbricate or none .....	64. <i>Caesalpiniaceae</i>
b.	Flowers in globose or elongate spike; petals valvate .....	65. <i>Mimosaceae</i>
83a.	Stamens many .....	84
b.	Stamens 5-12 .....	87
84a.	Leaves stipulate; alternate .....	66. <i>Rosaceae</i>
b.	Leaves exstipulate .....	85
85a.	Fruit a berry only; ovary loculi superposed in 2- series, the lower axile, the upper one parietal placentation .....	82. <i>Punicaceae</i>
b.	Fruit a capsule; ovary otherwise .....	86
86a.	Carpels 4-20 .....	81. <i>Sonneratiaceae</i>
b.	Carpels 2-3 .....	80. <i>Lythraceae</i>
87a.	Gynoecium inferior or semi-inferior .....	88
b.	Gynoecium superior .....	110

88a.	Fruit 1-seeded .....	89
b.	Fruit 2-many seeded .....	90
89a.	Aquatic herbs; fruit with spines .....	84. <i>Trapaceae</i>
b.	Terrestrial, trees; fruit spineless smooth .....	78. <i>Myrtaceae</i>
90a.	Flowers in simple or compound umbels .....	91
b.	Flowers in racems, cymes or panicles .....	92
91a.	Plants herbaceous .....	93. <i>Apiaceae</i>
b.	Plants scandent or erect shrubs or trees .....	94. <i>Araliaceae</i>
92a.	Flowers unisexual .....	93
b.	Flowers bisexual .....	97
93a.	Terrestrial plants .....	94
b.	Aquatic plants .....	75. <i>Haloragaceae</i>
94a.	Flowers regular; stamens few-4 .....	95
b.	Flowers irregular; stamens many .....	88. <i>Begoniaceae</i>
95a.	Tendrils bearing climbers or trailing herbs .....	87. <i>Cucurbitaceae</i>
b.	Plants not tendril bearing; trees; anthers 2-locular .....	96
96a.	Small trees or tall shrubs : leaves digitately lobed; stamens 10, inserted on long corolla tube .....	86. <i>Caricaceae</i>
b.	Low trees; leaves orbicular; stamens numerous to few; petals absent .....	89. <i>Datisceae</i>
97a.	Anthers opening longitudinally .....	98
b.	Anthers opening by apical pores .....	103
98a.	Ovule solitary in each cell .....	99
b.	Ovules 2 or more in each cell .....	77. <i>Combretaceae</i>
99a.	Petals imbricate; stamens up to twice the number of petals .....	97. <i>Nyssaceae</i>
b.	Petals valvate; stamens as many as petals .....	100
100a.	Petals 5; stamens 5; fruit a capsule or berry .....	101
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101a.	Ovary semi-inferior; fruit a capsule .....	70. <i>Heaceae</i>
b.	Ovary completely inferior; fruit a berry .....	102
103a.	Plants medium sized trees .....	69. <i>Escalloniaceae</i>
b.	Plants shrubs only, armed or unarmed .....	68. <i>Grossulariaceae</i>
103a.	Connectives prolonged and appendaged or tubercled .....	79. <i>Melastomataceae</i>
b.	Connectives not as above .....	104
104a.	Ovary completely septate into separate cells; ligule in pairs .....	38. <i>Geraniaceae</i>
b.	Ovary incompletely septate with free central placenta .....	105
105a.	Petals crinkled .....	80. <i>Lythraceae</i>
b.	Petals not as above .....	106
106a.	Stamens 4-5; sepals connate below or adnate to ovary .....	67. <i>Saxifragaceae</i>

b.	Stamens 6-10 .....	107
107a.	Ovule 1 in each cell .....	96. <i>Alangiaceae</i>
b.	Ovules always more than 1 in each cell .....	108
108a.	Ovules numerous in each cell pendulous .....	83. <i>Onagraceae</i>
b.	Ovules 2-5 in each cell, pendulous .....	109
109a.	Ovary 1-celled .....	77. <i>Combretaceae</i>
b.	Ovary 2-6-celled .....	76. <i>Rhizophoraceae</i>
110a.	Plants insectivorous .....	111
b.	Plants not insectivorous .....	112
111a.	Leaves with a glandular tentacles .....	73. <i>Droseraceae</i>
b.	Leaves with bladder and glands, without tentacles .....	133. <i>Lentibulariaceae</i>
112a.	Tendrils present .....	85. <i>Passifloraceae</i>
b.	Tendrils absent .....	113
113a.	Fruits circumscissile .....	91. <i>Aizoaceae</i>
b.	Fruits not as above .....	114
114a.	Fruits capsular; placenta axile; seeds not arillate .....	92. <i>Molluginaceae</i>
b.	Fruits follicular, leaves fleshy .....	72. <i>Crassulaceae</i>
115a.	Ovary superior .....	116
b.	Ovary inferior .....	145
116a.	Plants parasitic, erect herbs or climbers, leafless .....	117
b.	Plants not-parasitic herbs, shrubs or trees .....	118
117a.	Plants climber, stems yellow .....	129. <i>Cuscutaceae</i>
b.	Plants herbaceous, root parasites, stems brown or yellow; flowers unisexual .....	132. <i>Orobanchaceae</i>
118a.	Plants with milky sap .....	119
b.	Plants without milky sap .....	123
119a.	Stigmatic surface flat cohering with or touching pollen-sac .....	120
b.	Stigmas simple, not cohering with pollen-sac or anthers .....	122
120a.	Stigmas rattle-shaped; follicle cohering .....	119. <i>Apocynaceae</i>
b.	Stigma and pollen-sac from gynostegium; follicle divericcate .....	121
121a.	Pollen-grains in pollinia, filaments connate.....	120. <i>Asclepiadaceae</i>
b.	Pollen-grains granular; filaments free .....	121. <i>Periplocaceae</i>
122a.	Leaves alternate; flowers fasciculate in the leaf-axils or at the nodes .....	113. <i>Sapotaceae</i>
b.	Leaves opposite or sub-opposite; flowers in axillary racemes or panicles .....	114. <i>Sarcospermaceae</i>
123a.	Leaves all alternate .....	124
b.	Leaves opposite, whorled or opposite and alternate on the same plant .....	133
124a.	Flowers unisexual .....	115. <i>Ebenaceae</i>
b.	Flowers bisexual .....	125

- 125a. Free central placentation ..... 126  
 b. Parietal placentation ..... 127
- 126a. Style solitary ..... *111. Primulaceae*  
 b. Style 5, distinct; calyx covered with stalked glands ..... *110. Plumbaginaceae*
- 127a. Leaves all radical ..... *140. Plantaginaceae*  
 b. Leaves not radical, opposite or alternate ..... 128
- 128a. Leaves gland-dotted ..... *112. Myrsinaceae*  
 b. Leaves not gland-dotted ..... 129
- 129a. Prostrate or climbing herbs or scandent shrubs; stamens sub-equals ..... *128. Convolvulaceae*  
 b. Erect herbs, shrubs or trees; stamens equal ..... 130
- 130a. Ovary 3-celled; fruits a loculicidal capsule ..... *125. Polemoniaceae*  
 b. Ovary 2-celled ..... 131
- 131a. Ovules many in each cell ..... 132  
 b. Ovules 1-4 in each cell ..... 142
- 132a. Corolla lobes imbricate; style 2 ..... *126. Hydrophyllaceae*  
 b. Corolla lobes plicate; style one ..... *130. Solanaceae*
- 133a. Flowers regular or subregular ..... 134  
 b. Flowers irregular ..... 137
- 134a. Stamens only 2 ..... *118. Oleaceae*  
 b. Stamens more than 2 ..... 135
- 135a. Stipules absent; anther-cells opening by longitudinal slits ..... *124. Gentianaceae*  
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- 136a. Fruits a berry ..... *123. Loganiaceae*  
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- 137a. Bracts conspicuous ..... *137. Acanthaceae*  
 b. Bracts inconspicuous, minute or absent ..... 138
- 138a. Leaves compound ..... *135. Bignoniaceae*  
 b. Leaves simple ..... 139
- 139a. Plants viscid, pubescent; seeds not albuminous ..... *134. Gesneriaceae*  
 b. Plants not viscid pubescent ..... 140
- 140a. Flowers irregular; ovary 1-2 celled; corolla tube not curved ..... *131. Scrophulariaceae*  
 b. Flowers regular; ovary 4-5 celled ..... 141
- 141a. Leafless parasitic herbs; anthers opening by two equal chinks; pollen in a mass ..... *109. Monotropaceae*  
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- 142a. Fruits spinous ..... *136. Pedaliaceae*

b.	Fruits not spinous .....	143
143a.	Inflorescence a helicoid cymes: leaves with hispid hairs .....	127. <i>Boraginaceae</i>
b.	Inflorescence otherwise .....	144
144a.	Ovary entire; style terminal .....	138. <i>Verbenaceae</i>
b.	Ovary 4-lobed: styles gynobasic .....	139. <i>Lamiaceae</i>
145a.	Ovary 1-celled .....	146
b.	Ovary more than 1-celled .....	150
146a.	Inflorescence a head .....	147
b.	Inflorescence varied, never a head .....	148
147a.	Calyx limb cup-shaped 4-lobed; stamens 4, anthers free .....	101. <i>Dipsacaceae</i>
b.	Calyx limb 0 or reduced to pappus; stamens 5; anthers cohering in a tube round the style .....	102. <i>Asteraceae</i>
148a.	Stamens 3 .....	100. <i>Valerianaceae</i>
b.	Stamens 5; leaves simple .....	149
149a.	Ovules solitary, pendulous .....	98. <i>Caprifoliaceae</i>
b.	Ovules 5 or more, not pendulous .....	112. <i>Myrsinaceae</i>
150a.	Leaves with inter or intrapetiolar stipules .....	99. <i>Rubiaceae</i>
b.	Leaves without such stipules .....	151
151a.	Stamens more than twice the number of corolla lobes, epipetalous; ovules pendulous .....	117. <i>Symplocaceae</i>
b.	Stamens as many as twice the corolla lobes; ovules axile .....	152
152a.	Stamens usually 5; anthers dehisces longitudinally .....	153
b.	Stamens usually 10; anthers dehisces by slits .....	156
153a.	Fruits with persistent cupular calyx .....	116. <i>Styracaceae</i>
b.	Fruit without persistent cupular calyx .....	154
154a.	Corolla 2-tipped, cleft dorsally to the base, anthers connate: capsule 2-valved at the crown .....	104. <i>Labeliaceae</i>
b.	Corolla regular; anthers free or imperfectly connate .....	155
155a.	Fruit a capsule, membranous, breaking up irregularly .....	105. <i>Sphenocleaceae</i>
b.	Fruit a capsule, dehiscent at the base or sides outside the calyx teeth .....	103. <i>Campanulaceae</i>
156a.	Calyx free at anthesis; fruit a capsule .....	106. <i>Ericaceae</i>
b.	Calyx partly connate with ovary at anthesis; fruit a berry .....	107. <i>Vacciniaceae</i>
157a.	Plants aquatic .....	147. <i>Podostemaceae</i>
b.	Plants terrestrial .....	158
158a.	Stipules ochraceous .....	146. <i>Polygonaceae</i>
b.	Stipules when present, not ochraceous .....	159
159a.	Perianth present .....	160
b.	Perianth absent .....	184

160a.	Flowers bisexual .....	161
b.	Flowers unisexual .....	173
161a.	Leaves with silvery or stellate scales beneath .....	157. <i>Elaeagnaceae</i>
b.	Leaves without such scales .....	162
162a.	Plants climbers; fruits many seeded .....	149. <i>Aristolochiaceae</i>
b.	Plants herbs, shrubs or trees not climbers .....	163
163a.	Anthers dehiscing by 2 or 4 upcurled lids .....	154. <i>Lauraceae</i>
b.	Anthers not dehiscing by lids .....	164
164a.	Flowers ebracteate .....	165
b.	Flowers bracteate .....	166
165a.	Stems twining; bracteoles adnate to the perianth; anthers versatile .....	144. <i>Basellaceae</i>
b.	Stems not twining; bracteoles free from the perianth; anthers erect or incurved in buds .....	143. <i>Chenopodiaceae</i>
166a.	Bracts much longer than the fruits and adnate to them as wings; leaves compound .....	166. <i>Juglandaceae</i>
b.	Bracts otherwise .....	167
167a.	Trees; perianth variously splitting, spirally curved backwards .....	155. <i>Proteaceae</i>
b.	Herbs or scandent shrubs .....	168
168a.	Perianth corolline .....	169
b.	Perianth calycine .....	170
169a.	Plants parasitic .....	158. <i>Loranthaceae</i>
b.	Plant non-parasitic .....	141. <i>Nyctaginaceae</i>
170a.	Plants parasitic (roots or otherwise) .....	159. <i>Santalaceae</i>
b.	Plants non parasitic .....	171
171a.	Flowers petalous .....	172
b.	Flowers apetalous; stamens 30-50 inserted on a fleshy disc; fruit drupe- like .....	145. <i>Phytolaccaceae</i>
172a.	Perianth and bracts scarious .....	142. <i>Amaranthaceae</i>
b.	Perianth and bracts not as above; stamens twice the perianth lobes .....	156. <i>Thymelaeaceae</i>
173a.	Plants parasitic .....	174
b.	Plants non-parasitic herbs, shrubs or trees .....	175
174a.	Flowers large, solitary; ovules numerous .....	148. <i>Rafflesiaceae</i>
b.	Flowers densely crowded in an inflorescence; ovules solitary .....	160. <i>Balanophoraceae</i>
175a.	Seeds enclosed by often aromatic arils .....	168. <i>Myristicaceae</i>
b.	Seeds without arils .....	176
176a.	Ovary 1-loculed; 1-ovuled .....	177
b.	Ovary 2 or 3 loculed; 2-many ovuled .....	181
177a.	Flowers crowded inside a fleshy receptacle; latex present .....	164. <i>Moraceae</i>

- Flowers not in a fleshy receptacle: latex absent ..... 178
- 178a. Anthers erect, not inflexed in buds ..... 179
  - b. Anthers usually inflexed at ends; fruit an achene; leaves stipulate ..... 163. *Urticaceae*
- 179a. Plants aquatic; leaves verticillate, dichotomously cleft into filiform minute toothed lobes; stamens 12-30 with truncate connectives ..... 172. *Ceratophyllaceae*
  - b. Plants terrestrial ..... 180
- 180a. Fruit an achene ..... 166. *Ulmaceae*
  - b. Fruit a samara or a drupe ..... 165. *Cannabaceae*
- 181a. Leaves exstipulate ..... 168. *Myricaceae*
  - b. Leaves mostly stipulate : ..... 182
- 182a. Plants with milky sap : styles 3 or more; fruit a capsule, rarely drupe, 3-12 celled: 3-24 seeded ..... 162. *Euphorbiaceae*
  - b. Plants without milky latex; fruits otherwise ..... 183
- 183a. Plants with watery sap, styles and locules 3; fruit subtended by a cupular involucre (involucre often spiny covering the fruit); integuments-2 ..... 169. *Fagaceae*
  - b. Plants without sap (milky or watery); styles and locules 1-2; fruits not subtended by involucre (usually arranged in a cone-like fashion); seed integument one (1) ..... 170. *Betulaceae*
- 184a. Inflorescence a cyathium ..... 162. *Euphorbiaceae*
  - b. Inflorescence not as above ..... 185
- 185a. Inflorescence a syconium ..... 164. *Moraceae*
  - b. Inflorescence not as above ..... 186
- 186a. Monoecious; fruit a globose drupe resinous and succulent; male spike branched ..... 168. *Myricaceae*
  - b. Trees; leaves finely serrulate crenulate ..... 187
- 187a. Dioecious; fruit an ovoid or lanceolate capsule; not succulent; male spike unbranched ..... 171. *Salicaceae*
  - b. Shrubs; climbers or herbs; leaves quite entire leaves finely serrulate crenulate ..... 188
- 188a. Leaves opposite, stipulate; stipules often caducous, stipular scars visible ..... 152. *Chloranthaceae*
  - b. Leaves without stipules ..... 189
- 189a. Spikes with a basal whorl of 4 patent white bracts; seeds 2-4 in each fruit ..... 151. *Saururaceae*
  - b. Spikes without such bracts; seeds solitary in each fruit ..... 150. *Piperaceae*
- 190a. Flowers in the axils of glumes or between two glumes: glumes imbricate in spikelets or heads ..... 191
  - b. Flowers not as above; bracts when present not glumaceous ..... 195
- 191a. Perianth segments not petaloid, reduced or absent ..... 192

- b. Perianth segments petaloid 3, yellow ..... 194. *Nyctaginaceae*
- 192a. Inflorescence a solitary head or spirally ribbed peduncle ..... 205. *Eriocaulaceae*
- b. Inflorescence not as above ..... 193
- 193a. Ovules many ..... 196. *Juncaceae*
- b. Ovules solitary ..... 193
- 194a. Culms usually triangular; leaves 3-ranked; anthers basifixed; stigmas not feathery; fruit an achene ..... 206. *Cyperaceae*
- b. Culms usually cylindrical; leaves 2-ranked; anthers versatile; stigmas feathery; fruit a caryopsis ..... 207. *Poaceae*
- 195a. Flowers bisexual ..... 196
- b. Flowers unisexual ..... 216
- 196a. Flowers surrounded by thread-like or spatulate forked scales arranged in spike ..... 199. *Typhaceae*
- b. Flowers scales otherwise ..... 197
- 197a. Perianth distinguishable into two heteromorphic series; the outer series sepaloid ..... 198
- b. Perianth segments of the same colour, sepaloid or petaloid, all or all but one resembling each other in form ..... 198
- 198a. Ovary superior ..... 199
- b. Ovary inferior ..... 200
- 199a. Pistil solitary ..... 195. *Commelinaceae*
- b. Pistil 3 or more ..... 202. *Alismataceae*
- 200a. Petiole pulvinate ..... 179. *Marantaceae*
- b. Petiole not pulvinate ..... 201
- 201a. Plants often epiphytes; stamens 6 ..... 182. *Bromeliaceae*
- b. Plants not epiphytes; fertile stamens 1 ..... 202
- 202a. Calyx free; anthers 1-celled; style flattened ..... 181. *Cannaceae*
- b. Calyx tubular or spathaceous; anthers 2-celled; styles slender ..... 178. *Zingiberaceae*
- 203a. Gynoecium consisting of 2 or more free pistils, each or 1-celled carpel ..... 204. *Potamogetonaceae*
- b. Gynoecium consisting of one pistil of one carpel or 2 or more carpels united completely; style connate atleast at base ..... 204
- 204a. Ovary superior ..... 205
- b. Ovary inferior ..... 209
- 205a. Plants aquatic ..... 143. *Pontederiaceae*
- b. Plants terrestrial ..... 206
- 206a. Plants climbers ..... 208
- b. Plants herbaceous, not climbing; leaves mostly with parallel venation ..... 207
- 207a. Leaves with parallel venation; stem not prickly ..... 187. *Stemonaceae*



- b. Leaves with reticulate venation; stem often prickly ..... 192. *Smilacaceae*
- 208a. Ovary 1-celled ..... 185. *Taccaceae*
  - b. Ovary 2 or more-celled ..... 189. *Liliaceae*
- 209a. Flowers zygomorphic ..... 177. *Orchidaceae*
  - b. Flowers actinomorphic ..... 210
- 210a. Plants scapose ..... 211
  - b. Plants without scapes ..... 215
- 211a. Flowers subtended or enclosed within spathaceous bracts ..... 212
  - b. Flowers ebracteate or bracts not spathaceous ..... 213
- 212a. Ovary 6-celled; styles 6 ..... 175. *Hydrocharitaceae*
  - b. Ovary 3-celled; style 1, may be 3-lobed in stigmatic region ..... 190. *Amaryllidaceae*
- 213a. Leaves fibrous, spine-tipped; inflorescence terminal; flowers in panicle, perianth segments connate to the middle or more ..... 187. *Agavaceae*
  - b. Leaves neither fibrous nor spine tipped; inflorescence radicle ..... 214
- 214a. Flowers blue or purple ..... 176. *Burmanniaceae*
  - b. Flowers yellow ..... 191. *Hypoxidaceae*
- 215a. Stamens 3; flowers large, about 5 cm across, blue ..... 183. *Iridaceae*
  - b. Stamens 6; flowers small, yellow, white or pinkish in racemes ..... 184. *Haemodoraceae*
- 216a. Plants aquatic or marshy ..... 217
  - b. Plants terrestrial or epiphytic herbs or climbers ..... 218
- 217a. Free floating minute herbs, with leaf-like fronds; stamens 1-2 ..... 201. *Lemnaceae*
- 218a. Plants twiners, dioecious; leaves bracts simple or absent ..... 185. *Dioscoreaceae*
  - b. Plants herbaceous, epiphytic or woody; bracts otherwise ..... 219
- 219a. Plants tubiferous herbs, terrestrial or epiphytic; perianth none or rudimentary; leaves 3-sect ..... 200. *Araceae*
  - b. Plants woody or stem formed by imbricate base of leaf-petioles ..... 220
- 220a. Stem formed by imbricate bases of leaf-petioles; bracts spathaceous ..... 180. *Musaceae*
  - b. Stem woody ..... 221
- 221a. Leaves spirally arranged, spinulose ..... 198. *Pandanaceae*
  - b. Leaves neither spirally arranged nor spinulose; only petioles beset with spines ..... 197. *Arceaceae*
- 222a. Leaves with resin canals, acicular, usually linear or needle-shaped; fruit a woody cone ..... 173. *Pinaceae*
  - b. Leaves without resin canals, bifarious, linear, flattened; fruit drupaceous ..... 174. *Taxaceae*

## SYSTEMATIC ACCOUNT

## 1. RANUNCULACEAE

(A. L. de Juss. Gen. Pl. 231. 1789).

(A.S. Chauhan &amp; D.P. Dam)

- 1a. Plants woody shrubs or climbers ..... 2  
 b. Plants herbaceous ..... 3
- 2a. Plants climbing by means of twining petioles;  
 petals absent ..... 3. *Clematis*  
 b. Plants climbing by means of leaf tendrils;  
 petals present ..... 6. *Naravelia*
- 3a. Flowers actinomorphic; carpels 1 ovuled ..... 4  
 b. Flowers zygomorphic; carpels many ovuled ..... 6
- 4a. Leaves spirally arranged; petals present;  
 ovules erect ..... 7. *Ranunculus*  
 b. Leaves basal as well as on stems; petals absent;  
 ovules pendulous ..... 5
- 5a. Leaves all basal; flowers in umbeliform cymes ..... 2. *Anemone*  
 b. Leaves basal as well as on stems;  
 flowers in racemes or panicles ..... 8. *Thalictrum*
- 6a. Annual herbs; petals solitary;  
 follicles solitary ..... 4. *Consolida*  
 b. Perennial, rarely annual herbs;  
 petals 2 or 4; follicles 3-12 ..... 7
- 7a. Petals 2; upper most sepal broader,  
 boat or helmet shaped ..... 1. *Aconitum*  
 b. Petals 4; upper most sepal elongated  
 into a spur ..... 5. *Delphinium*

1. *Aconitum* L.

- 1a. Lowest pedicels up to 5 cm long; carpels 6,  
 obliquely oblong, glabrous ..... 1. *A. etwesii*  
 b. Lowest pedicel up to 2.5 cm long;  
 carpels 5, oblong, pubescent ..... 2. *A. nagarum*

1. *Aconitum elwesii* Stapf in Ann. R. Bot. Gard. Calc. 10 : 74, t. 112 A. 1905; Rau in Sharma *et. al.* Fl. India 1 : 10. 1993; Deb in Bull. Bot. Surv. India 3 : 315. 1961; Hara. Fl. E. Himal. 86. 1966. *A. uncinatum auct. non L.* 1735; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 28. 1972.

Stems 1.5-2 cm, scrambling, branched, slender, crispo-pubescent from adpressed reversed hairs. Leaves 6-10 × 1-2.5 cm, cordate-ovate or rotundate, with 0.5-1.5 cm deep sinus, unequally 2 lobed to the middle, lobes acuminate, coarsely crenate, apiculate, petioles ca 3 cm long. Flowers few to many blue or violet in axillary and terminal racemose or sub-paniculate raceme, nodding; pedicels up to 5 cm long, recurved, upper most sepal helmet shaped, semi-elliptic; lateral sepal sub-orbicular, 1.5-1.6 cm; lower deflexed 1-1.3 cm, oblong obtuse, ca 5 cm long, slightly 2-lobed; filaments ca 6 mm long, united up to or beyond the middle; carpels 6, obliquely oblong, globose. Follicles ca 1.3 cm long, oblong, divergent.

*Fl. & Fr.* : July-September.

*Specimens examined*: Sirohee, Mukerjee 3518 (CAL).

2. *Aconitum nagarum* Stapf in Ann. R. Bot. Gard. Calc. 10 : 176 t. 113. 1905; Rau in Sharma *et. al.*, Fl. India 1 : 19. 1993; Deb in Bull. Bot. Surv. India 3 : 315. 1961. *A. ferox auct. non Wallich ex Seringe*; C.B. Clarke in J. Linn. Soc. 25 : 3. 1889.

Roots tuberous, stems erect, ca 1 m tall, terete, finely pubescent with adpressed reversed hairs. Leaves scattered, 3-partite, 12-20 × 5-8 cm, cordate-reniform, with 5-11 cm deep sinus, 3-lobed, lateral lobes unequally 2-lobed; lobules acute, 1-2 dentate, sharply and coarsely dentate; basal petioles ca 60 cm long, winged, sulcate and amplexicauline, upper ones shorter. Flowers in terminal and axillary over 30 cm long racemes; pedicels up to 2.5 cm long, erect or sub-erect, bracts foliaceous, 3-partite; upper sepal helmet shaped, ca 1.8 cm long, semi orbicular, lateral sepals ca 1.5 cm long sub-orbicular, oblique, lower sepals deflexed, ca 1 cm long, elliptic, sub-acute; claw ca 1.6 cm long, very slender; carpels 5, oblong, pubescent. Follicles oblong, truncate, minutely pubescent.

*Fl. & Fr.* : July-October.

*Specimens examined* : Sirohee, Mukerjee 3515 (CAL).

## 2. Anemone L.

*Anemone rivularis* Buch - Ham. ex DC., Syst. Nat. 1 : 211. 1817; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 9. 1872; Rau in Sharma *et al.*, Fl.

India 1 : 35, 1993; Kanjilal *et al.*, Fl. Assam 1 : 7, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961.

Rhizomatous perennial herbs, ca 40 cm tall. Leaves ternate; leaflets 4-7 × 3-5 cm, broadly elliptic, acute, cuneate at base often deeply 3-lobed, serrate; petioles 10-40 cm, peduncles 7-8 cm, ridged, pubescent. Flowers 2-5 cm across, bluish white outside, white inside, in simple or compound 2-bracteolate 10-30 cm long cymes; sepals 8-12 × 4-5 mm, elliptic. Achenes ca 8 mm, broadly elliptic or oblong, compressed, glabrous, bluish when ripe.

*Fl. & Fr.* : March-August.

*Specimens examined* : Japvo, G., Watt 684; Sirohce, Mukerjee 3181 (CAL).

### 3. Clematis L.

- 1a. Flowers 1-3 in axillary fascicles ..... 2
- b. Flowers many, in axillary or terminal racemes or panicles ..... 4
- 2a. Pedicels with a pair of acute leafy bracts near the middle.  
  achenes without feathery tails ..... 4. *C. cadmia*
- b. Pedicels without bracts; achenes with feathery tails ..... 3
- 3a. Flowers solitary or few; stamens and  
  achenes densely hairy ..... 1. *C. acutangula*
- b. Flowers 2-3; filaments and achenes glabrous ..... 6. *C. montana*
- 4a. Branches with 6-ribs; leaves pinnate; achenes  
  with long feathery hairs ..... 7. *C. puberula*
- b. Branches with more than 6-ribs ..... 5
- 5a. Filaments glabrous ..... 6
- b. Filaments hairy ..... 7
- 6a. Leaves simple or pinnately 3-foliolate;  
  filaments more or less produced ..... 2. *C. apiculata*
- b. Leaves bipinnate or if pinnate then more than 3-foliolate;  
  filaments not produced ..... 5. *C. gouriana*
- 7a. Flowers in decompound panicles; sepals spreading ..... 10. *C. wightiana*
- b. Flowers in panicles; sepals erect or sub-erect ..... 8
- 8a. Sepals not ribbed outside; filaments silky  
  below the middle only ..... 8. *C. roylei*
- b. Sepals ribbed outside; filaments hairy throughout ..... 9
- 9a. Sepals 5-7 mm wide; anthers twisted ..... 3. *C. buehananiana*
- b. Sepals 6-11 mm wide; anthers not twisted ..... 9. *C. wattii*

1. *Clematis acutangula* Hook. f. & Thomson in Hook f., Fl. Brit. India 1 : 3, 1872; Rau in Sharma *et al.*, Fl. India 1 : 56, 1993; Deb in Bull. Bot. Surv. India 3 : 316, 1961.

Slender woody climber. Leaves ternate or biternate; leaflets 2-5 × 1-4 cm, ovate to ovate-lanceolate, acute or acuminate, rounded or truncate at base, margins coarsely serrate, often 3-lobed, pubescent; petiole 5-8 cm. Flowers ca 1.6 cm, across, yellowish brown, solitary or a few in panicles; sepals 4 or 5, 2-16 × 4-6 mm, oblong-elliptic, acute purplish; stamens densely covered with long white hairs; styles ca 2.5 cm. Achenes ca 3 × 2 cm, ovate-elliptic, pubescent, brownish.

*Fl. & Fr.* : August - November.

*Specimens examined* : North Manipur, C.B. Clarke.

2. *Clematis apiculata* Hook. f. & Thomson in Hook f., Fl. Brit. India 1 : 4 1872; C.B. Clarke in J. Linn. Soc. 25: 3, 1889; Kanjilal *et al.*, Fl. Assam 1 : 3, 1934; Rau in Sharma *et al.*, Fl. India 1 : 57, 1993.

Slender woody climbers. Leaves opposite, 3-foliolate, rarely simple and 3-lobed; leaflets 2.5-7.2 × 0.8-4.5 cm, ovate-cordate, acuminate, crenate-serrate, membranous, pubescent on both surface; petioles 2.6-6.5 cm, patently hairy. Flowers in axillary fascicles with naked pedicels; tepals ca 4-7 × 1-3 mm, oblong, tomentose outside; stamens glabrous, connectives produced into a minute mucronate beyond the anther. Achenes ca 8 mm, broad, ovate or obovate, hairy.

*Fl. & Fr.* : June-October.

*Specimens examined* : Kaithemenba 1000 m, C.B. Clarke 42063 (CAL).

3. *Clematis buchananiana* DC., Syst. Nat. 1 : 140, 1817; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 6, 1872; Kanjilal *et al.*, Fl. Assam 1 : 5, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 60, 1993. *C. buchananiana* DC. vars. *rugosa*, *tortuosa* and *virifolia* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 6 1872. Fig. 1

Woody climbers; branches brownish pubescent. Leaves pinnately 3-7 foliolate; leaflets 7-12 × 4-10 cm, broadly ovate, acute or shortly acuminate, rounded or cordate at base, coarsely serrate or 3 lobed, densely pubescent beneath; petioles ca 1.2 cm long, thickened at base, hairy. Flowers ca 4.5 cm across, creamy white, in many flowered, 3-chotomously branched axillary panicles; sepals 2-3 × 0.5-0.6 cm, ovate, greenish-yellow, pubescent outside. Achenes ca 4.5 mm, ovate to elliptic, densely hairy.

*Fl. & Fr.* : October- February.

*Specimens examined* : Liugli 1350 m, G. Watt 6672 & 6678 : Ukhrul 2000 m, Mukerjee 2432; Manipur, Deb 1295 (CAL).

4. *Clematis cadmia* Buch. - Han. ex Hook. f. & Thomson, Fl. Ind. 5, 1855 & in Hook. f., Fl. Brit. India 1 : 2, 1872; Kanjilal *et al.*, Fl. Assam 1 : 2, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.* Fl. India 1:60, 1993.

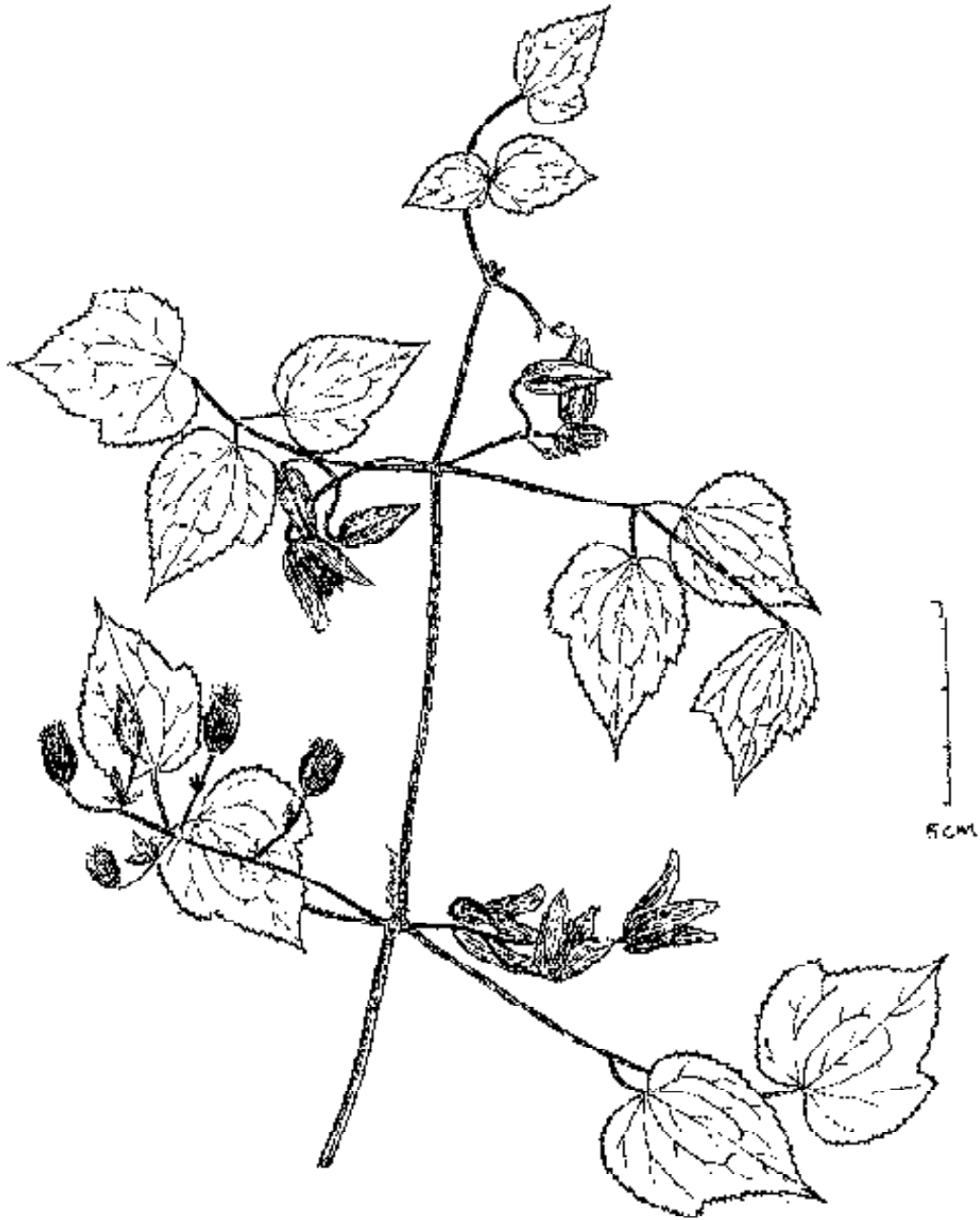


Fig. 1 : A flowering branch of *Clematis buchananiana* DC.

Sub-herbaceous climbers. Leaves biternate, 7-22.5 cm. leaflets 2-5 × 0.5-2 cm, ovate-lanceolate, acuminate, rounded at base, entire or minutely crenulate. Flowers solitary, axillary, bluish; pedicels 6-12 cm, bearing a pair of ovate acute bracts near the middle; sepals 2-5 × 0.6-2 cm, elliptic-oblongate, bluish-white styles 4-6 cm, short without straight hairs. Achenes ca 6 mm, ovate, compressed, long beaked, adpressed pubescent.

*Fl. & Fr.* : January-June.

*Specimens examined* : Imphal valley 1000 m, G. Watt 6241; Aowaching, Deb 2172 (CAL).

**5. Clematis gouriana** Roxb. ex DC., Syst. Nat. 1 : 138, 1817; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 4, 1872; Kanjilal *et al.*, Fl. Assam 1 : 4, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 64, 1993.

Fig. 2

Slender woody climber. Leaves pinnate, rarely ternate sometimes biternate; leaflets 7, ovate, 2.4-7.8 × 1.3-3.4 cm, acuminate, rounded at base, entire but distantly toothed at apex, glabrous or sparsely pubescent along veins; petioles not winged at base. Flowers ca 4.5 cm across, creamy white, in axillary, many flowered, 3-4-chotomously branched panicles; sepals 5-7 mm, elliptic, pubescent. Achenes ca 3 mm long, normally oblong, densely grey hairy with feathery tails.

*Fl. & Fr.* : October-January.

*Specimens examined* : Imphal, Deb 616; Thunginaibang, Deb 283 (CAL).

**6. Clematis montana** Buch.-Ham. ex DC., Nat. 1 : 164, 1817; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 2, 1872; Kanjilal *et al.*, Fl. Assam 1 : 3, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961, subsp. *montana* var. *manipurensis* Bruehl in Ann. R. Bot. Gard. Calc. 5 : 74, 1896; Rau in Sharma *et al.*, Fl. India 1 : 71, 1993.

Woody climber. Leaves ternate; leaflets ovate, 3-7 × 1-3.5 cm, toothed, acute, 3-nerved from the base; petiole tendril like, ca 5 cm long. Flowers solitary fragrant, pinkish white or yellowish white, pedicel long, taller than the leaves; sepals 4, elliptic glabrous outside, hairy inside, narrowly acuminate; filaments glabrous. Achenes ovate ca 5 × 4 mm, glabrous.

*Fl. & Fr.* : April-October.

*Specimens examined* : Japvo, G. Watt 6439 & 11443; Sirohce furat, G. Watt 6439 (CAL).

**7. Clematis puberula** Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 4, 1872; Kanjilal *et al.*, Fl. Assam 1 : 3, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 72, 1993.

Slender woody climber. Leaves pinnate; leaflets 2.5-4 cm, ovate lanceolate, toothed or 3-lobed, sparsely hairy on both surfaces. Flowers rather small in few flowered axillary panicles; sepals elliptic, spatulate, whitish pubescent outside. Achenes silky.



Fig. 2 : A branch of *Clematis gouriana* Roxb. ex DC.



*Fl. & Fr.* : August - November.

*Specimens examined* : Tosem 700 m, Mukerjee 2570 (CAL).

8. *Clematis roylei* Rehd. in J. Arn. Arb. 22 : 575, 1941; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 74, 1993. *Clematis nutans* Royle. Illus. Bot. Himal. 51, 1834; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 5, 1872; Kanjilal *et al.*, Fl. Assam 1 : 5, 1934.

Woody climber. Leaves decompositely pinnate; leaflets 2.5-7.5 cm, ovate, oblong or lanceolate, deeply acutely or obtusely 3-5 lobed, rarely entire. Flowers panicles, yellow, sepals oblong, many nerved, silky outside, filaments narrow, linear, silky below the middle, ovate, silky hairy.

*Fl. & Fr.* : November - February.

*Specimens examined* : Tosem, Mukerjee 34758; Mukerjee 3583 (CAL).

9. *Clematis wattii* J. R. Drum. & Craib in Kew Bull. 1915: 421, 1915; Gupta in Bull. Nat. Bot. Gard. Lucknow 54: t. 20, 1960 & 80: t. 46, 1963; Kapoor in Bull. Nat. Bot. Gard. Lucknow 78 : 85, 1962 & 124: 80, 1966; Rau in Sharma *et al.*, Fl. India 1 : 79, 1993.

Climbers; branches, leaves, petioles and inflorescence axes all densely villous or tomentose-villous; branches ribbed. Leaves 5-foliolate, up to 25 cm long; leaflets simple or 2-3 lobed, 5-7 nerved from base. Inflorescence laxely 3-9 flowered; bracts foliaceous; sepals 4, oblong, oblanceolate or obovate, ca 2.6 × 0.8 cm, yellow, densely villous outside, filaments hairy, connectives slightly produced. Achenes ca 4 mm long, compressed, brown, hairy at margins.

*Fl. & Fr.* : January-March.

*Specimens not seen.*

10. *Clematis wightiana* Wallich ex Wight & Arn., Prodr. 2 : 1834; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 5, 1872; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 81, 1993.

Woody climber. Leaves pinnate; leaflets usually 5, 3-5 lobed, 5 cm, orbicular or ovate cordate, densely villous and brown below, glabrous above. Flowers in decompound panicles, sepals 4, brown tomentose outside; filaments silky below the middle, glabrous at the base and tip. Achenes silky.

*Fl. & Fr.* : October - January.

*Specimens examined* : Morch 300 m, Deb 661 (CAL).

#### 4. *Consolida* (DC.) S.F. Gray

*Consolida ajacis* (L.) Schur. verh. Siebenurg Ver. Naturf. 4 : 47, 1853; Janchen in Feddes Report. 72 : 34, 1966. *Delphinium ajacis* L., Sp. Pl. 351, 1753; Deb in Bull. Bot. Surv. India 3 : 315, 1961

Herb. Leaves palmately lobed. Flowers in simple racemes, commonly known as Larkspur & cultivated in the garden.

*Specimens examined* : Cultivated in Imphal, Deb 201 (CAL).

### 5. *Delphinium* L

*Delphinium altissimum* Wallich, Cat. 167, N. 4718. 1831, *nom. nud.* Pl. Asiat. Rar. 2 : 25, t. 128. 1831; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 26. 1872; Kanjilal *et al.*, Fl. Assam 1: 9. 1934; Deb in Bull. Bot. Surv. India 3: 315. 1961; Rau in Sharma *et al.*, Fl. India 1: 86, 1993. *Delphinium altissimum* subsp. *wallichii* var. *nepalensis* Bruehl in Ann. Bot. Gard. Calc. 5: 101. 1896.

Stem up to 1.5 m tall, pubescent with deflexed hairs. Leaves palmately lobed, 5 - 7 fid; segments broadly cuneate, coarsely toothed, sparsely hairy above, ciliate along the nerves beneath. Racemes lax, 2 - 4 flowered, purple or lucid-blue, pedicels 1 - 5 cm long; bracts and bracteoles linear; petals - 4, upper blade bidentate at apex. Folicles 3, cylindrical divergent, pubescent.

*Fl. & Fr.*: July - September

*Specimens examined* : Sirohce, Mukerjee (CAL).

### 6. *Naravellia* DC, *nom. cons.*

*Naravellia zeylanica* (L.) DC. Syst. Nat. 1: 167. 1817; Hook. f. & Thomson. Fl. Ind. 1: 7. 1855 & in Hook. f., Fl. Brit. India 1: 7. 1872; Kanjilal *et al.*, Fl. Assam 1: 6. 1934; Deb in Bull. Bot. Surv. India 3: 316. 1961; Rau in Sharma *et al.*, Fl. India 1: 106. 1993. *Atragene zeylanica* L., Sp. Pl. 542. 1753.

Woody climbers. Leaves opposite; 2 - 5 foliolate; leaflets 3 - 12 x 3.5 - 10 cm, ovate, lobed, acuminate, base cordate or rounded. Panicles both terminal & axillary, 10 - 40 cm long. Flowers greenish - yellow, 1 - 1.5 cm across; sepals 0.6 x 0.3 mm, adpressed, elliptic-ovate, densely pubescent; petals 6 - 12 narrow, ca 7 x 1 mm spatulate; stamens numerous, yellow; style 3 - 4 cm. Achenes long pointed at both ends, shortly stipitate, with 5 - 7.5 cm long, tail horny.

*Fl. & Fr.*: October - March.

*Specimens examined* : Languat, Deb 2 (CAL).

### 7. *Ranunculus* L.

- |     |  |                           |
|-----|--|---------------------------|
| 1a. | Flowers 0.5 - 0.7 cm across .....  | 2                         |
| b.  | Flowers (0.5) 1.2 - 2.5 cm across .....  | 3                         |
| 2a. | Annual, erect, glabrous herbs; flowers many in diffuse racemes;<br>achenes obovoid .....       | 4. <i>R. scleratus</i>    |
| b.  | Perennial, prostrate hirsute herbs, flowers solitary,<br>axillary; achenes sub-orbicular ..... | 2. <i>R. diffusus</i>     |
| 3a. | Sepals reflexed .....  | 1. <i>R. cantoniensis</i> |
| b.  | Sepals not reflexed .....  | 3. <i>R. hirtellus</i>    |

1. **Ranunculus cantoniensis** DC., Prodr. 1 : 43. 1824; Deb in Bull. Bot. Surv. India 3 : 316. 1961; Rau in Sharma *et al.*, Fl. India 1 : 117. 1993. *R. pennsylvanicus* auct. non L. f., 1781; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 19. 1872, *p.p.*; Kanjilal *et al.*, Fl. Assam 1 : 9. 1934; Deb in Bull. Bot. Surv. India 3 : 316. 1961.

Mani.: *Lallucauba*

Erect herbs, up to 60-90 cm. Leaves ternately divided into 3 leaflets; deeply 3-lobed, appressed, pubescent, ternatisect or leaf opposed, shorter petioled. Flowers solitary 1-2 cm diam., reflexed; petals ovate-obovate, 7-8 × 3-5 mm, yellow. Achenes broadly elliptic, compressed with an intra marginal-rib and short straight beak.

*Fl. & Fr.* : February-October.

*Specimens examined* : Imphal valley, G. Watt 5998 : Maram, Deb 2050; Chingsao, G. Watt 5927; Chaitar Mukerjee 2502 (CAL).

2. **Ranunculus diffusus** DC., Prodr. 1 : 38. 1824; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 19. 1872, *p.p.*; Kanjilal *et al.*, Fl. Assam 1 : 36. 1961; Rau in Sharma *et al.*, Fl. India 1 : 119. 1993.

Perennial prostrate herbs; with fibrous root and soft hairy stem. Leaves 3-lobed, margin shortly toothed, pubescent beneath 3.0 × 3.0 cm, petiole 5.0-10 cm long. Flowers solitary, axillary, yellow; sepals 6 elliptic; petals 0.4 × 0.3 cm. Achenes ca 0.15 cm, orbicular, brownish green.

*Fl. & Fr.* : March - August.

*Specimens examined* : Chaitar, Mukerjee 2509; Maram, Deb 1946 (CAL).

3. **Ranunculus hirtellus** Royle ex D. Don in Royle, Illus. Bot. Himal. 53. 1834; Hook. f. & Thomson, Fl. Ind. 1 : 34. 1855 & in Hook. f., Fl. Brit. India 1 : 18. 1872; Deb in Bull. Bot. Surv. India 3 : 316. 1961; Rau in Sharma *et al.*, Fl. India 1 : 121. 1993. *R. nivalis* auct. non L. 1753; Hook. f. & Thomson, Fl. Ind. 1 : 35. 1855.

Erect or decumbent herbs, 2-3 cm high, pubescent root stock fibrous. Leaves 3 lobed, not entire, radical, reniform, lateral segments often deeply 2-lobed; cauline, palmately 3-5 lobed. Flowers many, brightly yellow, 0.5-1.5 cm in diam; sepals hairy. Achenes glabrous or hairy, oblong or globose-inflated, style straight or hooked.

*Fl. & Fr.* : March- June.

*Specimens not seen.*

4. **Ranunculus scleratus** L., Sp. Pl. 54. 551. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 19. 1872; Kanjilal *et al.*, Fl. Assam 1 : 8. 1934; Deb in Bull. Bot. Surv. India 3 : 316. 1961; Rau in Sharma *et al.*, Fl. India 1 : 128. 1993. *R. indicus* Roxb., Wallich. Cat. 167, n. 4699. 1831. *nom. nud* & Fl. Ind. ed. 2 : 671. 1832.

Mani.: *Lallucauba*.

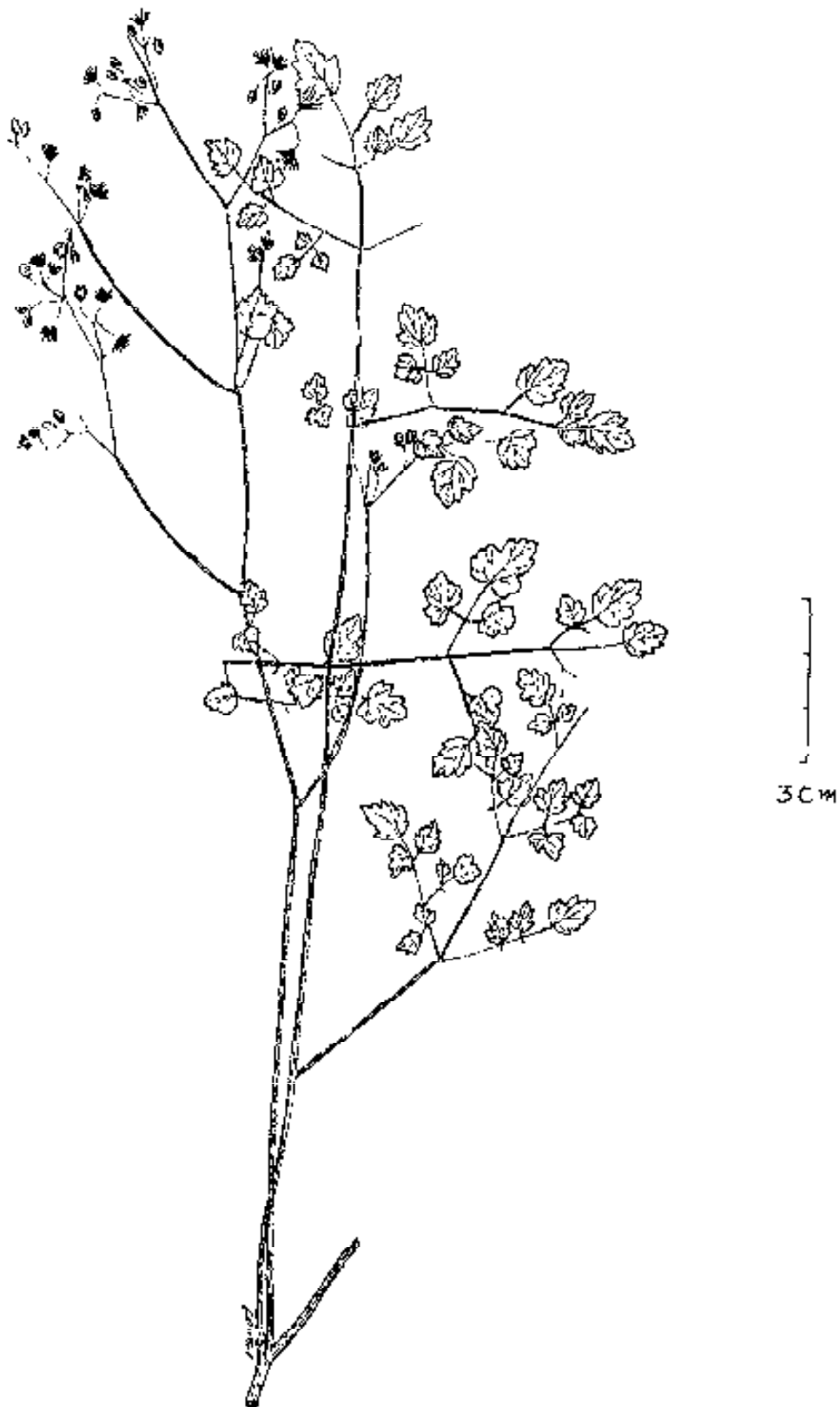


Fig. 3 : *Thalictrum foliolosum* DC.

Erect annual herbs, 30-60 cm high, stem fleshy fistular, usually glabrous. Radical leaves 3-lobed, 3-5 cm across, sub-orbicular, reniform, segments cuneate; cauline leaves sessile. Flowers in diffuse racemes; sepals as long as the petals, reflexed, yellow. Achenes ca 3 cm long, obovoid, compressed with a continuous intermarginal ridge all round.

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

*Specimens examined* : Imphal, Deb 162; Imphal, S.C. Sinha 1640; Kanongui valley, G. Watt 6168 (CAL).

### 8. *Thalictrum* L.

- 1a. Leaves pinnately decomposed; anthers mucronate at apex; 2-3 mm; style deciduous ..... 1. *T. foliolosum*.  
 b. Leaves ternately decomposed; anthers obtuse at apex, ca 1 mm; style persistent ..... 2. *T. javanicum*

1. *Thalictrum foliolosum* DC., Syst. Nat. 1 : 175, 1817. Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 14, 1872; Kanjilal *et al.*, Fl. Assam 1 : 7, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 136, 1993.

Fig. 3

Tall herbs, 1-3 m high. Leaves pinnately decomposed; leaflets 1.5-4 × 3.5 cm, broadly ovate, acute, bluntly toothed, glaucous beneath. Flowers in much branched axillary & terminal panicles, 0.2-0.3 cm long, pale green to purple, sepals ovate, caducous; anthers mucronate, 2-3 mm long; style deciduous. Achenes ellipsoid, 0.3 cm long, strongly ribbed.

*Fl. & Fr.* : May-September.

*Specimens examined* : Ukhrul, Mukerjee 3135; Anaching, Deb 2172 (CAL).

2. *Thalictrum javanicum* Blume, Bijdr. 2, 1925; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 13, 1872; Kanjilal *et al.*, Fl. Assam 1 : 8, 1834; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Rau in Sharma *et al.*, Fl. India 1 : 138, 1993. *T. glyphocarpus* Wight & Arn., Prodr. Fl. Ind. Or. 2, 1834; Wight, Ic. Fl. Ind. Or. 1 : t. 48, 1838.

Fig. 4

Bushy herbs up to 1 m high. Leaves ternately decomposed; leaflets 0.4-2 cm diam., ovate or orbicular, membranous, glabrous, somewhat glaucous beneath, 3-7 toothed; base cordate. Inflorescence laxly branched; branches ca 0.4 cm long. Flowers white, anthers obtuse, ca 1 mm long. Achenes up to 15, about 0.5 cm long, ellipsoid; strongly ribbed, glabrous, style persistent.

*Fl. & Fr.* : July-October.

*Specimens examined* : Sini, Mukerjee 3180 (CAL).

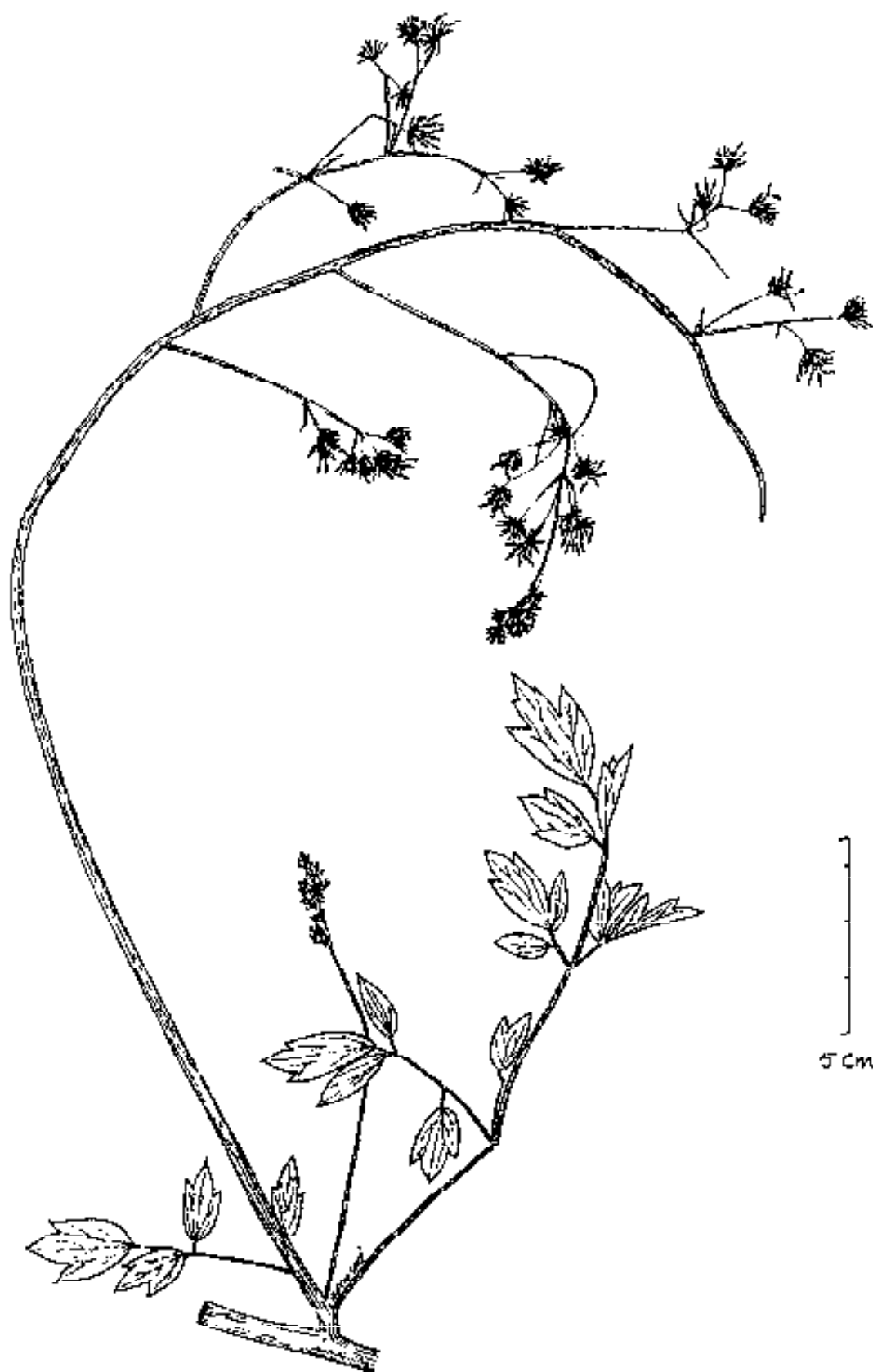


Fig. 4 : *Thalictrum javanicum* Blume

## 2. DILLENACEAE

Salisbury in W. Hook. Parad. Loud. 2 (1) : t. 73. 1807

("Dilleneae").

(D. P. Dam)

- 1a. Trees; flowers solitary or in clusters; anther cells parallel; fruits fleshy ..... 1. *Dillenia*
- b. Climbing shrubs; flowers in terminal panicles; anther cells divergent; fruits dry ..... 2. *Tetracera*

### 1. *Dillenia* L.

- 1a. Flowers solitary, white, appearing with leaves; pedicels 3-6 cm long ..... 1. *D. indica*
- b. Flowers in fascicles, greenish-yellow appearing before leaves; pedicels 2 cm long ..... 2. *D. pentagyna*

1. *Dillenia indica* L., Sp. Pl. 535. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 36. 1872; Kanjilal *et al.*, Fl. Assam 1 : 10. 1934; Deb in Bull. Bot. Surv. India 3 : 258. 1961; Majumdar in Sharma *et al.*, Fl. India 1 : 155. 1993. Fig.5

Mani.: *Hiegri*.

Evergreen trees, about 18 m tall, often fluted, buttressed at the base, with a large oval crown, Leaves 15-40 × 7.5-12.5 cm, oblong, oblanceolate or narrow-elliptic, apex acute to acuminate, glabrous above, pubescent beneath, sharply serrate, lateral nerves 30-50; petioles 2.5-7.5 cm long. Flowers 15-20 cm in diam., solitary, pendant always sub-terminal, white; sepals 4-6 × 3-5 cm, orbicular, thick and fleshy; petals 7-9 × 5-6 cm, white, obovate, with reflex apex arching, Fruits 7.5-12.5 cm diam., always green, with 16-20 carpels slightly enclosed inside the much thickened sepal; seeds compressed, margin hairy.

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

*Specimens examined* : Imphal valley, *Deb* 45 (CAL).

2. *Dillenia pentagyna* Roxb., Pl. Corom. 1 : 21, t. 20. 1759; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 38. 1872; Kanjilal *et al.*, Fl. Assam 1 : 11. 1934; Deb in Bull. Bot. Surv. India 3 : 258. 1961; Majumdar in Sharma *et al.*, Fl. India 1 : 56. 1993.

Mani.: *Larongn*.

Spreading deciduous trees, about 25 m in height, branches ascending, branchlets marked with V-shaped leaf scars. Leaves 30-60 × 10-30 cm, oblanceolate or obovate-oblong, obtuse at apex, narrow at base, serrate, coriaceous, glabrous above, glabrescent beneath, lateral nerves up to 40, almost straight; petiole 1.5-5.0 cm long with persistent winged like stipules. Flowers ca 3 cm across, yellow, appearing before the leaves; sepals ca 1.2 cm long, broadly ovate, concave, pale

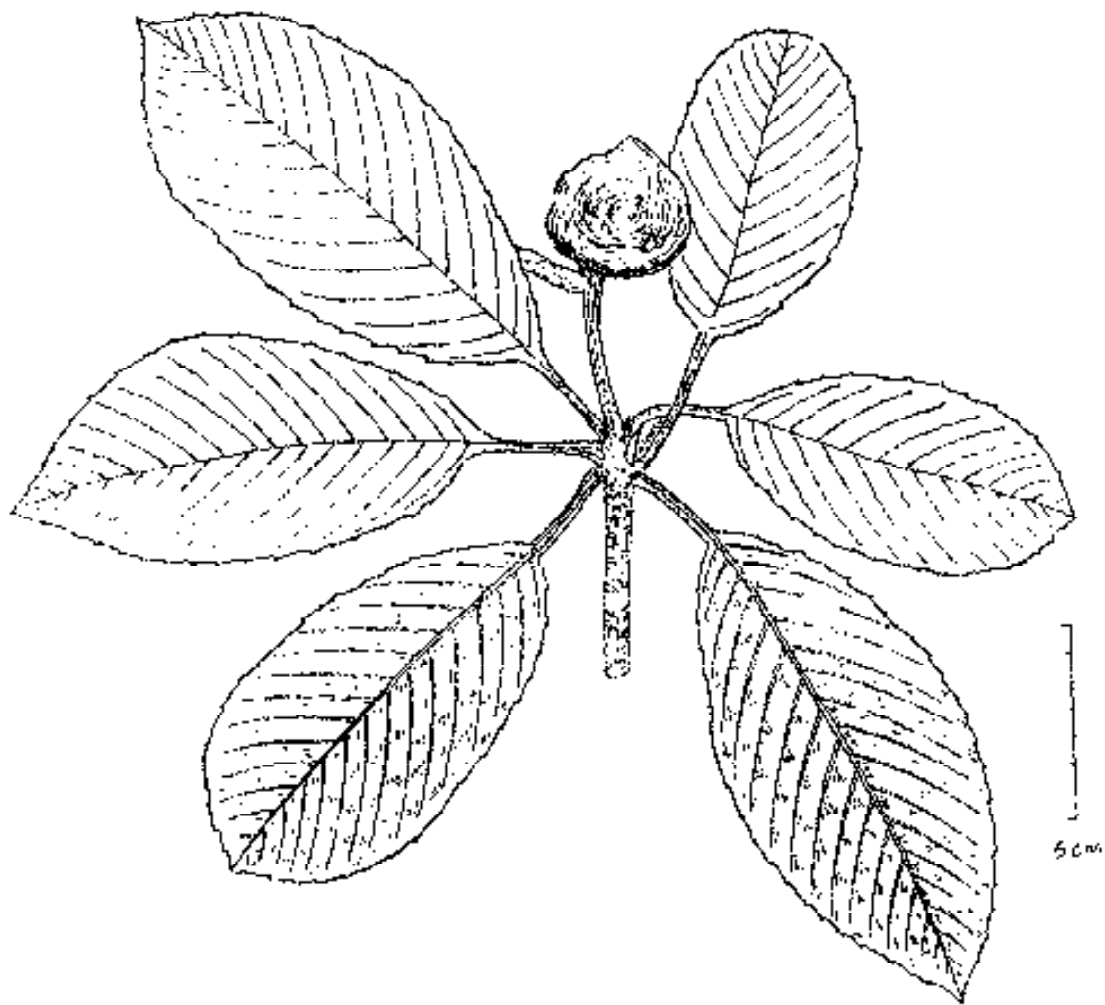


Fig. 5 : *Dillenia indica* L.



green, glabrate, slightly ciliate; petals ca 2.5 cm long, obovate or elliptic, light greenish-yellow. Fruits 1.2-1.8 cm in diam., yellow or orange-red; seeds ovoid, exarillate, black, glabrous.

*Fl. & Fr.* : February- November.

*Specimens examined* : Larong, Deb s. n. (CAL).

## 2. *Tetracera* L.

*Tetracera sarmentosa* (L.) Vahl subsp. *andamanica* (Hoogl.) Hoogl. in *Blumea* 9 : 588. 1959; Majumdar in Sharma *et al.*, *Fl. India* 1 : 159. 1993. *T. asiatica* (Lour.) Hoogl. subsp. *andamanica* Hoogl. in *Fl. Males.* 1. 4 : 144. 1951. *Delima sarmentosa* L., var. *glabra* Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1 : 31. 1872; Kanjifal *et al.*, *Fl. Assam* 1 : 10. 1934; Deb in *Bull. Bot. Surv. India* 3 : 258. 1961.

Shrubs, climbing with young branches, sparsely strigose. Leaves 6-10 × 4-6 cm, ovate, obtuse or acute at the apex and base, crenate, scabrid; petiole 5-10 mm long. Flowers ca 1 cm across, in pilose spreading panicles; sepals 5, the outer 2 × 1.5 mm and inner 4 × 3 mm, scabrid outside, reflexed and persistent to the fruit; petals 3, white or yellowish, 3-4 × 2-3 mm, stamens many. Fruits ca 0.8 cm, ovoid, coriaceous, with a short beak, purplish, 1-2 seeded; seeds 4 × 3 mm; aril up to 5 mm long, limbriate.

*Fl. & Fr.* : June- February.

*Specimens examined* : West Manipur, C. B. Clarke.

## 3. MAGNOLIACEAE

A.L. Juss., *Gen. Pl.* 280. 1789 ("Magnoliac").

(A.S. Chouhan, R. Shanpru & D. P. Dani)

- 1a. Leaves alternate; flowers usually terminal;  
gynoecium sessile ..... 1. *Magnolia*
- b. Leaves spirally arranged; flowers usually axillary;  
gynoecium stipitate ..... 2. *Michelia*

### 1. MAGNOLIA L.

- 1a. Carpels free, densely crowded on the receptacle;  
ovules 1-2 in each carpel ..... 2
- b. Carpels united, forming an ovoid head;  
ovules more than 3 in each carpel ..... 3
- 2a. Leaves 25-35 cm long, oblong; flowers yellow.....*M. griffithii*
- b. Leaves 10-30 cm long;  
flowers creamish-white ..... 1. *M. campbellii*
- 3a. Flowers white or yellowish-white;  
lateral nerves 10-14 pairs ..... 4. *M. hookeri*

- b. Flowers pink or red; lateral nerves 15-25 pairs ..... 4
- 4a. Leaves 15-22 cm long, elliptic-lanceolate; ovaries with 4-6 ovules; fruits dehiscing by dorsal suture ..... 5. *M. insignis*
- b. Leaves 25-30 cm long, oblanceolate; ovaries with 3-4 ovules; fruits dehiscing by ventral suture ..... 3. *M. hodgsonii*

1. *Magnolia campbellii* Hook. f. & Thomson, Fl. Ind. 77, 1855 & in Hook. f., Fl. Brit. India 1 : 41, 1872; Deb in Bull. Bot. Surv. India 3 : 254, 1961; Raju in Sharma *et al.*, Fl. India 1 : 166, 1993.

Large trees, 12-24 m, deciduous. Leaves 10-30 × 4.5-10 cm, elliptic-ovate or oblong, base cordate rounded or oblique, acute or acuminate, glabrous above, glaucous pubescent or silky beneath, membranous; petiole 2.2 cm. Flowers erect, 15-20 cm diam., enclosed at first by spathe-like tomentum, 4.5-6 cm, white or rose coloured bracts; petals 9-12, outer ones yellowish, inner white purple near the base; stamens and carpels purplish. Fruits 15-25 cm, ripe carpels obovoid, not beaked, laterally compressed; seeds 2, obovoid, compressed.

*Fl. & Fr.* : March-June.

*Specimens examined* : Sirohee 2670 m, G. Watt 596; Sirohee 2000 m, G. Watt 6448 (CAL).

2. *Magnolia griffithii* Hook. f. & Thomson, Fl. Ind. 77, 1855 & in Hook. f., Fl. Brit. India 1 : 41, 1872; Kanjilal *et al.*, Fl. Assam 1 : 14, 1934; Deb in Bull. Bot. Surv. India 3 : 254, 1961; Raju in Sharma *et al.*, Fl. India 1 : 168, 1993. *M. pealiana* King in Ann. R. Bot. Gard. Calc. 210, t. 59, 1891.

Evergreen trees, ca 25 m tall; young branches and buds silky tomentose, finely glabrate. Leaves persistent, 25-35 × 12.5-15 cm, oblong to elliptic, acute pale beneath, coriaceous, glabrous above, nerves a little rough beneath; petiole 1 cm. Flower buds ca 5 cm long, oblong, appearing with the leaves, coriaceous, glabrous above; flowers 8-12 cm across, pale white to yellow, slightly fragrant; sepals 6; petals 6, enclosed in silky bract. Fruiting receptacles ca 15 cm long; seeds 1-2 in each carpel, reddish-brown.

*Fl. & Fr.* : March-September

*Specimens examined* : Imphal 750 m, Deb 2422 (CAL).

3. *Magnolia hodgsonii* (Hook. f. & Thomson) Keng. in Gard. Bull. Singapore 31(2) : 129, 1978; Raju in Sharma *et al.*, Fl. India 1 : 168, 1993. *Talauma hodgsonii* Hook. f. & Thomson, Fl. Ind. 74, 1855 & in Hook. f., Fl. Brit. India 1 : 40, 1872; Kanjilal *et al.*, Fl. Assam 1 : 17, 1934; Deb in Bull. Bot. Surv. India 3 : 258, 1961.

Mani.: *Uthum*.

Evergreen trees 8-15 m, branches few and spreading. Leaves 25-50 × 10-20 cm,

oblanceolate, cuneate to acute at base, acuminate to rounded at apex, thinly coriaceous or glabrous, lateral nerves 15-25 on either side, straight; petiole 2-6 cm long. Flowers 6-8 cm across, white or pale pink, fragrant; perianth parts 9 in 2 whorls, outer whorls white, inner whorls purplish. Fruits ovoid, 10-15 × 6-8.5 cm, carpels beaked, woody, dehiscent by the ventral suture; seeds 3-4 in each carpel, oblong, red.

*Fl. & Fr.* : April-September

*Specimens examined* : Langol, Deb 2431 (Cal); Jiriban Malick 791 (BSIS).

**4. *Magnolia hookeri*** (Cubitt & Smith) Raju & Nayar in Indian J. Bot. 3 : 171, 1980; Raju in Sharma *et al.*, Fl. India 1 : 170, 1993. *Manglietia hookeri* Cubitt & Smith in Rec. Bot. Surv. India 4 : 273, 1913.

Large trees. Leaves 15-20 × 2-6 cm, elliptic to oblanceolate; thinly coriaceous; petioles 2-6 cm long. Flowers ca 12.5 cm across, white or pale yellowish. Fruits fragrant, carpels ca 2 cm across. Fruits ca 7 cm long, ovoid with 3-4 seeds.

*Fl. & Fr.* : March- August.

*Specimens* not seen.

**5. *Magnolia insignis*** Wallich, Tent. Fl. Nep. 3, t. 1, 1824; Raju in Sharma *et al.*, Fl. India 1 : 170, 1993. *Manglietia insignis* (Wallich) Blume, Fl. Jav. 1 : 22, 1829; Hook. f. & Thomson, Fl. Ind. 76, 1855 & in Hook. f., Fl. Brit. India 1 : 42, 1872; Kanjilal *et al.*, Fl. Assam 1 : 16, 1934; Deb in Bull. Bot. Surv. India 3 : 254, 1961.

Mani.: *Leithaa*.

Evergreen trees, 24 - 27 m high. Leaves 15-21.5 × 4.5 - 7.5 cm, elliptic-lanceolate, acute or cuneate at base or acuminate at apex, generally thickly coriaceous, quite glabrous, main lateral nerves about 18 on either side alternating with shorter ones. Flowers 10-15 cm across, pale pink, fragrant; sepals 3, 7.5 × 4.5 cm, pink; petals 9, white, gradually narrower towards the centre, fleshy; carpels ca 40 or more, slightly beaked, warty, each with about 6 ovules. Fruits narrowly ovoid or almost cylindrical, 3-5 cm long; woody, dorsally dehiscent; seeds bright red.

*Fl. & Fr.* : May- September

*Specimens examined* : Ukhrul 2000 m, Mukerjee 2841 (CAL).

## 2. *Michelia* L.

- 1a. Petioles without stipule scars;  
carpels never more than 5 ..... 4. *M. glabra*
- b. Petioles with stipule scars; carpels numerous ..... 2
- 2a. Perianth parts usually less than 4 cm long ..... 2. *M. champaca*
- b. Perianth parts always more than 4 cm long ..... 3
- 3a. Leaves pubescent beneath; flowers pale or orange  
later, ripe carpels ovoid to ellipsoid seed many ..... 1. *M. cathcartii*
- b. Leaves glabrous beneath; flowers white; ripe

- carpels obovate or subglobose: seeds -1 ..... 5. *M. pundura*  
 4a. Petioles glabrous: lateral nerves 7-10 pairs ..... 3. *M. doltsopa*  
 b. Petioles velutinous: lateral nerves  
 14-18 pairs ..... 6. *M. velutina*

1. *Michelia cathcartii* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 42, 1872; Kanjilal *et al.*, Fl. Assam 1 : 21, 1934; Raju in Sharma *et al.*, Fl. India 1 : 175, 1993. *Alcimandra cathcartii* (Hook. f. & Thomson) Dandy in Kew Bull. 1927: 260, 1927; Deb in Bull. Bot. Surv. India 3 : 254, 1961.

Large evergreen trees, young branches silky-hairy. Leaves 7.5-12.5 × 4-5 cm, lanceolate or oblong-lanceolate, cuneate or rounded at base, acute to acuminate, quite entire, midrib densely silky-hairy above, brown pilose beneath, lateral nerves 10-15 on either half, petiole 0.5-0.8 cm long, slender, densely hairy. Flowers mostly terminal, 7.5 cm diam., creamy white; sepals and petals 9 in 3 whorls, each 3.5-5 cm long, stamens ca 2 cm long, overtopping the carpophore; carpels sessile, beaked and densely imbricate while young. Fruiting-spike 7.5-12.5 cm long; ripe carpels 0.6-0.8 cm diam., sub-orbicular, compressed, dehiscent by dorsal suture; seeds 2-3.

Fl. & Fr. : March- July.

Specimens examined : Japvo 2200 m. G. Watt 6874 (CAL).

2. *Michelia champaca* L., Sp. Pl. 536, 1753; Hook. f. & Thomson, Fl. Ind. 79, 1855 & in Hook. f., Fl. Brit. India 1 : 42, 1872; Kanjilal *et al.*, Fl. Assam 1 : 22, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Raju in Sharma *et al.*, Fl. India 1 : 175, 1993. *M. aurantiaca* Wallich, Pl. Asiat. Rat. 2 : 39, t. 147, 1831.

Muni.: *Lethao*.

Large evergreen trees ca 20 m tall, with oblong crown, pubescent branchlets. Leaves 10-20 × 4-6 cm, ovate lanceolate, tapering towards the ends, entire or wavy, shining above, pale and glabrescent below. Lateral nerves 12-18 either side. Flowers 3-4 cm across, axillary, pale or orange yellow, fragrant; perianth parts 12-15, oblong, acute, petaloid; petals linear. Fruiting spike 7.5-15 cm long, cone like drooping; seeds many, enclosed by fleshy red aril.

Fl. & Fr. : May- March.

Specimens examined : Koirange & Ukhrul, Deb 80 & 828; Ukhrul 1670 m, Mukerjee 2474 (CAL); Jaribam, Malick 788 (BSIS).

3. *Michelia doltsopa* Buch.-Ham. ex DC., Syst. Nat. 1 : 488, 1817; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Raju in Sharma *et al.*, Fl. India 1 : 176, 1993. *Magnolia excelsa* Wallich, Tent. Fl. Nep. 5, t. 2, 1824. *Michelia excelsa* (Wallich) Blume ex Wallich, Cat. 220, n. 6494, 1832; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 43, 1872. *M. manipurensis* G. Watt ex Brandis, India, Trees 8, 1906; Kanjilal *et al.*, Fl. Assam 1 : 25, 1934.

Muni.: *Lethao*.

Middle sized evergreen trees, 8-25 m high. Leaves 7.5-11.5 × 3.5-5.5 cm, elliptic

or oblong-lanceolate, acuminate, base cuneate, puberulous beneath with very minute hairs, lateral nerves 10-12 on either half; petiole 1.5-3 cm long. Flowers 10-15 cm across, white, solitary, shortly stalked; perianth parts 9-12, lanceolate-oblongate; carpels many, ovoid, 1-1.5 × 0.7 cm. Fruiting carpels slightly compressed; seeds 1-2, red.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Miao, 2000 m, G. Watt 6121 & 6229, Khongli hills, G. Watt 6480 & 6800; Sirohce 2300 m, Mukerjee 2711 (CAL).

**4. *Michelia glabra*** Pam. in Bull. Soc. Fr. Belg., 27 : 214, 1896; Raju in Sharma *et al.*, Fl. India 1 : 177, 1993. *Michelia kingii* Dandy in J. Bot., 66 : 321, 1928. *M. montana* non Blume; Karjalal *et al.*, Fl. Assam 1 : 25, 1934; Deb. in Bull. Bot. Surv. India 3 : 255, 1961.

Mani. : *Leihao-leisang*.

Large trees. Leaves 15-20 × 8-10 cm, ovate-obovate, oblong-elliptic, cuneate at base, acute or abruptly acuminate, shining on both surfaces or greyish pubescent on the veins; lateral nerves 6-12 on either half; petioles 2-2.5 cm, finely channelled. Flowers 3-4 cm across, whitish yellow, axillary, solitary or 2 on a short peduncle; perianth members 9 or less, lanceolate-oblongate, 2-2.5 cm long; carpels 3.5-7 cm, 1-5 in numbers, usually only one maturing, ellipsoid, sessile or short stalked; seeds 2-3, reddish-brown.

*Fl. & Fr.* : June- October.

*Specimens examined* : West Manipur, Kaith s. n.

**5. *Michelia punduana*** Hook. f. & Thomson, Fl. Ind., 81, 1855 & in Hook. f., Fl. Brit. India 1 : 43, 1872; Raju in Sharma *et al.*, Fl. India 1 : 180, 1993.

Trees with grey bark. Leaves 6.5- 14 × 3 cm, oblong, obovate or elliptic-oblongate, coriaceous. Flowers axillary, solitary, rarely in pairs, ca 4 cm. across, white, perianth lobes 9-12; carpels 50, beaked. Fruiting spikes 5-10 cm long; ripe carpels sub-globose, with solitary seed.

*Fl. & Fr.* : October- March.

*Specimens examined* : Puntoshi, C. B. Clarke 15153 (CAL).

**6. *Michelia velutina*** DC., Prodr. 1 : 79, 1824; Raju in Sharma *et al.*, Fl. India 1 : 181, 1993. *M. lanuginosa* Wallich, Tent. Fl. Nepal 8, t. 5, 1825; C.B. Clarke in J. Linn. Soc., 25 : 3, 1889; Deb in Bull. Bot. Surv. India 3 : 255, 1961.

Evergreen trees, 10-25 m. Leaves 17-25 × 3-6 cm, lanceolate-oblongate, base rounded, acute or acuminate, silky and pubescent when mature lateral nerves 14-18 pairs on either side; petiole 2-3 cm; stipule scars 3-5 mm. Flowers 4-5 cm across, pale-white, perianth member 4 × 0.5 cm, lanceolate-oblongate; carpels 1.5-2 × 1-1.5 cm, young carpels pubescent, matured ones glabrous; seeds 1-3, deep orange

*Fl. & Fr.* : July- December.

*Specimens examined* : West Manipur, C. B. Clarke l. c.

## 4. ILLICIACEE

A. C. Smith, *Sargentia* 7 : 8, 1947.

(A. S. Chauhan &amp; D. P. Dam)

*Illicium* L.

- 1a. Carpels 12-20; stamens more than 18;  
filaments shorter than anther..... 1. *I. griffithii*
- b. Carpels 7-13; stamens up to 18;  
filaments as long as anthers ..... 2
- 2a. Perianth segments 23-27; follicles with  
apical beaks ..... 2. *I. manipurense*
- b. Perianth segments 14-23; follicles  
with sub-apical beaks ..... 3. *I. simonsii*

1. *Illicium griffithii* Hook. f. & Thomson. *Fl. Ind.* 74, 1855 & in Hook. f., *Fl. Brit. India* 1 : 40, 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 27, 1934; Deb in *Bull. Bot. Surv. India* 3 : 255, 1961; Raju *et al.* in Sharma *et al.*, *Fl. India* 1 : 186, 1993. *Ternstroemia khasiana* Choisy in *Mem. Soc. Phys. Hist. Nat. Genev.* 14 : 108, 1855.

Large aromatic, evergreen shrubs up to 4 m tall. Leaves 4-12 × 2-5 cm, ovate, elliptic-oblong, cuneate at base, acuminate at apex, pellucid dotted above, lateral nerves 6-7 on either half; petioles up to 1.5 cm long, terete. Flowers axillary or subterminal, solitary or in clusters of 2-3; perianth segments ca 24, inner ones fleshy, not much longer than outer ones; stamens 20-40, biseriate, with sub-truncate anthers; carpels 12-20, free, style up to 3 mm long; seeds ca 5 mm diam, sub-rotund, glossy brown.

*Fl. & Fr.* : April- October.

*Specimens examined* : Lamlong. Mukerjee 2990 (CAL).

2. *Illicium manipurense* G. Watt ex King in *Ann. R. Bot. Gard. Calc.* 3 : 200, 1891; Deb in *Bull. Bot. Surv. India* 3 : 255, 1961; Raju *et al.*, in Sharma *et al.*, *Fl. India* 1 : 186, 1993. Fig. 6

Shrubs or small trees, up to 7 m tall. Leaves broadly elliptic, oblong, cuneate at base, acuminate at apex, coriaceous; petioles ca 1.5 cm long. Flowers axillary, solitary; perianth segments 23 - 27, inner ones narrowly oblong, much longer than outer ones; stamens 18, biseriate, anthers truncate; carpels 7-8 free, with 2-3 mm long style.

*Fl. & Fr.* : March- September

3. *Illicium simonsii* Maxim. in *Duff. Acad. Sci. St. Petersburg.* 32 : 480, 1888; Raju *et al.*, in Sharma *et al.*, *Fl. India* 1 : 187, 1993.

Shrubs or trees up to 9 m tall. Leaves 6- 12.5 × 2.5-3.5 cm, elliptic-lanceolate or elliptic-oblong attenuate at base, emarginate-acuminate at apex, coriaceous. Flowers axillary, crowded towards apices of branchlets; perianth segments 14 - 23, inner ones



Fig. 6: *Illicium manipurensis* G. Wall ex King

12-18, pale-yellow; stamens 16-18, 2-3 seriate, anthers oblong-obtuse; carpels 8-13, with subtulose style. seeds ca 6 mm diam., sub-orbicular.

*Fl. & Fr.* : March- September.

*Specimens examined* : Kapra near Mao 2400m, G. Watt 6146 (CAL).

## 5. SCHIZANDRACEAE

Binne, Fl. Jav. 32-33; 3, 1830 ("Schizandreae").

(D. K. Singh & D.P. Dam)

### **Kadsura** Juss.

- 1a. Lateral nerves 10-15 pairs; fruits globose, 2.5-3.5 cm diam., carpel 1 seeded; seeds orbicular ..... 1. *K. heteroclita*  
 b. Lateral nerves 10 pairs; fruits capitate, 4-6 cm diam., carpels 2-3 seeded; seeds obovoid ..... 2. *K. wattii*

1. ***Kadsura heteroclita*** (Roxb.) Craib, Fl. Siam. Enum. 1 : 28, 1925; Rao & Hajra in Sharma *et. al.*, Fl. India 1 : 189, 1993. *Uvaria heteroclita* Roxb., Fl. Ind. 2 : 663, 1832. *Kadsura roxburghiana* Arn., Mag. Zool. & Bot. 2 : 546, 1838; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 45, 1872; Kanjilal *et. al.*, Fl. Assam 1 : 29, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961.

Woody evergreen climbing shrubs, branches generally with elongated lenticels. Leaves 7.5-15 × 3-6 cm, elliptic to ovate-lanceolate, acute or shortly acuminate, distantly dentate, serrate on young plants, entire on mature ones, soft and rather fleshy, but membranous when dry. Flowers 1 sexual, whitish, axillary, solitary, about 1 cm; bracteoles ciliate; sepals and petals 12, the largest ca 0.5 cm long, orbicular; stamens ca 12, outer filaments free, inner connate; carpels many, imbricated, stigma sessile; ovules 2. Fruits 0.8 cm long, oblong and faceted red, juicy, more or less coarsening, shortly mucronate; seeds orbicular, compressed.

*Fl. & Fr.* : September - November.

*Specimens examined* : Irong, Meekold 255 (CAL).

2. ***Kadsura wattii*** C. B. Clarke in J. Linn. Soc. 25 : 4, 1889; Deb in Bull. Bot. Surv. India 3 : 254, 1961; Rao & Hajra in Sharma *et. al.*, Fl. India 1 : 191, 1993.

Large, scandent shrubs, bark lenticellate. Leaves elliptic-ovate, short acuminate, margins entire; primary nerve branching into lateral on each side, intermediate nerves interlaced. Inflorescence solitary, capitate, short peduncled, 4-6 cm diam.; carpels clavate-obovoid, 1.2-1.8 cm long, 2-3 seeded; seeds obovoid, emarginate, compressed, pale, supported below by false horizontal partition.

*Fl. & Fr.* : June - November.

*Specimens examined* : North Manipur, C. B. Clarke 42082 (CAL).



6. ANNONACEAE

A. L. Juss., Gen Pl. 283, 1789 ("Anonae")

(R. Shanprei & D. K. Singh)

1a.	Petals all equal .....	2
b.	Petals unequal .....	4
2a.	Lianas or climbing shrubs .....	3
b.	Trees or shrubs .....	7 <i>Polyalthia</i>
3a.	Flowers solitary or fascicled on hooked peduncles: petals concave .....	2 <i>Artabotrys</i>
b.	Flowers solitary on normal peduncles: petals not concave .....	3 <i>Desmos</i>
4a.	Outer petals smaller than inner .....	6 <i>Mitusa</i>
b.	Outer petals longer than the inner .....	5
5a.	Straggling shrubs .....	4 <i>Fissistigma</i>
b.	Erect shrubs or trees .....	6
6a.	Flowers terminal or leaf-opposed; petals 3-6 .....	1 <i>Annona</i>
b.	Flowers axillary or extra axillary; petals 6 .....	5 <i>Goniothalamus</i>

1. *Annona* L.

1a.	Leaves subcoriaceous; flowers 2-3 together .....	1 <i>A. reticulata</i>
b.	Leaves membratous; flowers solitary .....	2 <i>A. squamasa</i>

1. *Annona reticulata* L., Sp. Pl. 537, 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 78, 1872; Kanjilal *et al.*, Fl. Assam 1 : 43, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Mitra in Sharma *et al.*, Fl. India 1 : 207, 1993.

Mani.: *Sitaphal*

Large trees, branches thin dark-brown or black, glabrous. Leaves 12.5-19 x 3.5-6 cm, lanceolate or oblong-lanceolate, acuminate, sub-coriaceous, glabrous, dark green. Flowers 2-3 together, 2-3.5 cm long; inner whorl of petals usually present. Fruits 7.5-10 cm in diam., ovoid, reddish-brown, smooth, faintly areolate, seeds similar.

Fl. & Fr. : July- March

Specimens examined : Imphal, Deb 2422 (CAL).

2. *Annona squamasa* L., Sp. Pl. 537, 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 78, 1872; Kanjilal *et al.*, Fl. Assam 1 : 43, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Mitra in Sharma *et al.*, Fl. India 1 : 207, 1993.



Fig. 7: *Artabotrys cubitti*, Chatterjee

Mani.: *Sitaphal*.

Small trees: branches thin, glabrous. Leaves 3.5-12.5 × 2-3 cm, oblong or oblong-lanceolate, ovate, obtuse or rounded at apex, acute at the base, membranous, glabrate, lateral nerves 8 on either half, slender, oblique; petioles 0.5-1 cm long. Flowers ca 2.5 cm long, pubescent. Fruits 5-7.5 cm in diam., globose, deeply white areolate when ripe; seeds 0.8-1 cm long, oblong-lanceolate, glossy-black.

*Fl. & Fr.* : March- November.

*Specimens examined* : Imphal, Deb 1182 (CAL).

### 2. *Artabotrys* R. Br.

- la. Sepals ca 1 cm long, long-acuminate;  
petals less than 2.5 cm long ..... 1 *A. cubittii*
- b. Sepals less than 1 cm long, acute;  
petals 3 cm or more long ..... 2 *A. hexapetalus*

1. *Artabotrys cubittii* Chatterjee in J. Bombay Nat. Hist. Soc. 19 : 1. 1940; Mitra in Sharma *et al.*, Fl. India 1 : 250-1993. Fig. 7

Bushy climbers up to 2.5 m tall. Leaves 10-20 × 3-8 cm, elliptic-lanceolate, narrow at base; petioles 3-7 mm long. Flowers in fascicles; sepals 3 united at base, free at tips; petals 6, concave at base, obtuse at apex, slightly tomentose on both surface; carpels 12, pyramidal-ovoid, ca 4 mm long, ripe carpels 6-7, ovoid, narrowed at both ends

*Fl. & Fr.* : March- September.

*Specimens examined* : Imphal 1000 m. Meebold 1907; s.l. Prazer 205 (CAL).

2. *Artabotrys hexapetalus* (L. f.) Bhandari in Baileya 12 (4) : 147. 1964; Deb in Bull. Bot. Surv. India 3 : 225. 1861; Mitra in Sharma *et al.*, Fl. India 1 : 251. 1993. *Annona hexapetala* L. f., Suppl. Pl. 270. 1781. *A. uncinata* Lam., Encycl. 2 : 127. 1786. *Artabotrys odoratissimus* R. Br. in Edward's Bot. Reg. 5, t. 423. 1819, non Blume 1825; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 54. 1872.

Mani.: *Chinichampa*.

Climbing shrubs. Leaves 22 × 6 cm, acuminate, glabrous, base cuneate; petiole up to 1 cm. Flowers solitary, greenish-yellow, strongly scented; petals spreading from clawed coherent base, ovate, outer ones 2.3 × 1.3 cm; ovary 1-2 seeded.

*Fl. & Fr.* : March- November.

*Specimens examined* : Chingmairong, Deb 2008 (CAL)

### 3. *Desmos* Lour.

- la. Erect, glabrous shrubs, petals  
2-3 puberulous ..... 3 *D. longiflorus*

- b. Spreading, often pubescent shrubs;  
petals 6, glabrous or adpressedly hairy ..... 2
- 2a. Petals twice as long as broad ..... 2 *D. cochinchinensis*
- b. Petals 4 times as long as broad or longer ..... 1 *D. chinensis*

1. **Desmos chinensis** Lour., Fl. Cochinch. 1 : 352. 1790; Malik & Safui in J. Econ. Tax. Bot. 19 : 2. 1987; Mitra in Sharma *et al.*, Fl. India 1 : 257. 1993. *Unona discolor* Vahl, Symb. Bot. 2 : 63, t. 36. 1791; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 59. 1872; Kanjilal *et al.*, Fl. Assam 1 : 35. 1934. *U. undulata* Wallich, Pl. Asiat. Rar. 3 : t. 265. 1832.

Spreading, often climbing shrub, 1.5-3 m high, young branches slender, more or less pubescent. Leaves bi-farious, 7.5-17.5 × 2.5-5 cm, oblong, oblong-lanceolate or oblanceolate, acuminate, rounded at the base, membranous, glabrous above, pale and more or less pubescent beneath; lateral nerves 8-12 on either half. Flowers leaf-opposed or extra-axillary, solitary, ca 5 cm long on peduncles 2-3.5 cm long, with a small linear bracteole below the middle, slender in flower, thickening in fruit; sepals 1-1.4 cm long, ovate-acuminate, spreading; petals 6, ca 5 cm long, narrow-lanceolate, coriaceous, glabrous or appressedly silky. Fruits 1.5-3.5 cm long, 2-5 seeded, constricted between the ovoid joints, on 0.5-0.7 cm long stalks.

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

*Specimens examined* : Kangrendhar Malik 998 (BSIS).

2. **Desmos cochinchinensis** Lour., Fl. Cochinch. 1 : 352. 1790; Mitra in Sharma *et al.*, Fl. India 1 : 259. 1993. *Unona cochinchinensis* (Lour.) DC., Prodr. 1 : 91. 1824. *Unona desmos* Rausch., Nomencl. ed. 3. 161. 1797; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 59. 1872.

Climbers or scandent shrubs. Leaves 12-20 × 4-8 cm, oblong to elliptic oblong, thinly coriaceous. Flowers solitary, ca 5 mm long, fragrant, greenish yellow to yellow, pink at base inside; petals 4 times as long as broad or longer. Carpels many, ca 3 mm long, oblong, brownish hirsute; ripe carpels moniliform with 2-5 joints.

*Fl. & Fr.* : June- November.

*Specimens examine* : Manipur, Prazer 1 (CAL).

3. **Desmos longiflorus** (Roxb.) Saff. in Bull. Torrey Bot. Club 39 : 507. 1912; Deb in Bull. Bot. Surv. India 3 : 255. 1961; Mitra in Sharma *et al.*, Fl. India 1 : 261. 1993. *Unona longiflora* Roxb., Fl. Ind. 2 : 668. 1832; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 61. 1872; Kanjilal *et al.*, Fl. Assam 1 : 3. 1934.

Erect glabrous shrubs, 3-3.5 m high, branches slender, spreading. Leaves 12.5-30 × 4.5-10 cm, narrowly oblong or oblong-lanceolate, acute or acuminate, chartaceous, green and more or less shining above, glaucous beneath; lateral nerves 12-16 on either half; petioles 0.5-1 cm long, somewhat swollen. Flowers red, horn shaped in outline, peduncles axillary, 2-10 cm long, elongating in fruits.

bracteoles jointed near the base, expanded at the upper extremity; sepals 3, triangular, acute, pubescent outside; petals 2 or 3, 7.5-15 cm long, red, puberulous outside. Fruits 7-60, moniliform, on stalks, 1-2.5 cm long, channelled above, joints elongate-ellipsoid, verrucose.

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

*Specimens examined* : West Manipur, *Aleebold* 5418 (CAL).

#### 4. *Fissistigma* Griffith

- 1a. Leaf surface adpressed hairy beneath;  
flowers 1-3; carpels silky ..... 1. *F. bicolor*
- b. Leaf surface finely tomentose beneath;  
flowers 3-7; carpels hairy ..... 2. *F. polyanthum*

**1. *Fissistigma bicolor*** (Roxb.) Merr., *Philipp. J. Sci (Bot.)* 15 : 131, 1919; Deb in *Bull. Bot. Surv. India* 3 : 255, 1961; Mitra in Sharma *et al.*, *Fl. India* 1 : 297, 1993. *Civaria bicolor* Roxb., *Fl. Ind.* ed. 2 : 662, 1832. *Melodorum bicolor* (Roxb.) Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1 : 80, 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 48, 1934.

Large woody climber; young branches and flowers tomentose. Leaves 10-20 × 5-7.5 cm, oblong-elliptic, acute or obtuse, base rounded; petiole 0.5-0.8 cm. Flowers 1-3, in leaf-opposed fascicles; pedicels 1-2.5 cm; bracteole small, basal; sepals ovate; petals villous, ovate-lanceolate, red. Fruits 2.5 cm diam., mucronate; stalk 0.5-0.8 cm.

*Fl. & Fr.* : March- October.

*Specimens examined* : Markoo, *C. B. Clarke* 42299 (CAL).

**2. *Fissistigma polyanthum*** (Hook. f. & Thomson) Merr., *Philipp. J. Sci. Bot.* 15 : 135, 1919; Deb in *Bull. Bot. Surv. India* 3 : 255, 1961; Mitra in Sharma *et al.*, *Fl. India* 1 : 299, 1993. *Melodorum polyanthum* Hook. f. & Thomson, *Fl. Ind.* 1 : 121, 1855 & in Hook. f., *Fl. Brit. India* 1 : 81, 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 49, 1934.

Large woody climbers, branches blackish, glabrous. Leaves 7.5-20 × 1.5-3.5 cm, acute or sharply acuminate, pale beneath, narrowly oblong or lanceolate, usually acute at both ends, minutely pubescent beneath; petioles 5-8 cm, glabrate. Flowers small, 3-7, in leaf-opposed sub-umbellate cymes; peduncles short, woody, hairy; pedicels 1 cm, with a basal scale and a median orbicular, deciduous bracteole; sepals ovate, 4 × 2.5 mm, greyish, tomentose; petals 1 cm, orange-red, outer ovate, broadened and concave at base, tomentose outside, 5 mm thick.

*Fl. & Fr.* : November- July.

*Specimens examined* : Kanglatombi, *Aleebold* 5165 (CAL).

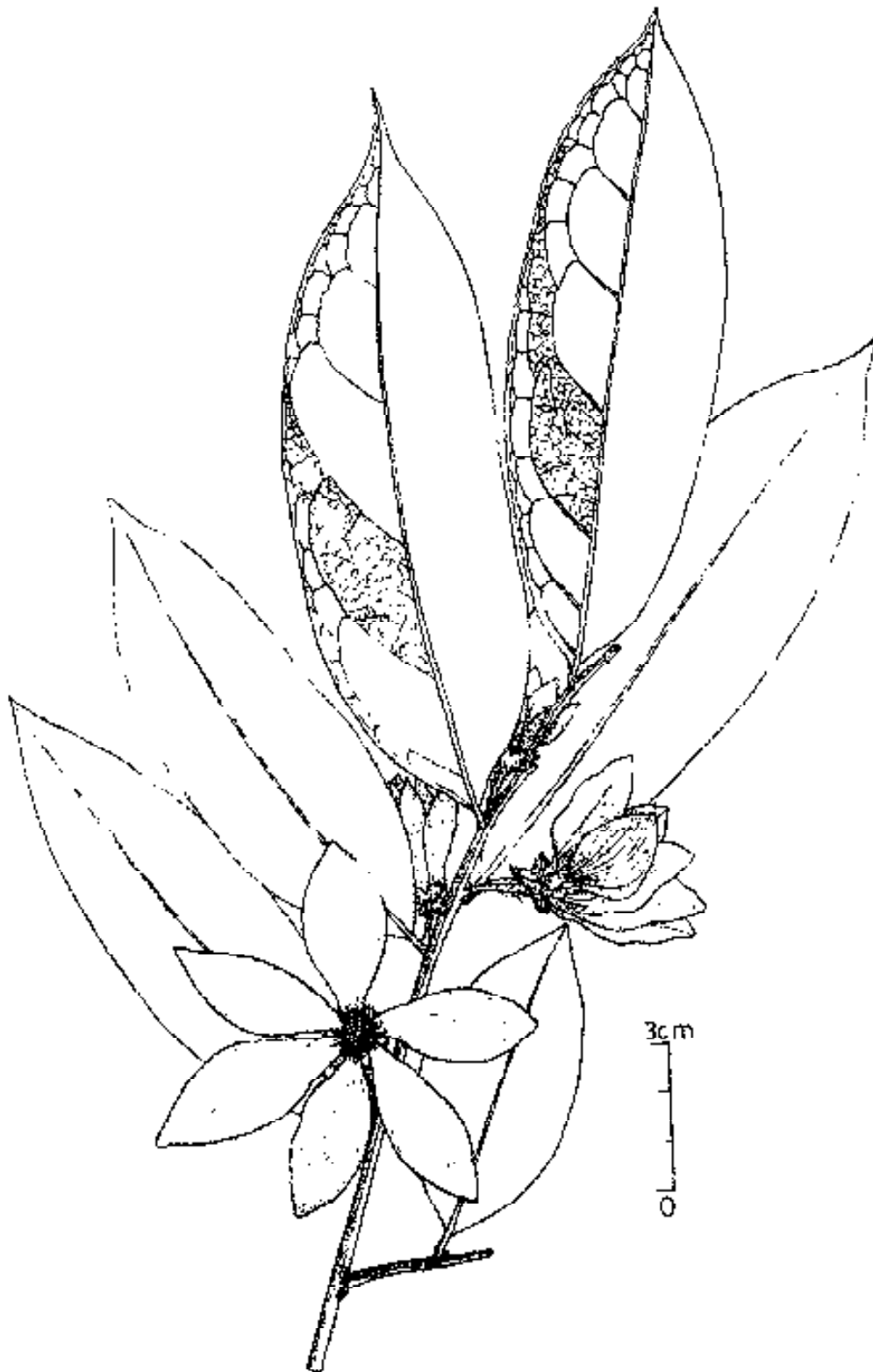


Fig. 8: *Polyalthia jenkinsii* Benth. ex Hook. f.

### 5. *Goniathalamus* Blume

*Goniathalamus sesquipetalis* (Wallich) Hook. f. & Thomson, Fl. Ind. 1 : 108, 1855, & in Hook. f., Fl. Brit. India 1 : 73, 1872; Kanjilal *et al.*, Fl. Assam 1 : 37, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Mitra in Sharma *et al.*, Fl. India 1 : 237, 1993. *Guatteria sesquipetalis* Wallich, Pl. Asiat. Rar. 3 : 266, 1832.

Mani.: *Lleikham*.

Glabrous shrubs, 50-120 cm. Leaves 28-32 × 5-8 cm, coriaceous, minutely pellucid-punctate, shining above; petioles 1 cm. Flowers greenish-yellow, axillary or supra-axillary; pedicels 0.2-0.4 cm; sepals 0.4 cm, glabrous; petals 2 cm, lanceolate, glabrous. Fruits 3-4 or 8-10, 1 cm, mucronate, granulate, orange-red.

Fl. & Fr. : May- September.

*Specimens examined* : Sarpung, Meebold 7210 (CAL).

### 6. *Milium* Leschen. ex DC.

*Milium globosa* (DC.) Panigr. & Mishra in Taxon 33 : 713, 1984; Mitra in Sharma *et al.*, Fl. India 1 : 215, 1993. *Guatteria globosa* DC. in Mem. Soc. Phys. Hist. Natur. Geneve 5 : 41 (43) (pre-print 1831) *Hyalostemma roxburghiana* Wallich, Cat. 6434, 1832 *nom illeg.* *Milium roxburghiana* (G. Watt) Hook. f. & Thomson, Fl. Ind. 150, 1855 & in Hook. f., Fl. Brit. India 1 : 87, 1872; Kanjilal *et al.*, Fl. Assam 1 : 42, 1934; Malick & Safni in J. Econ. Tax. Bot. 10 : 2, 1987. *Uvaria dioica* Roxb., Fl. Ind. ed. 2, 2 : 659, 1832.

Small deciduous trees. *ca* 6 m high, young shoots pubescent. Leaves 2-farious, somewhat aromatic, 5-12.5 × 2.5-5 cm, elliptic, oblong or lanceolate, acuminate, base rounded, thinly coriaceous, upper surface glabrous except puberulous midrib, sub-sessile or petiole up to 5 mm. Flowers dioecious or polygamous *ca* 1 cm long, axillary, solitary or 2-3 together on pedicels 1- 3.5 cm long; sepals 3-4 × 1.5mm, small, lanceolate, narrowly ovate, reflexed, tomentose outside; petals 1- 3.5 cm long, ovate, sub-acute, more or less saccate at the base, red. Fruits oblong or sub-globose, 0.5-0.8 cm long, glabrous, verrucose, on slender stalks, 0.8-1.5 cm long, generally 1- seeded.

Fl. & Fr. : March- December.

*Specimens examined* : Malick 967 (BSIS).

### 7. *Polyalthia* Blume

- a. Young shoots brown tomentose; leaves oblong-lanceolate;  
flowers solitary or rarely geminate ..... 1 *P. jenkinsii*
- b. Young shoots not brown tomentose; leaves narrow  
lanceolate; flowers sub-umbellate ..... 2 *P. longifolia*

1. *Polyalthia jenkinsii* Benth. ex Hook. f., Gen. Pl. 1 : 25, 1862; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 64, 1872; Kanjilal *et al.*, Fl. Assam 1 : 32, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Mitra in Sharma *et al.*, Fl. India 1 : 272, 1993.

Fig. 8

Trees, branches spreading, glabrous; young shoots brown-tomentose. Leaves oblong-lanceolate, glabrous, 10-17.5 × 3.5-6 cm, firm, shining above, pale beneath, base rounded, acute or oblique; petioles 1 cm. Flowers large, spreading; pedicels 1-2.5 cm, erect, axillary, solitary; sepals ovate-obovate; petals 2.5-3 cm long, broad-lanceolate, narrowed to a claw, thinly coriaceous, inner shorter and narrower, outer petals 4.5 × 1 cm, greenish yellow; stamens numerous, hairy. Ripe carpels, yellowish-red, carpels many, smooth, 1.5 cm, oblong, glabrous; stalks 1.5 cm long; seeds 1, yellow.

*Fl. & Fr.* : August- June.

*Specimens examined* : Koupru 2300 m, Meebold 6481 (CAL).

2. *Polyalthia longifolia* Benth. & Hook. f., Gen. Pl. 1 : 25, 1862; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 62, 1872; Kanjilal *et al.*, Fl. Assam 1 : 31, 1934; Deb in Bull. Bot. Surv. India 3 : 255, 1961; Mitra in Sharma *et al.*, Fl. India 1 : 272, 1993.

Lofty trees, branches slender. Leaves 12.5-20 × 2.5-5 cm, membranous, base acute, rarely rounded, shining above pellucid dotted; petioles 0.5-0.8 cm. Flowers numerous, dense, yellowish, green; peduncles 1 cm or less, hairy; pedicels 2.5-5 cm, slender; bracts minute, linear basal; petals narrow, linear, carpels 3-5 cm, ovoid, obtuse at both ends; stalks 1 cm, stout, glabrous.

*Fl. & Fr.* : July-December.

*Specimens examined* : Imphal, Deb 2315 (CAL).

## 7. MENISPERMACEAE

A. L. Juss., Gen. Pl. 284, 1789 ("Menisperma")

(R. Shanpru & D. K. Singh)

- |     |   |                       |
|-----|---|-----------------------|
| 1a. | Flowers always trimerous; ovaries usually with 3 or more carpels .....                                  | 2                     |
| b.  | Flowers tri-pentamerous; ovaries usually with solitary carpels .....                                    | 7                     |
| 2a. | Drupes with subterminal or ventral style scars; seeds oblong or subglobose; cotyledons foliaceous ..... | 3                     |
| b.  | Drupes with sub-basal style-scars; seeds horse-shoe shaped; cotyledons linear .....                     | 5                     |
| 3a. | Flowers in slender panicles; sepals 12 .....  | 1. <i>Aspidocnema</i> |
| b.  | Flowers not in slender panicles; sepals 6 .....   | 4                     |
| 4a. | Flowers in axillary dichotomous cymes; staminodes cylindrical .....                                     | 5. <i>Parabaena</i>   |



- b Flowers in axillary or terminal racemes:  
staminodes clavate ..... 9. *Tinospora*
- 5a. Styles forked ..... 6. *Pericampylus*
- b. Styles subulate ..... 6
- 6a. Climbing or sarmentose shrubs;  
petals 6, auricled; styles cylindric ..... 3. *Coccolus*
- b. Climbing shrubs; petals 6,  
not auricled; styles subulate ..... 8. *Tiliacora*
- 7a. Petals of male and female  
flowers 3-5, free ..... 7. *Stephania*
- b. Petals of male flowers 4-8, connate;  
of female flower only 1 ..... 8
- 8a. All flowers panicled; sepals  
4-8, connate ..... 4. *Cyclea*
- b. Male flowers cymose, female  
flowers racemed; sepals 4, free ..... 2. *Cissampelos*

**1. *Aspidocarya* Hook. f. & Thomson**

*Aspidocarya uvifera* Hook. f. & Thomson, Fl. Ind. 1 : 180, 1855 & in Hook. f., Fl. Brit. India 1 : 95, 1872; Kanjilal *et al.*, Fl. Assam 1 : 53-54, 1934; Deb in Bull. Bot. Surv. India 3 : 317, 1961; Pramanik in Sharma *et al.*, Fl. India 1 : 345, 1993.

Climbers, branches slender, terete. Leaves 10-15 × 7.5-15 cm, acuminate, tip obtuse, base sometimes sub-sagitate or cordate, entire; nerves beneath hairy; petioles 7-10 cm, cylindric. Panicles 10-20 cm, pubescent; sepals lanceolate or oblong, 2-5 × 0.5-1 mm, greenish, ciliate; petals obovate, concave, cuneate. Drupes 1.5-2.5 cm, oblong-ovoid and woody, fragile.

*Fl. & Fr.* : February- August.

*Specimens examined* : Mao, Deb 1884 (CAL).

**2. *Cissampelos* L.**

*Cissampelos pareira* L. var. *hirsuta* (Buch.-Ham. ex DC.) Forman in Kew Bull. 22: 356, 1968; Gangopadhyay in Sharma *et al.*, Fl. India 1: 317, 1993. *C. hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535, 1817. *C. pareira* L., Sp. Pl. 103, 1753; Hook. f. & Thomson, Fl. Ind. 198, 1855. & in Hook. f., Fl. Brit. India 1 : 103, 1872; Kanjilal *et al.*, Fl. Assam 1 : 52-53, 1934; Deb in Bull. Bot. Surv. India 3 : 317, 1961.

Fig. 9

Twiners. Leaves orbicular, reniform or cordate or broadly ovate, mucronate; petioles 2-9 cm. Male inflorescence dense axillary cymes; female inflorescence racemiform; male flowers greenish-yellow; sepals oblanceolate; petals united into

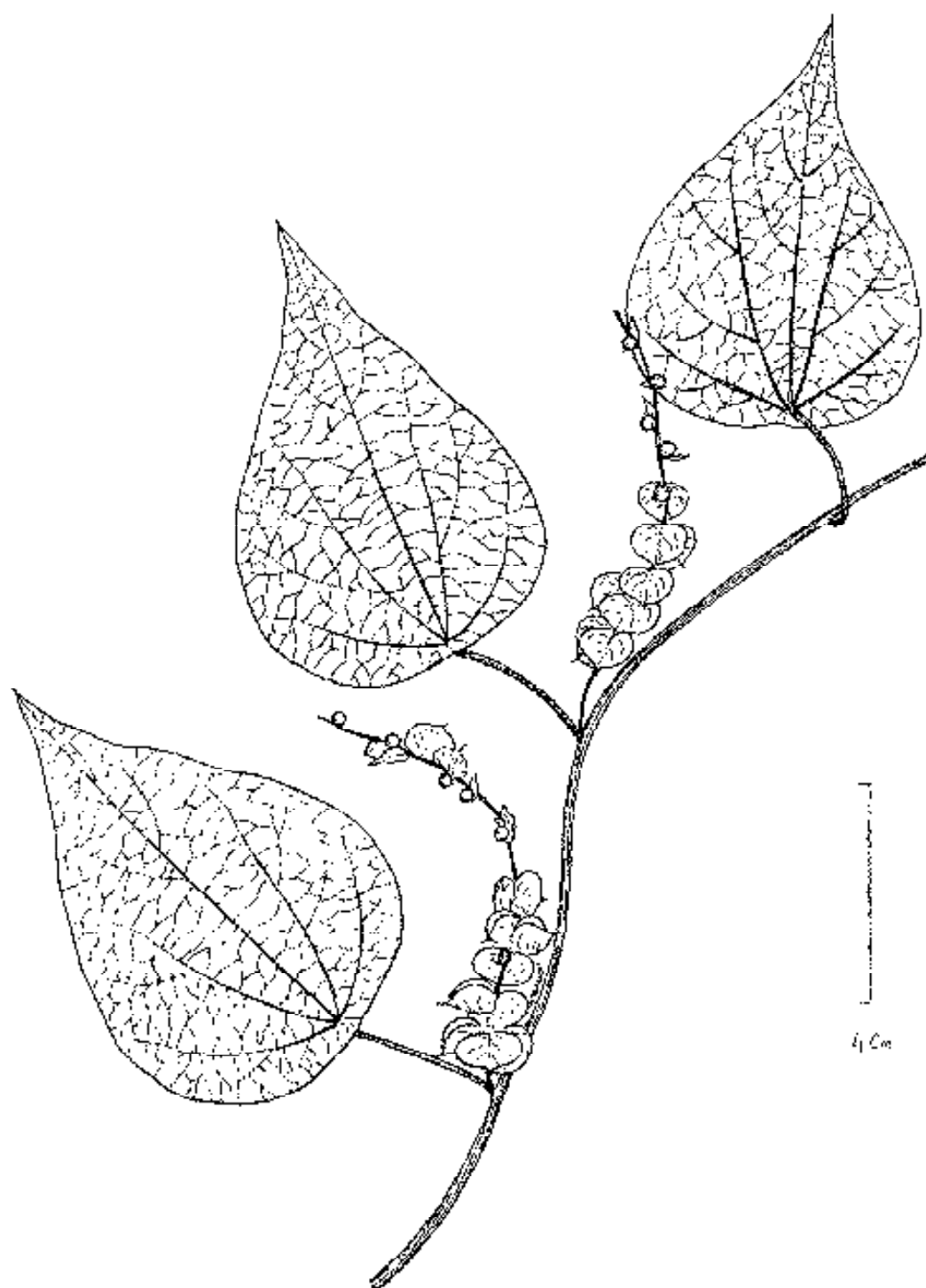


Fig. 9 : *Cissampelos pareira* L. var. *hirsuta* (Buch. Ham. ex DC.) Forman

a shallow cup; female flowers greenish; sepals obovate; petals broadly obovate, long and broad. Drupes sub-globose, hirsute.

*Fl. & Fr.* : October- May.

*Specimens examined* : Nambal, *Deb* 446 & 451; Laimatak, Meebold 6330; Nongamajin, *Deb* 2126 (CAL).

### 3. *Cocculus* DC. *nom. cons.*

*Cocculus orbiculatus* (L.) DC., *Syst. Nat.* 1 : 523, 1817; Gangopadhyay in Sharma *et al.*, *Fl. India* 1 : 319, 1993. *Merispermum orbiculatum* L., *Sp. Pl.* 341, 1753. *Cocculus mollis* Wallich ex Hook. f. & Thomson, *Fl. Ind.* 193, 1855 & in Hook. f., *Fl. Brit. India* 1 : 1-2, 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 57, 1934. *C. trilobus* (Thunb.) DC., *Syst.* 1 : 522, 1817; Deb in *Bull. Bot. Surv. India* 3 : 317, 1961.

Deciduous, scandent pubescent shrubs; branchlets blackish, slender, striate, pubescent. Leaves 3.5-10 × 2-10 cm, broadly ovate, cordate, acute or acuminate, truncate or suddenly cuneate, 3-5-nerved at the base, rarely cordate; lateral nerves 2-3 pairs; petioles 1-2 cm, slender. Panicles usually axillary, sometimes terminal. Flowers yellowish white; petals notched. Drupes 0.4-0.6 cm diam., compressed, tuberculate.

*Fl. & Fr.* : June- October.

*Specimens examined* : Kakching, *Deb* 1273 (CAL).

### 4. *Cyclea* Arn. ex Wight

*Cyclea hieristata* (Griffith) Diels in Engler, *Pflanzenreich* 46 : 317, 1910; Deb in *Bull. Bot. Surv. India* 3 : 317, 1961; Gangopadhyay in Sharma *et al.*, *Fl. India* 1 : 322, 1993. *Lophophyllum hieristatum* Griffith, *Notul.* 4 : 313, 1854; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1 : 105, 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 53, 1934.

Tall climbing shrubs, bark white; branchlets pubescent. Leaves 10-15 × 5-15 cm, sub-peltate, coriaceous, glabrous above, pilose beneath; petiole 5-10 cm, cylindric, pubescent. Panicles slender, decomposed, fascicled, tomentose; male flowers: sepals 4-5, connate into a cup shaped calyx; petals absent; anther 4-5, connate into a peltate disc; female flower: sepals 2; petals absent; Drupes 0.5 cm diam., sub-globose, endocarp with 3-series of hooked spines on each edge.

*Fl. & Fr.* : March- May.

*Specimens examined* : Manipur, G. Watt 7203 (CAL).

### 5. *Parabaena* Miers

*Parabaena sagittata* Buch.-Ham. ex Hook. f. & Thomson, *Fl. Ind.* 181, 1855 & in Hook. f., *Fl. Brit. India* 1 : 96, 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 58, 1934; Deb in *Bull. Bot. Surv. India* 3 : 317, 1961; Pramanik in Sharma *et al.*, *Fl. India* 1 : 346

1993. *Cissampelos sagittata* Buch.-Ham. in Wallich, Cat. 175. n 4983. 1831 - 32. *nom. nud.*

Climbers, glabrous, pubescent or softly tomentose; branchlets grooved. Leaves 4.5 - 20 × 4.5 - 10 cm. 5 -7 nerved, acuminate, base more or less cordate, young sinuate-toothed, older entire, petiole 7.5 - 10 cm. cymes usually geminate. Inflorescence axillary dichotomous cymes. Flowers minute, male flower: sepals 6, oblong-ovate; petals 6, obovate-cuneate, stamens 6, filaments connate into a column; anther free; female flowers: sepals and petals as long as in male; carpels erect, style recurved. Drupes greenish.

*Fl. & Fr.* : May- June

*Specimens examined* : Ukhrul, Mukerjee 2831 (CAL).

#### 6. *Pericampylus* Miets

*Pericampylus glaucus* (Lam.) Merr., Interpr. Rumph. Herb. Amboin. 219. 1917; Deb in Bull. Bot. Surv. India 3 : 317. 1961; Pramanik in Sharma *et al.*, Fl. India 1 : 330. 1993. *Menispermum glaucum* Lam., Encycl. 4 : 100. 1797. *Cocculus incanus* Colobr. in Trans. Linn. Soc. 13 : 57. 1822. *Pericampylus incanus* (Colchr.) Hook. f. & Thomson, Fl. Ind. 194. 1855 & in Hook. f., Fl. Brit. India 1 : 102. 1872; Kanjilal *et al.*, Fl. Assam 1 : 52. 1934.

Climbing shrubs; branchlets tomentose, then glabrate. Leaves 5 -10 cm in diam., base truncate or sub-cordate, entire; petioles 2-4 cm. Inflorescence axillary paniculate cymes, 2- 3 cm in diam. Male flowers: sepals greenish-yellow, lanceolate; petals oblanceolate; stamens 1.5 mm; female flowers: staminode adnate to petals. Drupes red or reddish black.

*Fl. & Fr.* : March - May

*Specimens examined* : Langul Hill, Deb 2098; Barak, Meebold 5427 (CAL).

#### 7. *Stephania* Lour.

- 1a. Umbels capitate; flowers sessile, leaves  
9 - 11 nerved ..... 3. *S. japonica*
- b. Umbels cymose; flowers pediculate;  
leaves 5 nerved ..... 2.
- 2a. Leaves deltoid, acuminate;  
flowers purple, sepals glabrous;  
endocarp ribbed ..... 1 *S. elegans*
- b. Leaves ovate-orbicular;  
flowers yellow; sepals papillose;  
endocarp with erect tubercles ..... 2 *S. glandulifera*

1. *Stephania elegans* Hook. f. & Thomson, Fl. Ind. 195. 1855 & in Hook. f., Fl. Brit. India 1 : 103. 1872; Deb in Bull. Bot. Surv. India 3 : 318. 1961; Gangopadhyay in Sharma *et al.*, Fl. India 1 : 333. 1993.

Large climbers. Leaves deltoid, 4-10 × 3-6 cm, acuminate, base truncate or somewhat rounded, entire, glabrous; petioles 2-4. Inflorescence umbels, axillary, peduncle 2-5 cm; male flowers: sepals ovate; petals obovate, fleshy; female flowers: sepals and petals as in male. Fruits reddish, obovoid; seeds with 15-20 projections.

*Fl & Fr* : May-July.

*Specimens examined* : Landang 1800 m; Mukerjee 2710 (CAL)

**2. *Stephania glandulifera*** Miers in Contrib. Bot. 3 : 220, 1871; Gangopadhyay in Sharma *et al.*, Fl. India 1 : 334, 1993. *S. rotunda* *avet.*, non Lour., Fl. Cochinch. 608, 1770; Hook. f. & Thomson, Fl. Ind. 187, 1855 & in Hook. f., Fl. Brit. India 1 : 103, 1872, *p.p.*; Deb in Bull. Bot. Surv. India 3 : 318, 1961.

Large climbers. Leaves 4-15 × 2-15 cm, ovate-orbicular, acute, often mucronate, with rounded base; petioles 3-15 cm. Inflorescence umbellate, borne on leafless branches; male flowers: sepals oblong or ovate, glandular at the apex, petals ovate-cuneate; female flowers: sepals and petals as in males; carpels ovoid. Fruits orbicular, 4-8 mm in diam., reddish at maturity.

*Fl & Fr* : February-May.

*Specimens examined* : Nuangba 1600 m, Meebold 10896; Ukhrul, Mukerjee 3274 (CAL).

**3. *Stephania japonica*** (Thunb.) Miers, Contrib. Bot. 3 : 213, 1871, *p.p.*; Gangopadhyay in Sharma *et al.*, Fl. India : 335, 1993. *Menispermum japonicum* Thunb., Fl. Jap. 193-1784, *Cissampelas hernandifolia* Willd., Sp. Pl. 4 : 861, 1806, *Stephania hernandifolia* (Willd.) Walp., Rep. Bot. Syst. 1 : 96, 1842; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 103, 1872; Kanjilal *et al.*, Fl. Assam 1 : 51, 1934; Deb in Bull. Bot. Surv. India 3 : 318, 1961.

Mani, Thang-uri-angauha.

Climbers with striate-grooved branches. Leaves 7-14 × 6-10 cm, ovate-deltoid, sub-obtuse, mucronate or acute, truncate or subcordate at base; lateral nerves 9-11; petioles 5-11 cm. Flowers sessile in capitate umbels, yellow. Drupe ca 8 cm across, globose, red.

*Fl. & Fr.* : April-October.

*Specimens examined* : Imphal valley, Deb 529 & 1263 (CAL).

### 8. *Tiliacora* Colebr.

***Tiliacora acuminata*** (Lam.) Miers in Ann. Mag. Nat. Hist. ser. 2, 7 : 39, 1851; Hook. f. & Thomson, Fl. Ind. 187, 1855; Deb in Bull. Bot. Surv. India 3 : 317, 1961; Gangopadhyay in Sharma *et al.*, Fl. India 1 : 343, 1993. *Menispermum acuminatum* Lam., Encycl. 4 : 101, 1797. *Tiliacora racemosa* Colebr. in Trans. Linn. Soc. 13 : 67, t. 6, 1822; Hook. f. & Thomson, Fl. Ind. 187, 1855 & in Hook. f., Fl. Brit. India 1 : 99, 1872.

Fig. 10

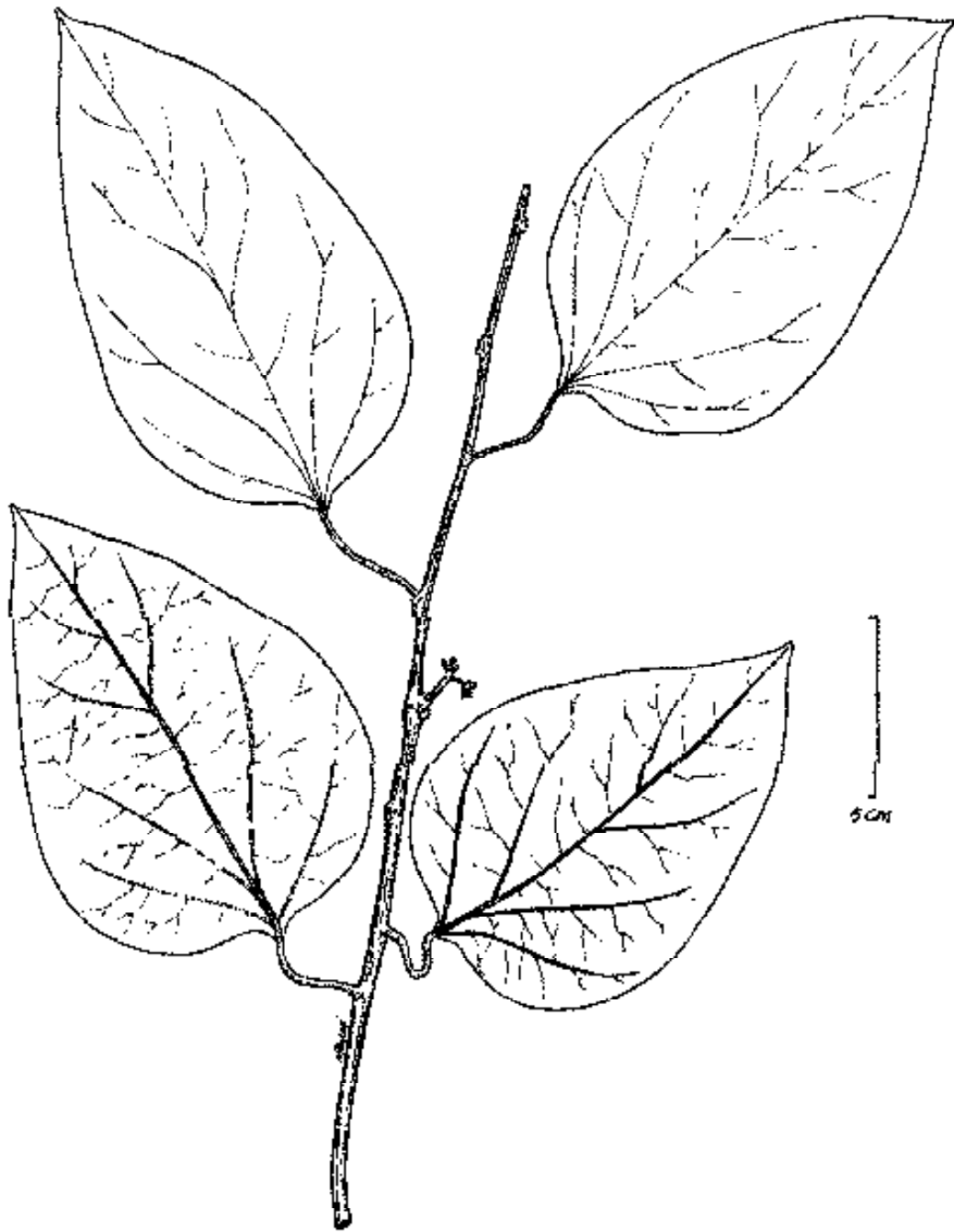


Fig. 10 : *Tiliacora acuminata* (Lam.) Miers

Climbing shrubs: branches glabrous. Leaves 7.5 - 15 × 3.5 - 8.5 cm, ovate, acuminate, glabrous, base acute truncate, rounded or sub-cordate, thin, margin undulate; petiole 1 - 2.5 cm. Panicles 15 - 30 cm, hoary at length, glabrous; branches 2.0 cm, male 3 - 7 flowered, yellow; female simple, 1-flowered, bracts oblong or subulate. Drupes 1 cm, red.

*Fl. & Fr.* : February - May.

*Specimens examined* : Nongmaing 1330 m, Deb 2127; Longol Hill 900 m, Deb 2433 (CAL).

### 9. *Tinospora* Miers

*Tinospora sinensis* (Lour.) Merr. in *Sunyatsenia* 1 : 193, 1934; Pramanik in Sharma *et al.*, *Fl. India* 1 : 349, 1993. *Campylus sinensis* Lour., *Fl. Cochinch.* 113, 1790. *Menispermum malabaricum* Lam., *Encycl.* 4 : 96, 1797. *Cacculus tomentosus* Colebr. in *Trans. Linn. Soc.* 13 : 59, 1822. *Menispermum tomentosus* (Colebr.) Roxb., *Fl. Ind.* ed 2, 3 : 813, 1832. *Tinospora malabarica* (Lam.) Hook. f. & Thomson, *Fl. Ind.* 1 : 183, 1855 & in Hook. f., *Fl. Brit. India* 1 : 96, 1872. *T. tomentosa* (Colebr.) Hook. f. & Thomson, *Fl. Ind.* 1 : 183, 1855 & in Hook. f., *Fl. Brit. India* 1 : 96, 1872. *T. cordifolia* auct. non Willd.: Kanjilal *et al.*, *Fl. Assam* 1 : 54, 1934. Fig. 11

Mani.: *Ningthou khongli*.

Climbing shrubs. Leaves broadly ovate, 5 - 15 × 6 - 12 cm, abruptly acuminate, sometimes lobed, pubescent beneath. Inflorescence racemose; male flowers in clusters of few; outer sepals ovate, inner elliptic; petals obovate; stamens club-shaped; female flowers with sepals and petals as in male; carpels ellipsoid. Drupes red; stones broadly ellipsoid, rounded at both ends.

*Fl. & Fr.* : February - May.

*Specimens examined* : Longol Hill, Deb 2432 (CAL).

## 8. BERBERIDACEAE

A. L. Juss., *Gen. Pl.* 286, 1789 ("Barberides").

(A. S. Chauhan & D.P. Dam)

- 1a. Leaves simple; stems usually spiny ..... 1. *Berberis*
- b. Leaves pinnate; stems unarined ..... 2. *Mahonia*

### 1. *Berberis* L.

- 1a. Stem without spines ..... 1. *B. doxylecta*
- b. Stem with spines ..... 2
- 2a. Shrubs ca 1 m tall; ovules 6 - 12 ..... 2. *B. hookeri*
- b. Shrubs more than 1.5 m tall; ovules 5 or less ..... 3.
- 3a. Ovules 3 - 5 ..... 3. *B. manipurensis*
- b. Ovules 1 - 2 ..... 4. *B. sublexis*

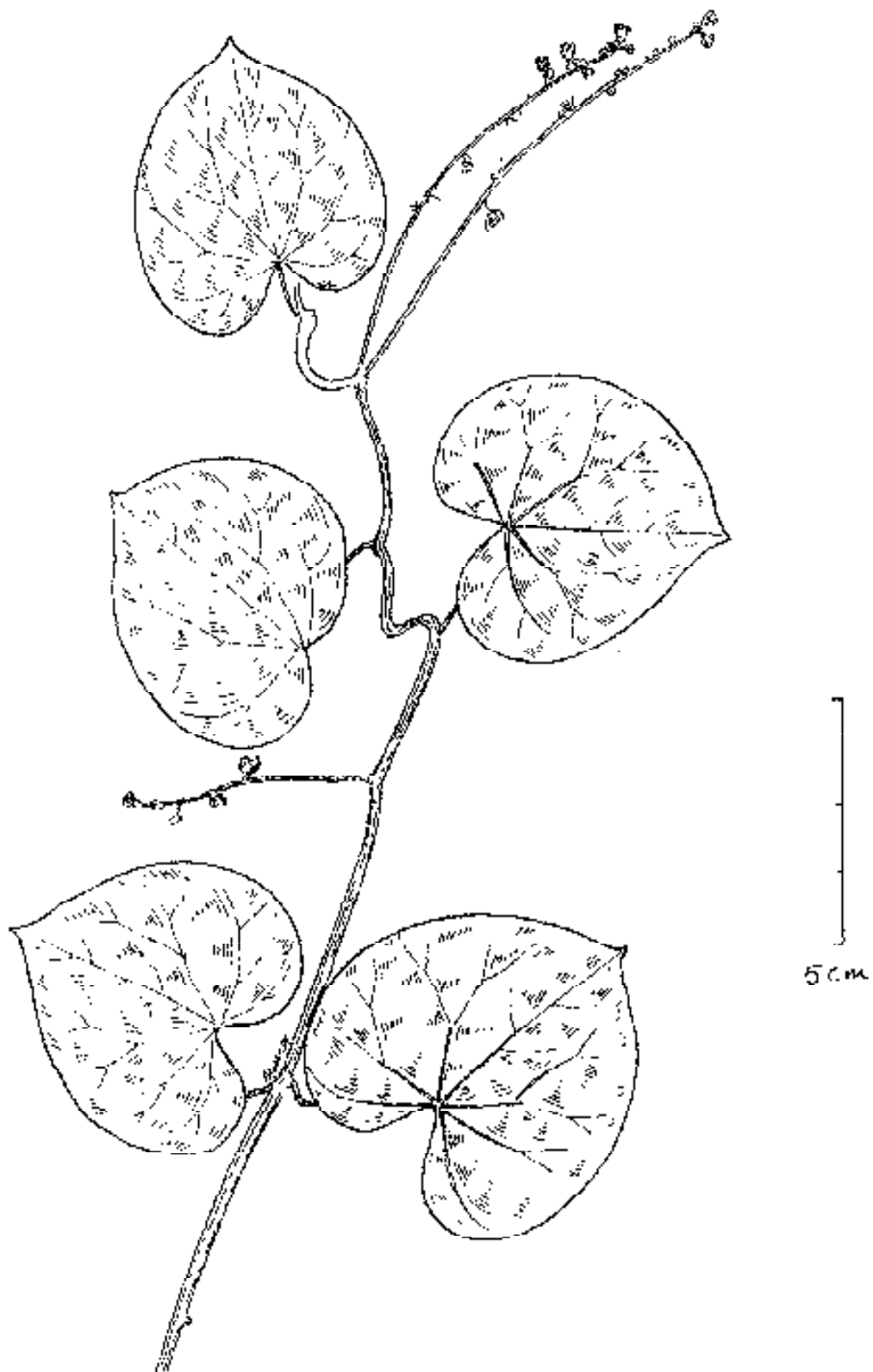


Fig. 11 : *Tinospora sinensis* (Lour.) Merr.



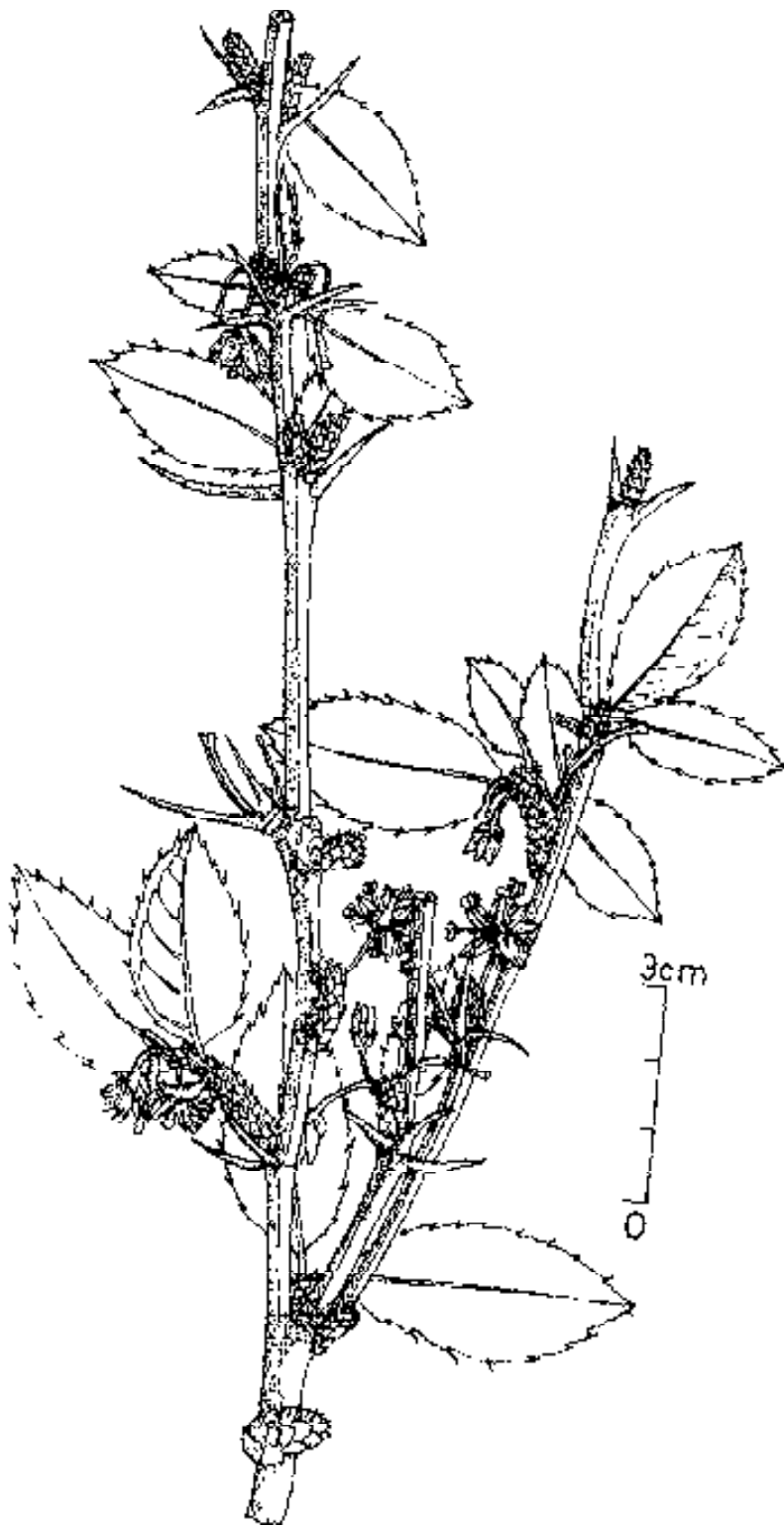


Fig. 12 : *Berberis manipurana* Aitrendt

1. *Berberis dasyclada* Ahrendt in J. Bot. Lond. 79 (Suppl.) : 12, 1941 & in J. Linn. Soc. Lond. (Bot.) 57: 36, 1961. *B. insignis* Hook. f. & Thomson var. *zaluica* Ahrendt in J. Bot. 79 (Suppl.) : 9, 1942; Dasgupta in Sharma *et al.* Fl. India 1: 397, 1993, Deb in Bull. Bot. Surv. India 3 : 318, 1961.

Low growing rather gregarious herbs. Leaves thickly coriaceous, margin coarsely dentate. Flowers few, fascicled; pedicled short and stout; petals lanceolate, entire, glandular.

*Fl. & Fr.*: July - November.

*Specimens examined* : Sirohec, G. Watt 6533 (CAL).

2. *Berberis hookeri* Lemaire in Illus. Hort. t. 207, 1859; Chatterjee in Rec. Bot. Surv. India 16 (2) : 8, 1953; Dasgupta in Sharma *et al.*, Fl. India 1: 395, 1993. *B. wallichiana* auct. non DC.; Hook. f. & Thomson in Bot. Rec. 76, t. 4656, 1852.

Shrubs ca 1 m tall; stems glabrous, yellow, angled, sulcate; spines 1.1 - 2.3 cm, 3-fid. Leaves 3 - 6 × 0.8 - 1.8 cm, oblong-elliptic, each margin with 7 - 15 teeth. Flowers 1.5 - 1.8 cm diam., fascicled 3 - 6; panicles stout, 1.5 - 2.5 cm long; sepals in 3 series, outer oblong-obovate, sub-acute, 5.6 × 3.5 - 4 mm; median oblong-elliptic, inner obovate; petals obovate, 6-7 × 5 - 6 cm, entire; stamens 4 - 5 cm, truncate; ovules 6 - 9. Berries oblong, estylose, purplish - black.

*Fl. & Fr.* : June - December.

*Specimens examined* : Sirohec, Mukerjee 2758 (CAL); Chingsow 2670 m. G. Watt 6535 (BSIS).

3. *Berberis manipurana* Ahrendt in Kew Bull. 1939: 262, 1939; Deb in Bull. Bot. Surv. India 3 : 318, 1961; Dasgupta in Sharma *et al.*, Fl. India 1: 401, 1993.

Mani.: Unapu.

Shrubs semi-erect, ca 3m high; branches glabrous coarse yellowish brown; spines 1.5 - 3 cm, 3-fid, sulcate. Leaves almost sessile, 4 - 8 × 1 - 3 cm, elliptic-ovate or oblong-elliptic, terminal sharp pointed, margin entire or remotely dentate, green above, pale yellowish-green beneath. Flowers fascicled, 6 -12 flowered; sepals in 2 series, outer ovate, 4.5 × 4.5 mm, inner obovate, 7 - 6 mm; petals broadly obovate, 5 × 5 mm; stamens 3 - 5 mm; ovules 2 - 5. Berries oblong or oblong-ovoid, blue-black or black.

*Fl. & Fr.* : July - November

*Specimens examined* : Sirohec, G. Watt 6533 (CAL).

4. *Berberis sublevis* W. Smith in Notes R. Bot. Gard. Edinb. 9 : 83, 1916; Dasgupta in Sharma *et al.*, Fl. India 1: 405, 1993.

Shrubs 1.5 - 2 m tall; stems yellow, more or less verruculose; spines ca 1.5 cm long. Leaves 10 - 18 subappressed, 2.5 - 8 × 0.5 - 3.5 cm, lanceolate, acuminate,

spinules along margins or subentire; petiole 1 - 4 mm long. Flowers in fascicles, 3-30 flowered; sepals in 2 series; petals emarginate; stamens ca 3.5 mm, obtuse, produced. Berries ca 8 mm, black, cystlose.

- 1a. Leaves entire; fascicles 10-50 flowers ..... 1. var. *sublevis*
- b. Leaves marginal spinules;  
fascicles 3-10 flowered ..... 2. var. *microcarpa*

4.1 var. *microcarpa* (Hook. f. & Thomson) Ahrendt in J. Linn. Soc. Bot. 57 : 58, 1961; Deb in Bull. Bot. Surv. India 3 : 318, 1961; Dasgupta in Sharma *et al.*, Fl. India 1: 405, 1993. *B. wallichiana* var. *microcarpa* Hook. f. & Thomson, Fl. Ind. 226, 1855 & in Hook. f., Fl. Brit. India 1: 111, 1872.

*Fl. & Fr.* : March - September.

*Specimens examined* : Sirohee furar, G. Watt 6428 (CAL).

4.2 var. *sublevis*

*Fl. & Fr.*: June - December.

*Specimens examined* : Manipur ca 2600 m, *s.n.*

2. *Mahonia* Nutt. *non. cons.*

- 1a. Style prominent more than 1 mm long ..... 2
- b. Style insignificant ..... 3
- 2a. Bracts longer than pedicels:  
pedicels 1.5 mm long; shrubs ..... 1. *M. feddei*
- b. Bracts shorter or sub-equal than pedicels;  
pedicels 2-5 mm long; small trees ..... 2. *M. magnifica*
- 3a. Leaflets 5-9 pairs; petals with 2 nectar  
glands at base ..... 3. *M. manipurensis*
- b. Leaflets 4-5 pairs; petals  
without nectar glands ..... 4. *M. roxburghii*.

1. *Mahonia feddei* Ahrendt in J. Linn. Soc. Lond. (Bot.) 57 : 303, 1961; Guha Bakshi in Sharma *et al.*, Fl. India 1: 409, 1993.

Shrubs up to 2 m high. Leaflets 4-6 pairs, 7-9 × 4-6 cm, terminal one oblong-elliptic, 3-6 spines along margins, loosely veined. Racemes 6-11 cm long; flowers golden yellow; bracts 3-4 mm long; outer sepals 2.5 × 1.5 mm, oblong; elliptic-obovate, with two acute lobes at apex; stamens ca 4 mm long; outer ovule solitary; style 1 mm or longer.

*Fl. & Fr.* : April - July.

*Specimens examined* : Manipur 2500 m. (Specimens not seen).

Endemic to Manipur.

2. *Mahonia magnifica* Ahrendt in J. Linn. Soc. Lond. (Bot.) 57 : 309, 1961; Guha Bakshi in Sharma *et al.*, Fl. India 1 : 410, 1993.

Scandent tree, branching repeatedly. Leaves up to 50 × 20 cm; the basal pair 5–20 mm above the base; lateral leaflets 10–11 pairs, lanceolate, broadly cuneate to sub rounded at base. Racemes erect, 10–20 cm, fascicled. Flowers ca 12, yellow; pedicels slender, 2–5 mm; outer sepals 2–3 × 6–8 mm, oblong-ovate; inner 6 × 3 mm; oblong-elliptic; stamen truncate; styles ca 1.5 mm or more.

*Fl. & Fr.* : July–December.

Specimens not seen.

3. *Mahonia manipurensis* Takeda in Notes R. Bot. Gard. Edinb. 6 : 22, 1917; Deb in Bull. Bot. Surv. India 3 : 318, 1961; Guha Bakshi in Sharma *et al.*, Fl. India 1 : 410, 1993.

Shrubs; leaflets 5–9 pairs, 3–6 × 2–3 cm, ovate or broadly ovate, coriaceous; shining above; dull beneath, terminal leaflets rather large, rounded at base. Racemes fascicles of 5–8 flowers; sepals in 3 series, outer ovate, median oblong-ovate, inner elliptic or oblong-ovate; petals oblong-ovate, bilobed at apex with 2 distinct nectar glands at the base; stamens dentate, connective triangular; ovules 1–2; styles short.

*Fl. & Fr.* : April–October.

*Specimens examined* : Sirohee Suar, G. Watt 6472; Sirohee, Mukerjee 2762, Koupri, Deb 2369 (CAL).

4. *Mahonia roxburghii* (DC.) Takeda in Notes R. Bot. Gard. Edinb. 6 : 218, 1917; Deb in Bull. Bot. Surv. India 3 : 318, 1961; Guha Bakshi in Sharma *et al.*, Fl. India 1 : 412, 1993. *M. nepalensis* var. *roxburghii* DC., Prodr. 1 : 109, 1824.

An erect shrub with pinnate compound leaves; leaflets 4–5 pairs, 6–8 × 3–4 cm, oblong, dull above, pale beneath, oblique, coriaceous, 5-nerved at base; margins sinuate-dentate. Racemes in fascicles, densely flowered; floral bracts triangular; sepals in 3 series; outer oval, median oblong, inner elliptic; petals oblong, 3-nerved; stamens dentate, connective truncate; ovules 2, style short.

*Fl. & Fr.* : April–September.

*Specimens examined* : Koupri-Tosen, Mukerjee 3562 (CAL).

## 9. LARDIZABALACEAE

Decaisne, Arch. Mus. Hist. Nat. Paris 1 : 185, 1839

("Lardizabalaceae").

(A. S. Chauhan)

### *Holboellia* Wallich

*Holboellia latifolia* Wallich, Tent. Fl. Nep., 24, t. 16, 1824; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 108, 1872; Kanjilal *et al.*, Fl. Assam 1 : 61, 1934; Deb

in Bull. Bot. Surv. India 3 : 317, 1961; Nayar & Paul in Sharma *et al.*, Fl. India 1 : 423, 1993.

Climbing shrubs ca 3 - 5 m high with corky bark in mature stem, glabrous, branches and twigs often twining at the apical portion. Leaves alternate, digitately compound, 3 - 9 foliolate; petiole 4 - 8 cm long; leaflets 4 - 13 × 1 - 5 cm, ovate, oblong or ovate-lanceolate, apex acute to slightly acuminate, base rounded or cuneate, margin entire, glabrous usually 3 nerved at the base. Racemes few flowered in axillary fascicles; peduncles as long as the petiole. Flowers 10 - 20 mm across, green or purplish-green. Fruits 5 - 10 × 2 - 6 cm, oblong or oblong-ovate, red; seeds ca 2 mm long, ovoid, orbicular, blackish.

*Fl. & Fr.* : March - August.

*Specimens examined* : Ukhrul 2000 m, Mukerjee 2447 (CAL); Chingsow 2900m, G. Watt 6572; Kanglofogied 2000m, Meebold 6731 (BSIS).

- 1a. Leaflets 7 - 9, linear - lanceolate..... 1. var. *angustifolia*
- b. Leaflets oblong - ovate..... 2. var. *latifolia*

1. var. *angustifolia* (Wallich) Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 108, 1872; Nayar & Paul in Sharma *et al.*, Fl. India 1 : 423, 1993. *H. angustifolia* Wallich, Tent. Fl. Nep. 24, t. 17, 1824; Deb in Bull. Bot. Surv. India 3 : 317, 1961.

*Fl. & Fr.* : March - September.

*Specimens examined* : Sirohee firar 2660 m, G. Watt 6456; Khongui, G. Watt 6326; Ukhrul, Mukerjee 2202 (CAL).

2. var. *latifolia*

*Fl. & Fr.* : June - November

## 10. NYMPHAEACEAE

Salisb. in Konig & Sims ed., Ann. Bot. 2 : 70, 1805

("Nymphaeaceae").

(A. S. Chauthan & D. P. Dam)

- 1a. Plants densely prickly; flowers epigynous:  
sepals persistent ..... 1. *Euryale*
- b. Plants without prickles; flowers  
hypo-perigynous; sepals deciduous ..... 2. *Nymphaea*

### 1. *Euryale* Salisb.

*Euryale ferox* Salisb. in Koenig & Sims (ed.), Ann. Bot. 2 : 74, 1805; Hook. f. & Thomson, Fl. Ind. 1 : 245, 1855 & in Hook. f., Fl. Brit. India 1 : 115, 1872; Kanjilal *et al.*, Fl. Assam 1 : 65, 1934; Deb in Bull. Bot. Surv. India 3 : 316, 1961; Mitra in Sharma *et al.*, Fl. India 1 : 427, 1993.

Mani : "Thangjing"

Annual or short lived perennial prickly, aquatic herbs with submerged and floating leaves. Leaves 30 - 120 × 25 - 110 cm, centrally peltate, orbicular, acute at one side terminating in a pinnately branched vein, prickly along veins. Flowers 3 - 5 cm long, violet blue or red; sepals 4; petals many passing into stamens; carpels 8, united. Berries 4 - 10 cm across, globular-ovoid, densely prickly; seeds ca 20, arillate.

*Fl. & Fr.*: June - October.

*Specimens examined*: Loktak, *Meebold* 6378 (CAL); Dibong, *Malick* 724 (BSIS).

## 2. *Nymphaea* L., nom. cons.

- 1a. Leaves entire or obtusely sinuate;  
stamens with distal sterile appendages ..... 2
- b. Leaves sharply sinuate toothed;  
stamens without sterile appendages ..... 3. *N. pubescens*
- 2a. Leaves bearing vegetative buds;  
flowers yellow ..... 1. *N. micrantha*
- b. Leaves not bearing vegetative buds;  
flowers blue, purplish or white ..... 2. *N. nouchali*

1. *Nymphaea micrantha* Guill. & Perr., Fl. Seneg. Tent. 1 : 16, 1830; Mitra in Fasc. Fl. Ind. 20 : 23, 1990 & in Sharma *et al.*, Fl. India 1 : 434, 1993. *N. stellata* *aut. non* Willd. 1799; Deb in Bull. Bot. Surv. India 3 : 317, 1961.

Rhizomes clustered. Leaves 7.5 - 20 × 5 - 15 cm, elliptic, entire above, sinuate below, lobes spreading, acuminate, green above, reddish beneath with dark violet spots. Flowers yellow or bluish; sepals 5, lanceolate; petals 10, yellowish or blue-violet; ovary round; stigmatic rays ending in long horns; seeds small, blackish.

*Fl. & Fr.* : July - February.

*Specimens examined* : Imphal valley, *Panigrahi*, 13473; Imphal, *Deb* 404; Kripok, *Deb* 570 (CAL).

2. *Nymphaea nouchali* Burm. f., Fl. Ind. 120, 1768; Mitra in Fasc. Fl. Ind. 20 : 17, 1990 & in Sharma *et al.*, Fl. India 1 : 430, 1993. *N. stellata* Willd., Sp. Pl. 2 : 1153, 1799; Hook. f. & Thomson, Fl. Ind. 1 : 243, 1855 & in Hook. f., Fl. Brit. India 1 : 114, 1872; Kanjilal *et al.*, Fl. Assam 1 : 64, 1934. *N. pygmaea* *aut. non* Ait. ; Deb in Bull. Bot. Surv. India 3 : 317, 1961.

*Mani.*: *Tharo & Thariktha*.

Aquatic herbs. Leaves 6 - 45 × 5.0 - 4.1 cm, elliptic or orbicular, sub-rotund, irregularly sinuate-dentate with broad obtuse teeth, or sub-entire, glabrous, greenish above, reddish-purple beneath. Flowers 4 - 17 cm across, bluish purple or pale bluish-white, fragrant; sepals 2.5 - 9 cm, triangular ovate; petals 2.5 - 7.5 cm, lanceolate to oblong lanceolate; ovary 8 - 16 loculate, stigmatic appendages incurved. Berries 1.5 - 4 cm; seeds ribbed.

*Fl. & Fr.* : July - December.

*Specimens examined* : Lousy, Deb 2555; Imphal, Deb 462 (CAL).

**3. *Nymphaea pubescens*** Willd., Sp. Pl. 2 : 1154. 1799; Deb in Bull. Bot. Surv. India 3 : 317. 1961; Mitra in Fasc. Fl. India 20 : 18. 1990 & in Sharma *et al.*, Fl. India 1 : 431. 1993. *N. lotus* var. *pubescens* (Willd.) Hook. f. & Thomson, Fl. Ind. 1 : 241. 1855 & in Hook. f., Fl. Brit. India 1 : 114. 1872. *N. lotus* *encl. non* L. (1753) : Roxb., Fl. Ind. 2 : 577. 1832; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 114. 1872, p.p.; Kanjilal *et al.*, Fl. Assam 1 : 84. 1934, p. p.

Mani. : 'Thuro & Angouha.

Rhizomes nodular. Leaves 15 - 50 × 12 - 45 cm, broadly ovate-elliptic or reniform to orbicular, spinous-dentate, glabrous above, velutinous pubescent beneath; petioles ca 1.5 m. green or reddish brown. Flowers 4 - 15 cm across, white or with a purple tinge; sepals 2.5 - 8 cm, elliptic-oblong; petals 2 - 7 cm, oblanceolate; ovary 13 - 22 loculate, stigmatic appendages inflexed. Berries 2.5 - 4 cm; seeds papillose.

*Fl. & Fr.* : August - December.

*Specimens examined* : Imphal valley, Deb 498 & 499 (CAL).

## 11. NELUMBONACEAE

Dum., Anal. Fam. Pl. 53. 1829

("Nelumboneae").

(A. S. Chauhan)

*Nelumbo* Adans.

*Nelumbo nucifera* Gaertn., Fruct. 1 : 73, t. 19, f. 2. 1788; Deb in Bull. Bot. Surv. India 3 : 316. 1961; Mitra in Fasc. Fl. India 20 : 8. 1990 & in Sharma *et al.*, Fl. India 1 : 441. 1993. *Nymphaea nelumbo* L., Sp. Pl. 511. 1753. *Nelumbium spectosum* Willd., Sp. Pl. 2 : 1258. 1799; Hook. f. & Thomson, Fl. Ind. 1 : 247. 1855 & in Hook. f., Fl. Brit. India 1 : 116. 1872; Kanjilal *et al.*, Fl. Assam 1 : 65. 1934.

Mani. : "Thambal"

Large perennial aquatic herbs with watery sap. Leaves 20-80 cm, sub-orbicular, shallowly notched, apiculate at one side terminating in a simple vein; glabrous and glaucous on both surfaces, flat when floating; petioles ca 2 cm long. Flowers 8 - 25 cm across, rose pink or white, fragrant; style 1.5 - 5 × 0.8 - 3.5 cm, ovate or elliptic, green or pinkish green; petals 4 - 15 × 2 - 8 cm, elliptic, obovate to spatulate; stamens many, yellow during anthesis; carpels many, free, sunken in turbid spongy toms.

*Fl. & Fr.* : July - December.

*Specimens examined* : Imphal, Deb 1014 (CAL)

## 12. PAPAVERACEAE

A. L. de Juss. Gen. Pl. 235. 1789

(A. S. Chauhan)

- 1a. Stigmatic lobes alternate to the placentae:  
capsules opening throughout its length ..... 2. *Eschscholtzia*
- b. Stigmatic lobes opposite to placentae:  
capsules usually opening by pores or by short valves,  
rarely throughout to whole length. .... 2
- 2a. Styles absent: stigmas discoid:  
capsules opening by pores just beneath the stigma ..... 4. *Papaver*
- 2b. Styles present or inconspicuous:  
stigmas not discoid: capsules opening  
by short valves ..... 3
- 3a. Leaves sessile, pinnatifid, dentate; sepals 3, horned;  
flowers yellow; capsules 1-4 cm.  
seeds sub-orbicular ..... 1. *Argemone*
- b. Leaves petiolate, entire or shallow  
crenately lobed: sepals 2, not horned:  
flowers blue, purplish blue or red:  
capsules 1 - 1.5 cm; seeds sub-reniform ..... 3. *Meconopsis*

1. *Argemone* L.

*Argemone mexicana* L., Sp. Pl. 508. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 117. 1872; Kanjilal *et al.*, Fl. Assam 1 : 65. 1934; Deb in Bull. Bot. Surv. India 3 : 319. 1961; Debnath & Nayar in Sharma *et al.*, Fl. India 2 : 2. 1993.

Mam.: *Khomthongpee*.

Herbs, up to 1.5 m tall, divaricately branched, spinescent or devoid of spines. Leaves sessile, semi-amplexicaul, elliptic-oblong or elliptic-obovate, 3 - 22 × 2 - 8 cm, pinnatifid, sinuate-lobulate; segments inciso-dentate, margins acute, toothed with spines, lower surfaces prickly, upper surface smooth or both surface smooth. Flowers 3 - 7 cm in diam., subtended by 2 - 3 foliaceous bracts; sepals imbricate, elliptic, ca 1.5 × 1 cm, prickly, caducous; petals 2 - 3 × 1.2 - 2.4 cm, obovate, 4 - 6, yellow. Capsules 1 - 4 × 0.5 - 2.1 cm, oblong or elliptic-oblong; seeds deeply reticulate, sub-orbicular.

f. *mexicana* Plants spinescent.

Fl. & Fr. : February-May.

Specimens examined : Imphal valley, Deb 2755 (CAL).

2. *Eschscholtzia* Cham.

*Eschscholtzia californica* Cham. in Nees, Horae Phys. Berol. 74, t. 15 1820;





Fig. 13 : *Eschscholtzia californica* Cham.

Deb in Bull. Bot. Surv. India 3 : 319, 1961; Deb Nath & Nayar in Sharma *et al.*, Fl. India 2 : 8, 1993. Fig. 13

Perennial erect diffuse herbs, stems *ca* 50 cm tall, quadrangular, scapose or leafy, dichotomously branched, glabrous or nearly so. Leaves 10–30 cm long, alternate, radical or cauline, ternately dissected into very narrow segments; segments linear *ca* 1 m broad, acute or sub-obtuse; petioles 5–20 cm long, shorter in the upper leaves. Flower buds ovate; pedicels 6–20 cm long; flowers solitary, axillary or terminal, 4–8 cm in diam., showy; sepals 2, united into a calyptra, deciduous; petals 4, yellow, broadly obovate, shortly clawed. Capsules 7–10 × 3–4 mm, longitudinally prominently ribbed, glabrous; seeds 2 mm in diam., black, globose, reticulate.

*Fl. & Fr.* : February–August.

*Specimens examined* : Imphal, Deb 227 (CAL).

Under cultivation as an ornamental plant in the gardens.

### 3. *Meconopsis* Vignier

*Meconopsis aculeata* Royle, Illus. Bot. Himal. 67, t. 15, Mar. 1834; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 118, 1872; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Deb Nath & Nayar in Sharma *et al.*, Fl. India 2 : 11, 1993.

Herbs; stems *ca* 60 cm, covered with 2–7 mm long bristles. Leaves oblong in cauline, pinnatifid, rarely bipinnatifid, segments oblong or ovate or ovate-triangular, obtuse or rounded, a few acute, up to 30 cm long; basal leaves on 2.5–10 cm long petioles, upper ones sessile. Flowers on spiny 1–15 cm long, pedicels; sepals broadly oblong-ovate, 1–2 cm long; petals 4, rarely 6, blue, purplish-blue or red, obovate to sub-orbicular; ovary subglobose or ellipsoid. Capsules dehiscent by 4–6 valves, 1–1.5 cm long; seeds 1 mm long, sub-reniform.

*Fl. & Fr.* : July–October.

*Specimens examined* : Imphal, Deb s. n. (CAL).

Cultivated in the gardens as ornamental plants.

### 4. *Papaver* L.

- |     |  |                         |
|-----|--|-------------------------|
| 1a. | Stems very short, scapes without cauline leaves;<br>flowers yellow to orange-yellow .....              | 2. <i>P. nudicaule</i>  |
| b.  | Stems long, rarely short, scapose with<br>cauline leaves; flowers white,<br>pink-red or purplish ..... | 2                       |
| 2a. | Plants glabrous or rarely so;<br>cauline leaves amplexicaul;<br>1 or few-flowered .....                | 4. <i>P. somniferum</i> |
| b.  | Plants robust, shortly hairy;<br>flowers red or scarlet .....  | 3                       |

- 3a. Flowers scarlet with dark spots  
at the base; capsules hairy ..... 3. *P. orientale*
- b. Flowers brick-red without dark spots;  
capsules glabrous ..... 1. *P. dubium*.

1. **Papaver dubium** L., Sp. Pl. 1196, 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 117, 1872; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Debnath & Nayar in Sharma *et al.*, Fl. India 2 : 28, 1993. *P. dubium* var. *laevigatum* (Bieb.) Elkan. Yant. Mem. Gen. Pap. 25, 1837. *P. dubium* var. *glabrum* (Royle) Koch, Synop. ed. 1 : 30, 1838.

Caulescent or subscapose, 15 - 40 cm tall, stems basicauliramous. Leaves pinnatisect, sometimes pinnatifid, oblong-ovate, entire, often demate, 2 - 10 × 2 - 7 cm, peduncles 5-33 cm long; buds ovoid, 8 - 15 × 5 - 8 mm. Flowers ca 3.7 cm in diam., sepals caducous; petals 2.5 - 3 × 3 - 3.3 cm, brick red to red. Capsules 5 - 8 × 3 - 9 mm, glabrous; seeds purplish-black.

*Fl. & Fr.* : April - August.

*Specimens examined* : Imphal valley, Deb s. n. (CAL).

Cultivated in the gardens as an ornamental plant.

2. **Papaver nudicaule** L., Sp. Pl. 507, 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 117, 1872; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Debnath & Nayar in Sharma *et al.*, Fl. India 2 : 31, 1993.

Herbs with 10 - 85 cm long scapes. Leaves 2 - 8.5 cm long and widened at the base, leaf sheaths 2 - 6 × 1.5 cm, pinnately 3-lobed; lobes usually pinnatifid, secondary lobes 11 × 5 mm. Flowers 1.5 - 5 cm; buds ovoid - orbicular, 8 - 12 × 5 - 9 mm; sepals concave, caducous; petals 4, obovate to sub orbicular, yellow to orange-yellow, 1 - 2 cm long and usually about as broad. Capsules 0.8 - 1.5 × 0.5 - 1 cm, oblong to oblong-globose, stigmatic disc 7 - 8-ridged, pores 7 - 8.

*Fl. & Fr.* : May - August.

*Specimens examined* : Imphal, Deb s. n. (CAL).

Cultivated in the gardens as an ornamental plant.

3. **Papaver orientale** L., Sp. Pl. 508, 1753; Deb in Bull. Bot. Surv. India 3 : 320, 1961.

Robust stiff hairy annuals ca 1 m high. Leaves 30 cm long, pinnatifid, oblong-lanceolate, lobed, toothed. Flowers 10 - 13 cm in diam., peduncles white hairy; petals 4 - 6; obovate, narrowed below, scarlet with black spots at the base; stigmas 11 - 15, capitate. Capsules ca 2.5 cm long.

*Fl. & Fr.* : April - October.

*Specimens examined* : Imphal, Deb 143 (CAL).

Cultivated in the gardens as an ornamental plant.

4. *Papaver somniferum* L., Sp. Pl. 1 : 508, 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 117, 1872; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Debnath & Nayar in Sharma *et al.*, Fl. India 2 : 32, 1993.

Herbs; stems 10 - 100 cm long. Leaves simple, repand, serrate-dentate, rarely pinnatifid, 3 - 15 × 1 - 8 cm. Pedicels 3 - 20 cm long; buds coriaceous, ovoid-oblong, 1.5 - 5.5 × 1.5 - 6.5 cm, obovate-orbicular, white, pink, red or purple. Capsules *ca* 7 × 5 - 6 cm; stigmatic disc scarious with 7 - 18 stigmatic rays; seeds small, white greyish-black.

*Fl. & Fr.* : April - August.

*Specimens examined* : Jhuphal valley, G. Watt. 7208 (CAL).

### 13. FUMARIACEAE

A. P. de Candolle, Syst. Nat. 2 : 105, 1821.

(A. S. Chauhan)

- 1a. Climbing herbs; leaves often tendrillar;
  - outer petals both gibbous at base ..... 2. *Incentra*
- b. Diffuse or scrambling herbs; leaves not tendrillar;
  - outer pairs of petals not gibbous ..... 2
- 2a. Scrambling herbs; fruit a single seeded outlet ..... 3. *Fumaria*
- b. Diffuse herbs; fruit more than one
  - seeded capsule ..... 1. *Corydalis*

#### 1. *Corydalis* DC., *non. cons.*

- 1a. Flowers with blue, pink or purple,
  - as main colour ..... 2.
- b. Flowers with yellow or rarely orange
  - or white as main colour ..... 3
- 2a. Roots tuberous; leaves triternate with
  - entire segments; pedicels 1 - 3 mm long ..... 2. *C. dorpii*
- b. Roots fibrous; leaves biternate with
  - crenately lobed segments;
    - pedicels 5 - 8 mm long ..... 3. *C. leptocarpa*
- 3a. Leaf segments oblong, bluntly pointed;
  - bracts lanceolate, 3 - 5 mm, entire, qualling pedicels;
    - flowers in paniculate racemes, secund ..... 1. *C. chaerophylla*
- b. Leaf segments broadly ovate or obovate;
  - bracts all deeply toothed; racemes lax,
    - few flowered, not secund ..... 4. *C. longipes*

1. *Corydalis chaerophylla* DC., Prodr. 1 : 128, 1834; D. Don, Prodr. Fl. Nep. 198, 1825; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 126, 1872; Deb in Bull. Bot.

Surv. India 3 : 320, 1961; Hara in Fl. E. Himal, 103, 1966, Ellis & Balakr. in Sharma *et al.*, Fl. India 2 : 44, 1993

Robust herbs, 0.6 - 1.2 m. with stout rootstock and persistent stem and petiole bases; basal leaves broadly ovate, 9 - 15 × 7 - 14 cm, petioles 15 - 25 cm long; primary division ternate into 3 - petiolulate, bipinnatisect major divisions; pinnae of each major division sessile, decurrent, segment oblong, blunt-tipped, pale beneath; stems, leaves similar but smaller, becoming sessile upwards; racemes terminal, forming branched panicles 10 - 20 cm. Flowets numerous, secund; bracts lanceolate, 3 - 5 mm, entire, equalling pedicel; petals yellow, outer pair apiculate very narrowly crested, upper 11 - 13 mm, including slender usually straight spur 8 - 9 mm. Capsule ovoid, ca 8 × 3 mm, spreading.

*Fl. & Fr.* : July - October.

*Specimens examined* : Koupru hill, Deb 2342 (CAL).

2. *Corydalis dorjii* D. G. Long in Notes R. Bot. Gard. Edinb. 42 : 93, f. 3A, 1984; Ellis & Balakr. in Sharma *et al.*, Fl. India 2 : 52, 1993.

Slender, erect herbs up to 50 cm tall, arising from a cluster of spindle shaped ca 2 cm long tuberous roots. Basal leaves 2 - 3, triternate, 7 - 11 cm long, broadly triangular; lobes 12 - 20 × 4 - 12 mm, elliptic-obovate, attenuate at base, obtuse at apex. Flowers 2 - 4 in short terminal racemes; bracts 3 - 6 mm long, elliptic, acute; upper petal 25 - 28 mm long, including 16 - 18 mm long deflexed spur; lower lip boat-shaped, gibbous; nectariferous glands 7 - 8 mm long. Capsules ca 1.5 cm long, compressed, ellipsoid torulose.

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

*Specimens examined* : Specimens not seen.

3. *Corydalis leptocarpa* Hook. f. & Thomson, Fl. Ind. 26, 1855 & in Hook. f., Fl. Brit. India 1 : 122, 1872; Banerjee in J. Bombay Nat. Hist. Soc. 51 : 546, 1933; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Grierson & D. G. Long in Fl. Bhutan 1 (2) : 389, 1984; Ellis & Balakr. in Sharma *et al.*, Fl. India 2 : 65, 1993.

Diffuse herb 15 - 40 cm, with several stems arising from a cluster of slender fibrous roots; basal leaves biternate, 5 - 8 × 3 - 5 cm, petioles 5 - 9 cm, terminal and lateral segments ovate-elliptic, up to 2 × 1 cm, crenately lobed, pale beneath. Racemes 2 - 6 cm, 5 - 8 flowered; bracts obovate, 6 - 10 mm, lower toothed, upper narrower and entire; petals purple or mauve, sometimes whitish, outer pair crested, upper 26 - 30 mm, including spur 13 - 15 × 3 - 3.5 mm with deflexed tip; nectariferous glands 6 - 7 mm. Capsule linear, 20 - 30 × 1.5 - 2 mm.

*Fl. & Fr.* : March - August.

*Specimens examined* : Koupru 1950, Deb 2371 (CAL).

4. *Corydalis tangipes* DC., Prodr. 1 : 128, 1824; D. Don, Prodr. Fl. Nep. 98, 1825; Deb in Bull. Bot. Surv. India 3 : 320, 1961, Hara in Fl. East. Himal, 103, 1966,

Diffuse much branched herbs, 15 - 30 cm, rootstock slender. Leaves numerous, mostly borne on stems, 1 - 3 × 1 - 3 cm, broadly ovate in outline, deeply and equally biternatisect, on slender petioles 3 - 6 cm; ultimate segments obovate or oblanceolate, 1.5 - 3 mm broad. Raceme lax, few flowered, 1.5 - 3 cm; bracts all deeply toothed; sepals sub-orbicular, 0.6 - 1 mm, dentate; petals yellow, upper lip with broad often crenately toothed, crest decurrent along spur, spur slightly longer and broader; nectariferous glands much shorter 0.7 - 1.4 mm, one-sixth to one-eighth the length of spur. Capsule ovoid, 4-6 mm with 2 rows of seeds.

*Fl. & Fr.* : June - September.

*Specimens examined* : Chingsaw 2835 m. G. Watt 6314; Kouptu, Deb 2372 (CAL).

## 2. *Dicentra Bernardi*, *nom. cons.*

*Dicentra scandens* (D. Don) Walp., Report, 1 : 118, 1942; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 121, 1872, *p.p.* Deb in Bull. Bot. Surv. India 3 : 320, 1961; Ellis & Balakr. in Sharma *et al.*, Fl. India 2 : 79, 1993, *Dielytra scandens* D. Don, Prodr. Fl. Nep. 198, 1825, *Dicentra thalictrifolia* (Wallich) Hook. f. & Thomson, Fl. Ind. 2 : 1855 & in Hook. f., l.c. 1 : 121, 1872.

Climbers up to 3 m. Leaves 2 - 3 ternate; leaflets ovate-elliptic, 1 - 3.5 × 0.5 - 2 cm, obtuse or acute, base cuneate, 5 - 7 veined from base. Flowers 7 - 10 in racemes; peduncles 2 - 7 cm; bracts lanceolate, 4 - 10 mm, entire; sepals triangular, 2 - 3 mm, entire; petals yellow; outer pair 1.8 - 2 cm; nectariferous glands 4 - 5 × 0.8 - 1 mm, strongly hooked at apex. Capsules 14 - 20 × 6 - 8 mm, ovoid-ellipsoid.

*Fl. & Fr.* : June - September.

*Specimens examined* : Imphal, Deb 11; Khangkuri, Mukerjee 3718 (CAL).

## 3. *Fumaria* L.

*Fumaria indica* (Haussk.) Pugsley in J. Linn. Soc. Bot. 44 : 313, 1919; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Grierson & Long in Fl. Bhutan 1 (2) : 384, 1984; Ellis & Balakr. in Sharma *et al.*, Fl. India 2 : 84, 1993, *F. vaillantii* Loisel, var. *indica* Haussk. in Fl. 56 : 443, 1873, *F. parviflora* *met non*, Lam.; Wight & Arn., Prodr. Fl. Ind. or. 1 : 18, 1934.

Scrambling or erect herbs, up to 50 cm (20 - 50 cm). Leaves up to 12 cm, lobes linear, 3 - 10 × 1 - 1.5 mm, acute. Racemes dense, 15 - 20 flowered. Flowers 2.5 - 4 cm, in 0.5 - 1.5 cm long peduncles; petals purple darker at tips; upper outer petals 6 - 7 mm, including swollen spur 1.5 mm. Nutlets sub-globose, 2 mm, rugose, on erect pedicels.

*Fl. & Fr.* : March - May.

*Specimens examined* : Ukhrul, Mukerjee 2412 (CAL).

**14. BRASSICACEAE**

Burnett, *Out. Bot.* 1123. 1835 (Nom. alt. : *Cruciferae*).

(A. S. Chaulan, R. Shanpu & D.K. Singh)

- 1a. Pods indehiscent ..... 4. *Raphanus*
- b. Pods dehiscent ..... 2
- 2a. Pods long or short, terete, 4-angled or laterally compressed (parallel to the septum) ..... 3
- b. Pods short, terete, laterally compressed (at right angles to the septum) ..... 5
- 3a. Seeds 1-serate ..... 5. *Rorippa*
- b. Seeds 2-serate ..... 4
- 4a. Glabrous or hispid herbs; flowers yellow; sepals saccate ..... 1. *Brassica*
- b. Glabrous or pubescent herbs; flowers white or purple; sepals not saccate ..... 3. *Cardamine*
- 5a. Seeds narrowly winged; cotyledons incumbent ..... 2. *Capsella*
- b. Seeds not winged; cotyledons acumbent ..... 6. *Thlaspi*

**1. Brassica L.**

- 1a. Upper leaves narrowed at base ..... 1. *B. juncea*
- b. Upper leaves usually amplexicaul, rounded or deeply cordate at base ..... 2.
- 2a. All leaves glabrous; fruits erect ..... 3. *B. oleracea*
- b. Lower leaves ciliate-hairy; fruits erecto-patent ..... 2. *B. napus*

**1. Brassica juncea** (L.) Czerniak., *Consp. Fl. Chark.* 8, 1859; Hook. f., *Fl. Brit. India* 1 : 157. 1872; Deb in *Bull. Bot. Surv. India* 3 : 320. 1961; Hajra *et al.* in Sharma *et al.*, *Fl. India* 2: 134. 1993. *Sinapis juncea* L., *Sp. Pl.* 668. 1753.

Erect, annual herb, 30-95 cm tall. Leaves 8-20 cm, lower leaves lyrate-pinnatifid, middle ones obovate-ovate or oblong, pinnate, lobed, upper leaves oblong-lanceolate or linear, ca 7 mm across, narrowed base not amplexicaul, dentate. Flower ca 7 mm across, bright yellow; sepals 0.5 cm long; petals 0.6-0.8 cm long, yellow. Pods 3-5 cm long, erecto-patent; seed globose dark brown or reddish brown.

*Fl. & Fr.* : December - April

*Specimens examined* : Sripurikhal, Malick 1803 (BSIS).

**2. *Brassica napus* L., Sp. Pl. 666, 1753; Hajra *et al.* in Sharma *et al.*, Fl. India 1: 135, 1993. *B. campestris* L. subsp. *napus* (L.) Hook. f., Fl. Brit. India 1: 156, 1872. *B. campestris* L. var. *sarson* Prain in Dept. Land. Rec. & Agric. Bengal Bull. 4: 24, t. 5-7, 1903; Deb in Bull. Bot. Surv. India 3: 320, 1961.**

subsp. *napus* var. *quadrivalvis* (Hook. f. & Thomson) O. Schulz. in Engler. Pflanzenr. 70: 42, 1919. *B. quadrivalvis* Hook. f. & Thomson in J. Linn. Soc. Bot. 5: 170, 1861.

Mani.: *Haggam*.

Annual erect herb. Basal leaves lyrate-pinnatisect, 6-30 × 3-5 cm, upper leaves 3-6 × 1-2 cm, base amplexicaul. Inflorescence 20-45 cm long, terminal racemes; flowers yellow. Siliques erect, 4-loculed, 2.5-4 cm long, linear, cylindric, reticulately veined; seeds, globose pale dark, small.

*Fl. & Fr.* : January - May.

*Specimens examined* : Imphal valley, G. Watt 6113; Deb 2454 (CAL).

**3. *Brassica oleracea* L., Sp. Pl. 667, 1753; Hajra *et al.* in Sharma *et al.*, Fl. India 2: 136, 1993.**

Mani.: *Kobi-mula*.

Herbs, glabrous with stems 30-100 cm tall. Leaves fleshy, lower leaves petioled, lyrate-pinnatifid, 10-40 cm long, terminal lobes broadly ovate or suborbicular, rounded at apex; upper leaves sessile, simple, lanceolate to oblong lanceolate, often sub amplexicaul at base. Racemes simple or paniced; pedicel ca 2 cm long; sepals erect, 8-12 × 2-3 mm, oblong, obtuse; petals 15-20 × 4-6 cm, obovate, clawed. Fruits erect, often 1-seeded; seeds reticulate.

The following two varieties are cultivated for vegetable.

- 1a. Leaves neither densely packed nor forming head ..... 1. var. *botrytis*
- b. Leaves densely packed forming subglobose or ellipsoid head ..... 2. var. *capitata*

3.1. var *botrytis* L., Sp. Pl. 667, 1753; Deb in Bull. Bot. Surv. India 3: 320, 1961; Hajra *et al.*, in Sharma *et al.*, Fl. India 2: 137, 1993.

Leaves 15-40 cm, thick, lyrate-pinnatifid, broadly ovate or suborbicular, usually shallowly lobed; base cordate, sinuate, broadly dentate or crenate; lateral lobes 2-5 pairs, much smaller than terminal ones, upper leaves simple, oblong, sessile and semi-amplexicaul. Inflorescence racemose, 25-30 cm tall; raceme ebracteate, with sterile; flowers compactly crowded to forming a dense yellowish white fleshy mass with the flowers and buds.

*Fl. & Fr.* : January - April.

Cultivated - Cauliflower.

3.2 var *capitata* L., Sp. Pl. 667, 1753; Deb in Bull. Bot. Surv. India 3: 320, 1961; Hajra *et al.*, in Sharma *et al.*, Fl. India 2: 137, 1993.



Leaves 10–25 cm across, oblong-ovate to round, lobed at the base, concave, thick, densely packed together forming round ellipsoid or subglobose head, nerves prominent, thick and stout.

*Fl. & Fr.* : February–April

Cultivated Cabbage.

### 2. *Capsella* Medikus, *nom. cons.*

*Capsella bursa-pastoris* (L.) Medikus. Pflanzenfart. 1 : 85, 1972; Hook. f. & T. Anderson in Hook. f., *Fl. Brit. India* 1 : 159, 1872; Deb in *Bull. Bot. Surv. India* 3 : 320, 1961; Bhaumik in Sharma *et al.*, *Fl. India* 2 : 189, 1993. *Thlaspi bursa-pastoris* L., *Sp. Pl.* 617, 1753.

Erect annual herbs, 5–40 cm tall. Lower leaves 4–8 × 1.2–2 cm, rosette, petiolate, entire-pinnatifid, acute, toothed; upper leaves 2.5–4.5 cm, sessile, oblong-lanceolate, amplexicaul, hastate. Flowers white small, on a 15–20 cm long raceme; sepals 1–1.5 cm long, oblong, petals obovate-ovate, white. Pods notched at the apex; seeds 15–30 mm, ellipsoid.

*Fl. & Fr.* : February–April.

*Specimens examined* : Chingsow Village, G. Watt 7211; Ukhrul, Mukerjee 2428; Imphal Valley, Deb 456 (CAL).

Cultivated and exotic.

### 3. *Cardamine* L.

- a. Leaflets crenately toothed at margin,  
flowers yellow ..... 2. *C. trichocarpa*
- b. Leaflets sinuately lobed at margin;  
flowers white ..... 1. *C. hirsuta*

1. *Cardamine hirsuta* L., *Sp. Pl.* 655, 1753; Hajra & Chowdhery in Sharma *et al.*, *Fl. India* 2 : 112, 1993. *C. hirsuta* L., var. *sylvatica* (Link.) Hook. f. & T. Anderson in Hook. f., *Fl. Brit. India* 1 : 138, 1872, *p.p.*

Annual herbs up to 50 cm high, diffuse much branched. Leaves variable, 0.5–2.5 × 1–2 cm; basal leaves rosette, imparipinnate; leaflets 5–15, ovate or orbicular, irregularly lobed. Inflorescence racemose or sub-corymbose. Flowers ca 4 mm across, white. Pods 1.5–2.5 cm long, compressed, 6–12 seeded.

*Fl. & Fr.* : March–October.

*Specimens examined* : Mao, C.B. Clarke 41205; Maitaphum, G. Watt 6093; Acaaseme, G. Watt 5116; Tengnopale, Deb 681 (CAL).

2. *Cardamine trichocarpa* Hochst. ex A. Rich. *Tem. Fl. Abyss.* 1 : 18, 1847; Deb in *Bull. Bot. Surv. India* 3 : 320, 1961; Hajra & Chowdhery in Sharma *et al.*, *Fl. India* 2 : 117, 1993. *C. subumbellata* Hook. f. ex Hook. f. & T. Anderson in Hook. f., *Fl. Brit. India* 1 : 138, 1872.

Slender, diffuse herbs. 10 - 20 cm high, spreading. Leaves pale green; leaflets 6 - 12 × 0.6 - 3 cm, petiolate, elliptic-ovate, irregularly crenate. Inflorescence corymbose. Flowers 0.15 cm long, yellow. Pods 3 - 5 cm long, 6 - 10 seeded; seeds broad-oblong; funicle dilated.

*Fl. & Fr.* : February - May.

*Specimens examined* : Ukhrul, Mukerjee 2518; Imphal Valley, Deb 694 (CAL).

#### 4. *Raphanus* L.

***Raphanus sativus* L.**, Sp. Pl. 669, 1753; Hook. f. & T. Andersons, in Hook. f., Fl. Brit. India 1 : 166, 1872; Kanjilal *et al.*, Fl. Assam 1 : 71, 1934; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Hajra *et al.* in Sharma *et al.*, Fl. India 2 : 145, 1993.

Mani.: *Mula*.

Annual herb, stem ca 1 m tall, corymbosely branched with swollen fleshy tap root. Lower leaves long petioled, lyrate-pinnalipartite, dentate; upper leaves short petioled, entire or dentate. Inflorescence racemose, long. Flowers white-lilac colour; sepals ca 1 cm long; petals ca 2 cm long. Pods 2.5 - 3 cm long, erect or erecto-patent, not constricted between seeds.

*Fl. & Fr.* : Nov. - May.

*Specimens examined* : Imphal Valley, Deb 1618 & 1621; Bishenpur, Meebold 5420 (CAL).

#### 5. *Rorippa* Scop.

- 1a. Radical leaves deeply pinnatifid; flowers  
bracteate or ebracteate; pods long, narrow..... 1. *R. indica*
- b. Radical leaves sinuate-pinnatifid;  
flowers strictly bracteate; pods short, turgid..... 2. *R. montana*

**1. *Rorippa indica* (L.) Hiern**, Cat. Afr. Pl. Welw. 1 : 26, 1896; Deb in Bull. Bot. Surv. India 3 : 320, 1961; Hajra & Chowdhery in Sharma *et al.*, Fl. India 2 : 129, 1993. *Sisymbrium indicum* L., Sp. Pl. ed 2, 93, 1767. *Nasturtium indicum* (L.) DC., Syst. Nat. 2 : 199, 1821; Hook. f. & T. Anderson in Hook. f., Fl. Brit. India 1 : 134, 1872; Kanjilal *et al.*, Fl. Assam 1 : 70, 1934. Fig. 14

Trailing or suberect annual herbs. Leaves 5 - 10 cm long, lyrate-pinnatifid, membranous. Racemes 8 - 25 cm long. Flowers yellow; sepals and petals equal. Siliques 1.0 - 1.5 mm long, linear; seeds spherical, reddish-brown.

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

*Specimens examined* : Imphal valley, Deb 1567 (CAL).

**2. *Rorippa montana* (Wallich ex Hook. f. & T. Anderson) Small**, Fl. S.F. United States ed 2, 1336, 1913; Deb in Bull. Bot. Surv. India 3 : 321, 1961; Hajra & Chowdhery in Sharma *et al.*, Fl. India 2 : 131, 1993. *Nasturtium montanum* Wallich ex Hook. f. & T. Anderson in Hook. f., Fl. Brit. India 1 : 134, 1872



Fig 14. *Rorippa indica* (L.) Hiern



Fig. 15: *Thlaspi arvense* L.

Erect, annual herb. Basal leaves petiolate, 5-8 cm long, sinuate, pinnatifid; upper ones sessile, 2-5 × 1.5-2.5 cm ovate, dentate-serrate. Racemes with bracteole at the base. Flowers yellow. Siliquas 1.5-2.5 cm long, cylindrical; seeds with small holes, brown.

*Fl. & Fr.* : December - March.

*Specimens examined* : Imphal, Meehold 6377; Deb 46; Mukerjee 2845 (CAL).

**6. *Thlaspi* L.**

*Thlaspi arvense* L., Sp. Pl. 641. 1753; Hook. f. & Thomson in J. Linn. Soc. Bot. 5 : 176. 1861. Hook. f. & T. Anderson in Hook. f. Fl. Brit. India 1 : 162. 1872; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Bhanmik in Sharma *et al.*, Fl. India 2 : 211. 1993. Fig. 15

Annual erect herb. 15-40 cm tall. Leaves 2-5 × 0.5-1.5 cm, ovate or oblong-lanceolate or oblanceolate, obtuse, base with broadly sagittate auricles, margin shallowly serrate. Flowers in elongated racemes; sepals 2 mm long, elliptic; petals 3 mm long, white. Pods 1-1.5 × 1-1.05 cm, tip deeply notched, with a membranous wing; seeds 4-5 in each cell.

*Fl. & Fr.* : February - May.

*Specimens examined* : Imphal valley, Deb 1620 (CAL).

Other cultivated varieties:

- i) ***Brassica napus* L. var. *dichotoma* Prain.**
- ii) ***Brassica napus* L. var. *cucifolia* Prain.**  
(Mani.: *Hangan*).

**15. CAPPARACEAE**

A. L. de Juss., Gen Pl. 242. 1789

("Capparides").

(A. S. Chauhan)

- 1a. Leaves simple: ..... 2
- b. Leaves digitately compound ..... 3
- 2a. Sepals 4; petals 4; stamens united  
to gynophore; fruits many seeded ..... 1. *Capparis*
- b. Sepals 6; petals absent;  
stamens adnate to gynophore;  
fruits 1-seeded ..... 4. *Stixis*
- 3a. Herbs; fruits capsules ..... 2. *Cleome*
- b. Trees; fruits berries ..... 3. *Crateva*

**I. Capparis L.**

- 1a. Flowers in supra-axillary vertical series ..... 2  
 b. Flowers never in supra-axillary series ..... 4  
 2a. Flowers appearing before leaves ..... 4. *C. multiflora*  
 b. Flowers appearing when leafy ..... 3  
 3a. Stipular thorns straight: stamens more than 20 ..... 1. *C. acutifolia*  
 b. Stipular thorns strongly recurved: stamens up to 15 ..... 5. *C. tenera*  
 4a. Inflorescence racemose or paniculate; 6 - 12 flowers in subumbles: cataphylls absent ..... 2. *C. cantoniensis*  
 b. Inflorescence neither racemose nor paniculate; flowers either solitary or 5 in umbels: cataphylls profuse at base ..... 3. *C. cinera*

**I. *Capparis acutifolia*** Sweet. Hort. Brit. ed. 2. 585. 1830; Raghavan in Sharma *et al.*, Fl. India 2: 255. 1993. *C. sabiaefolia* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 179. 1872; Deb in Bull. Bot. Surv. India 3: 281. 1961. *C. membranifolia* Kurz in J. Asiat. Soc. Bengal 43 (2): 70. 1874.

Climbing shrubs or small trees; branches unarmed or with short straight stipular thorns. Leaves variable in shape and size, ovate-elliptic to lanceolate, cuneate or rounded at base, acute or acuminate at apex. Flowers 2 - 4 in axillary or supra-axillary rows, sometimes solitary, white; petals ovate, rounded, white; stamens 20 - 35; filaments white. Fruits 1 - 1.5 cm across, globose or sub-globose, apiculate, blackish when ripe, seeds 1 - 3 embedded, reniform.

- 1a. Innovations glabrous, to rarely glabrescent; nerves 7 - 10 pairs ..... 1. subsp. *sabiaefolia*  
 b. Innovations tomentose, later glabrescent; nerves 5 - 7 pairs ..... 2. subsp. *viminea*

**I. subsp. *sabiaefolia*** (Hook. f. & Thomson) Jacobs in Blumea 12: 432. II. 1965; Raghavan in Sharma *et al.*, Fl. India 2: 256. 1993. *C. sabiaefolia* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1: 179. 1872; Kanjilal *et al.*, Fl. Assam 1: 78. 1934; Deb in Bull. Bot. Surv. India 3: 281. 1961.

Climbing shrubs or small trees, up to 8 m tall; branches unarmed or with short, straight stipular spines. Leaves 5 - 10 x 2 - 4 cm, ovate-elliptic, elliptic or oblong-lanceolate, rounded or cuneate at base, acute or abruptly acuminate, minutely stellate pubescent; lateral nerves 7 - 10 pairs. Flowers 1 - 1.5 cm across, white, 2 - 4 in vertical rows at or above leaf axils, sometimes solitary; sepals 5 - 8 x 3 - 4 mm, broadly elliptic; petals 9 - 12 x 3 - 5 mm, obovate, white. Fruits 1 - 1.5 cm, sub-globose, blackish, 1 - 3 seeded.

*Fl. & Fr.* : March - October.

*Specimens examined* : Ukhrul. *Kingdom-Ward* 17323; Tolloi, *Mukerjee* 2860 (CAL).

2. subsp. *viminea* Jacobs in *Blumea* 12: 429, f. 22, 1965; Raghavan in Sharma *et al.*, *Fl. India* 2: 257, 1993. *C. viminea* Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 179, 1872. (*non* Oliver, 1869); Kanjilal *et al.*, *Fl. Assam* 1: 78, 1934; Deb in *Bull. Bot. Surv. India* 3: 281, 1961.

Erect shrubs, rarely climbing, trunk thorny, glabrescent. Leaves 7 - 15 x 2 - 6 cm, ovate, elliptic or elliptic-ovate, base narrowed into the petiole, acuminate, glabrous; lateral nerves 5 - 7 pairs. Flowers small, white; sepals *ca* 6 mm, tomentose outside, with ciliate margins; petals *ca* 8 mm, densely tomentose. Fruits 1 - 1.5 cm in diam., dark brown, pulp yellow, 1 - 3 seeded.

*Fl. & Fr.*: February - June.

*Specimens examined* : Imphal valley - Deb 2241 (CAL).

2. *Capparis cantoniensis* Lour., *Fl. Cochinch.* 331, 1790; Raghavan in Sharma *et al.*, *Fl. India* 2: 260, 1993. *C. pumila* Benth. in Hook., *J. Bot. Kew. Misc.* 3: 260, 1851; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 177, 1872; Kanjilal *et al.*, *Fl. Assam* 1: 71, 1934.

Prickly shrubs with straight branches; prickles small, recurved. Leaves 4 - 7 x 2 - 7 cm, elliptic to oblong-lanceolate, acuminate, glabrous. Flowers white in corymbs or terminal panicles; stamens *ca* 20, florets *ca* 1.5 cm across, globose, glabrous 1- seeded.

*Fl. & Fr.*: March - December

*Specimens examined* : *s. loc.*, A. Meebold 7271 (CAL).

3. *Capparis cinera* Jacobs in *Blumea* 12: 444, 1965; Raghavan in Sharma *et al.*, *Fl. India* 2: 262, 1993.

Shrubs with small greyish-fulvous hooked hairs; branches straight, thorns conical, ascending. Leaves 8 - 10 x 2 - 3.5 cm, ovate, elliptic-ovate, obtuse at base, acuminate, thinly pubescent on both surfaces, pinkish. Flowers in lateral sub-umbels; sepals 6 x 4 mm, sub-equal, elliptic; petals *ca* 9 x 4 mm, obovate, whitish tomentose; gynophore 2 - 2.5 cm, glabrous; ovary 1.5 mm long, ellipsoid, with indistinct stigma.

*Fl. & Fr.* : May - September.

*Specimens examined* : Khaiyong, *Kingdom-Ward* 17347(CAL).

4. *Capparis multiflora* Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1: 178, 1872; C.B. Clarke in *J. Linn. Soc.* 25, 5, 1889; Deb in *Bull. Bot. Surv. India* 3: 281, 1961; Raghavan in Sharma *et al.*, *Fl. India* 2: 279, 1993.

Shrubs *ca* 2.5 m high; stipular thorns straight often absent. Leaves elliptic, oblong or oblanceolate, cuneate at base, abruptly acuminate. Flowers *ca* 5 mm

across, white or greenish - white, fragrant. 6 - 10 arranged in supra - axillary vertical rows; stamens 8 - 12. Fruits *ca* 1 cm across, subglobose. 1 - 3 in a row, reddish purple; seeds 1 - 3.

*Fl & Fr.*: May - February.

*Specimens examined*: Myangkhong, *G. Watt* 7146 (CAL).

**5. *Capparis tenera*** Dalz. in Hook., *J. Bot. Kew Gard. Misc.* 2 : 41. 1850; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1 : 179. 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 78. 1935; Raghavan in Sharma *et al.*, *Fl. India* 2 : 297. 1993. *C. tenera* var. *zeylanica* Hook. f., *f. c.* 1 : 179. 1872; Deb in *Bull. Bot. Surv. India* 3 : 281. 1961.

Bushy shrubs or climbers, up to 3 m high; branches spreading glabrous or glabrescent; thorns 3 - 4 mm, strongly recurved, sharp, at the base of each leaf. Leaves 4 - 7 × 2 - 6 cm, obovate, ovate or elliptic, acute or rounded at base, acuminate; lateral nerves 3 - 5 pairs. Flowers small fragrant; sepals 3 - 5 × 2 - 3 mm, ovate or boat shaped, glabrous, sometimes hairy at margins; petals 4 - 7 × 1.5 - 2.5 mm, ovate, white; gynophore 1.5 - 2.5 cm, filiform, glabrous. Fruits 1 - 1.5 cm in diam., sub-globose, 1 - 2 -seeded.

*Fl. & Fr.* : April - November.

*Specimens examined* : Keibul Lamjao, *G. Watt* 7210; Imphal valley, *Deb* 3667 (CAL).

## 2. *Cleome* L.

- 1a. Stamens 6; capsules borne on  
elongate gynophore ..... 1. *C. hassleriana*  
b. Stamens 12; capsule sessile ..... 2. *C. viscosa*

**1. *Cleome hassleriana*** Chodat in *Bull. Herb. Boiss.* 6 : 12. 1898; Raghavan in Sharma *et al.*, *Fl. India* 2 : 320. 1993. (*Gynandropsis gynandra* (L.) Briq. in *Ann. Conserv. Jard. Bot. Geneve* 17 : 382. 1914; Malick & Safui in *J. Econ. Tax. Bot.* 10: 2. 1987. *Cleome gynandra* L., *Sp. Pl.* 671. 1753. *Gynandropsis pentaphylla* (L.) DC., *Prodr.* 1 : 238. 1824; Hook. f. & Thomson in Hook. f., *Fl. Brit. India* 1 : 171. 1872.

Annual herbs; stems up to 1 m tall. Leaves 5 - 7 foliolate; petioles 4 - 6 cm, with 2 spine like stipules at base; leaflets 2.5 - 10 × 1 - 3 cm, oblanceolate, attenuate at base, acute, often spiny on midribs beneath; bracts 10 × 5 mm, ovate. Flowers purplish, in terminal racemes; pedicels 2 - 5 cm; sepals 8 - 10 cm, lanceolate, reflexed; petals *ca* 2.5 cm, purple; stamens sessile. Capsules 4 - 9 cm, straight linear; seeds dark brown.

*Fl & Fr.* : April - October.

*Specimens examined* : Jirimukh, *Malick* 806 & 852 (BSIS).

Cultivated for its showy flowers.



2. *Cleome viscosa* L., Sp. Pl. 672. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 170. 1872; Kanjilal *et al.*, Fl. Assam 1 : 72. 1934; Raghavan in Sharma *et al.*, Fl. India 2 : 317. 1993. *Polanisia icosandra* (L.) Wight & Arn., Prodr. 1 : 22. 1834; Deb in Bull. Bot. Surv. India 3 : 281. 1961. *Cleome icosandra* L., Sp. Pl. 672. 1753. ....

var. *viscosa*

Viscid herbs; stems up to 60 cm; branches tomentose, glandular hairy. Leaves 5-foliolate, exstipulate; leaflets 0.8-4 × 0.5-2 cm, elliptic-oblancoolate, connate at base, acute to acuminate, membranous, glandular pubescent. Flowers yellow, in terminal racemes; sepals 4, lanceolate, 8 × 2 mm; petals 4, oblanceolate, 9 × 4 mm, yellowish; ovary sessile. Capsules 6-9 cm, linear, narrowed at both ends; seeds reniform, dark-brown.

*Fl. & Fr.* : June - August.

*Specimens examined* : Jirimukh, *Malick* 862; Barabakra, *Malick* 864 (BSIS).

### 3. *Crateva* L.

- a. Androphore 1-4 mm long;  
gynophore 4-7 cm; seeds tuberculate..... 1. *C. religiosa*
- b. Androphore 0.5 mm long;  
gynophore 3-6 cm; seeds smooth..... 2. *C. unifloccularis*

1. *Crateva religiosa* Forster f., Pl. Esenl. Ins. Occ. Austral. 45. 1786; Raghavan in Sharma *et al.*, Fl. India 2 : 325. 1993. *C. nureala acut.* non Buch.-Ham.; Kanjilal *et al.*, Fl. Assam 1 : 74. 1934; Deb in Bull. Bot. Surv. India 3 : 281. 1961.

*Mani.* : *Nganestur & Laitymbalei*.

Large trees, up to 30 m tall; bark grey or greyish; branches mostly hollow. Leaves 3-foliolate; leaflets 6-18 × 2-8 cm, ovate-elliptic or ovate-lanceolate, round at base, often oblique, acuminate, glabrous; lateral nerves 7-11 pairs. Flowers 4-5 cm across, white turning yellow; towards the end of leafy twig; sepals 4-8 mm; petals 0.5-2 cm, clawed, limb 2-4 × 1-3 cm long, ovate, narrowly clawed; gynophore 3-4 cm long. Fruits ca 5 cm across, sub-globose, many seeded.

*Fl. & Fr.* : March - October.

*Specimens examined* : Imphal valley, *Deb* 376 (CAL).

2. *Crateva unifloccularis* Buch.-Ham. in Trans. Linn. Soc. 15 : 121. 1827; Raghavan in Sharma *et al.*, Fl. India 2 : 235. 1993. *C. raxburghii sensu* Kanjilal *et al.*, Fl. Assam 1: 73. 1934. *auct. non* R. Br. 1826; Deb in Bull. Bot. Surv. India 3: 281. 1961.

Mani: *Laiyimba*.

Trees up to 30 m tall; branches grey-brownish. Leaflets 4–12 mm stalked, 5–14 × 2–7 cm, ovate-elliptic or lanceolate, acute; lateral leaflets oblique, lateral nerves 5–9 pairs. Flowers white, turning to pale yellow in terminal corymbs; sepals 7–9 mm; petals 0.7–1.8 cm clawed, limbs 1–2.5 cm; gynophore 3–6 cm. Fruits 2.5–4 cm, globose; seeds reniform, dull brown.

*Fl. & Fr.* : March–October.

*Specimens examined* : Imphal, Deb 2470 (CAL).

#### 4. *Stixis* Lour.

- la. Leaflets 7–16 cm, elliptic-oblong, lateral nerves  
7–10 pairs; gynandrophore *ca* 2 mm long ..... 1. *S. scandens*  
b. Leaflets 10–25 cm, oblong, lateral nerves  
5–8 pairs; gynandrophore *ca* 5 mm long ..... 2. *S. suaveolens*

1. *Stixis scandens* Lour., Fl. Cochinch. 295, 1790; Raghavan in Sharma *et al.*, Fl. India 2 : 332, 1993. *Roydsia parviflora* Griffith, Notul. Pl. Asiat. 4 : 578, 1854; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 180, 1872. in obs. *Stixis manipurensis* Deb & Rout in J. Bombay Nat. Hist. Soc. 86 (1) : 86, 1989.

Climbing shrubs, 15–20 cm high, profusely branching above, unarmed. Leaves simple, alternate, congested on branchlets, 7.5–16 × 2.5–5 cm, elliptic-oblong, coriaceous, acute or obtuse at base, acute or shortly acuminate at apex, entire, glabrous; lateral nerves 7–10 on either side. Flowers yellow, sweet scented, minutely pubescent, in axillary racemes or panicles, bracts *ca* 2 × 1 mm, cauducous; pedicels 1–1.5 cm long, stout; petals absent; androgynophore *ca* 0.2 cm long, glabrous; stamens more than 40. Fruits 2.5–3.2 cm, ellipsoid, 3 angled; seed one, embedded in the pulp.

*Fl. & Fr.* : April–October.

*Specimens examined* : Tengnoupul, Deb 3549 (CAL).

2. *Stixis suaveolens* (Roxb.) Pierre. in Bull. Soc. Linn. Paris 1 : 655, 1887; Raghavan in Sharma *et al.*, Fl. India 2 : 333, 1993. *Roydsia suaveolens* Roxb., Pl. Corom. 3 : 87, t. 289, 1819; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 180, 1887; Kanjilal *et al.*, Fl. Assam 1 : 79, 1934; Deb in Bull. Bot. Surv. India 3 : 281, 1961.

Large woody climbers with specked branches. Leaves 10–5 × 5–10 cm, oblong, oblong-lanceolate or obovate, ciliate at base, acuminate or apiculate, coriaceous, glabrous; lateral veins 5–8 pairs. Flowers 0.8–1.4 cm across, white or yellowish-white, fragrant; sepals *ca* 5 mm, ovate-elliptic, olive-green, pubescent;

gynophore ca 5 mm, enlarging in fruit. Drupes 2-4 cm long, obovoid, surface covered with flat whitish-warts. 1-seeded.

*Fl & Fr* : March - November.

## 16. VIOLACEAE

Batsch, Tab. Aff. Reg. Veg. 57, 1802 ("Violarie").

(A. S. Chauhan)

### *Viola* L.

- |     |  |                            |
|-----|--|----------------------------|
| 1a. | Root-stock woody .....   | 2                          |
| b.  | Root-stock not woody, articulated .....  | 4                          |
| 2a. | Leaves linear-lanceolate, glabrous;<br>flowers lilac; capsules linear-oblong .....           | 1. <i>V. betonicifolia</i> |
| b.  | Leaves otherwise, hirsute or pilose;<br>flowers white or violet; capsules ellipsoid .....    | 3                          |
| 3a. | Leaves ovate-cordate, pilose;<br>flowers white or violet .....                               | 5. <i>V. pilosa</i>        |
| b.  | Leaves reniform or cordate, not pilose;<br>flowers purplish-blue .....                       | 3. <i>V. hamiltoniana</i>  |
| 4a. | Stolonless herbs; leaves in rosettes;<br>stipules up to 1 cm long, denticulate .....         | 4. <i>V. philippica</i>    |
| b.  | Herbs with stolons; leaves not in rosettes,<br>stipules more than 1 cm long, fimbriate ..... | 5                          |
| 5a. | Flowers pale-violet; petals<br>obovate-oblong .....  | 6. <i>V. thomsonii</i>     |
| b.  | Flowers white or rose purple;<br>petals orbicular-obovate .....                              | 2. <i>V. glaucescens</i>   |

1. *Viola betonicifolia* J. Smith in Rees, Cyclop. 37 : 7, 1819; Jacobs & D. M. Moore in Fl. Males. 7 : 202, 1971; Banerjee & Pramanik in Sharma *et al.*, Fl. India 2 : 355, 1993. *V. betonicifolia* J. Smith subsp. *nepalensis* (Ging.) W. Backer in Engl. Bot., Jahrb. Beibl. 120, 54 : 167, 1917. *V. patrinii sensu* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 183, 1872, non DC. 1824; Deb in Bull. Bot. Surv. India 3 : 281, 1961.

#### subsp. *betonicifolia*

Perennial herbs, 15-20 cm tall; rootstock woody. Leaves 2-8 × 1-3 cm, linear-lanceolate to triangular-ovate, acute to obtuse, glabrous to more or less

pubescent; petioles 4–10 cm, usually winged above. Flowers *ca.* 1.5 cm across, solitary, litae; peduncles 4–12 cm, bi-bracteolate at the middle; sepals 5, *ca.* 6 mm, oblong-lanceolate; spur 2–4 mm; ovary 1-celled. Capsules *ca.* 6 mm long, linear-oblong, many seeded.

*Fl. & Fr.* : January–June.

*Specimens examined* : Ukhrul, Meebold 5422; Sirohee, Mukerjee 2424; Lalan, Deb 1414 (CAL); Keithemabi, G. Watt 5837; Chingbenthes, Madick 1532 (BSIS); Keibul Lamjao National Park, Chauhan 95171 (ASSAM).

2. *Viola glaucescens* Oudem. in Miq., Ann. Mus. Bot. Lugd. Bat. 3 : 74, 1867; Banerjee & Pramanik in Sharma *et al.*, Fl. India 2 : 362, 1993. *V. glaucescens* var. *rubella* W. Becker in Beih. Bot. Centralbl. Abt. 2, 34 : 259, 1916. *V. glaucescens* f. *rubella* (W. Becker) Hara in Fl. E. Himal. 213, 1966. *V. distans* var. *fimbriata* Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 184, 1872.

Perennial herbs; rootstocks articulated; stolons up to 20 cm long. Leaves 2.45 × 1.2–3.5 cm, acute to sub-acuminate, basal sinus moderately wide, margins broadly and evenly crenate, glabrous or sparsely hispid above; petioles up to 10 cm long; stipules up to 1.5 cm long, ovate-oblong, aurate or fimbriate. Flowers 1–1.5 cm across, white or rose-purple; sepals 5 mm long, lanceolate; petals 1 cm long, orbicular-obovate; spur 3 mm, saccate. Capsules 8 mm, oblong, apiculate.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Mao 2000 m, Deb 1826; Chingslaw 2000–2340 m, G. Watt 6573; Japvo 2000–2500 m, G. Watt 6234; Meitaphum, G. Watt 6084; Sirohee 2500 m, Mukerjee 2797 (CAL).

3. *Viola hamiltoniana* D. Don, Prodr. Fl. Nep. 206, 1825; Banerjee & Pramanik in Sharma *et al.*, Fl. India 2 : 362, 1993. *V. arcuata* Bunge, Bijdr. 58, 1825; Kanjilal *et al.*, Fl. Assam 1 : 81, 1934; Deb in Bull. Bot. Surv. India 3 : 281, 1961. *V. distans* Wallich in Trans. Med. Phys. Soc. Cal. 7 : 227, 1835; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 183, 1872.

Perennial herbs, 20–30 cm tall; rootstock woody; stems or stolons trailing. Leaves 1.4 × 1–4.5 cm, ovate to reniform, cordate, usually as broad as long, basal sinus broad, obtuse to acute, crenate-serrate, glabrous to hirsute; petioles 3–5 cm. Flowers solitary, *ca.* 1.5 cm across, purplish-blue with dark stripes; sepals 5, acute; ovary sessile, 1-locular. Capsules *ca.* 8 mm long, ellipsoid-oblong, many seeded.

*Fl. & Fr.* : October–June.

*Specimens examined* : Mao, Mukerjee 2479; Ukhrul, Mukerjee 2797; Sirohee, Deb 1826 (CAL).

4. *Viola philippica* Cav. Icon. Descr. 6 : 19, 1801; Banerjee & Pramanik in Sharma *et al.*, Fl. India 2 : 370, 1993. *V. philippica* subsp. *munda* W. Becker in Engl., Bot. Jahrb. 54 (120) : 174, 1917.

Perennial herbs; rootstock articulate, stem or stolonless. Leaves in rosettes, 1-4 × 0.3-3 cm, crenate, usually long decurrent on petioles, glabrous or puberulous beneath; petioles 1-6 cm.; stipules up to 1 cm, ovate-lanceolate, acute, shortly dentate, adnate to the petiole up to above the middle. Peduncles 5-8 cm, bi-bracteolate at the middle. Flowers ca 1.5 cm, pale to dark violet; sepals short, ovate to ovate-lanceolate, acute; petals ca 1.5 cm, spurs up to 6 mm. Capsules ca 1 cm, elliptic-oblong.

*Fl. & Fr.* : October - June.

*Specimens examined* : Keithamabi, G. Watt 5837 & 6032 (CAL).

5. *Viola pilosa* Blume, Cat. Gew. Britenz. 57, 1823 & in Bijdr. 57, 1825; Banerjee & Pramanik in Sharma *et al.*, Fl. India 2 : 371, 1993. *V. serpens* Wallich ex Ging. in DC., Prodr. 1 : 296, 1824; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 184, 1872; Deb in Bull. Bot. Surv. India, 3 : 281, 1961.

Perennial herbs, 20-40 cm tall; rootstock woody stolons decumbent, glabrous or hirsute. Leaves 1.5-7.5 × 2-4 cm, ovate-cordate or deltoid, serrate, mostly hirsute or pilose to glabrous; petioles 2-10 cm, pubescent; stipules 6-12 mm, ovate-acuminate, sub-entire or dentate. Flowers solitary, ca 1.5 cm across, white or pale violet in 3-8 cm long pilose peduncles; sepals 5, acute, linear-lanceolate; ovary sessile, 1-celled. Capsules ca 7 mm long, globose to ellipsoid, few seeded, often pubescent.

*Fl. & Fr.* : March - July.

*Specimens examined* : Myong Khong 1800-2000 m, G. Watt 6055; Ukhrul 2000 m. Mukerjee 2479; Mao 2000 m. G. Watt 6124 (CAL).

6. *Viola thomsonii* Oudem. in Miq., Ann. Mus. Bot. Lugd. Bat. 3 : 74, 1867; Banerjee & Pramanik in Sharma *et al.*, Fl. India 2 : 377, 1993.

Perennial herbs, with articulated rootstock; stolons ca 30 cm long. Leaves 2-6 × 1.3-4 cm, ovate, acute, serrate-crenate, glabrous to sparsely strigose; petioles 2-12, glabrous; stipules ca 1.5 cm, lanceolate, deeply fimbriate. Peduncles up to 13 cm, not exceeding leaves; bracteoles up to 1.5 cm; linear, acuminate with a few teeth at the margins. Flowers 1.5 cm long; sepals 6 mm; lanceolate, acute; petals pale violet, obovate-oblong, lower petal spurred, spur 3-4 mm, saccate. Capsules ca 1 cm long, oblong, apiculate.

*Fl. & Fr.* : March - August.

*Specimens examined* : Japvo 2000-2400 m G. Watt 6234; Sirohoc 2000-2300 m. G. Watt 6490; Mao 2000-24000 m G. Watt 6130 (CAL).

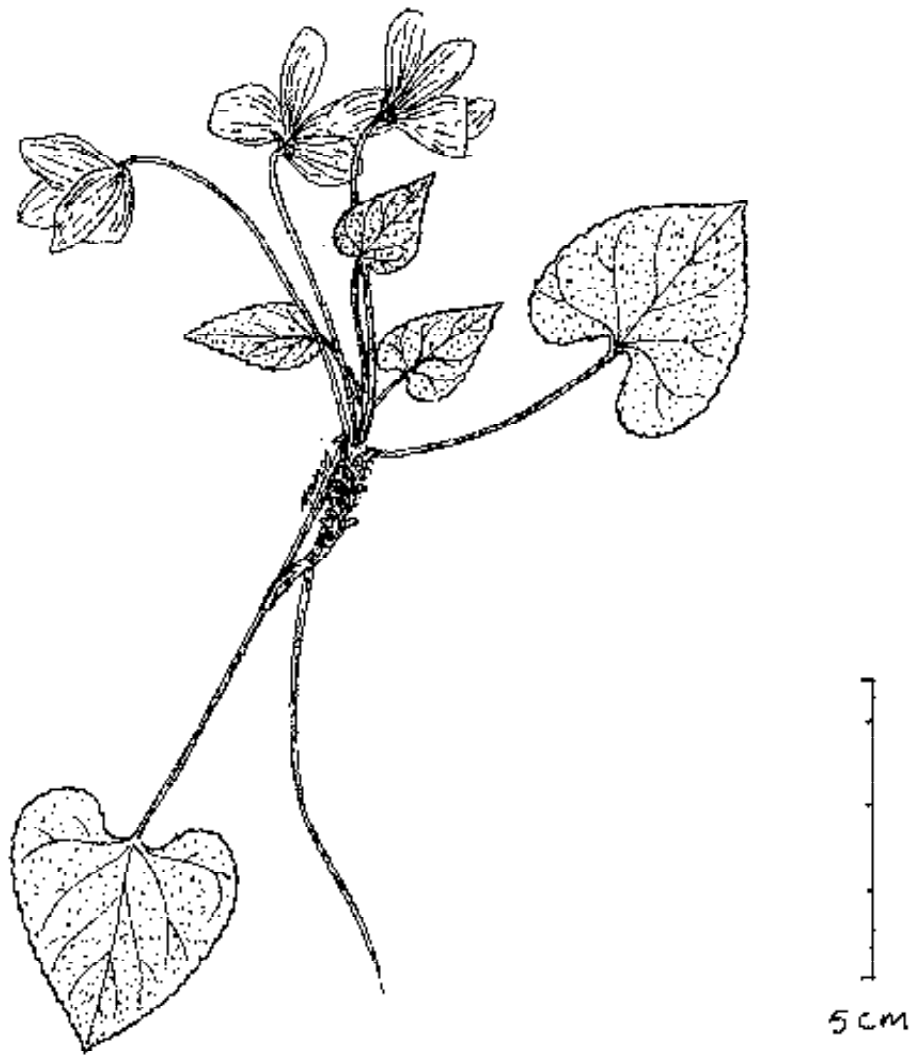


Fig. 16 : *Viola pilosa* Blume

**17. BIXACEAE**

Link, Handbuch 2 : 371. 1831 ("Bixinae").

(A. S. Chauhan)

**Bixa** L.

**Bixa orellana** L., Sp. Pl. 512. 1753; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 190. 1872; Kanjilal *et al.*, Fl. Assam 1 : 83. 1934; Deb in Bull. Bot. Surv. India 3 : 280. 1961; Balakr. in Sharma *et al.*, Fl. India 2 : 381. 1993  
Mani. : "Uritome"

Shrubs or small trees 2-8 m tall. Leaves 7-20 × 3-12 cm, ovate, subcordate to truncate at base, long acuminate, glossy above, densely red dotted beneath; lateral nerves 4-5 pairs; petioles 4-10 cm; stipules 5-8 mm, oblong, acute. Panicles terminal, corymbose. Flowers white or pinkish, 3-5 cm across. Capsules ovoid, 2-4 × 2-3 cm, densely clothed with long red or greenish brown bristles.

*Fl. & Fr.* : June - November.

*Specimens examined* : North Manipur 650-1000 m, *G. Watt* 7218; Chingmairong, *Deb* 608; Imphal, *Deb* 327 (CAL).

**18. FLACOURTIACEAE**

DC., Prodr. 1 : 225. 1824 ("Flacourtiaceae").

(A. S. Chauhan)

- 1a. Armed plants; flowers unisexual ..... 2
- b. Unarmed plants; flowers bisexual rarely unisexual ..... 3
- 2a. Ovary 2-3 locular; fruit 1-seeded ..... 2. *Flacourtia*
- b. Ovary 1-celled; fruits 3-8-seeded ..... 4. *Xylocarpus*
- 3a. Petals present; fruits berries ..... 3. *Hydnocarpus*
- b. Petals absent; fruits capsules ..... 1. *Casearia*

**1. Casearia** Jacq.

**Casearia vareca** Roxb., Fl. Ind. 2 : 418. 1832; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 593. 1879; Kanjilal *et al.*, Fl. Assam 1:93.1934; Deb in Bull. Bot. Surv. India 3 : 280. 1961; Mitra in Sharma *et al.*, Fl. India 2 : 398. 1993.

Tall shrubs or small trees, up to 10 m high. Leaves 6-14 × 3-5 cm, oblong-lanceolate or elliptic-oblong, cuneate at base, acuminate, sharply serrate, sparsely hairy; lateral nerves 7-12 pairs. Flowers ca 4 cm across, greenish-yellow; in lax axillary fascicles. Capsules ca 1 cm long, ellipsoid or ovoid, 3-angled, orange-yellow, 4-6-seeded.

*Fl. & Fr.* : June - February.

*Specimens examined* : Nungba 1670 m, *Meebold* 6101; Jirighat, *Meebold* 5790; Neechangard, *Meebold* 5509 (CAL).

## 2. *Flacourtia* Comm. ex L' Herit.

*Flacourtia jangomas* (Lour.) Rausch., Nomencl. Bot. ed. 3 : 290. 1797; Deb in Bull. Bot. Surv. India 3 : 280. 1961; Mitra in Sharma *et al.*, Fl. India 2 : 403. 1993. *Stigmarota jangomas* Lour., Fl. Cochinch. 2 : 634. 1790. *Flacourtia cataphracta* Willd., Sp. Pl. 4 : 830. 1806; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1:193. 1872; Kanjilal *et al.*, Fl. Assam 1 : 89. 1934.

Mani.: *Heitroi*.

Small evergreen trees up to 15 m tall; armed with compound spines at basal portion. Leaves 5 - 10 × 2.5 - 5 cm. ovate or ovate lanceolate, broadly cuneate at base, acuminate, crenate, serrate, glabrous; lateral nerves 4 - 5 pairs. Flowers pale yellow or whitish, fragrant, in short axillary, sub-corymbose racemes; sepals orbicular, ciliate. Berries globose, dark purple, crowned by persistent styles.

*Fl. & Fr.* : March - October.

*Specimens examined* : Imphal valley, G. Watt 7219; Imphal, Deb 2104 (CAL).

## 3. *Hydnocarpus* Gaertn.

*Hydnocarpus kurzii* (King) Warb. in Engl. & Prantl, Pflanzenfam. 3, 60 : 21. 1893; Deb in Bull. Bot. Surv. India 3 : 280. 1961; Mitra in Sharma *et al.*, Fl. India 2 : 421. 1993. *Taraktogenos kurzii* King in J. Asiat. Soc. Bengal 59 (2) : 123. 1890; Prain, Bengal Pl. 232. 1903. *Hydnocarpus heterophyllus* Kurz. For. Fl. Brit. Burma 1 : 77. 1877, non Blums. 1848.

Mani.: *Uhon*.

Evergreen trees. Leaves 15 - 22 cm long, oblong or elliptic-oblong, acute or cuneate at base, shortly acuminate, entire, coriaceous, glabrous. Flowers greenish white, in few flowered axillary cymes; stamens 20 - 30; ovary 1-celled, villous. Fruits globose, rind velvety; seeds numerous, oval, immersed in pulp.

*Fl. & Fr.* : April - February.

*Specimens examined* : Barak, Meebold 5701; Jirighat, Meebold 5424 (CAL).

## 4. *Xylosma* G. Forst. *nom. cons.*

*Xylosma longifolium* Clos. in Ann. Sci. Nat. ser. 4, 8 : 231. 1857; Hook. f. & Thomson in Hook. f., Fl. Brit. India 1 : 194. 1872; Kanjilal *et al.*, Fl. Assam 1 : 90. 1934; Deb in Bull. Bot. Surv. India 3 : 280. 1961; Mitra in Sharma *et al.*, Fl. India 2 : 436. 1993.

Mani.: *Nongleisang*.

Small trees, up to 10 m high; bark often thorny. Leaves 8 - 16 × 2.5 - 5 cm. oblong or elliptic-lanceolate, cuneate at base, acuminate, glabrous, serrate with recurved margins; lateral nerves 8 - 12. Flowers ca 0.5 cm



across, dull white or yellowish, in 2.5 cm long, panicles axillary racemes; sepals orbicular; disc glandular. Berries globose, red.

*Fl. & Fr.* : November - June.

*Specimens examined* : Ligri Pukoi, *G. Watt* 10392 (BSIS) ; Imphal 1000 m, *G. Watt* 7200; Imphal valley, *Meebold* 5423; Imphal, Deb 262 (CAL).

### 19. PITTOSPORACEAE

R. Br. in Flinders, *Voy. Terr. Austr.* 2, App. 3 : 542. 1814  
 ("Pittosporae").

(A. S. Chauhan)

#### 1. *Pittosporum* Banks ex Soland. *nom. cons.*

- 1a Capsules 2-valved; leaves large, elliptic-oblong or elliptic-lanceolate; ovary pubescent .....1. *P. napaulense*
- b. Capsules 3-valved; leaves oblong-lanceolate to oblanceolate; ovary densely tomentose .....2. *P. podocarpum*

1. *Pittosporum napaulense* (DC.) Rehder. & Wilson in *Pl. Willson.* 3 : 326. 1916; Nayar & Giri in *Sharma et al., Fl. India* 2 : 445. 1993. *Senecio napaulensis* DC., *Prodr.* 1 : 347. 1824; Hook. f. & Thomson in *Hook. f., Fl. Brit. India* 1 : 199. 1872; Kanjilal *et al., Fl. Assam* 1 : 95. 1934; Deb in *Bull. Bot. Surv. India* 3 : 280. 1961. *Pittosporum floribundum sensu* Hook. f., *Fl. Brit. India* 1 : 199. 1872, *p.p.*

Shrubs or small trees. Leaves 5-20 × 2-8 cm, apex acute to acuminate, margins entire or slightly wavy, glabrous; petioles 1-2 (-3) cm long. Inflorescence pubescent. Flowers 6-8 cm long; sepals 1.5-2.5 mm long, broadly ovate or oblong, ciliate; petals 6-7 × 2 mm, narrowly oblong, apex obtuse, filaments 3 mm long; anthers 1.5 mm long; ovary brownish-pubescent; styles glabrous. Capsules 6-8 mm in diam., globose; seeds 4-8 per capsule.

*Fl. & Fr.* : February - December.

*Specimens examined* : Bishenpur 1670 m, *Meebold* 10856 (CAL).

2. *Pittosporum podocarpum* Gagnep., *Notul. Syst.* 8 : 211. 1939; Nayar & Giri in *Sharma et al., Fl. India* 2 : 446. 1993. *P. glabratum auct. non* Lindley, 1846; Hook. f. & Thomson in *Hook. f., Fl. Brit. India* 1 : 198. 1872; Kanjilal *et al., Fl. Assam* 1 : 95. 1934; Deb in *Bull. Bot. Surv. India* 3 : 280. 1961.

Erect shrubs, 2-4 m high, bark brown lenticellate. Leaves 3-22 × 1-4 cm, oblong-lanceolate to oblanceolate, acute to acuminate, margins revolute, base cuneate; petioles 2-5 mm long, grooved above. Inflores-

cence glandular hairy or glabrescent, axillary or terminal, racemes or corymbs. Flowers ca 1.5 cm long, yellow; sepals 5, imbricate, ovate; petals 5, recurved, spreading at tips; ovary 1-celled, tomentose. Capsules 2 × 1.5 cm, obovoid or ellipsoid, striate inside; seeds reddish brown.

- la. Leaves 3-16 × 2-3.5 cm, oblanceolate  
or elliptic-lanceolate 2. var. *podocarpum*
- b. Leaves 6-22 × 1-2.5 cm,  
linear-lanceolate 1. var. *angustum*

1. var. *angustum* Gowda in J. Arn. Arb. 32 : 295, 1951; Nayar & Giri in Sharma *et al.*, Fl. India 2 : 447, 1993.

In this variety the ovary is densely tomentose.

Fl. & Fr. : March-December.

Specimens examined : Japvo, G. Watt 6538 & 11453 (CAL).

2. var. *podocarpum*

Fl. & Fr. : May-October.

Specimens examined : Chingshow, G. Watt 5908; Koupru hill, Deb 2234 (Cal).

## 20. POLYGALACEAE

R. Brown in Flinders, Voy. Terra Austr. 2 : 542, 1814 ("Polygalae").

(A. S. Chauhan)

- la. Inner 2 sepals much larger than the outer ones;  
stamens 8; seeds arillate.....1. *Polygala*
- b. Sepals subequal; stamens 4 or 6; seeds exarillate .....2. *Salomonina*

### 1. *Polygala* L.

- la. Herbs, shrubs or trees; capsules margined not winged.....2
- b. Annual herbs, capsules winged.....5
- 2a. Erect shrubs or small trees.....1. *P. arillata*
- b. Annual herbs.....3
- 3a. Leaves 1-3 cm long, elliptic; flowers up to 2 mm long,  
secund in terminal racemes; capsules globose..... 9. *P. tartarinowii*
- b. Leaves 2-6 cm long, ovate or  
elliptic-ovate; flowers more than  
2 mm long, not secund; capsules orbicular.....4
- 4a. Flowers ca 3 mm long, yellow; capsules up to

- 2 mm in diam., seeds smooth..... *P. hyalina*  
var. *pusilla*
- b. Flowers ca 6 mm long, greenish white  
with pink blotches; capsules  
ca 5 mm in diam., seeds hairy..... 7. *P. chinensis*
- 5a. Alae asymmetric, subfalcate, sub-obtuse or  
acute at apex; not petaloid.....6.
- b. Alae symmetric, obovate or elliptic, blunt at apex, petaloid.....7.
- 6a. Lower petal crested with two flap-like appendages;  
capsules truncate at apex, not notched.....4. *P. furcata*
- b. Lower petal without appendages;  
capsules not truncate at apex, notched.....8. *P. sibirica*
- 7a. Alae elliptic, less than 5 mm long  
in fruits; bracts caducous after anthesis.....6. *P. longifolia*
- b. Alae obovate to orbicular, 6-7 mm  
long in fruits; bracts persistent.....8
- 8a. Leaves 1.5 - 2.5 cm, obovate,  
rounded at apex; flowers ca 8 mm  
long, purplish white; alae mucronate at apex.....3. *P. crotalarioides*
- b. Leaves 1.2 - 4.5 cm, linear-elliptic, acute at apex;  
flowers 4 mm long, red; alae obtuse at apex.....7. *P. persicariifolia*

1. *Polygala arillata* Buch. Ham. ex D. Don, Prodr. Fl. Nep. 199, 1825; Bennett in Hook. f., Fl. Brit. India 1 : 200, 1872, p.p.; Kanjilal *et al.*, Fl. Assam 1 : 97, 1934; Deb in Bull. Bot. Surv. India 3 : 282, 1961; Banerjee in Sharma *et al.*, Fl. India 2 : 457, 1993.

Tall shrubs or small trees, young parts pubescent. Leaves 7.5 - 15 × 3 - 6.5 cm, elliptic, oblong-lanceolate or ovate-lanceolate, cuneate or rounded at base, acuminate, glabrous, hairy along nerves; lateral nerves 6 - 10 pairs. Flowers ca 1.6 cm across, orange-yellow, in 5 - 8 cm long axillary or terminal racemes; sepals 3 (2 + 1), obovate; petals 3, bright yellow. Capsules ca 1.2 cm in diam., broadly reniform, fleshy, notched at apex, purplish; seeds black, with white hairs.

Fl. & Fr. : May - October.

Specimens examined : Tolloi, Mukerjee 2963 (CAL).

2. *Polygala chinensis* L., Sp. Pl. 2 : 704, 1753; Bennett in Hook. f., Fl. Brit. India 1 : 204, 1872; Banerjee in Sharma *et al.*, Fl. India 2 : 264, 1993. *Polygala glomerata* Lour., Fl. Cochinch. 426, 1790; Bennett in Hook. f., Fl. Brit. India 1 : 206, 1872; Kanjilal *et al.*, Fl. Assam 1 : 98, 1934; Deb in Bull. Bot. Surv. India 3 : 282, 1961.

Much branched, erect or ascending herbs, up to 80 cm high. Leaves  $2.5-6.5 \times 1-3$  cm, ovate, ovate-lanceolate or elliptic-ovate, cuneate at base, obtuse-mucronate at apex. Flowers *ca* 0.6 cm, greenish-white with pink blotches, drooping; in axillary or supra-axillary racemes. Capsules *ca* 0.5 cm in diam., oblong, sub-orbicular, notched at apex, ciliate; seeds hairy.

*Fl. & Fr.*: April-September.

*Specimens examined*: Chamma, Mukerjee 3065; Imphat, Deb 426 (CAL).

3. *Polygala erotalarioides* Buch.-Ham. ex DC., Prodr. 1: 327, 1824; Bennett in Hook. f., Fl. Brit. India 1: 201, 1872; Kanjilal *et al.*, Fl. Assam 1: 97, 1934; Deb in Bull. Bot. Surv. India 3: 282, 1961; Banerjee in Sharma *et al.*, Fl. India 2: 466, 1993.

Perennial herbs, densely hairy, up to 40 cm tall. Leaves  $1.5-2.5 \times 0.7-1.2$  cm long, obovate to oblanceolate, cuneate at base, rounded-apiculate at apex, pubescent. Flowers *ca* 0.8 cm, lilac or purplish-white, in axillary or extra-axillary 1-3 cm long racemes; lateral sepals winged, persistent, longer than fruits. Capsules *ca* 0.4 in diam., oblong-orbicular, winged, ciliate at margins; seeds dark brown, white hairy.

*Fl. & Fr.*: May-November.

*Specimens examined*: Imphal valley, Deb 705 & 1096 (CAL).

4. *Polygala furcata* Royle, Illus. Bot. Himal. 3: 78, t. 19 B. (1-4) 1834; Banerjee in Sharma *et al.*, Fl. India 2: 469, 1993. *P. triphylla* Buch.-Ham. ex D. Don var. *glaucescens* Bennett in Hook. f., Fl. Brit. India 1: 201, 1872, *excl. syn. Semeiocardium hyalinum* Hassk.; Deb in Bull. Bot. Surv. India 3: 282, 1961.

Slender annual herbs, 10-25 cm high. Leaves  $2-6 \times 1-3$  cm, elliptic-ovate or elliptic, glaucescent; petioles 3-6 cm long. Flowers small, yellow or mauve, in 2-8 cm long rachis. Capsules winged.

*Fl. & Fr.*: September-October.

*Specimens examined*: North Manipur, C.B. Clarke *s. n.*

5. *Polygala hyalina* Wallich ex Hassk. var. *pusilla* Mukerjee in J. Bombay Nat. Hist. Soc. 51: 525, 1953; Deb in Bull. Bot. Surv. India 3: 282, 1961.

Small herbs, up to 12 cm high; stems erect, tender, terete. Leaves  $2.5 \times 1.2$  cm, elliptic or ovate, obtuse, base decurrent on petioles, glabrous on both the surfaces; petioles 4-6 mm long. Flowers *ca* 3 mm long, clustered, yellow, in axillary and terminal racemes; pedicels *ca* 1 mm long; bracts absent. Capsules *ca*  $1.5 \times 2$  mm. in diam., orbicular, compressed, retuse, margined but not winged; seeds tuberculate.

*Fl. & Fr.*: July-August.

*Specimens examined*: Karhan, Mukerjee 3615 (CAL).

6. *Polygala longifolia* Poiret in Lam., *Encycl.* 5 : 501. 1804; Banerjee in Sharma *et al.*, *Fl. India* 2 : 476. 1993, *P. leptalea* DC., *Prodr.* 1 : 325. 1824; Bennett in Hook. f., *Fl. Brit. India* 1 : 202. 1872; Kanjilal *et al.*, *Fl. Assam* 1 : 98. 1934; Deb in *Bull. Bot. Surv. India* 3 : 282. 1961.

Slender erect herbs, up to 50 cm high. Leaves 2–3.5 × 0.1–0.4 cm, linear or linear-lanceolate, sub-sessile, acute at both ends, 1-nerved. Flowers ca 0.2 cm, purplish-white; in 2–8 cm long subconical racemes. Capsules ca 0.3 cm, obovate, obcordate, winged; seeds oblong, white hairy.

*Fl. & Fr.* : April–October.

*Specimens examined* : Nongmajnig 1500 m, Deb 386 & 1314; Ukhrul 1340 m, Mukerjee 2724; Mukhu 1000 m, G. Watt. 5056; Bishenpur, Meebold 5428 (CAL).

7. *Polygala persicariifolia* DC., *Prodr.* 1 : 326. 1824; Bennett in Hook. f., *Fl. Brit. India* 1 : 202. 1872; Deb in *Bull. Bot. Surv. India* 3 : 282. 1961; Banerjee in Sharma *et al.*, *Fl. India* 2 : 480. 1993.

Erect annual herbs, up to 50 cm tall, pubescent. Leaves 1.2–4.5 × 0.3–1.2 cm, linear-elliptic, linear-lanceolate, cuneate at base, acute or acuminate; petioles very short. Flowers ca 0.4 cm, pink or reddish-purple, in terminal or lateral racemes or leaf-opposed; lateral sepals ovate, winged. Capsules ca 0.4 cm, oblong-obovate, notched at apex, ciliate, winged.

*Fl. & Fr.* : July–November.

*Specimens examined* : Ukhrul 1335 m, Mukerjee 2724 & 3151; Laimaklong, Deb 527; Laimetak 1330 m, Meebold 5978 (CAL); Kauchepkul, Bat 536 (BSIS).

8. *Polygala sibirica* L., *Sp. Pl.* 702. 1753; Bennett in Hook. f., *Fl. Brit. India* 1:205.1872. p.p.; Kanjilal *et al.*, *Fl. Assam* 1:98. 1934; Deb in *Bull. Bot. Surv. India* 3 : 282. 1961; Banerjee in Sharma *et al.*, *Fl. India* 2 : 481. 1993.

Erect or ascending, perennial herbs, up to 50 cm high, pubescent. Leaves 2–3.5 × 2.5–7 cm, elliptic, linear-lanceolate, sub-acute at base, acute or acuminate; lateral nerves 6–9 pairs. Flowers ca 0.6 cm, blue or purple; in axillary or supra-axillary racemes; pedicels recurved in fruits. Capsules ca 0.5 cm, sub-orbicular, notched at apex, broadly winged.

*Fl. & Fr.* : March–October.

*Specimens examined* : Khangkholi 1330 m, Mukerjee 2517; Imphal, Deb 2274; Nong Shong Khong, G. Watt 6292 (CAL).

9. *Polygala tartarinowii* Regel in *Bull. Soc. Nat. Moscou* 34 (2) : 523. 1861; Banerjee in Sharma *et al.*, *Fl. India* 2 : 483. 1993, *P. triphylla* auct. non Buch. Ham. ex D. Don; Bennett in Hook. f., *Fl. Brit. India* 1 : 201. 1872. p.p. Deb in *Bull. Bot. Surv. India* 3 : 282. 1961; Pal & Giri in *J. Econ. Tax. Bot.* 14 : 226. 1990.

Erect, delicate glabrous herbs; stems 4–12 cm long, angular, often branched at base. Leaves 1–3 cm long, elliptic or orbicular-ovate, abruptly narrowed to a winged petiole, acute to obtuse. Flowers ca 2 mm long, pale purple, many, secund in terminal racemes; pedicels ca 1 cm long, petals 1–1.5 mm long, purple. Capsules ca 3 mm, globose, flat, wingless; seeds ellipsoid.

*Fl. & Fr.* : July–October.

*Specimens examined* : Nongamajing, Deb 2528 (CAL).

## 2. *Salomonina* Lour., nom. cons.

*Salomonina cantoniensis* Lour., Fl. Cochinch. 17, 1790; Bennett in Hook. f., Fl. Brit. India 1 : 206, 1872; Deb in Bull. Bot. Surv. India 3 : 282, 1961; Banerjee in Sharma *et al.*, Fl. India 2 : 489, 1993.

Slender, ascending, much branched herbs, up to 30 cm high. Leaves 0.4–2 × 0.3–1.5 cm, ovate, ovate-lanceolate, cuneate or truncate at base, subacute or obtuse. Flowers pink or pinkish-white; in terminal 2–4 mm long spikes. Capsules ca 2 mm, obcordate, compressed, septicidal; minutely toothed; seeds lenticular, black.

*var. cantoniensis*

*Fl. & Fr.* : August–December.

*Specimens examined* : Kasam, 1350 m, Mukerjee 3286; Imphal 510 m, Deb 497 (CAL).

## 21. CARYOPHYLLACEAE

A. L. de Jussieu, Gen. Pl. 299, 1789 ("Caryophylleae").

(A. S. Chauhan)

- 1a. Extensive divaricate climbing herbs.....1. *Brachystemma*
- b. Subscandent, procumbent or decumbent herbs.....2
- 2a. Sepals united into a distinct calyx tube; petals long clawed, inserted together with the stamens on a short gynophore.....3
- b. Sepals free or connate at the base only; petals subsessile, inserted together with the stamens on a disk.....4
- 3a. Epicalyx present; styles 2.....3. *Dianthus*
- b. Epicalyx absent; styles 3.....2. *Cucubalus*
- 4a. Stipules absent.....5
- b. Stipules present, scarious.....6
- 5a. Petals bifid; capsules globose, ovoid or oblong.....8. *Stellaria*
- b. Petals entire, minute or absent.....7. *Sagina*

- 6a. Leaves opposite.....4. *Drynaria*  
 b. Leaves in pseudowhorls.....6. *Polycarpon*  
 7a. Capsule valves as many as styles.....5. *Myosoton*  
 b. Capsule valves twice as many as styles.....8. *Stellaria*

### 1. *Brachystemma* D. Don

***Brachystemma calycinum*** D. Don, Prodr. Fl. Nep. 216. 1825; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 235. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Majumdar in Sharma *et al.*, Fl. India 2 : 519. 1993.

Extensive,divaricate climbing herbs; stems 4 angled, shining and brittle. Leaves 3 8 × 1 3 cm, ovate or lanceolate, trinerved, margins obscurely crenulate; petioles up to 2 cm, becoming recurved, thickened and hardened. Inflorescence a cyme. Flowers white, sepals entirely scarious; petals entire. Capsules depressed, 1 seeded; seeds reniform or globose, tuberculate.

*Fl. & Fr.* : November April.

*Specimens examined* : Imphal, Deb 1424; Lingli village, Watt 6687; Keithemabi, G. Watt 5828; Mao, G Watt 7123; Piplima, Meebold 5430; Imphal, Meebold 217 (CAL).

### 2. *Cucubalus* L.

***Cucubalus haccifer*** L., Sp. Pl. 413. 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 222. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Majumdar in Sharma *et al.*, Fl. India 2 : 525. 1993.

Slender, often scandent, perennial herbs, more or less pubescent with curly white hairs. Leaves 3 7 × 1 2.5 cm, membranous, acuminate, rounded at base, sparsely pubescent. Flowers greenish white, drooping; calyx 1 1.3 cm; petals 3 × 2 mm, bilobed, greenish white. Fruits black.

*Fl. & Fr.* : August December.

*Specimens examined* : Ukhrul, Mukerjee 3243 (CAL).

### 3. *Dianthus* L.

***Dianthus chinensis*** L., Sp. Pl. 411. 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 215. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Majumdar in Sharma *et al.*, Fl. India 2 : 528. 1993.

Annual unbranched glabrous herbs. Leaves sessile. 5 8 × 0.5 1 cm, acute, ciliate at the margins. Flowers rose or lilac; sepals united; petals clawed; stamens on an elongated gynophore; styles 2. Capsules ca 2 cm, cylindric.

*Fl. & Fr.* : September December.

*Specimens examined* : Imphal, Deb 2473 (CAL).

4. *Drymaria* Willd. ex Roem. & Schultes

*Drymaria diandra* Blume, Bijdr. 62. 1825; Majumdar in Sharma *et al.*, Fl. India 2 : 533. 1993. *Drymaria cordata auct. non* (L.) Willd. ex Roem. & Schultes 5 : 406. 1819; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 244. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961. Fig. 17

Mani.: *Tandalpambi*

Diffuse glabrous herbs. Leaves 5 - 25 × 5 - 30 mm, ovate cordate, elliptic or orbicular, mucronate; 3 - 5 nerved. Flowers ca 6 mm long, white, in axillary and terminal slender; dichasial cymes; sepals 5, free; petals 5, subsessile; ovary unilocular. Capsules ca 3 mm, ovoid, trigonous; seeds dark brown.

Fl. & Fr. : November - March.

*Specimens examined* : North and East Manipur, Deb 1851; Mukerjee 3428 (CAL); Imphal, Matick 1346 (BSIS); Ukhrul, Chauhan 94820 (AS-SAM).

5. *Myosoton* Moench

*Myosoton aquaticum* (L.) Moench, Methodus 225. 1974; Majumdar in Sharma *et al.*, Fl. India 2 : 548. 1993. *Cerastium aquaticum* L., Sp. Pl. 439. 1753. *Stellaria aquatica* (L.) Scop., Fl. Carn. ed. 2, 2, 1 : 319. 1772; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 229. 1874.

Mani.: *Venrum keisum*.

Perennial, erect, sub erect or decumbent herbs; upper parts glandular pubescent. Leaves 2 - 4 × 1 - 2 cm, glandular pubescent. Leaves 2 - 4 × 1 - 2 cm, narrowly ovate, acute. Flowers 5 - 20 or more, white; bracts foliaceous; petals 2 - fid up to base; stamens 10; styles 5. Capsule ca 8 mm long, ovoid, dehiscent into 5, 2 - dentate valves; teeth 2 - fid.

Fl. & Fr. : July - September.

*Specimens examined* : S. C. Sinha. *l.c.*

6. *Polycarpon* Loefl. ex L.

*Polycarpon prostratum* (Forssk.) Asch. & Schwein. in Dester. Bot. Zeit. 39 : 128. 1889; Deb, Fl. Tripura 2 : 148. 1983; Majumdar in Sharma *et al.*, Fl. India 2 : 553. 1993. *Alsine prostrata* Forssk., Fl. Aeg. Arb. 207. 1775. *Polycarpon loeflingiae* (Wallich ex Wight & Arn.) Benth. & Hook. f., Gen. Pl. 153. 1862; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 245. 1874. *P. indicum* (Retz.) Merr. in Philipp. J. Sci. (Bot.) 10 : 302. 1915; Deb in Bull. Bot. Surv. India 3 : 321. 1961.

Dichotomously branched herbs. Leaves 5 - 20 × 2 - 5 m, linear - oblong or spatulate, cuneate. Flowers ca 7 mm long, pink, in terminal fascicles or panicle cymes; sepals 5, keeled; petals smaller than sepals, hyaline, en-



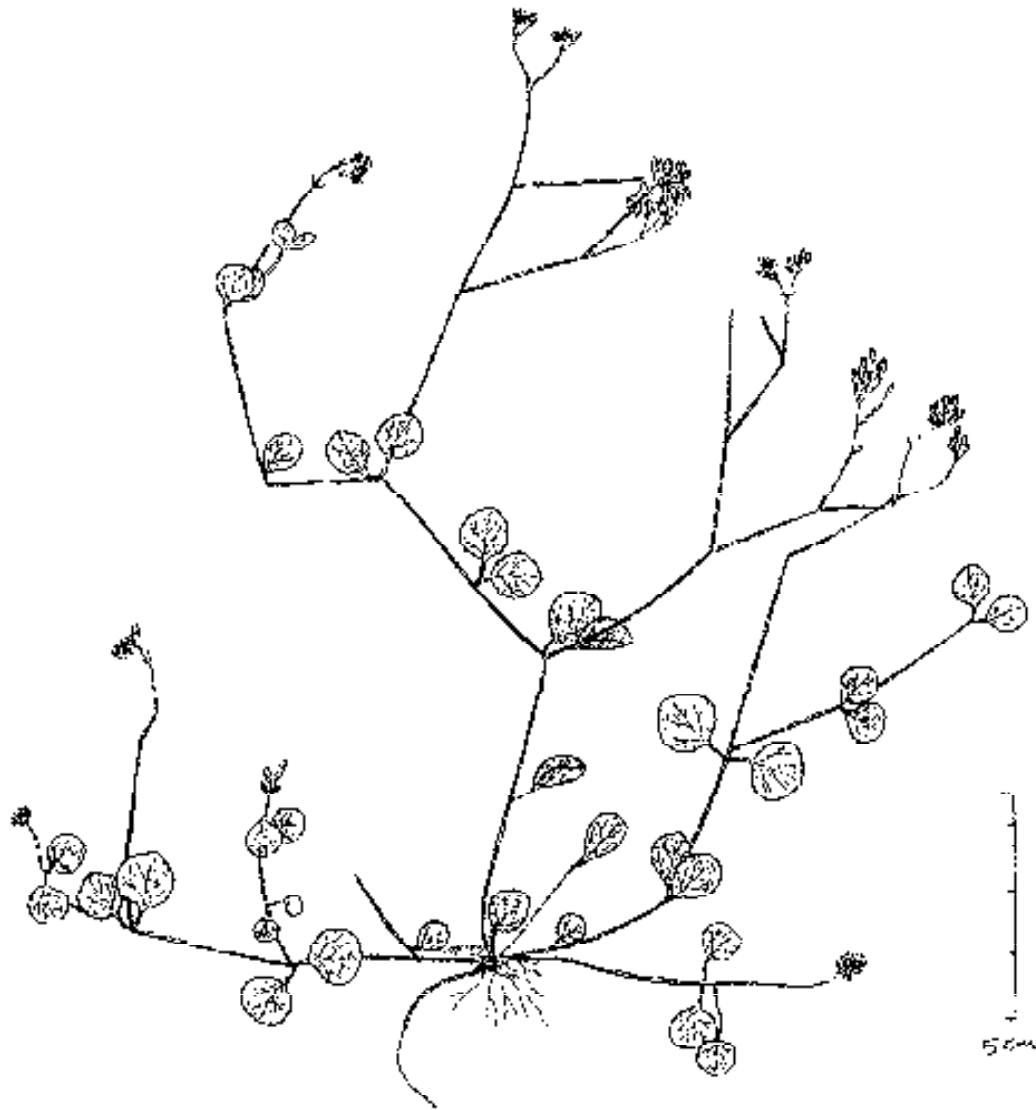


Fig. 17 : A flowering plant of *Drymaria diandra* Blume

(ire: stamens 3-5 on an annular disk; ovary unifolcular. Capsules ovoid, 3-valved, red; seeds numerous, sub-cylindric, minutely tubercled, pale brown.

*Fl. & Fr.* : May-July.

*Specimens examined* : Imphal, Deb 1632 (CAL).

#### 7. *Sagina* L.

*Sagina saginoides* (L.) Karsten. Deutsche Fl. 539. 1883; Majumdar in Sharma *et al.*, Fl. India 2:559. 1993. *Spergula saginoides* L., Sp. Pl. 441. 1753. *Sagina procumbens auct. non L.*, 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1:243. 1874, p.p.; Deb in Bull. Bot. Surv. India 3: 321. 1961.

Annual or rarely perennial herbs with tufted stem. Leaves 3-10 × 0.5-0.6 mm, acuminate to a fine awn like tip, glabrous. Flowers very small, solitary axillary and terminal; sepals 4, rounded; petals ovate, minute or absent; stamens usually 4. Fruits ca 2 mm; seeds dark brown, smooth.

*Fl. & Fr.* : January-March.

*Specimens examined* : Mao, Deb 1860 (CAL).

#### 8. *Stellaria* L.

1a. Stems 60-130 cm; leaves 3.5-14 cm; sepals 4 mm..... 2. *S. monosperma*

b. Stems less than 60 cm; leaves up to 2.5 × 1.5cm ..... 2

2a. Leaves 1-6 mm broad, flowers few or solitary;

petals minute or absent..... 3. *S. uliginosa*

b. Leaves 5-15 mm broad, flowers many in cymes:

petals deeply bifid..... 1. *S. media*

1. *Stellaria media* (L.) Vill., Hist. Pl. Dauph. 3:615. 1789, p.p.; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1:230. 1874, p.p.; Deb in Bull. Bot. Surv. India 3: 321. 1961; Majumdar in Sharma *et al.*, Fl. India 2: 585. 1993.

Mani.: *Yekum Keirum*.

Erect or procumbent herbs up to 60 cm tall; stems quadrangular with a line of hairs. Leaves 1-2.5 × 0.5-1.5 cm, ovate, rounded at base. Flowers small, in axillary or terminal cymes; sepals sparsely glandular-pubescent; petals shorter than sepals, deeply bifid. Capsules ovoid, 3-valved; seeds tubercled brown.

*Fl. & Fr.* : March-July.

*Specimens examined* : Khongi valley, G. Watt 6317 (CAL).

2. *Stellaria monosperma* Buch. Ham. ex. D. Don var. *paniculata* (Edgew.) Majumdar in J. Indian Bot. Soc. 44 (1): 141. 1965 & in Sharma *et al.*, Fl. India 2: 586. 1993. *S. paniculata* Edgew. in Trans. Linn. Soc. 20: 35. 1846; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1: 229. 1874; Deb in Bull. Bot. Surv. India 3: 321. 1961.

Subscandent or decumbent herbs, up to 120 cm tall. Leaves variable in shape, lanceolate or elliptic, shortly acuminate, membranous; petioles winged. Flowers very small, in glandular pubescent much branched cymes; sepals 3-4 mm long, pubescent; petals shorter than sepals, notched. Capsules equating the calyx, opening by 6 valves; seeds compressed, tubercled.

*Fl. & Fr.* : January - March.

*Specimens examined* : North Manipur, C.B. Clarke s.n

3. *Stellaria uliginosa* Murray, Prodr. Stirp. Gotting. 55. 1770; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 233. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Majumdar in Sharma *et al.*, Fl. India 2 : 589. 1993.

var. *undulata* (Thunb.) Fenzl in Ledeb., Fl. Ross. 1: 393, 1842. *S. undulata* Thunb., Fl. Jap. 185. 1784.

Mani.: *Keirum & Venrum Keirum.*

Procumbent herbs; stems 4 angled. Leaves sessile, 0.5-2 × 0.1-0.6 cm, ovate or oblong-lanceolate, with mucronate tips, margins undulate. Flowers few, sometimes solitary, in axillary and terminal cymes; bracts ovate, scarious; sepals 3-4 mm, glabrous; petals minute or absent. Capsules ovoid, 6-valved; seeds minutely tubercled.

*Fl. & Fr.* : February - April.

*Specimens examined* : Ugonkhong, G. Watt 6035; Ukhrul, Mukherjee 1948; Marain, Deb 1945 (CAL).

## 22. PORTULACACEAE

A. L. de Jussieu, Gen. Pl. 312. 1789 ('Portulacaceae').

(A. S. Chauhan)

### 1. *Portulaca* L.

- 1a. Leaves 1.5-3.5 cm, ovate or spatulate..... 1. *P. oleracea*  
 b. Leaves 0.5-0.8 cm, elliptic-ovate or ovate-lanceolate .....  
 ..... 2. *P. quadrifida*

1. *Portulaca oleracea* L., Sp. Pl. 445. 1753; Dyer in Hook. f., Fl. Brit. India 1 : 246. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Rao in Sharma *et al.*, Fl. India 3 : 4. 1993.

Mani.: *Leipak*

var. *oleracea*

Erect to decumbent or prostrate herbs, up to 50 cm tall. Leaves 1.5-3.5 × 0.5-2 cm, ovate to obovate or spatulate, fleshy, cuneate at base,

rounded or slightly emarginate, with inconspicuous axillary hairs; petioles 2-7 mm. Flowers yellow, solitary or 5-10 in clusters; sepals *ca* 6 mm, strongly keeled in upper half; petals 5-7 mm, united at base, yellow. Capsules *ca* 4 × 3 mm, obovate; seeds many, black.

*Fl. & Fr.* : April-September.

*Specimens examined* : Imphal valley Deb 343 (CAL); Imphal, Mallick 1325 (BSIS).

2. *Portulaca quadrifida* L., Mant. Pl. 1 : 73. 1767; Dyer in Hook. f., Fl. Brit. India 1:247. 1874; Deb in Bull. Bot. Surv. India 3 : 321. 1961; Rao in Sharma *et al.*, Fl. India 3:6. 1993.

*Mani* : *Leipak kundu*.

Prostrate, creeping, succulent herbs, with ascending branches. Leaves 0.5-0.8 cm, elliptic-ovate or ovate-lanceolate, fleshy, with axillary hairs. Flowers small, solitary or terminal yellow; sepals *ca* 3 mm, connate at base; petals *ca* 5 mm, obovate, yellow, connate below. Capsules 3 × 2.5 mm, obovate, straw yellow, shining; seeds many, minute.

*Fl. & Fr.* : April-July.

*Specimens examined* : Imphal, Deb 2474 (CAL).

### 23. TAMARICACEAE

Link, Enum. Hort. Berol. Alt. 1 : 291. 1821 ("Tamariscinae").

(A. S. Chauhan)

#### *Myricaria* Desv.

*Myricaria squamosa* Desv. in Ann. Sci. Nat. ser. 1. 4 : 350. 1825; Oaiscer in Nasir & Ali, Fl. W. Pakistan 141 : 52. 1982; Shetty & Panday in Sharma *et al.*, Fl. India 3 : 17. 1993. *M. germanica auct. non Desv.* : Dyer in Fl. Brit. India 1 : 250. 1874, *p.p.* ; Deb in Bull. Bot. Surv. India 3:281. 1961.

Gregarious shrubs up to 2.5 m high; stem slender, striate, brownish-green, glaucous. Leaves small, sessile, 1-5 × 0.5-1 cm, linear-lanceolate, linear-oblong, or ovate, subacute to obtuse at apex. Flowers pink, clustered in 3-5 cm long, lateral spikes, rarely terminal; bracts ovate-lanceolate, *ca* 3 times longer than pedicels, sepals *ca* 4 mm long, linear-lanceolate, petals *ca* 6 mm, oblong-ovate; stamens connate 2/3 of their length. Capsules *ca* 1 cm long; seeds *ca* 1.5 mm long, obovoid-oblong, beaked.

*Fl. & Fr.* : June-September.

*Specimens examined* : Ukhrul, Mukherjee 2228 (CAL).

## 24. CLUSIACEAE

Lindley, Nat. Syst. Bot. ed. 2 : 74. 1836.

( *Nom. Alt. Guttiferae* ).( *A. S. Chauhan* )

- 1a. Ovary 2-8 or more celled; stigma sessile; fruit a berry pulpy.....2. *Garcinia*
- b. Ovary 1-2 celled; stigma peltate; fruits capsular or drupaceous.....2
- 2a. Flowers in racemes, small, ca 1 cm in diam., fruits 1-seeded drupe.....1. *Calophyllum*
- b. Flowers solitary or in pairs, large, ca 5-7 cm in diam., fruits 1-4-seeded capsule.....3. *Mesua*

1. *Calophyllum* L.

*Calophyllum polyanthum* Wallich ex Choisy, Descr. Guttif. Inde. 43. 1849; T. Anderson in Hook. f., Fl. Brit. India 1 : 276. 1874; Kanjilal *et al.*, Fl. Assam 1 : 114. 1934; Deb in Bull. Bot. Surv. India 3 : 295. 1961; Singh in Sharma *et al.*, Fl. India 3 : 94. 1993.

Trees up to 25 m high with compressed angular branchlets; bark grey brown. Leaves 7-15 × 2-6 cm, elliptic or oblong-lanceolate, base cuneate, apex acute, margins undulate; petioles narrowly margined, 1.5-2 cm long. Flowers ca 1 cm across, white, in axillary broad 3-10 cm long panicles; pedicels 0.5-1 cm long; sepals 4, unequal, outer 2 smaller, concave, inner 2 petaloid; petals white, 5-6 mm long, obovate; stamens indefinite, yellow, 3-4 mm long; ovary ovoid with 2-3 mm long style. Fruits broadly ellipsoid or subglobose, pointed, ca 3 cm long; seed ovoid, brown.

*Fl. & Fr.* : March-December.

*Specimens examined* : West Manipur. *Kaith s. n.* (CAL).

2. *Garcinia* L.

- 1a. Branchlets angular; flowers pentamerous; fruits 1-5-seeded ..... 6. *G. xanthochymus*
- b. Branchlets terete; flowers tetramerous; fruits 4-10-seeded.....2
- 2a. Leaves obovate or oblanceolate; pedicels ca 1 cm long; fruits 8-10-seeded.....4. *G. pedunculata*
- b. Leaves elliptic or lanceolate; pedicels 3-5 mm long; fruits 4-8-seeded.....3
- 3a. Flowers solitary or 1-3 together;

- petals shorter than sepals.....4
- b. Flowers many in panicles; petals longer than sepals.....5
- 4a. Male flowers 1-2, sessile; stamens more than 20; petioles more than 7 mm long .....2. *G. lanceaefolia*
- b. Male flowers usually 3; stamens numerous; petioles ca 5 mm long .....3. *G. loniceroides*
- 5a. Male flowers in fascicles; anthers dehiscent by 4 clefts.....1. *G. cowa*
- b. Male flowers in panicles; anthers dehiscent by 2 clefts.....5. *G. sopsopia*

1. **Garcinia cowa** Roxb. ex DC., Prodr. 1 : 561. 1824; T. Anderson in Hook. f., Fl. Brit. India 1 : 262. 1874, *p.p.*; Kanjilal *et al.*, Fl. Assam 1 : 105. 1934; Deb in Bull. Bot. Surv. India 3 : 295. 1961; Singh in Sharma *et al.*, Fl. India 3 : 108. 1993.

Mani. : *Kau.*

Medium to large sized deciduous trees, ca 25 m high; branches axillary, greyish brown, smooth. Leaves 5-14 × 2.5-7 cm, elliptic lanceolate, apex acute or acuminate, base cuneate to attenuate, thinly coriaceous, veins numerous, slender, young leaves reddish. Male flowers ca 1 cm in diam., yellow, in axillary or terminal fascicles of 3-7; pedicels 3-5 mm long; sepals 4, ovate, yellowish pink; petals 4, twice the length of sepals, oblong; stamens many on fleshy receptacles; female flowers with 4 clusters of staminodes around ovary; stigmas 4-8 lobed; sessile. Berries globose, ca 4 cm in diam., vertically grooved, 4-8 seeded, yellow.

Fl. & Fr. : February - September.

Specimens examined : Imphal, Deb *s. n.* (CAL).

Planted in homestead compounds in Imphal.

2. **Garcinia lanceaefolia** (G. Don) Roxb., Fl. Ind. 2:263.1832; T. Anderson in Hook. f., Fl. Brit. India 1:263.1874; Kanjilal *et al.*, Fl. Assam 1:106.1934; Malick & Safai in J.Econ.Tax.Bot. 10:2.1987; Singh in Sharma *et al.*, Fl.India 3:116.1993. *Stalagmitis lanceaefolia* G. Don, Syst.1:621. 1831.

var. **lanceaefolia**

Trees or large shrubs, ca 6 m tall. Leaves 4-10 × 1-3 cm, lanceolate, elliptic lanceolate, cuneate at base, cuspidate acuminate, lateral nerves 8-10 pairs, obscure. Flowers terminal or axillary, 1-3 together, ca 0.8 cm across, pinkish yellow or red; sepals broadly elliptic oblong; petals shorter. Berries ca 2.5 cm across, obovoid, orange yellow; 6-8 seeded.

*Fl. & Fr.* : February - July.

*Specimens examined* : Ainadhat, *Malick* 962; Sripurkhal, *Malick* 1104; Nungba, *Malick* 1260 (BSIS).

3. *Garcinia loniceroides* T. Anderson in Hook. f., *Fl. Brit. India* 1 : 264. 1874; Singh in Sharma *et al.*, *Fl. India* 3 : 118. 1993. *G. succifolia* Kurz in *J. Asiat. Soc. Bengal* 41 : 293. 1872.

Tall shrubs or small trees with reddish purple branches. Leaves at apices, 5 - 10 × 1.5 - 2, oblong lanceolate or oblanceolate, narrowed at both ends, entire. Male flowers terminal or broadly ovate; petals 4, similar to sepals in shape and size; female flowers ca 5 mm across, ovary globose with tuberculate stigma.

*Fl. & Fr.* : November - April.

*Specimens examined* : Nungba, *Meebold* 6326 (CAL).

4. *Garcinia pedunculata* Roxb. ex Buch. - Ham. in Brewster, *Edinb. J. Sci.* 7 : 45, t.1 1872; T. Anderson in Hook. f., *Fl. Brit. India* 1 : 264. 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 107. 1934; Deb in *Bull. Bot. Surv. India* 3 : 295. 1961; Singh in Sharma *et al.*, *Fl. India* 3 : 121. 1993.

*Mani.* : *Heihung*

Trees up to 20 m high with short spreading branches; bark greyish brown, smooth. Leaves 9 - 30 × 3 - 13 cm, obovate, oblanceolate, lateral nerves, 10 - 15 pairs; petioles ca 2 cm long. Male flowers ca 2 cm across; in terminal 8 - 10 flowered short panicles, pedicels slender, ca 1 cm long; sepals 4, orbicular; petals 4, as long as sepals or slightly longer, pale green; stamens indefinite; female flowers solitary, yellowish green, staminodes in 4 bundles. Berries 6 - 10 cm in diam., globose, yellow when ripe. 8 - 10 seeded; seeds ovoid, brown, arillate.

*Fl. & Fr.* : October - January.

*Specimens examined* : West Manipur, *Kaith s. n.* (CAL).

5. *Garcinia sopsopia* (Buch. - Ham.) Mabberley in *Taxon* 26 : 529. 1977; Singh in Sharma *et al.*, *Fl. India* 3 : 124. 1993. *Oxycarpus sopsopia* Buch. - Ham. in *Mem. Wern. Soc.* 5 : 345. 1826. *Garcinia paniculata* Roxb. ex Wight, *Illus. Ind. Bot.* 125. 1831; T. Anderson in Hook. f., *Fl. Brit. India* 1 : 266. 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 108. 1934.

Trees, 15 - 20 m high, with lax crown. Leaves 8 - 18 × 4 - 9 cm, oblanceolate, obovate or elliptic, cuneate at base, acute or acuminate; lateral nerves 8 - 12 pairs, prominent. Male flowers in axillary or terminal trichotomous panicles, ca 2 cm across, dull white; female flowers in 5 - 8 cm long terminal spikes; ovary subglobose, tubercled. Berries ca 2.5 cm

across, globose to ellipsoid, yellow when ripe, 3–5 seeded.

*Fl. & Fr.* : November–July.

*Specimens examined* : Phalong, *Medhold* 6471 (CAL).

6. *Garcinia xanthochymus* Hook. f., *Fl. Brit. India* 1 : 269, 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 104, 1934; Deb in *Bull. Bot. Surv. India* 3 : 295, 1961; Singh in Sharma *et al.*, *Fl. India* 3 : 129, 1993. *Xanthochymus pictorius* Roxb., *Fl. Corom.* 2 : 51, t, 196, 1805. *X. tinctorius* DC., *Prodr.* 1 : 562, 1824. *Garcinia tinctoria* (DC.) W.F. Wight in U.S. Deptt. Agr. Bur. Pl. Indus. Bull. 137 : 50, 1909.

*Mani.* : Heibung

Medium sized trees, up to 20 m high with drooping angular branches. Leaves 15–35 × 4–9 cm, oblong, oblong-lanceolate, coriaceous, base cuneate, apex shortly acuminate or apiculate, margins thickened, shining above, lateral nerves 10–35 pairs; petioles thick, ca 2 cm long. Flowers in axillary fascicles of 2–8, dull white or yellow, ca 2.5 cm across; pedicels ca 2.5 cm long; sepals 5, 4–6 mm, sub-orbicular, concave; petals 5, 8–10 mm long, white, obovate; stamens in 5 bundles of 5 each, alternating with 5 fleshy glands; ovary pentacarpellary, ovoid, stigmas deeply 5-lobed. Berries 4–5 cm in diam., subglobose or ovoid, pointed, dark yellow when ripe, pulpy, 1–5 seeded; seeds arillate.

*Fl. & Fr.* : March–November.

*Specimens examined* : Ukhrul, *Mukerjee* 3005; Imphal, *Deb* 1107 (CAL).

### 3. *Mesua* L.

*Mesua ferrea* L., *Sp. Pl.* 515, 1753; T. Anderson in Hook. f., *Fl. Brit. India* 1 : 277, 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 111, 1934; Deb in *Bull. Bot. Surv. India* 3 : 295, 1961; Singh in Sharma *et al.*, *Fl. India* 3 : 136, 1993.

*Mani.* : Uthau & Nageshur

Evergreen, large sized trees up to 35 m high; crown conical, dense; bark brown, smooth, later warty. Leaves 8–15 × 2–4 cm, elliptic-lanceolate, apex acuminate, base rounded or acute; green and glossy above, whitish-waxy beneath, pinkish when young, glabrous, lateral nerves numerous, inconspicuous; petioles 0.5–1 cm long. Flowers large, ca 5–7 cm in diam., white, showy, fragrant, 1–2, terminal or in the axils of upper leaves; pedicels ca 5 mm long; sepals 4, in 2 pairs, greenish-white, suborbicular, concave, 1.5–2.5 cm, puberulous; petals white, 2–3 × 1.5–2.1 cm, obovate or obovate, caducous; stamens many, yellow; ovary ovoid, style curved with peltate stigma. Berries ovoid, woody, indehiscent, ca 4–5 cm diam., with pointed apex, 1–4 seeded.

*Fl. & Fr.* : March–September.

*Specimens examined* : Irong 1000m, *Meebold* 5435; West Manipur, *Deb* 2471 (CAL).



**25. HYPERICACEAE**

A. L. de Juss. Gen. Pl. 254, 1789 ('Hyperica').

(A. S. Chauhan)

**1. Hypericum 1.**

- 1a. Erect or diffuse herbs, less than 1 m high.....2
- b. Shrubs or under shrubs, more than 2 m high.....6
- 2a. Flowers often 4 merous, 1-2 or 3 in cymes.....5. *H. monanthemum*
- b. Flowers 5 merous, more than 3 in cymes.....3
- 3a. Diffuse herbs with monadelphous  
stamens at the base.....4. *H. japonicum*
- b. Erect herbs with 3 adelphous stamens at the base.....4
- 4a. Leaves connate at the base; capsules smooth,  
covered by resinous vesicles.....1. *H. assamicum*
- b. Leaves not connate at the base; capsule longitudinally  
ribbed; without resinous vesicles.....2. *H. elodeoides*
- 5a. Stems 4 winged or ribbed; leaves  
sessile; glaucous white beneath;  
flowers 1.5-3 cm in diam. ....6. *H. uralum*
- b. Stems smooth, leaves petiolate, pale green  
beneath not glaucous; flowers 3-6 cm in diam. ....5. *H. hookerianum*

**1. *Hypericum assamicum*** S. N. Biswas in *Webbia* 25 : 671, 1971 & in Sharma *et al.*, Fl. India 3 : 52, 1993. *H. sampsonii* auct. non Hance in 1865; Dyer in Hook. f., Fl. Brit. India 1 : 255, 1874; Kanjilal *et al.*, Fl. Assam 1:102, 1934; Deb in Bull. Bot. Surv. India 3 : 295, 1961.

Erect herbs up to 32 cm, high. Leaves 2.5-5 × 1-1.5 cm, oblong, obtuse, connate at base, sessile, pellucid dots present on both surfaces; lateral nerves 3-4 pairs. Flowers ca 8 mm in diam., in lax terminal and axillary peduncled cymes; peduncles ca 3 cm long; sepals 5, ca 4 mm long, oblong, acute; petals 5, equalling the sepals, oblong; stamens numerous, arranged in 3 bundles at the base; ovary subglobose, styles much shorter than the ovary. Capsules, ca 5 mm long, subglobose, tipped with persistent styles and resinous vesicles.

Fl. & Fr. : April-June.

Specimens examined : Maram, Deb 2394 (CAL).

**2. *Hypericum elodeoides*** Choisy in DC., Prodr. 1 : 551, 1824; Dyer in Hook. f., Fl. Brit. India 1 : 255, 1874; Kanjilal *et al.*, Fl. Assam 1 : 101, 1934; Biswas in Sharma *et al.*, Fl. India 3 : 56, 1993. *H. nepaulense* Choisy in DC., Prodr. 1 : 557, 1824, *p.p.*: Dyer in Hook. f., Fl. Brit. India 1 : 256, 1874, Deb in Bull. Bot. Surv. India 3 : 194, 1961.



Fig. 18 : A fruiting twig of *Hypericum hookerianum* Wight & Arn.

subsp. *wardii* N. Robson in J. Jap. Bot. 52 : 286. 1972; Biswas *l.c.* 3 : 58. 1993.

Erect herbs, usually unbranched, 15–75 cm high. Leaves 1.4–3 × 0.5–1.2 cm, lanceolate, ovate-lanceolate or ovate-oblong, sessile; apex acute or sub-acute, base cordate, pellucid dots and blackish marginal glands present; veins inconspicuous beneath. Flowers 8–12 mm in diam., yellow, in terminal or sub-terminal paniculate cymes; pedicels 3–10 mm long; sepals 5–6 × 1–1.5 mm, elliptic-lanceolate, entire; petals equal to sepals, oblanceolate. Capsules ca 6 mm across, ovoid or ellipsoid, longitudinally ribbed; seeds small, black.

*Fl. & Fr.* : June–September.

*Specimens examined* : West Manipur, *Meebold* 5937; Ukhru, *Mukerjee* 2552; Chingsaw village, 1500–2300 m, Imphal valley, *Deb* 1948 & 2173 (CAL).

3. *Hypericum hookerianum* Wight & Arn., Prodr. Fl. Pen. Ind. Or. 1 : 99. 1834; Dyer in Hook. f., Fl. Brit. India 1 : 254. 1874, *p.p.*; Kanjilal *et al.*, Fl. Assam 1 : 101. 1934; Deb in Bull. Bot. Surv. India 3 : 294. 1961; Biswas in Sharma *et al.*, Fl. India 3 : 64. 1993. Fig. 18

var. *hookerianum*

Bushy shrubs up to 3 m high; bark reddish-brown. Leaves 3–7 × 3 cm, lanceolate or narrowly ovate, oblong-obtuse; apex sub-acute or bluntly apiculate; base rounded, sometimes broadly cuneate, glabrous, pale green beneath, not glaucous, margins revolute; petioles, ca 4 mm long. Flowers solitary or in threes, 3–6 cm in diam., bright yellow; sepals usually spreading, ca 8 mm long, elliptic or ovate; petals 1.5–2.5 cm, asymmetrically obovate; stamens 5-adelphous, 6–10 mm; ovary ovoid, 6–8 mm, glabrous, green. Capsules, ca 1.5 cm long, ovoid, 6–8 mm, glabrous, green.

*Fl. & Fr.* : April–October.

*Specimens examined* : Sirohee hill, *Mukerjee* 3233 (CAL); Thilaphai, *Chauhan* 95049 (ASSAM).

4. *Hypericum japonicum* Thunb. ex Murray, Syst. Veg. ed. 14 : 702. 1784; Dyer in Hook. f., Fl. Brit. India 1 : 256. 1874; Kanjilal *et al.*, Fl. Assam 1 : 102. 1934; Deb in Bull. Bot. Surv. India 3 : 294. 1961; Biswas in Sharma *et al.*, Fl. India 3 : 69. 1993. *H. laxum* (Blume) Koidzumi in Bot. Mag. Tokyo 40 : 344. 1926; Balakr., Fl. Jowai 1 : 86. 1981.

Erect, suberect or diffuse, sometimes prostrate herbs, 6–20 cm high; stems quadrangular, glabrous, rooting near-base. Leaves opposite, 4–10 × 1.5–5 mm, elliptic, elliptic-oblong or ovate, pellucid dotted, 3-veined, small, sessile, obtuse, base rounded. Flowers 6–10 mm, elliptic-obovate or linear-lanceolate, acute; petals 5, oblique, 3–4 mm, shorter than sepals.

persistent; stamens many, fused into a ring at base; ovary one celled with many ovules in parietal placentae. Capsules ca 3.5 mm in diam., ovoid; seeds pale brown.

*Fl. & Fr.* : February – November (Almost throughout the year).

*Specimens examined* : Mukhu 1000 m, G. Watt 5076; Kassom, G. Watt 5114; Marum, Deb 1947; Imphal, Deb 1057 & 1571; Bishanpur, Meebold 5433; Churachandpur, Chauhan 94676 & 95142 (ASSAM).

5. *Hypericum monanthemum* Hook. f. & Thomson ex Dyer in Hook. f., Fl. Brit. India 1 : 256, 1874; Kanjilal *et al.*, Fl. Assam 1 : 102, 1934; Deb in Bull. Bot. Surv. India 3 : 294, 1961; Biswas in Sharma *et al.*, Fl. India 3 : 69, 1993. *Aseyrum filicaule* Dyer in Hook. f., Fl. Brit. India 1 : 252, 1874. *Hypericum filicaule* (Dyer) Robson in Enum. Fl. Pl. Nepal 2 : 62, 1979.

Slender, often unbranched, erect, perennial herbs up to 25 cm high. Leaves 1 – 1.5 × 0.4 – 0.8 cm, elliptic, oblong or ovate, obtuse, sessile or subsessile, pellucid dotted and with scattered blackish marginal glands. Flowers solitary or in 2 flowered cymes, ca 2 cm across, tetramerous, yellow, sessile; sepals 3 – 5 × 2 – 3 mm, elliptic, acute; petals 6 – 9 mm, with few black dots; ovary ovoid or subglobose; styles equal or shorter than ovary. Capsules ca 6 mm diam., woody.

*Fl. & Fr.* : April – August.

*Specimens examined* : Sirohee, Mukerjee 3519 (CAL); Tuitophia, Chauhan 95026 (ASSAM).

6. *Hypericum aralam* Buch. Ham. ex D. Don in Sims, Bot. Mag. 50, t. 2375, 1823; Biswas in Sharma *et al.*, Fl. India 3:77, 1993. *H. patulum auct. non* Thunb. ex Murray : Dyer in Hook. f., Fl. Brit. India 1:254, 1874; Kanjilal *et al.*, Fl. Assam 1:101, 1934; Deb in Bull. Bot. Surv. India 3:295, 1961.

Erect undershrubs up to 3 m tall, with many spreading branchlets; stems reddish, compressed, 4 winged or ribbed. Leaves 1.5 – 3.5 × 0.2 – 1.2 cm, ovate lanceolate or oblong lanceolate, apex acute or obtuse, base cuneate, narrowed, sessile, entire, slightly recurved, glaucous white beneath; lateral nerves 4 – 6 pairs. Flowers 1.5 – 3 cm across, bright yellow, in 3 – 5 flowered, terminal or upper axillary cymes; sepals 4 – 7 mm long, obovate or oblong, obtuse; petals ca 1 cm long, ovate or obovate; stamens 5 adelphous, much shorter than petals; ovary 5 celled, subglobose. Capsules, ca 1 cm across, subglobose, angular or lobed, brown red.

*Fl. & Fr.* : May – September.

*Specimens examined* : Khongui, G. Watt 6328; Kuprou, 2650 m, Meebold 6579; Mukerjee 2534 (CAL).

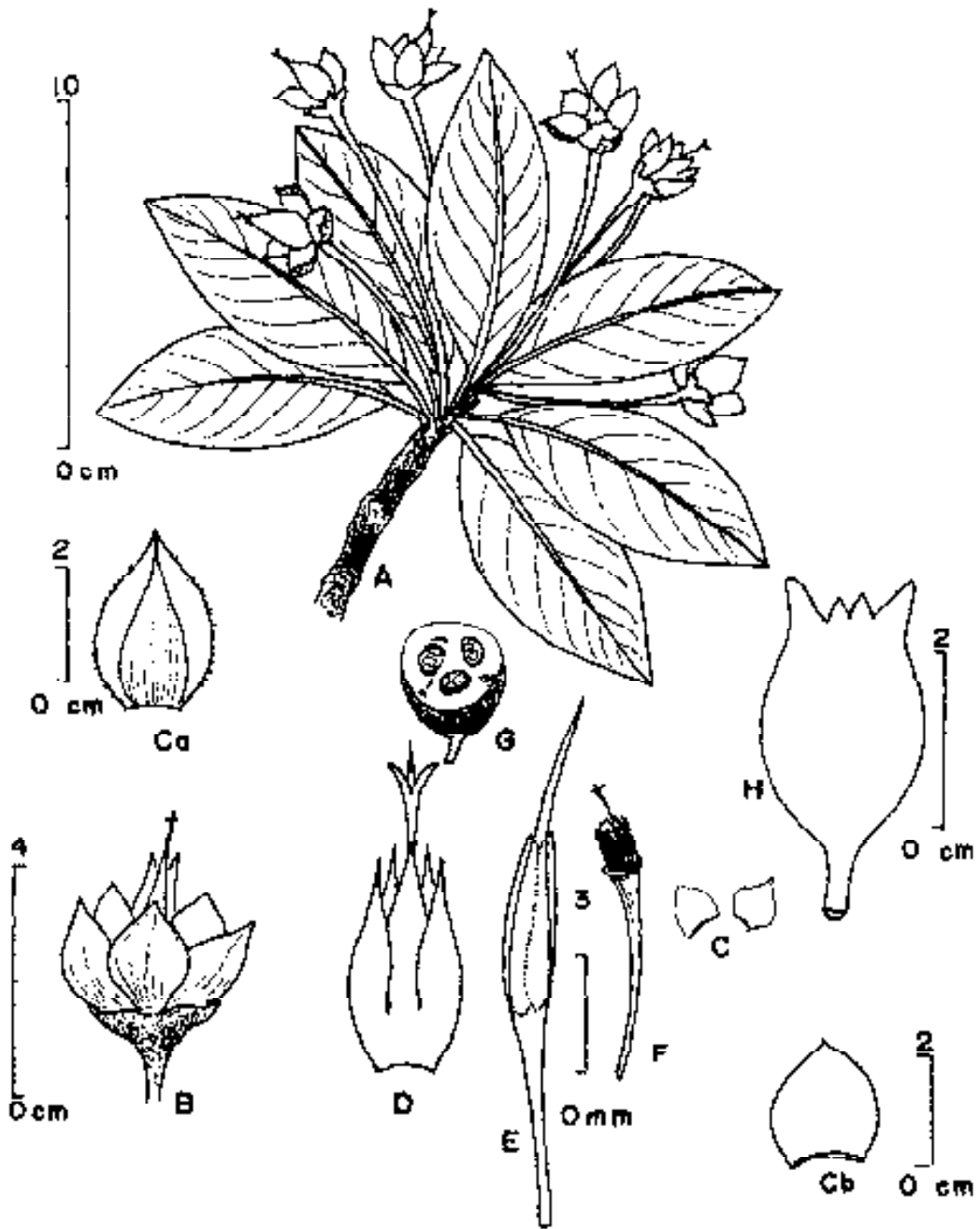


Fig. 19 : *Anneslea fragrans* Wallich

## 26. THEACEAE

D. Don, Prodr. Fl. Nep. 224. 1825.

(A. S. Chauhan)

- 1a. Flowers in sub-terminal  
umbellate corymbs; ovary inferior .....1. *Annestea*
- b. Flowers axillary or in the axils  
of fallen leaves, solitary or in fascicles; ovary superior.....2
- 2a. Flowers unisexual; fruits sub-  
globose; berries ca 5 mm in diam.....3. *Eurya*
- b. Flowers bisexual; fruits ovoid-  
obong; capsules ca 2 cm in diam.....3
- 3a. Capsules woody, 5-valved; seeds  
compressed, bearing a semicircular wing.....4. *Schima*
- b. Capsules more or less leathery, 3-valved;  
seeds sub-globose, unwinged.....2. *Camellia*

1. *Annestea* Wallich, nom. cons.

*Annestea fragrans* Wallich, Pl. Asiat. Rar. 1 : 5. t. 5. 1829; Dyer in Hook. f., Fl. Brit. India 1 : 280, 1874; Deb in Bull. Bot. Surv. India 3 : 292, 1961; Chauhan & Paul in Sharma *et al.*, Fl. India 3 : 172, 1993. Fig. 19

Trees ca 15 m tall; branchlets grey, terete, with lenticels. Leaves crowded at apices of branchlets, exstipulate, 9-16 × 2-5 cm, lanceolate or oblanceolate, base acute, obtuse or acute apex, entire, coriaceous, pale beneath, small glands present on dorsal surface of leaves; petioles 1.5-2.5 cm long, winged at base. Flowers terminal and sub-umbellate in the axils of fallen leaves; erect or nodding, white, fragrant; pedicels 2-5 cm long; calyx deeply 5-lobed, coriaceous; corolla 5-lobed, gamopetalous, white or yellowish; stamens 30 or more with long cuspidate anthers. Berries ca 2.5 cm in diam., globose, with minute tubercles; seeds deep red.

Fl. & Fr. : January - May.

*Specimens examined* : Sirohee, Mukerjee 3802; Thangmaiband, Deb 158 (CAL).

2. *Camellia* L.

- 1a. Pedicels less than 2 mm long;  
flowers erect; sepals deciduous.....1. *C. kissi*
- b. Pedicels more than 2 mm long;  
flowers drooping; sepals persistent.....2. *C. sinensis*

1. *Camellia kissi* Wallich in Pl. Asiat. Res. 13 : 429, 1820; Chauhan & Paul in Sharma *et al.*, Fl. India 3 : 154, 1993. *C. drupifera* auct. non Lour.

1970; Dyer in Hook. f., Fl. Brit. India 1 : 293. 1874; Kanjilal *et al.*, Fl. Assam 1 : 123, 1934; Deb in Bull. Bot. Surv. India 3 : 292. 1961.

var. *kisii*

Shrubs or small trees: bark brown, grey or reddish-brown. Leaves 4.7 × 1.5–2.5 cm, elliptic-oblong to oblong-lanceolate, cuneate at base, acute to acuminate, crenate, narrowly revolute, glabrous; lateral nerves 7–10 pairs, obscure; petioles 2–5 mm long. Flowers ca 2 cm across, white, axillary or terminal, solitary or 1–3 together; sepals obovate, sub-orbicular, silky outside; petals 1–1.5 cm long. Capsules glabrous, ca 2 mm long, pyriform; seeds solitary in each cell, ca 1.5 cm long, sub-globose.

Fl. & Fr. : September–March.

*Specimens examined* : Khongui, G. Watt 5805; Ukhrul, Mukerjee 3495 (CAL); Nungba, Malick 1165 & 1272 (BSIS).

2. *Camellia sinensis* (L.) O. Kuntze in Act. Hort. Petrop. 10 : 195, 1887; Deb in Bull. Bot. Surv. India 3 : 292. 1961; Chauhan & Paul in Sharma *et al.*, Fl. India 3 : 159. 1993. *Thea sinensis* L., Sp. Pl. 515. 1753. *Camellia theifera* Griffith, Notul. 4 : 558, 1854; Dyer in Hook. f., Fl. Brit. India 1 : 292, 1874; Kanjilal *et al.*, Fl. Assam 1 : 122. 1934.

var. *sinensis*

Mani.: *cha*

Small trees or shrubs, up to 4 m tall. Leaves 5–16 × 2–6 cm, oblong-elliptic to obovate, cuneate at base, lateral nerves 8–12 pairs. Flowers 3–3.2 cm across, white, axillary, solitary or few together, cernuous. Capsule ovoid to sub-globose, 1.7–2.3 cm, 3-lobed, leathery; seeds solitary in each locule, glabrous, faceted, ca 1.5 cm, brown.

Fl. & Fr. : December–September.

*Specimens examined* : Jampui, Deb 1737; East Manipur, Inam 3107 (CAL); Saikot village, Chauhan 94968 (ASSAM).

3. *Eurya* Thunb.

- 1a. Terminal leafbuds and young branchlets glabrous; fruits white or yellowish-white; anthers shorter than filaments; styles ca 2 mm long ..... 3. *E. nitida*
- b. Terminal leaf buds and young branchlets pubescent; flowers yellow; branches not winged ..... 2
- 2a. Leaves elliptic-lanceolate, acuminate, base cuneate, finally serrate; pedicels 2-bracteolate; anthers not chambered; ovary glabrous ..... 1. *E. acuminata*
- b. Leaves broadly lanceolate, base rounded or cuneate, margins serrate only in upper half; pedicels 3-bracteolate; anthers chambered; ovary glabrous or with few hairs ..... 2. *E. cerasifolia*

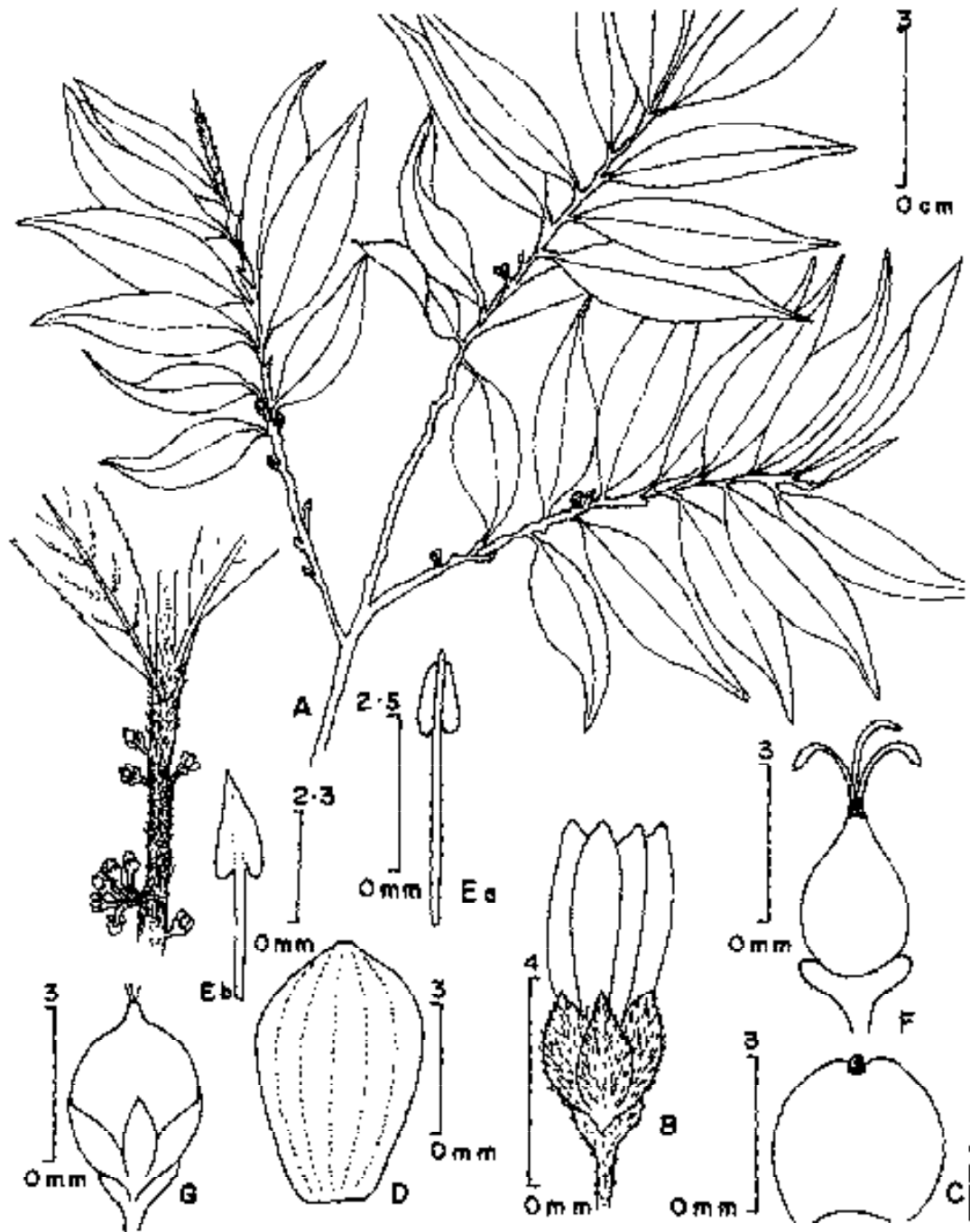


Fig. 20: *Eurya acuminata* DC.



1. *Eurya acuminata* DC., Mem. Syst. Phys. Geneve 1 : 418, 1822; Dyer in Hook. f., Fl. Brit. India 1 : 285, 1874; Kanjilal *et al.*, Fl. Assam 1 : 125, 1934; Deb in Bull. Bot. Surv. India 3 : 292, 1961; Chauhan & Paul in Sharma *et al.*, Fl. India 3 : 178, 1993. Fig. 20

Trees or tall shrubs ca 12 m high; young branches pubescent with spreading hairs. Leaves 3.9 × 1.5–3.5 cm, elliptic-lanceolate, acuminate or rarely acute, base cuncate, margins finally serrate, glabrous or sparsely pubescent beneath; petioles 2–3 mm; hairy. Flowers 1–5 in axillary fascicles, ca 4 mm across, white or yellowish-white, fragrant; sepals broadly elliptic, 2–3 mm, glabrous; pubescent outside; petals obovate, ca 4–4.5 × 3 mm, yellow; male flowers : stamens ca 15, anther cells not chambered; female flowers : ovary sub-globose, ca 1.5 mm in diam., glabrous; style base 0.5–1 mm, branches 1.5–2 mm. Fruits ca 5 mm in diam., bluish-black; seeds trigonous, shiny brown.

Fl. & Fr. : July–December.

*Specimens examined* : Ukhrul, Mukerjee 2467; Imphal, Deb 1912 (CAL); Litan, Chauhan 94615; Singhat, Chauhan 95055 (ASSAM).

2. *Eurya cerasifolia* (D. Don) Kobuski in Ann. Missouri Bot. Gard. 25 : 326, 1938; Deb in Bull. Bot. Surv. India 3 : 292, 1961; Chauhan & Paul in Sharma *et al.*, Fl. India 3 : 182, 1993. *Diospyrus cerasifolia* D. Don, Prodr. Fl. Nep. 144, 1825. *Eurya symplocina* Blume, Mus. Bot. Lugd. Bat. 2 : 114, 1850; Dyer in Hook. f., Fl. Brit. India 1 : 184, 1874; Kanjilal *et al.*, Fl. Assam 1 : 125, 1934. Fig. 21

Trees up to 7 m tall; buds and young branches appressed-pubescent. Leaves elliptic-lanceolate, 6–12 × 2–4 cm, acuminate, base rounded or cuncate, margins entire or serrate in the upper half, brown when dry, usually blotched with green, lateral veins 20 or more on each half. Flowers white or yellowish-white; sepals broadly elliptic, ca 2.5 × 2 mm, obtuse, appressed-pubescent externally; petals light yellow, oblong-elliptic, 4 × 2–2.5 mm; male flowers : stamens 15, anther cells divided into 4–6 rounded chambers; female flowers : ovary pubescent or glabrous; style base 2–2.5 mm, branches 1.5–3 mm. Fruits blue-black, broadly ellipsoid or sub-globose, 5 × 4–5 mm, glabrous or with a few hairs.

Fl. & Fr. : November–June.

*Specimens examined* : Koupru, Meebold 6457 (CAL).

3. *Eurya nitida* Korth. in Terminck, Verh. Nat. Gesch. Ned. Bezitt. Bot. 4 : 115, t. 17, 1841; Chauhan & Paul in Sharma *et al.*, Fl. India 3 : 184, 1993. *E. japonica* auct. non Thunb. : Dyer in Hook. f., Fl. Brit. India 1 : 284, 1874; Kanjilal *et al.*, Fl. Assam 1 : 124, 1934; Deb in Bull. Bot. Surv. India 3 : 292, 1961. Fig. 22

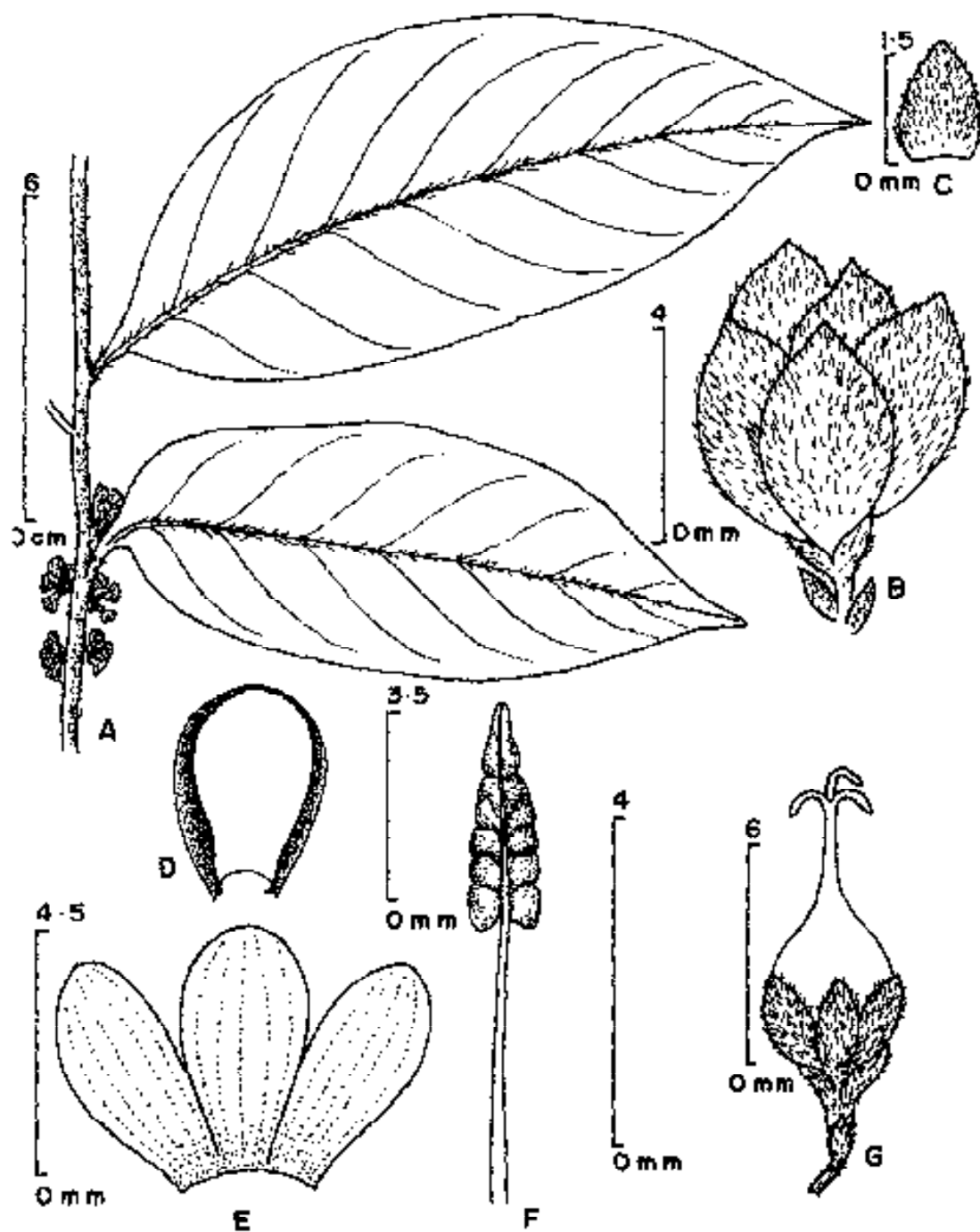


Fig. 21 : *Eurya cerasifolia* (D. Don) Kobuski

Shrubs or small spreading trees; bark brown. Leaves  $6 \times 0.5 - 2$  cm, oblanceolate, oblong-elliptic, acute, base cuneate, glabrous, crenate, often narrowly revolute, midrib and lateral nerves depressed above. Flowers 2 or more in the axils of leaves, white or yellow-white, ca 2.5 cm across, all parts glabrous; bracteoles 2 at the base of calyx; sepals and petals obovate, orbicular; stamens yellow, free; ovary ovoid; styles united and persistent in fruits. Fruits 3-5 mm across, globose, purple.

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

*Specimens examined* : Ukhrul, Mukerjee 3723; Koupru, Deb 2316 (CAL).

#### 4. *Schima* Reinw. ex Blume

*Schima Wallichii* (DC.) Korthals in Temminck, verh. Nat. Gesch. Ned. Bezitt. Bot. 5: 143. 1842; Dyer in Hook. f., Fl. Brit. India 1:289.1874; Chauhan & Paul in Sharma *et al.*, Fl. India 3:168.1993, *Gordonia wallichii* DC., Prodr. 1:528.1824. *G. chilaunea* Buch.-Ham. ex D. Don, Prodr. 225. 1825.

Mani.: *Usoi*

Trees 25-30 m high, branches glabrous. Leaves 5-20 x 2-7 cm, oblong to lanceolate-elliptic-oblong, ovate or obovate, cuneate to rounded at base, acute to shortly acuminate at apex, entire or crenate-serrate, glabrous above, appressed simple hairy beneath. Flowers 3-5 cm across, white, fragrant; sepals 3-4 x 3 mm, orbicular, glabrous outside, hairy inside; petals 1-1.5 x 1 cm, obovate; stamens numerous. Capsules 0.5-2 cm, globose, glabrescent; seeds glabrous.

- 1a. Leaves entire to undulate; lateral nerves mostly forked;  
flowers up to 5 cm across..... 2. *var. wallichii*
- b. Leaves strongly crenate; lateral nerves scarcely forked;  
flowers up to 6 cm across..... 1. *var. khasiana*

1. *var. khasiana* (Dyer) Bloom. in Reinwardtia 2: 164. 1952; Chauhan & Paul in Sharma *et al.*, Fl. India 3: 168. 1993, *Schima khasiana* Dyer in Hook. f., Fl. Brit. India 1: 289. 1874; Kanjilal *et al.*, Fl. Assam 1: 120. 1934; Deb in Bull. Bot. Surv. India 3: 292. 1961.

Medium sized trees, up to 20 m high; crown oblong-ovate; bark reddish-brown to dark brown, nearly smooth; branch tips tomentose, branchlets lenticellate, glabrate. Leaves 9-20 x 4-7 cm, broadly lanceolate, elliptic-oblong, oblong-lanceolate, acuminate, base cuneate, acute, glabrous, coriaceous, sharply serrate. Flowers axillary, solitary, white, 5-6 cm across, sepals rounded, silky tomentose outside; stamens numerous, yellow; filaments yellow, 1-1.5 cm long; ovary hairy at base. Capsules 1-1.5 x 2-2.5 cm, depressed globose.

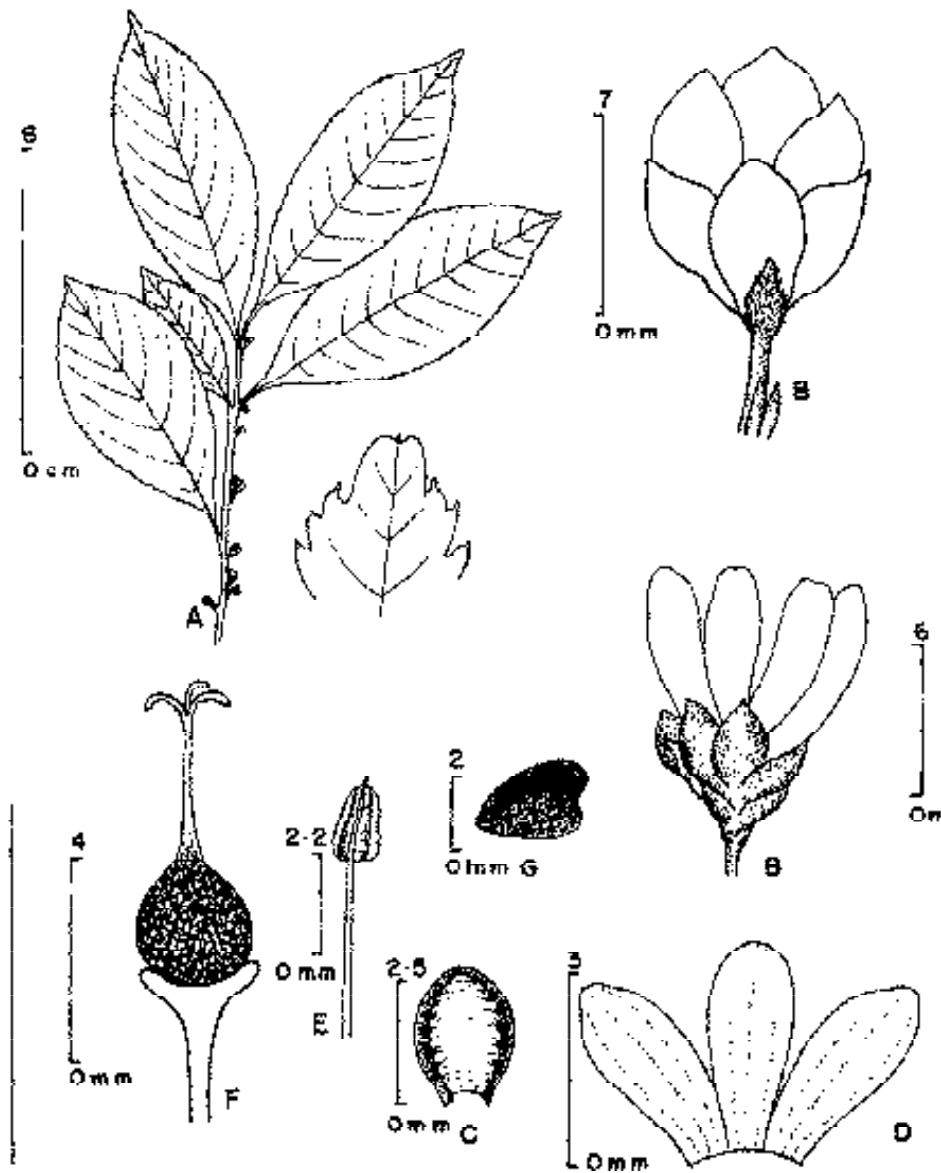


Fig. 22 : *Eurya nitida* Kobuski

*Fl. & Fr.* : July - March.

*Specimens examined* : Ukhrul, *G. Watt* 7221; Koupru, *Deb* 1391 (CAL).

2. *var. wallichii* Dyer in Hook. f., *Fl. Brit. India* 1:289, 1874; Kanjilal *et al.*, *Fl. Assam* 1:119, 1934; Deb in *Bull. Bot. Surv. India* 3:292, 1961. *Gordonia integrifolia* Roxb., *Fl. Ind.* 2:572, 1832. *Schinus mollis* Dyer l.c. 228.

Tall trees, up to 3 m; bark reddish brown, warty or blotched; crown ovoid, dense, young tips silky tomentose. Leaves 7-15 × 2.5-5 cm, elliptic-lanceolate, oblong-elliptic, oblanceolate, acute, base cuneate, margin entire, deciduously bulbous hairy beneath, glabrous above. Flowers axillary, solitary, rarely two, white, 3-4 cm across; sepals rounded, ciliate, glabrescent; petals obovate, ovoid, glabrescent; stamens yellow, nearly free, adnate to base of corolla; ovary hairy at base. Fruits grey-pilose, ca 2 cm across, depressed globose.

*Fl. & Fr.* : February - December.

*Specimens examined* : Khonguivally, *G. Watt* 6789 (BSIS); Kongpoki, *Deb* 945 (CAL); Kongpokpi, *Malick* 1366; Celjang, *Malick* 1425; Pachao, *Malick* 738 (BSIS); Litan, *Chauhan* 94620, 94810; Tuilaphai, *Chauhan* 95044 (ASSAM).

## 27. ACTINDIACEAE

Hutch., *Fam. Fl. Pl.* 1: 177, 1926.

(*A. S. Chauhan*)

### *Actinidia* Lindley

*Actinidia callosa* Lindley, *Nat. Syst. ed.* 2, 439, 1836; Dyer in Hook. f., *Fl. Brit. India* 1: 286, 1874; Kanjilal *et al.*, *Fl. Assam* 1: 130, 1934; Deb in *Bull. Bot. Surv. India* 3: 293, 1961; Paul in Sharma *et al.*, *Fl. India* 3: 195, 1993.

Shrubs or climbers, 1-3 m, bark brown, corky. Leaves 3-15 × 2.5-7.5 cm, ovate-oblong or obovate, acuminate, margins serrulate, base cuneate, glabrous above, tomentose beneath; petioles 2-3 cm long. Flowers in lax, axillary, umbellate cymes of 2-6, ca 10 cm across, white; sepals 5 connate at base, oblong, glabrous; petals 5, obovate; stamens many, adnate to the petals, sparingly hairy; styles many, clavate, deeply 5-fid, segments linear. Berries 1-1.6 cm across, obovoid to ellipsoid, purple, sparsely warted; seeds ovoid, brownish-black.

#### *var. callosa*

*Fl. & Fr.* : June - November.

*Specimens examined* : Kalanga, *G. Watt* 6919; Nungba, *Meebold* 5612 (CAL).

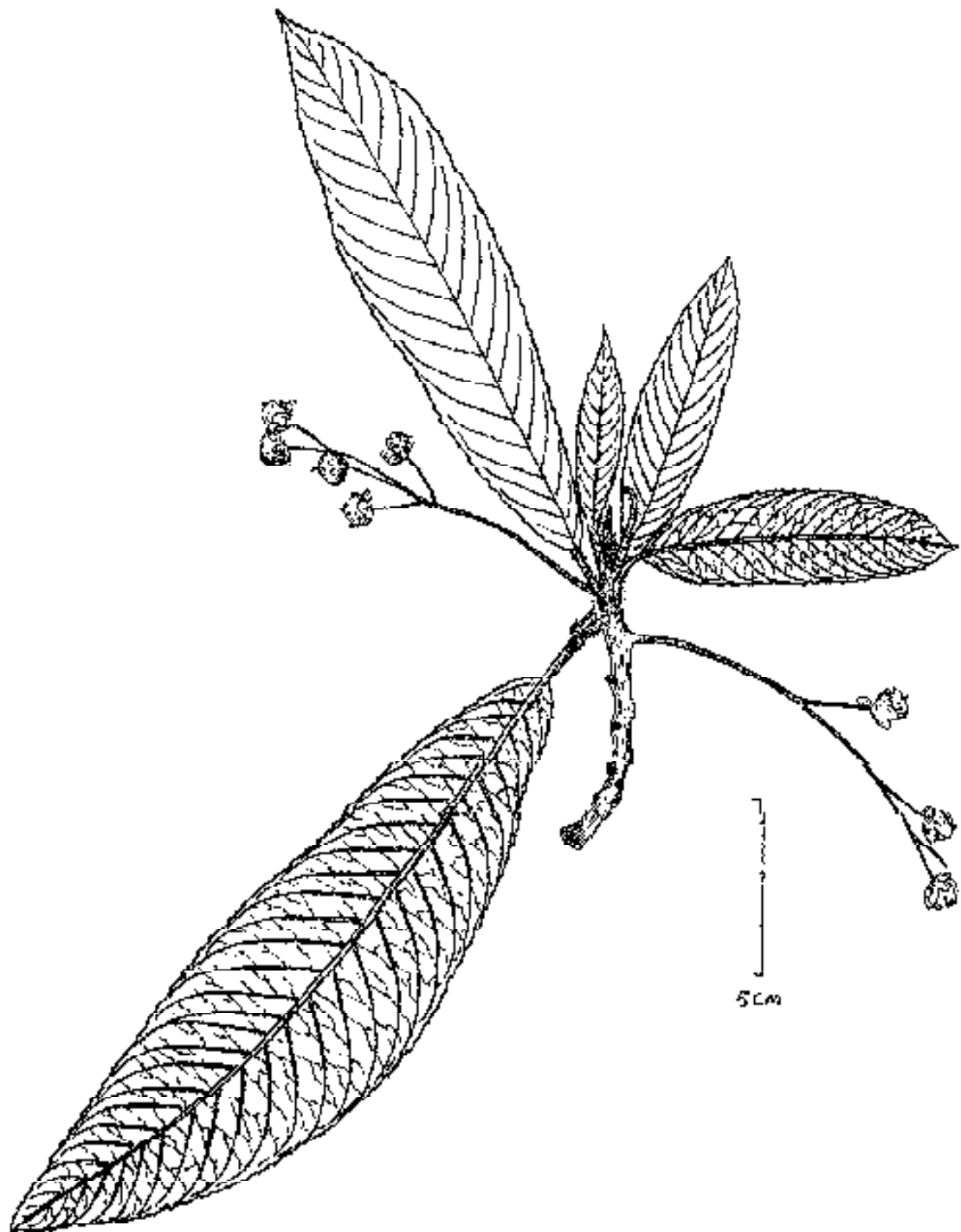


Fig. 23 : A twig of *Saurauia nepaulensis* DC. in flowering

## 28. SAURAUACEAE

J. G. Agardh. Theoria Syst. Pl. Fam. Phan. 110. 1858 ("Saurajae").

( A. S. Chauhan )

1. *Saurauia* Willd.

- 1a. Flowers in more than 12 cm long panicles.....1 *S. napaulensis*  
 b. Flowers in less than 10 cm long panicles.....2  
 2a. Mature leaves glabrous beneath.....2 *S. roxburghii*  
 b. Mature leaves densely rusty puberulous beneath.....3  
 3a. Young stems and branches covered with dense stiff  
 brownish or black hairs; leaves narrowly lanceolate or  
 elliptic lanceolate .....1. *S. macrotricha*  
 b. Young stems and branches covered with rusty  
 tomentum and scattered hairs;  
 leaves elliptic obovate or oblanceolate..... 3. *S. punduana*

1. *Saurauia macrotricha* Kurz ex Dyer in Hook. f., Fl. Brit. India 1: 287. 1872; Paul in Sharma *et al.*, Fl. India 3: 201. 1993; Sinha, Med. Pl. Manipur 165. 1996.

Mani.: *Tripuri*

Tall shrubs or small trees; young stems and petioles hirsute with brown and black, stiff, setose hairs, ultimately glabrescent. Leaves 10–25 x 3–6 cm, linear lanceolate to elliptic lanceolate, acute to rounded at base, acuminate at apex. Flowers in axillary cymes, red; sepals elliptic or broadly ovate; petals ovate, slightly exceeding the sepals. Berries globose.

*Fl. & Fr.*: April–September.

*Specimens examined*: Not seen.

2. *Saurauia napaulensis* DC., Mem. Ternstr. 29. 1822 & in Mem. Soc. Phys. Geneve 1: 421. 1822; Dyer in Hook. f., Fl. Brit. India 1: 286. 1874; Kanjilal *et al.*, Fl. Assam 1: 127. 1934; Deb in Bull. Bot. Surv. India 3: 292. 1961; Paul in Sharma *et al.*, Fl. India 3: 201. 1993. Fig. 23

Mani.: *Singkrau & Singkrang*.

Trees or large shrubs, up to 10 m tall. Leaves 15–30 x 7–15 cm, oblong elliptic to oblong lanceolate or oblong elliptic, shortly acuminate, rounded at base, crenate serrate, glabrous above, tomentose beneath; 1.5–4 cm. Panicles up to 3 cm long. Flowers pink, 1.5–1.8 cm across; sepals *ca* 0.5 cm long, ovate, rounded at tips; petals with recurved tips, margins imbricate; ovary glabrous; styles 5. Berries 0.8–1 cm across, supported by the persistent sepals; seeds reddish brown.

*Fl. & Fr.*: December–June.

*Specimens examined*: Bishenpur, *Meebold* 5167, 6424; *Kassame* 3830

m, *G. Watt* 5133; *s. loc.* *C. B. Clarke* 41288, Chingmyrong, *Deb* 572 (CAL); Ukhrul, *Chauhan* 94891 (ASSAM).

3. *Saurauia punduana* Wallich, *Pl. Asiat. Rat.* 2 : 40. 1831; Dyer in Hook. f., *Fl. Brit. India* 1 : 287. 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 129. 1934; Deb in *Bull. Bot. Surv. India* 3 : 292. 1961; Paul in *Sharma et al.*, *Fl. India* 3 : 202. 1993.

Small trees, up to 8 m tall; innovations brown tomentose and densely scaly. Leaves 15 - 30 × 7 - 15 cm, elliptic, obovate, oblanceolate, acuminate, base rounded, truncate, serrate, glabrous above, nearly tomentose beneath; petioles up to 5 cm long. Cymes up to 8 cm long, fascicles in axils of leaves. Flowers white, changing to pink; sepals glabrous; petals rounded, reflexed at tip; styles adnate at base. Berries globose, shining white.

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

*Specimens examined* : East Manipur 1000 - 2000 m, *G. Watt* 6801, 6911; Ukhrul, *Mukerjee* 2569; Imphal, *Deb* 2273 (CAL); Nungba, *Malick* 1163 (BSIS); Litan, *Chauhan* 94614 & 94795 (ASSAM).

4. *Saurauia roxburghii* Wallich, *Pl. Asiat. Rat.* 2 : 40. 1831; Dyer in Hook. f., *Fl. Brit. India* 1 : 287. 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 128. 1934; Deb in *Bull. Bot. Surv. India* 3 : 292. 1961; Paul in *Sharma et al.*, *Fl. India* 3 : 203. 1993.

*Mani.* : *Shingkhran & Singkrang.*

Small trees, up to 10 m tall; bark reddish grey; crown lax, young parts scurfy tomentose, scaly. Leaves 10 - 25 × 2 - 9 cm, elliptic - oblong or oblanceolate, rounded at base, acute to short acuminate, shallowly crenate at margins, glabrous above, tomentose beneath. Inflorescence 2.5 - 4 cm long. Flowers ca 1 cm across, pink; sepals ovate - lanceolate, acute, glabrous; petals pale pink, recurved at tip; ovary glabrous. Berries ca 0.5 cm across, subglobose, white.

*Fl. & Fr.* : March - October.

*Specimens examined* : East Manipur, *G. Watt* 6911; Limatak, *Meehold* 6176; Imphal valley, *C. B. Clarke* 7012 (CAL).

## 29. DIPTEROCARPACEAE

Blume, *Bijdr.* 1 : 222. 1825 ( "Dipterocarpeae").

( *A. S. Chauhan* )

- a. Small trees less than 10 m high ;  
 fruits with subequal calyx lobes, not winged;  
 stipules small fugacious.....3. *Vatica*
- b. Tall trees: fruits with small and large



wings; stipules large, persistent or caducous 2.

- 2a. Leaves oblong ovate, acuminate:  
stipules ca 1.5 cm long; not amplexicaul  
flowers small, in panicles ..... 2. *Shorea*
- b. Leaves cordate, acute; stipules ..... ca 8 cm long,  
amplexicaul ; flowers large in racemes ..... 1. *Dipterocarpus*

1. *Dipterocarpus* Gaertn. f.

- 1a. Calyx tube in fruit towards the top produce  
into 5 compressed knobs alternately with the  
calyx-lobe ..... 1. *D. tuberculatus*
- b. Calyx-tube in fruit perfectly terete ..... 2. *D. turbinatus*

1. *Dipterocarpus tuberculatus* Roxb., Fl. India 2: 614. 1832; Dyer in Hook. f., Fl. Brit. India 1: 297. 1872; Kurz, For. Fl. Burma 1: 113-114. 1877. *D. cordatus* Wallich Cat. 956. nom. nud. *D. grandifolius* Taysn ex Miq., Ann. Mus. Bot. Lyud. Bat. 1: 214. 1863; Dyer in Hook. f., l.c. 1: 297. 1872.

Mani.: *Yangou*.

Tall trees ca 30 m tall; branches short, thick, crooked, horizontally spreading, glabrous, young branches pubescent; bark dark - grey. Leaves 22-40 x 12-32 cm, broadly ovate or cordate ovate, cordate or cordate at base, glossy above, downy beneath; lateral nerves 15 pairs on either side; petioles ca 15 cm long, cordate at base; stipules ca 10 cm long, densely greyish tomentose. Flowers large, rose coloured or purplish, in the axils of new leaves at apices of branches; calyx pruinose or greyish velvety, with semidecurrent wings, between each pair of calyx-lobes; petals ca 3.2 cm long, tomentose outside. Fruiting calyx tube ca 3 cm in diam., obovate, produced into 5 knobs. 2 wing like; nut tomentose.

Fl. & Fr.: April - July.

Specimens examined: Chauhan K (Rare species).

2. *Dipterocarpus turbinatus* Gaertn. f., Suppl. Carp. 3:51, t. 188, f. 1. 1805; Dyer in Hook. f., Fl. Brit. India 1: 295. 1874, p.p.: Deb in Bull. Bot. Surv. India 3:293. 1961; Janardhanan in Sharma et al., Fl. India 3: 219. 1993.

Mani. : *Khangra*

Tall trees with compressed young branches, glabrous or canescent. Leaves 12-35 x 12-20 cm., cordate, acute, margins sinuate crenate, undulate; lateral nerves 15 on each side; petioles ca 10 cm; stipules ca 8

cm. Flowers large, white or yellow with pink tinge, 12-15 cm. long, racemes once or twice branched, 4-7 flowered; calyx in fruits 5-winged, linear, obtuse, 3-nerved. Fruits ca 3.5 cm long, 5-winged nut.

*Fl. & Fr.*: May - November.

*Specimens examined* : Myanmar border, Deb s.n. (CAL).

## 2. *Shorea* Roxb. ex Gaertn. f.

*Shorea robusta* Roxb. ex Gaertn. f., *Suppl. Carp.* 3 : 48, t. 186, 1805; Dyer in Hook. f., *Fl. Brit. India* 1:306, 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 135, 1934; Deb in *Bull. Bot. Surv. India* 3 : 293, 1961; Janardhanan in Sharma *et al.*, *Fl. India* 3 : 237, 1993.

Large trees, deciduous, with narrow conical crowns when young; bark brown with prominent longitudinal fissures. Leaves 10-30 × 5-18 cm., ovate-oblong, acuminate, coriaceous, glabrous, nerves beneath puberulous, base cordate; lateral nerves 12-15 on each side; petioles terete, up to 2 cm long; stipules caducous, 1-1.5 cm long, oblong, falcate, tomentose. Flowers small, subsessile, in axillary and terminal lax panicles, 1-2 cm long; calyx tube short, adnate to the ovary, densely tomentose outside; petals creamy white. Fruits 1.5-2 cm in diam., beaked, enclosed by the persistent wing-like calyx with 3 long and 2 small wings.

*Fl & Fr.* : March - July.

*Specimens examined* : Imphal Valley, Deb s.n. (CAL).

## 3. *Vatica* L.

*Vatica lanceaefolia* (Roxb.) Blume, *Mus. Bot. Lugd. Bat.* 2:31, t. 7, 1852; Dyer in Hook. f., *Fl. Brit. India* 1:302, 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 137, 1934; Deb in *Bull. Bot. Surv. India* 3 : 293, 1961; Janardhanan in Sharma *et al.*, *Fl. India* 3 : 250, 1993.

*Mani.* : Mekruk.

Trees, up to 10 m tall; bark dark brown, smooth, peeling off in thin flakes; crown compact, ovate with sub-erect branches. Leaves 13-22 × 3-8 cm., lanceolate, lanceolate-elliptic, acuminate, narrow at base, entire, glabrous, above, glaucous beneath. Flowers yellowish-white, fragrant, up to 40 cm long, glabrous; calyx tube short, lobes 3-6 mm long, ovate, sub-valvate, acrescent; petals white, caducous. Fruits ca 1.5 cm. in diam., ovoid, brown velvety.

*Fl. & Fr.* : May - September.

*Specimens examined* : West Manipur, Keith s. n. (CAL).

## 30. MALVACEAE

A. L. de Juss., Gen. Pl. 271. 1789.

(A. S. Chauhun)

- 1a. Style branched ..... 2  
 b. Style unbranched ..... 12  
 2a. Trees; flowers polygamous ..... 6. *Kydia*  
 b. Herbs or shrubs; flowers bisexual ..... 3  
 3a. Styler branches as many as carpels ..... 4  
 b. Styler branches twice as many as carpels ..... 6  
 4a. Flowers with epicalyx ..... 7. *Malvastrum*  
 b. Flowers without epicalyx ..... 5  
 5a. Ovule 1 in each locule ..... 11. *Sida*  
 b. Ovules 2 or more in each locule ..... 2. *Abutilon*  
 6a. Leaves always with a nectary on the midrib beneath;  
 mericarps usually with glochidia,  
 rarely smooth; fruits neither berry nor fleshy ..... 13. *Urena*  
 b. Leaves without nectary on the midrib beneath;  
 mericarps nonglochidiate; fruits capsular ..... 7  
 7a. Epicalyx segments winged during fruiting;  
 style 2-branched at apex; seeds smooth ..... 9. *Navartophyton*  
 b. Epicalyx segments not winged; styles divided  
 or undivided; seeds smooth or ribbed ..... 8  
 8a. Flowers sub-sessile; staminal column  
 5-angled; fruits with mericarps ..... 3 *Alcea*  
 b. Flowers pedicellate; staminal column  
 not angled; fruits berry or capsules ..... 9  
 9a. Petals auriculate; fruits berries like, fleshy ..... 8. *Malvaviscus*  
 b. Petals not auriculate; fruits neither berry like nor fleshy ..... 10  
 10a. Fruits schizocarp, indehiscent;  
 seeds 1 in each mericarps ..... 10. *Pavonia*  
 b. Fruits capsules dehiscent;  
 seeds more than 3 in each locule ..... 11  
 11a. Calyx regularly 5-toothed, not  
 spatheous, persistent ..... 5. *Hibiscus*  
 b. Calyx irregularly 2 - 3 lobed,  
 spatheous, deciduous ..... 1 *Abelmoschus*  
 12a. Epicalyx segments 3, large, cordate, persistent;  
 seeds cottony ..... 4. *Gossypium*.  
 b. Epicalyx segments 3 - 8, small,  
 linear-lanceolate, caducous; seeds smooth ..... 12. *Thespesia*

1. *Abelmoschus* Medicus

- 1a. Epicalyx segments more than 10;  
capsules equal or shorter than the epicalyx ..... 1. *A. crinitus*
- b. Epicalyx segments less than 10;  
capsules longer than the epicalyx ..... 2.
- 2a. Epicalyx segments ovate; capsules  
pentagonous; seeds stellate hairy ..... 3. *A. manihot*
- b. Epicalyx segments linear to lanceolate;  
capsule fusiform; seeds glabrous ..... 2. *A. esculentus*

1. *Abelmoschus crinitus* Wallich, Pl. Asiat. Rar. 1 : 389, t. 44, 1830; Paul in Sharma *et al.*, Fl. India 3 : 302, 1993. *Hibiscus crinitus* (Wallich) G. Don, Gen Syst. 1 : 380, 1832. *H. cancellata* Roxb., Fl. Ind. ed. Carey 3 : 201, 1832 non L. f., 1781; Masters in Hook. f., Fl. Brit. India 1 : 342, 1874; Deb in Bull. Bot. Surv. India 3 : 287, 1961. *Abelmoschus cancellatus* (Roxb.) Voigt., Hort. Sub. Calcutta 119, 1845.

Annual herbs. ca 1 m tall; stems and branches hirsute with bristly hairs. Leaves 6 - 12 × 4 - 10 cm, cordate, 5 - 7 palmately lobed to palmately partite, acute or acuminate, coarsely dentate-serrate, upper sagittate, petiole ca 15 cm long, stipule linear, 1 - 3 cm long. Flowers in terminal racemes, 10 - 20 cm diam., yellow with purple centre; epicalyx segments 10 - 15, 2 - 5 cm long; calyx 2 - 5 cm long. Capsules 2 - 4 × 2 - 3 cm, ovoid, furrowed; seeds 3 - 5 mm, rusty tomentose, rarely glabrous.

Fl. & Fr. : July - December.

Specimens examined : Nantol, Deb 443 (CAL); Nungba, Malick 1284; Kangranohar, Malick 1029 (BSIS).

2. *Abelmoschus esculentus* (L.) Moench., Meth. Pl. 617, 1794; Deb in Bull. Bot. Surv. India 3 : 287, 1961; Paul in Sharma *et al.*, Fl. India 3 : 385, 1993. *Hibiscus esculentus* L., Sp. Pl. 696, 1753; Masters in Hook. f., Fl. Brit. India 1 : 343, 1874.

Mani.: *Bhelendri*

Herbs ca 2 m tall, stem and branches scattered with short stiff simple hairs, often tinged red, glabrescent. Leaves 4 - 5 cm, lamina variously dissected, cordate at base, angular to 5 - 7 lobed, apex of lobes acute or sub-acuminate, coarsely serrate to crenate, 5 - 7 nerved at base, both surfaces short stiffly haired; petiole 4 - 30 cm long, stipules ca 1 cm, filiform. Flowers axillary, solitary, yellow or whitish yellow with dark purple centre; epicalyx segments 7 - 10, linear to lanceolate; 0.5 - 1 cm long; calyx 2 - 3 cm long, minutely 5-toothed at apex, adnate to the corolla. Capsules 7 - 20 (-25) cm long, fusiform; seeds small, minutely warty, glabrous.

Fl. & Fr. : Throughout the year.

Specimens examined : Nongmaijong, Deb 2525 & 2691 (CAL).

Cultivated in tropical regions of the world fruits used for vegetable.

3. *Abelmoschus manihot* (L.) Medikus, subsp. *tetraphyllus* (Roxb. ex Hornem.) Borss. in *Blumea* 14 : 98, 1966; Paul in Sharma *et al.*, *Fl. India* 3 : 307, 1993. *Hibiscus manihot* L., *Sp. Pl.* 636, 1753. *H. tetraphyllus* Roxb. ex Hornem, *Hort. Hafn* 661 1815.

Under shrubs, ca 3 m tall, stem densely hispid. Leaves 5-30 cm across, 5 lobed to parted, cordate or hastate at base, sometimes entire, crenate or dentate, apex acute to acuminate; petioles 2.5-20 cm long; stipules filiform to lanceolate, 4-20 cm long, all parts densely hirsute by stiff shiny simple hairs. Flowers axillary, solitary, yellow with a small purple centre; pedicel 1-2.5 cm long densely hirsute; epicalyx segments 4-6, 1-2.5 cm long; calyx 2-3 × 0.5-2 cm. Capsules 3-5 × 2.5-4 cm, pentagonous, acuminate with 5 prominent costa; seeds dark brown or blackish with stellate hairs.

var. *pungens* (Roxb.) Hochr. in *Candollea* 2 : 87, 1924; Paul in Sharma *et al.*, *Fl. India* 3 : 307, 1993. *Hibiscus pungens* Roxb., *Fl. Ind. ed. Carey* 3 : 213, 1832; Masters in Hook. f., *Fl. Brit. India* 1 : 341, 1974; Kanjilal *et al.*, *Fl. Assam* 1 : 144, 1934; Deb in *Bull. Bot. Surv. India* 3 : 288, 1961.

*Fl. & Fr.* : July-December.

*Specimens examined* : Imong, Meebold 6374; Ukhrul, Mukerjee 3339, Imphal, Deb 240 (CAL); Jirimukh, Malick 825; Barabakra, Malick 861; Sripurikhal, Malick 1059 (BSIS); Ukhrul, Chauhan 94886; Litan, Chauhan 94697 (ASSAM).

Tender fruits are eaten as vegetables.

## 2. *Abutilon* Mill.

*Abutilon indicum* (L.) Sweet, *Hort. Brit. ed. 1*, 54, 1826; Masters in Hook. f., *Fl. Brit. India* 1 : 326, 1874; Paul & Nayar in *Fasc. Fl. India* 19 : 88, 1988; Paul in Sharma *et al.*, *Fl. India* 3 : 266, 1993. *Sida indica* L., *Cent. Pl.* 2 : 26, 1756. *Sida populifolia* Lam., *Encycl.* 1 : 7, 1783. *Abutilon populifolium* (Lam.) Sweet, *Hort. Brit. ed. 1* : 53, 1826. *A. indicum* (L.) Sweet var. *populifolium* (Lam.) Wight & Arn. ex Masters in Hook. f., *Fl. Brit. India* 1 : 326, 1874. *emend.* Hochr. in *Ann. Cons. Jard. Bot. Geneve* 6 : 19, 1902; Deb in *Bull. Bot. Surv. India* 3 : 287, 1961.

### subsp. *indicum*

Herbs or under shrubs ca 3 m; stems, petioles and pedicels densely or sparsely velutinous with minute stellate and simple hairs. Leaves 1.7-7.4 × 1.5-6 cm, ovate to sub-orbicular, cordate at base, apex acute or acuminate, palmately 6-9 nerved; stipules linear. Flowers solitary, axillary, golden-yellow; pedicel longer than petiole, pointed towards the apex; epicalyx absent; calyx 5-8 mm across, shorter or as long as the schizocarp. Schizocarp. 1.5-2.5 cm in diam., globular; mericarps 15-22, reniform; seeds 2-3 per mericarp, reniform, minutely stellate hairy.

*Fl. & Fr.* : August-March.

*Specimens examined* : Kakching, Deb 1281 (CAL).

The plant is medicinal; roots, barks and leaves are used in Ayurvedic and Unani system of medicine since time immemorial.

### 3. *Alcea* Mill.

*Alcea rosea* L., Sp. Pl. 687, 1753; Paul in Sharma *et al.*, Fl. India 3 : 386, 1993, *Althaea rosea* (L.) Cav., Disc. 2 : 91, t. 28, f. 1, 1786; Masters in Hook. f., Fl. Brit. India 1 : 319, 1874; Deb in Bull. Bot. Surv. India 3 : 287, 1961.

Annual erect herbs, ca 2 m tall, stellate hairy or glabrescent. Leaves 2.8 - 12.5 × 3.5 - 12.0 cm, orbicular-cordate, deeply 3 - 7 lobed or wavy, rugose, crenate, apex acute; petiole ca 16 cm long. Flowers solitary, axillary or in terminal racemes 6 - 7.5 cm diam., sub-sessile; epicalyx segments 6 - 7, ovate, lanceolate, calyx-lobes ovate to ovate-lanceolate; petals 4 - 7 cm long, variously coloured usually red. Schizocarp ca 2 cm across, depressed, globose, pubescent.

*Fl. & Fr.* : March - September

*Specimens examined* : Imphal, Deb 16, 25 (CAL).

Cultivated as an ornamental plant in the gardens in Imphal and other places in the state.

### *Gossypium* L.

*Gossypium arboreum* L., Sp. Pl. 693, 1753; Masters in Hook. f., Fl. Brit. India 1 : 347, 1874; Deb in Bull. Bot. Surv. India 3 : 287, 1961; Paul in Sharma *et al.*, Fl. India 3 : 313, 1993.

*Mani.*: *Lashingpambi*.

Annual or perennial shrubs, ca 2 m tall; young branches pubescent with stellate and few simple hairs, glabrescent, glabrous, purple. Leaves palmately lobed to palmatifid, ovate to orbicular or oblong segments, base cordate, 5 - 7 lobed with an extra tooth in the sinus, 5 - 7 nerved; stipules linear to lanceolate, often falcate. Flowers solitary axillary, pale-yellow with or without purple centre; epicalyx cordate at base, entire or serrate, acute apex; calyx cupular, apex 5-dentate. Capsules 1.5 - 3 cm diam., more or less ovoid to globular; seeds ovoid to globular, with dense covering of long woolly white or rusty hairs.

var. *arboreum*

*G. neglectum* Tod., Relaz. Cult. Cot. 169, 1878. *G. arboreum* L. var. *neglectum* (Tod.) G. Watt, Cott. Pl. 95, t. 10, 11, 12, 1907.

*Fl. & Fr.* : August - February.

*Specimens examined* : Imphal, G. Watt 5824; Pallel, Deb 1342 (CAL).

Main source of cotton, oil-cake and oil, etc. from the seeds of the plant.

### 5. *Hibiscus* L., *non. cons.*

- 1a. Scandent shrubs or climbers; flowers fragrant;  
capsules 10-lobed by false septum ..... 2. *H. fragrans*
- b. Erect herbs or shrubs; flowers not fragrant;  
capsule 5-lobed ..... 2

- 2a. Stems with bristles or prickles; epicalyx segments forked at the tip; calyx lobes with prominent veins ..... 3
- b. Stamens without bristles or prickles; epicalyx segments not forked; calyx lobes without prominent veins ..... 5
- 3a. Leaves deeply lobed; lobation up to the base of lamina; capsules beaked ..... 4
- b. Leaves not deeply lobed; lobation up to 3/4th of lamina; capsules not beaked ..... 5. *H. sardariffa*
- 4a. Stipules linear subulate; epicalyx segments 8 or less; seeds dotted with scales ..... 1. *H. cannabinus*
- b. Stipules linear to lanceolate; epicalyx segments 8 or more; seeds smooth ..... 3. *H. radiatus*
- 5a. Herbs or undershrubs; leaves lobed or entire; staminal column shorter than corolla ..... 7. *H. syriacus*
- b. Shrubs; leaves unlobed; staminal column longer than corolla ..... 6
- 6a. Petals entire; staminal column slightly longer than the petals ..... 4. *H. rosa-sinensis*
- b. Petals lacinate; staminal column twice as long as the petals ..... 6. *H. schizopetalus*

1. **Hibiscus cannabinus** L., Syst. Nat. ed. 10, 2 : 1149. 1759; Masters in Hook. f., Fl. Brit. India 1 : 339. 1874; Paul in Sharma *et al.*, Fl. India 3 : 335. 1993. *H. cannabinus* L. var. *geminus* Hochr. in Ann. Cons. Jard. Bot. Geneve 4 : 115. 1900.

Mani.; *Sougree*

Annual or perennial herbs, 2.5 - 4.2 m tall; stem with prickles. Upper leaves palmatilobed to parted. 3 - 5 or 7 lobed, margins dentate; leaflets 3 - 7 × 0.3 - 2.0 cm. linear or elliptic-lanceolate, acuminate; petiole 3 - 10 cm; stipules *ca* 2.3 mm, linear subulate. Flowers solitary axillary or in racemes, *ca* 3.5 - 4.5 cm across, yellow, with purple throat; epicalyx segments 7 - 8, spreading; calyx free, lobes somewhat deltoid. Capsules *ca* 2 cm across, ovoid, apiculate, hairy, dehisces into 5-parts; seeds reniform, dotted with scales.

*Fl. & Fr.* : August - December.

*Specimens examined* : North Manipur, G. Watt 7348 (CAL).

2. **Hibiscus fragrans** Roxb., Fl. Ind. ed. Carey 3 : 195. 1832; Masters in Hook. f., Fl. Brit. India 1 : 337. 1874; Kanjilal *et al.*, Fl. Assam 1 : 143. 1934; Deb in Bull. Bot. Surv. India 3 : 287. 1961; Paul in Sharma *et al.*, Fl. India 3 : 318. 1993.

Scandent shrubs or rarely climbers on tall trees *ca* 20 cm in diam., young parts stellate pubescent. Leaves 5 - 12 × 2 - 8 cm, ovate, cordate at base, unlobed, acute, dentate or repand; lateral nerves 5 - 7 at the base, stellate hairy, glabrescent.

pedicels jointed, 3 - 7 cm long. Flowers in axillary or in terminal panicles, fragrant, white to pinkish with pale yellow centre; epicalyx segments 5, connate up to the half, ovate, acuminate; calyx fused up to the middle, acuminate, inner surface densely stellate tomentose, outer surface with stellate and club shaped hairs. Capsules 3 - 4 × 1.5 - 2 cm, ovoid, dehiscing into five parts, outer surface densely stellate hairy, inner surface glossy.

*Fl. & Fr.* : November - April.

*Specimens examined* : Kakching, Deb 1220 (CAL).

3. *Hibiscus radiatus* Cav., Diss. 3 : 150, t. 54, f. 2, 1787; Masters in Hook. f., Fl. Brit. India 1 : 335, 1874; Kanjilal *et al.*, Fl. Assam 1 : 144, 1934; Deb in Bull. Bot. Surv. India 3 : 288, 1961; Paul in Sharma *et al.*, Fl. India 3 : 327, 1993. *H. lindleyi* Wallich, Pl. Asiat. Rar 1 : 4, t. 4, 1830. *H. radiatus* Cav. var. *lindleyi* (Wallich) Kurz in J. Asiat. Soc. Bengal n. s. 43, 2 : 10, 1874. *H. heptaphyllus* Dalz. & Gibs., Bombay Fl. 20, 1861.

Undershrubs up to 2 m tall; stems covered with short scattered prickles along with some long simple hairs. Leaves 3 - 8 × 2 - 6 cm, ovate to oblong, cuneate at base, apex acute to acuminate, palmately 3 - 5 lobed, lobation nearly up to the base, margin coarsely or sharply serrate, glabrous, some thick hairs on the veins beneath, 3 - 5 nerved at base with nectaries; petioles 2 - 15 cm, aculeate and pubescent, upper surface coppery red in young condition; stipules linear to lanceolate. Flowers solitary, axillary, large, showy, yellow with purple centre, ca 6 - 6.5 cm across; pedicel jointed, epicalyx 8 - 10 bristly along the margin; calyx lobes ovate to deltoid, crescent, acuminate. Capsules ca 2.5 cm in diam., ovoid, beaked, bristly; seeds smooth, brown.

*Fl. & Fr.* : August - February.

*Specimens examined* : Imphal, Deb 1156 (CAL).

4. *Hibiscus rosa-sinensis* L., Sp. Pl. 694, 1753; Masters in Hook. f., Fl. Brit. India 1 : 334, 1874; Kanjilal *et al.*, Fl. Assam 1 : 145, 1934; Deb in Bull. Bot. Surv. India 3 : 288, 1961; Paul in Sharma *et al.*, Fl. India 3 : 391, 1993.

var. *rosa-sinensis*

Mani.: *Jubokushum*

Large shrubs up to 4 m high; stems woody, glabrous. Leaves 6 - 11 × 3 - 5 cm, ovate to ovate-lanceolate, acuminate, dentate or crenate throughout, somewhat tapering at the base, more or less serrate, glabrous or few scattered hairs on the veins beneath, palmately 3 - 5 nerved at the base; petioles ca 2.5 cm long or more with few simple hairs; stipules lanceolate, subulate, glabrous. Flowers solitary, axillary, rose red, in upper axils on short or long jointed peduncles; epicalyx segments 5 - 8, about half the length of the calyx, connate at base, lanceolate; calyx gamosepalous, campanulate, glandularly stellate pilose. Capsules rounded rarely formed.

*Fl. & Fr.* : Throughout the year.



*Specimens examined* : Imphal, Deb 291 (CAL).

*Uses* : Leaves, flowers and seeds have medicinal value. The flowers reported to possess contraceptive properties.

**5. *Hibiscus sabdariffa* L.**, Sp. Pl. 695, 1753; Masters in Hook. f., Fl. Brit. India 1 : 340, 1874; Deb in Bull. Bot. Surv. India 3 : 288, 1961; Paul in Sharma *et al.*, Fl. India 3 : 391, 1993.

*Mani.* : *Silo-soungree*

Tall erect herbs or shrubs ca 2 m; stems reddish-purple or green, glabrous. Leaves 4 - 15 × 1.5 - 3.2 cm, orbicular, palmately 3 - 5 lobed, cuneate at base, apex acute, lanceolate, serrate, glabrous; petioles 2 - 8 cm, reddish-purple; stipules ca 1.2 cm long, linear. Flowers axillary, solitary in racemes or panicles; epicalyx segments 8 - 12, adnate to the base of calyx; calyx cup-shaped, red, fleshy. Capsules 1.5 cm across, ovoid, pubescent; seeds reniform, villous.

*Fl. & Fr.* : August - December.

*Specimens examined* : Kakching, Deb 1377 (CAL).

**6. *Hibiscus schizopetalus* (Masters) Hook. f.** in Curtis. Bot. Mag. 3 : 36, t. 6524, 1880; Kanjilal *et al.*, Fl. Assam 1 : 145, 1934; Deb in Bull. Bot. Surv. India 3 : 288, 1961; Paul in Sharma *et al.*, Fl. India 3 : 392, 1993. *H. rosa-sinensis* L., var. *schizopetalus* Masters in Gard. Chron. n.s. 12 : 272, f. 45, 1879.

Shrubs ca 2.5 m tall, woody, with slender drooping branches, glabrous. Leaves 2 - 6 × 1 - 3 cm, narrowly ovate or ovate-elliptic, cuneate at base, acute at apex, basal part entire, upper coarsely serrate; lateral nerves 3 - 5 at the base, glabrous; stipules minute, caducous. Flowers solitary, axillary, red; epicalyx segments 6 - 7, minutely ciliate; calyx tubular, 2 - 4 lobed, outside minutely ciliate. Capsules 3 - 4 cm long, oblong.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Imphal, Deb s.n. (CAL).

Cultivated in the gardens as an ornamental plant.

**7. *Hibiscus syriacus* L.**, Sp. Pl. 695, 1753; Masters in Hook. f., Fl. Brit. India 1 : 344, 1874; Kanjilal *et al.*, Fl. Assam 1 : 145, 1934; Deb in Bull. Bot. Surv. India 3 : 288, 1961; Paul in Sharma *et al.*, Fl. India 3 : 393, 1993.

Erect shrubs, 3 - 5 m high, young branches pubescent with stellate hairs, glabrescent. Leaves 4 - 5 × 1.5 - 4 cm, ovate or sub-rhomboid or deltoid-ovate, often 3-lobed, cuneate at base, acute at apex, margins coarsely toothed; glabrous; stipules filiform. Flowers solitary, axillary, white or light pink to lilac blue with a purplish centre; peduncles shorter than petioles, epicalyx segments 6 - 8 each, linear, sparsely hairy; calyx cuneate up to the middle, lobes oblong or ovate lanceolate, acute. Capsules 1.5 - 2.5 cm long, obtuse or shortly beaked, sparsely hispid.

*Fl. & Fr.* : June - October.

*Specimens examined* : Imphal, Deb 2386 (CAL).

#### 6. *Kydia* Roxb.

*Kydia calycina* Roxb., Pl. Corom 3 : 11, t. 215. 1819; Masters in Hook. f., Fl. Brit. India 1 : 348. 1874; Kanjilal *et al.*, Fl. Assam 1 : 146. 1934; Deb in Bull. Bot. Surv. India 3 : 288. 1961; Paul in Sharma *et al.*, Fl. India 3 : 344. 1993.

Mani.: *Khabi*.

Trees ca 15 m tall; young parts densely pubescent with minute greyish stellate hairs. Leaves 6 - 15 × 3 - 12 cm, ovate to sub-orbicular or ovate-rounded, cordate to truncate at base, margins entire or irregularly serrate, palmately 3 - 5 lobed, 5 - 7 nerved, downy beneath; petioles 2 - 10 cm long, densely stellate pubescent; stipules subulate. Flowers 1.2 - 2 cm across, white or pinkish in much branched axillary and terminal panicles, polygamous; epicalyx segments 4 - 6, oblong or obovate, connate below; both surface stellate, pubescent, persistent. Capsules ca 5 mm across, sub-globose, hard, loculicidally 3-valved, single seed in each locale reniform.

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

*Specimens examined* : Tushar. Mukerjee 3436; Singjamai, Deb 2501 (CAL); Sunjok, G. Watt 6627; Celjang, Malick 1412 (BSIS); Ukhrul, Chauhan 94866 (AS-SAM).

Wood is used for making of matchboxes, pencils, plywoods, paper, pulp etc. and also in building constructions etc. Bark fibers for ropes.

#### 7. *Malvastrum* A. Gray, *nom. cons*

*Malvastrum coromandelianum* (L.) Garcke in Bonplandia 5 : 295. 1857; Malick & Safui in J. Econ. Tax. Bot. 10 : 2. 1987; Paul in Sharma *et al.*, Fl. India 3 : 277. 1993. *Molva coromandeliana* L., Sp. Pl. 687. 1753. *Malvastrum tricuspidatum* (R. Br.) A. Gray, Pl. Wright, 1 : 16. 1852; Masters in Hook. f., Fl. Brit. India 1 : 321. 1874.

Herbs or under shrubs up to 1 m high: stems, petioles and pedicels with stellate hairs. Leaves 1.4 - 6 × 0.5 - 3.2 cm, ovate-lanceolate or oblong, base rounded, obtuse or acute, apex acute or obtuse, irregularly toothed, 5-nerved at base, both surfaces pubescent; petioles ca 3 cm long; stipules small, linear to lanceolate, hairy. Flowers axillary, solitary or in clusters of 2 - 4, yellow; epicalyx segments linear to lanceolate, hairy; calyx campanulate, 5-fid, slightly accrescent, acuminate. Schizocarps globular, hairy to glabrescent; 1-seed in each mericarp, brown, glabrous.

*Fl. & Fr.* : June - December.

*Specimens examined* : Chandrapur, K. C. Malik 784 (CAL).

#### 8. *Malvaviscus* Cav.

*Malvaviscus arboreus* Cav. var. *penduliflorus* (DC.) Schery in Ann. Miss. Bot. Gard. 29 : 223. 1924; Paul in Sharma *et al.*, Fl. India 3 : 394. 1993. *M. penduliflorus*

Macino & Sesse ex DC., Prodr. 1 : 445. 1824. *M. conzattii* Greenman, Publ. Field Mus. Not. Hist. Bot. 2 : 233. 1912; Deb in Bull. Bot. Surv. India 3 : 288. 1961.

Shrubs. Leaves ovate-lanceolate, entire or palmately 3-lobed, slightly cordate at the base. Flowers axillary, solitary, pedicels not jointed; epicalyx segments 2-10, shortly connate at the base, lanceolate; calyx campanulate, 5-fid; corolla more than 4 cm long. Fruits schizocarpic, sub-globose, breaking up into mericarps.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Imphal, Deb 2318 (CAL).

Cultivated in the gardens as an ornamental plant.

### 9. *Nayariophyton* T. K. Paul

*Nayariophyton zizyphifolium* (Griffith) Long & A.G. Mill. in-Edinb. J. Bot. 47: 357. 1990; Paul in Sharma *et al.*, Fl. India 3: 345. 1993. *Kydia zizyphifolium* Griffith. Itin. in. Notes 108. 1848. *K. jujubifolia* Griffith, Notul. 4 : 534. 1854; Deb in Bull. Bot. Surv. India 3 : 287. 1961. *Dicellostyles jujubifolia* (Griffith) Benth. in Benth. & Hook. C., Gen. Pl. 1 : 207. 1862; Masters in Hook. L., Fl. Brit. India 1 : 333. 1874. *Nayariophyton jujubifolium* (Griffith) T.K. Paul in Fasc. Fl. India 19: 185. 1989.

Trees ca 8 m tall, young stems and branches pubescent with minute greyish stellate hairs. Leaves 7-13 × 4-7 cm, ovate or sub-orbicular to ovate-lanceolate, rounded or sub-cordate at base, apex acute or acuminate, entire or shallowly 3-lobed, upper surface glabrous or sparsely stellate pubescent densely stellate, pilose beneath, 5-7 nerved at base; petioles 1-3 cm long, stellate pubescent; stipules subulate. Flowers axillary, solitary or in short panicles of 2-5 flowers; pedicels 0.5-1.5 cm long; epicalyx segments 4-6, crescent, oblong-lanceolate, rounded at apex; calyx lobes triangular, connate in the middle, wide at base, stellate hairy. Capsules ca 8 mm across, sub-globose, densely hairy, indehiscent; one seed in each locule, reniform, glabrous.

*Fl. & Fr.* : August - January.

*Specimens examined* : Churachandpur, Deb 11 : Litan, Mukerjee 3349 (CAL); Lingli (G. Watt 580) (BSIS).

### 10. *Pavonia* Cav., *nom. cons.*

*Pavonia repanda* (Roxb. ex J.E. Smith) Spreng., Syst. Veg. 3 : 98. 1828; Paul in Sharma *et al.*, Fl. India 3 : 377. 1993. *Urena repanda* Roxb. ex J. E. Smith in Rees. Cyclop. 37, n. 6. 1819; Masters in Hook. L., Fl. Brit. India 1 : 330. 1874; Deb in Bull. Bot. Surv. India 3 : 288. 1961. *U. palmata* Roxb., Fl. Ind. ed. Carey 3 : 182. 1832.

Mani. *Sampakpi*.

Tall much branched herbs or undershrubs; stems, petioles and pedicels densely stellate hairy. Leaves 2-7 × 2-8 cm, ovate to ovate-cordate or rounded at base, rarely lobed, base cordate, apex acute, repand-serrate, 5-7 nerved, without nectary, both surfaces pubescent; petioles ca 5 cm long; stipules small, linear, hairy. Flowers axillary, solitary, or in clusters on terminal racemes; epicalyx segments 5, connate at

middle, hairy, calyx campanulate, more or less deltoid, densely hairy outside. Mericarps ca 0.5 cm across, oblong-ovoid, glabrous, never glochidiate, unarmed; seeds glabrous, brown.

*Fl. & Fr.* : September – January.

*Specimens examined* : Imphal, Deb 1159 (CAL).

### 11. *Sida* L.

- 1a. Prostrate or diffuse herbs; flowers usually solitary ..... 2. *S. cordata*
- b. Erect herbs or undershrubs; flowers apparently in racemes ..... 2.
- 2a. Leaves tomentose; pedicel jointed at middle ..... 1. *S. acuta*
- b. Leaves glabrous; pedicels jointed below the middle ..... 3. *S. rhombifolia*

1. *Sida acuta* Burm. f., *Fl. Ind.* 147, 1768; Deb in *Bull. Bot. Surv. India* 3 : 288, 1961; Paul in Sharma *et al.*, *Fl. India* 3 : 281, 1993. *S. carpinifolia* var. *acuta* (Burm. f.) Kurz in *J. Asiat. Soc. Bengal* 45 : 119, 1876. *S. lanceolata* Retz., *Obs. Bot.* 4 : 119, 1786. *S. carpinifolia sensu* Masters in Hook. f., *Fl. Brit. India* 1 : 323, 1874, non Linn. f., 1781; Kanjilal *et al.*, *Fl. Assam* 1 : 140, 1934.

*Mani.* : Uhal.

Undershrubs or tall herbs ca 2 m high, stems pubescent with minute stellate hairs. Leaves 1–8 × 1–2.5 cm, lanceolate to linear, rarely ovate to oblong, acute at base, rarely rounded or obtuse, apex acute, coarsely or remotely serrate, sparsely hairy on both the surfaces; petioles small ca 5 mm long; stipules unequally paired at the nodes. Flowers solitary, axillary or in clusters of 2–3 each, light yellow; pedicels jointed at the middle; calyx campanulate, slightly acrescent. Mericarps 6–10, rugose, glabrous, one-seeded.

*Fl. & Fr.* : September – April.

*Specimens examined* : Langol, Deb 1598 (CAL); Chumbenthao, Malick 1519; Nungba, Malick 1155; Kangrendhar, Malick 1035 (BSIS); Litan, Chauhan 94670 (ASSAM).

*Uses* : Roots and leaves are used in indigenous medicines; stem fibres are used for rope making.

2. *Sida cordata* (Burm. f.) Borss. in *Blumea* 14 : 182, 1966; Paul in Sharma *et al.*, *Fl. India* 3 : 283, 1993. *Melochia cordata* Burm. f., *Fl. Ind.* 143, 1768, *Sida veronicifolia* Lam., *Encycl.* 1 : 5, 1783; Deb in *Bull. Bot. Surv. India* 3 : 288, 1961. *S. humilis* Cav., *Diss.* 5, t. 134, f. 2, 1788; Masters in Hook. f., *Fl. Brit. India* 1 : 322, 1874. *S. beddomei* Jacob in *J. Bombay Nat. Hist. Soc.* 47 : 50, 1950.

Slender, prostrate or ascending herbs, young parts usually pubescent. Leaves 1–7 × 0.5–5 cm, orbicular to sub-orbicular to ovate, cordate at base, apex acute

to acuminate serrate or dentate; lateral nerves 5-7 on each half, both surfaces pubescent; petiole ca 2.5 cm long; stipules linear, filiform. Flowers axillary, solitary, or in few flowered racemes; pedicels ca 2 cm long, jointed at the middle; calyx campanulate, pubescent outside. Mericarps 5, keeled on the back, awnless; seeds ovoid, glabrous.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Ukhrul, Mukerjee 2143 (CAL).

**3. *Sida rhombifolia* L.**, Sp. Pl. 684. 1753; Paul in Sharma *et al.*, Fl. India 3:289, 1993. subsp. : ***rhomboidea*** var. ***rhombifolia*** Roxb. ex Fleming in Asiat. Res. 6 : 178, 1810. *S. rhombifolia* var. *rhombifolia* (Roxb. ex Fleming) Masters in Fl. Brit. India 1 : 324. 1874. *S. rhombifolia* L. var. *obovata* Wallich ex. Masters in Hook. f., Fl. Brit. India 1 : 324. 1874. *S. microphylla* Cav., Diss. 1 : 22, t. 12, f. 2. 1785. *S. rhombifolia* var. *microphylla* (Cav.) Masters in Hook. f., Fl. Brit. India 1 : 324. 1874.

Mani.: Uhai.

Herbs or shrubs ca 1 m high. Leaves 1.3 - 8 × 0.5 - 5 cm, ovate-oblong, lanceolate or rhomboid, obtuse, acute to truncate at base, apex acute to acuminate or obtuse, apically serrate, pubescent above, 3-nerved at base; petioles ca 2 cm long; stipules filiform. Flowers axillary, mostly solitary, sometimes in clusters of 2 - 5, yellow; pedicels ca 2 - 4 cm, longer than petiole; calyx campanulate, 4 - 5 mm long, crescent. Mericarps flattened, trigonous, 2-awned at apex; seeds reniform.

*Fl. & Fr.* : June - December.

*Specimens examined* : Imphal valley, Deb 610, 1124 & 2960; Ukhrul, Mukerjee 2931; Chingmairong, Deb 2317 (CAL); Uchathol, Malick 644 (BSIS).

## 12. *Thespesia* Sol. ex Correa. *nom. cons.*

***Thespesia lampas* (Cav.) Dalz. & Gibs.**, Bombay Fl. 19. 1861; Masters in Hook. f., Fl. Brit. India 1 : 345. 1874; Deb in Bull. Bot. Surv. India 3 : 288. 1961; Paul in Sharma *et al.*, Fl. India 3 : 350. 1993. *Hibiscus lampas* Cav., Diss. 3 : 154, t. 56. 1, 2. 1787.

Shrubs up to 2.5 m high, twigs densely stellate tomentose, glabrescent later. Leaves 6 - 12 cm across, cordate, 3-lobed; lobes deltoid, base cordate, apex acute or acuminate, pilose above, densely stellate tomentose beneath; petioles ca 1 - 10 cm long, densely pubescent; stipules pubescent, lanceolate. Flowers axillary, solitary or in 1 - 5 flowered racemes; epicalyx segments 5, free, subulate, minutely stellate hairy, caducous; calyx cyathiform, densely stellate outside, glabrous within. Capsules ca 3 cm across, ovoid to globose, dehiscing into 5-valves, glabrescent; seeds obovoid, hairy.

var. ***lampas***

Calyx lobes 1-3 mm long, subulate to triangular.

*Fl. & Fr.* : July - December.

*Specimens examined* : Sonjok 400 m, G. Watt 6625; Shugnu, Deb 2628 (CAL); Imphal, Malick 1335 (BSIS).

### 13. *Urena* L.

*Urena lobata* L. subsp. *lobata* var. *viminea* (Cav.) Guerke in Bot. Jahrb. 16 : 375. 1892; Paul in Sharma *et al.*, Fl. India 3 : 382. 1993. *U. viminea* Cav., Diss. 6 : 335. t. 184, f. 1. 1788. *U. scabruscula* Wight & Arn., Prodr. Fl. Pen. Ind. Or. 46. 1874, (non DC. 1824). *U. lobata* auct. non L., 1753 : DC., Prodr. 1 : 442. 1824; Deb in Bull. Bot. Surv. India 3 : 228. 1961.

Undershrubs up to 2 m tall. Leaves 1 - 10 × 1.2 - 12 cm, orbicular, palmately 3 - 5 lobed, more or less pubescent, often scabrous; upper ones ovate to oblong-lanceolate, rarely rhomboid, later glabrescent, 3 - 9 nerved at base, nectary on the midrib beneath; petioles 0.5 - 10 cm; stipules 2 - 4 mm, lanceolate. Flowers axillary, solitary or in clusters of 2 - 3; pedicels 1 - 5 mm long; epicalyx segments, linear to lanceolate, cupular in fruits, triangular; calyx campanulate, free. Schizocarp ca 1 cm across, globular, covered with sharp hooked, glochidiate spines at the top; seeds reniform, minutely hairy.

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

*Specimens examined* : Pushing, Mukerjee 3099; Imphal, Deb 595, 627 & 1610 (CAL); Uchathol, Malick 638; Chandrapur, Malick 777; Nungba, Malick 1141 (BSIS); Litan, Chauhan 94678 (ASSAM).

## 31. BOMBACACEAE

Kunth in Malvac. 5. 1822 ('Bombacae').

(A. S. Chauhan)

### *Bombax* L.

- 1a. Tree trunks with conical prickles;  
capsules up to 15 cm long, pubescent;  
flowers dark red ..... 1. *B. ceiba*
- b. Tree trunk, without prickles;  
capsules more than 15 cm long, glabrous;  
flowers pink ..... 2. *B. insigne*

1. *Bombax ceiba* L., Sp. Pl. 511. 1753, *p.p.*; Nicolson in Taxon 28 : 367 - 373. 1979; Nayar & Biswas in Sharma *et al.*, Fl. India 3 : 398. 1993. *B. malabaricum* DC., Prodr. 1 : 479. 1824; Masters in Hook. f., Fl. Brit. India 1 : 349. 1874; Kanjilal *et al.*, Fl. Assam 1 : 147. 1934. *Salmalia malabarica* (DC.) Schott & Endl., Melet. 35. 1832; Deb in Bull. Bot. Surv. India 3 : 287. 1961.

*Mani.* : *Tera*

Large deciduous trees, up to 35 m high; trunk buttressed; crown lax, pyramidal, spreading, armed with conical prickles. Leaves 9 - 18 × 3 - 5 cm, spirally alternate,

digitately compound, crowded at branch tips; petioles 10–20 cm long; leaflets elliptic, oblong-elliptic, acuminate, cuneate at base, glabrous, glaucous beneath. Flowers 8–13 cm across, showy red, in the axils of fallen leaf; calyx campanulate, lobes round; anthers reniform; ovary woolly. Capsules 12–15 cm long, woody, oblong-ovoid, pubescent, silky within.

*Fl. & Fr.* : February–June.

*Specimens examined* : Koirengi, Deb 2567 (CAL).

2. *Bombax insigne* Wallich, *Pl. Asiat. Rar.* 1 : 71, t. 79, 1830; Masters in Hook. f., *Fl. Brit. India* 1 : 349, 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 148, 1938; Nayar & Biswas in Sharma *et al.*, *Fl. India* 3 : 398, 1993. *Salmalia insignis* (Wallich) Schott. & Endl., *Melet.* 35, 1832; Deb in *Bull. Bot. Surv. India* 3 : 287, 1961.

Mani. : *Tera*.

Large deciduous trees; trunk buttressed at the base but without prickles. Leaves digitate; leaflets 5–12, obovate, cuspidate. Flowers more than 1 cm long, pink; stamens indefinite, filaments filiform. Capsules 15–20 cm long, oblong, glabrous; seeds numerous, surrounded by masses of white silky hairs.

*Fl. & Fr.* : December–April.

*Specimens examined* : Sekmai, Deb 1379 (CAL).

### 32. STERCULIACEAE

Bartling, *Ord. Nat. Pl.* 255, 340, 1830

(A. S. Chauhan)

- 1a. Flowers unisexual or polygamous; petals absent ..... 2
- b. Flowers bisexual; petals present ..... 4
- 2a. Seeds winged ..... 9. *Pterygota*
- b. Seeds not winged ..... 3
- 3a. Calyx-lobes shorter than staminal tube; follicles membranous ..... 4. *Firmiana*
- b. Calyx-lobes longer than staminal tube; follicles woody ..... 10. *Sterculia*
- 4a. Petals with appendages ..... 5
- b. Petals without appendages ..... 6
- 5a. Erect shrubs; capsules not spiny ..... 1. *Abroma*
- b. Climbing shrubs; capsules covered with spines ..... 2. *Byttneria*
- 6a. Anthers in a ring on the top of the column ..... 7
- b. Anthers on an antheriferous tube or only at margins of the tube ..... 8

- 7a. Fruits spirally twisted follicles ..... 5. *Helicteres*  
 b. Fruits 5-valved capsules ..... 8. *Pterospermum*  
 8a. Stamens definite, 5 or 15 ..... 9  
 b. Stamens indefinite.....3. *Eriolaena*  
 9a. Stamens 5 only.....6. *Melochia*  
 b. Stamens 15 only ..... 7. *Pentapetes*

### 1. *Abroma* Jacq.

*Abroma augusta* (L.) L. f., Suppl. Pl. 341. 1781; Masters in Hook. f., Fl. Brit. India 1 : 375. 1874; Kanjilal *et al.*, Fl. Assam 1 : 156. 1934; Malick & Safui in J. Econ. Tax. Bot. 10 : 2. 1987; Malick in Sharma *et al.*, Fl. India 3 : 409. 1993. *Theobroma augusta* L., Syst. Nat. ed. 12. 233. 1770.

Large shrubs, branchlets densely grey-pubescent. Leaves distichous, 10-30 × 6-15 cm, ovate to lanceolate, acuminate, sub-cordate at base. Flowers ca 5 cm across, purple, in leaf opposed few-flowered cymes; sepals lanceolate, persistent; petals concave, clawed prolonged into a large spatulate lamina, caducous. Capsules ca 6 cm long, obconical, truncate, 5-winged; seeds many black.

*Fl. & Fr.* : June - November.

*Specimens examined* : Jirimukh, Malick 808 (BSIS).

### 2. *Byttneria* Loebl., *nom. cons.*

*Byttneria pilosa* Roxb., Fl. Ind. 1 : 618. 1820; Masters in Hook. f., Fl. Brit. India 1 : 377. 1874; Kanjilal *et al.*, Fl. Assam 1 : 160. 1934; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Malick in Sharma *et al.*, Fl. India 3 : 414. 1993.

Woody climbers, stems angled, pilose along angles. Leaves shallowly 3-lobed, 10-20 × 3-15 cm, orbicular, oblong-lanceolate or ovate, cordate at base, acuminate, serrulate, dentate; petioles 10-20 cm long. Cymes axillary, paniculate, 8-15 cm long, stellate pubescent. Flowers 4-6 mm across, greenish yellow; petals shorter than sepals. Capsules 1.5-2 cm across, subglobose, prickly; seeds ovoid, angular.

*Fl. & Fr.* : August - February

*Specimens examined* : Barak, C.B. Clarke 42260; Jhiribum, G. Watt 7223; Nungba, Meebold 5080; Jekhoma, Meebold 5349; Nebungh, Deb 1176 (CAL).

### 3. *Eriolaena* DC.

*Eriolaena spectabilis* Planch. ex Masters in Hook. f., Fl. Brit. India 1 : 371. 1874; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Malick in Sharma *et al.*, Fl. India 3 : 418. 1993. *Wallichia spectabilis* DC., Mem. Mus. Paris 10 : 104. t. 6. 1823. *non* Roxb., 1819.

Small trees, young shoots stellately-hairy. Leaves simple, 7-10 × 3.5-4 cm, palmately 7-nerved, unequally serrate, cordate at base, acuminate at apex, scabrid above, pubescent beneath. Inflorescence a many flowered paniced cyme; calyx



linear lanceolate; corolla obovate, spatulate, villous. Capsules woody, tubercled.

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

*Specimens examined* : Karong 1160 m, *G. Watt* 7140; Nongba, *Meebold* 5958; Longshongkhong 1500 m, *Mukerjee* 2895 (CAL).

#### 4. *Firmiana* Marsili

*Firmiana colorata* (Roxb.) R. Br. in Bennett & R. Br., *Pl. Jav. Rat.* 235. 1844; Malick in Sharma *et al.*, *Fl. India* 3 : 420. 1993. *Sterculia colorata* Roxb., *Fl. Corom.* 1 : 26. 1795; Masters in Hook. f., *Fl. Brit. India* 1 : 359. 1874; Kanjilal *et al.*, *Fl. Assam* 1 : 151. 1934. *S. rubicunda* Wallich ex Masters in Hook. f., *Fl. Brit. India* 360: 1874.

Tall trees up to 40 m, often whitish. Leaves 8 - 18 × 10 - 22 cm, palmately 3 - 7 lobed, lobes caudate, acuminate, truncate or cordate at base, entire, densely pubescent beneath, 5 - 7 nerved; petioles 7 - 15 cm long, swollen at both ends. Flowers ca 2.8 cm across, bright red, in rusty tomentose panicles. Follicles 6 - 10 × 2 - 5 cm, compressed, membranous, densely tomentose; seeds 3 - 4 in each follicle, smooth, shining black.

*Fl. & Fr.* : February - December.

*Specimens not seen.*

#### 5. *Helicteres* L.

- 1a. Follicles 5 - 10 cm long, spirally twisted ..... 2. *H. isora*  
 b. Follicles 2-4 cm long, not spirally twisted ..... 1. *H. plebeja*

1. *Helicteres isora* L., *Sp. Pl.* 963. 1753; Masters in Hook. f., *Fl. Brit. India* 1 : 365. 1874; Malick in Sharma *et al.*, *Fl. India* 3 : 426. 1993.

Small trees up to 5 m tall. Leaves bifarious, 8 - 14 × 6 - 8 cm, obovate, abruptly acuminate, cordate at base, crenate-serrate, tomentose on both sides. Flowers ca 4.5 cm long, red, in short axillary cymes; calyx gibbous, somewhat 2-lobed; petal claws winged. Follicles 5 - 10 cm long, cylindric, beaked, stellate-tomentose.

*Fl. & Fr.* : September - December.

*Specimens examined* : Chingmairang, *Deb* 1159 (CAL).

2. *Helicteres plebeja* Kurz in *J. Asiat. Soc. Bengal* 39: 67. 1870; Malick in Sharma *et al.*, *Fl. India* 3: 427. 1993. *Helicteres glabriuscula* Wallich ex Masters in Hook. f., *Fl. Brit. India* 1 : 366. 1878; Deb in *Bull. Bot. Surv. India* 3 : 286. 1961.

Diffused stellately pubescent shrubs. Leaves 10 - 12 × 1.2 - 3 cm, simple, obliquely lanceolate, cordate at base, serrulate; stipules subulate. Flowers spicate; androecium columnar below, dilated into a cup above. Follicles 2 - 4 cm long, oblong, beaked, woody, shortly stellate hairy; seeds without wings.

*Fl. & Fr.* : October - January.

*Specimens examined* : Chatric 1000 m, *Mukerjee* 3701; *Deb* 448 (CAL).

6. *Melochia* L.

***Melochia corchorifolia* L.**, Sp. Pl. 675. 1753; Masters in Hook. f., Fl. Brit. India 1 : 374. 1874; Malick in Sharma *et al.*, Fl. India 3 : 441. 1993, *Riedelia corchorifolia* DC., Prodr. 1 : 492. 1824.

Tall profusely branching herbs or tall shrubs. Leaves 2.5 - 7 × 1.2 - 1.8 cm long, ovate oblong, acute, rounded or cordate at the base, glabrous on both sides. Flowers small ca 5 mm, white or pink, in dense heads, bracteoles 4 - 5; sepals 5, connate below; petals 5, marcescent; stamens 5, opposite the petals, connate at the base into a tube. Capsules ca 5 mm across, depressed globose, loculicidally 5 valved, hispid.

*Fl. & Fr.* : August - December.

*Specimens examined* : Waste land, Deb 464, 1422 (CAL).

7. *Pentapetes* L.

***Pentapetes phoenicea* L.**, Sp. Pl. 698. 1753; Masters in Hook. f., Fl. Brit. India 1 : 371. 1874; Deb in Bull. Bot. Surv. India 3 : 287. 1961; Malick in Sharma *et al.*, Fl. India 3 : 443. 1993.

Branching glabrous herbs, up to 2 m high. Leaves 5 - 15 cm long, lanceolate, crenate-serrate, 1-nerved; petioles 2 - 2.5 cm long. Flowers large, red, nodding axillary, in pairs on short peduncles; bracteoles 3, caducous; sepals 5, lanceolate, connate at the base, bristly stellate, persistent; petals 5, obovate; stamens 20, connate at the base. Capsules subglobose, bristly, half the length of the persistent calyx, loculicidal; seeds sub-globose, dotted.

*Fl. & Fr.* : June - November.

*Specimens examined* : Mairong, Deb (specimens not seen).

8. *Pterospermum* Schreb. *nom. cons.*

- 1a. Leaves palmately lobed, peltate; calyx lobes  
1- 12 cm long; capsules angled ..... *P. acerifolium*
- b. Leaves usually entire, not peltate;  
calyx lobes 4 - 6 cm long; capsules terete ..... *P. lancifolium*

**1. *Pterospermum acerifolium* (L.) Willd.**, Sp. Pl. 3 : 729. 1801; Masters in Hook. f., Fl. Brit. India 1 : 368. 1874; Kanjilal *et al.*, Fl. Assam 1 : 157. 1934; Deb in Bull. Bot. Surv. India 3 : 287. 1961; Chandra in Sharma *et al.*, Fl. India 3 : 448. 1993. *Pentapetes acerifolia* L., Sp. Pl. 698. 1753.

Mani. : *Kuakla*

Tall evergreen trees up to 40 m high. Leaves variable, 18 - 40 × 12 - 30 cm, peltate, ovate-orbicular, shallowly lobed, serrate, glabrous above, tomentose beneath. Flowers 20 - 30 cm across, dull white, fragrant, in cymes; petals white, membranous equalling or slightly shorter than the sepals. Capsules 10 - 16 × 3 - 8

cm, woody, 5 angled, tomentose; seeds 4 - 6 cm long, compressed, winged at one end.

*Fl. & Fr.* : April - February.

*Specimens examined* : West Manipur 1100 m. *G. Watt* 7222 (CAL).

**2. *Pterospermum lancifolium*** DC. in Mem. Mus. Hist. Nat. Paris 10:112, 1813; Chandra in Sharma *et al.*, Fl. India 3 : 450, 1993. *P. lancaefolium* Roxb., Hort. Bengal 50, 1814 *nom. nud.* & Fl. Ind. 3 : 163, 1832; Masters in Hook. f., Fl. Brit. India 1 : 368, 1874; Deb in Bull. Bot. Surv. India 3 : 287, 1961.

Medium sized trees up to 20 m tall. Leaves variable, 4 - 14 × 1.6 - 3.8 cm, oblong-lanceolate or lanceolate, acuminate, rounded or truncate at base, sub-peltate, 3 nerved at base, glabrous above, stellately tomentose beneath. Flowers solitary, 4 - 6 cm across, dull white, fragrant, peduncles jointed; petals slightly longer than sepals, dull white. Capsules 6 - 8 × 2 - 3 cm, woody 5 angled, seeds 3 - 4 cm long, ellipsoid, compressed, winged at apex.

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

*Specimens examined* : Jirighat 1150 m, *G. Watt* 7224 (CAL); Jiribum, *Malick* 697 (BSIS).

**9. *Pterygota* Schott. ex Endl.**

***Pterygota alata*** (Roxb.) R. Br. in Bennet & R. Br., Pl. Java. Rar. 234, 1844; Deb in Bull. Bot. Surv. India 3 : 287, 1961; Malick in Sharma *et al.*, Fl. India 3 : 455, 1993. *Sterculia alata* Roxb., Pl. Corom. 3: 84, t. 287, 1820; Masters in Hook. f., Fl. Brit. India 1 : 360, 1874; Kanjifal *et al.*, Fl. Assam 1 : 153, 1934.

var. *alata*

Mani.: *Kuakla & Phumberpu*.

Trees up to 40 m tall, Leaves simple, 10 - 30 × 8 - 20 cm, ovate, ovate-elliptic, acuminate, cordate or truncate and 7 nerved at base; stipules subulate. Flowers unisexual, 1.5 - 2.6 cm across, brownish, in axillary panicles; calyx campanulate, rusty brown; petals absent; stamens arranged around the base of the carpels. Follicles 10 - 15 × 8 - 12 cm, globose, woody, brown tomentose; seeds ca 2.5 cm long, elliptic, compressed, winged.

*Fl. & Fr.* : February - June.

*Specimens examined* : West Manipur ex *Kaith* 1.c.

**10. *Sterculia* L.**

- 1a. Lofty trees; leaves palmately lobed;  
flowers when leafless; follicles brown..... 3. *S. villosa*
- b. Small trees; leaves not lobed; flowers when leafy;  
follicles red or scarlet ..... 2
- 2a. Leaves short acuminate; follicles 2 - 5,

- orange-yellow; seeds 1.5 cm long ..... 1. *S. hamiltonii*  
 b. Leaves long acuminate; follicles 4 - 5,  
 red; seeds 3 cm long ..... 2. *S. kingii*

1. *Sterculia hamiltonii* (O. Kuntze) Adelfb. in Blumea 5 : 506, 1945 & in Backer & Bakh. f., Fl. Java 1 : 413, 1964; Malick in Sharma *et al.*, Fl. India 3 : 464, 1993. *Gompanus hamiltonii* O. Kuntze, Rev. Gen. Pl. 1 : 77, 1891. *Sterculia coccinea* Roxb., Fl. Ind. 3 : 151, 1832, *non* Jack, 1822; Masters in Hook. f., Fl. Brit. India 1 : 357, 1874; Kanjilal *et al.*, Fl. Assam 1 : 153, 1939.

Small trees up to 10 m tall. Leaves 10 - 30 × 3 - 10 cm, oblong-lanceolate, oblanceolate or obovate, shortly acuminate, rounded or truncate at base, coriaceous, glabrous or sparsely hairy beneath; petioles 1 - 4 cm long, swollen at both ends. Flowers ca 2.5 cm across, pinkish-red, in 10 - 25 cm long drooping axillary or supra-axillary panicles. Follicles 2 - 5, spreading, 6 - 12 × 1 - 2 cm, orange-yellow; seeds ca 1.5 cm, ovoid, black.

*Fl. & Fr.* : June - May.

*Specimens examined* : Manipur, Deb 1471 (CAL).

2. *Sterculia kingii* Prain in J. Asiat. Soc. Bengal 73, n.s. 295: 192, 1904; Deb in Bull. Bot. Surv. India 3 : 287, 1961; Malick in Sharma *et al.*, Fl. India 3 : 466, 1993.

Small trees up to 10 m tall. Leaves alternate, 20 - 30 × 10 - 15 cm, ovate-lanceolate or ovate, long acuminate, rounded at base, glabrous above, sparsely pubescent beneath; 10 - 12 nerved at base; petioles 5 - 7 cm long, flattened above. Flowers small, below the leaves at branch tips, in drooping, much shorter than the leaves, racemose or paniculate; calyx lobes lanceolate, acuminate, brownish red; stamens 5; ovary 4 - 5 celled. Fruits of 4 - 5 purplish red or scarlet follicles, 10 - 12 cm long; seeds ca 3 cm long, ovoid, testa blue.

*Fl. & Fr.* : May - November.

*Specimens examined* : Khagang 2000 m, Mukerjee 3040 (CAL).

3. *Sterculia villosa* Roxb. Hort. Bengal 50, 1814, *nom nud.* ex Smith in Rees, Cyc. 34; no. 16, 1816; *nom. nud.* Masters in Hook. f., Fl. Brit. India 1 : 355, 1874. Deb in Bull. Bot. Surv. India 3 : 287, 1961; Malick in Sharma *et al.*, Fl. India 3 : 472, 1993.

Mani.: *Ilei-rit*.

Large deciduous trees with spreading crowns. Leaves crowded at branch tips, simple 25 - 50 cm across, deeply 5 - 7 lobed, lobes acuminate, cordate at base, remotely serrate, tomentose; petioles 30 - 60 cm long, tomentose. Flowers small, polygamous, ca 5 mm across, brownish-yellow, crowded in terminal drooping panicles; calyx campanulate, densely tomentose. Follicles 5 - 8 × 2 - 3 cm, coriaceous brown scarlet inside, tomentose outside; seeds ca 1 cm long, oblong, black.

*Fl. & Fr.* : April - October.

*Specimens examined* : Lingshok 1000 m, Mukerjee 3089; Manipur, Deb 2404 (CAL).

33. TILIACEAE

A. L. de Jus. Gen. Pl. 289. 1789

(R. Shanpru & A. S. Chauhan)

- 1a. Trees or shrubs ..... 2
- b. Herbs or under shrubs ..... 3
- 2a. Fruits capsule ..... 1. *Colona*
- b. Fruits drupe ..... 3. *Grewia*
- 3a. Flowers yellowish, in dense cymes ..... 4. *Triumfetta*
- b. Flowers yellowish in axillary  
1-2 flowered peduncles ..... 2. *Corchorus*

1. *Colona* Cav

*Colona floribunda* (Kurz) Craib in Kew Bull. Misc. Inform. 1925 : 21. 1925 & Fl. Siam. Enum. 1 (1) : 188. 1925; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 482. 1993. *Columbia floribunda* Kurz in J. Asiat. Soc. Bengal 42 : 63. 1873; Masters in Hook. f., Fl. Brit. India 1 : 393. 1874; Kanjilal *et al.*, Fl. Assam 1 : 169. 1934; Deb in Bull. Bot. Surv. India 3 : 285. 1961.

Shrubs. Leaves 10 - 16 × 7 - 12 cm, petiolate; petiole 2 cm long. Inflorescence racemose. Flowers small in long terminal panicles; sepals 5 distinct red inside; petals 5 oblong-spathulate; stamens indefinite, free on a raised torus; ovary 3 - 5 celled. cells 2 - 4 ovuled. Capsules ca 2 cm in diam., winged, stellate; cocci 3 - 5, indehiscent.

Fl. & Fr. : July - October.

West Manipur, C. B. Clarke (Specimens not seen).

2. *Corchorus* L.

- 1a. Petals not spatulate, equal to sepals ..... 2. *C. capsularis*
- b. Petals spatulate, longer than sepals ..... 2
- 2a. Capsules 6-angled, alternate  
angles produced into wings ..... 1. *C. aestuans*
- b. Capsules 10-ribbed, not winged ..... 3. *C. olitorius*

1. *Corchorus aestuans* L., Syst. Nat. ed 10. 2 : 1079. 1759; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 485. 1993. *C. acutangulus* auct. non Foskal. 1755 : Lam., Encycl. Meth. Bot. 2 : 104. 1786; Masters in Hook. f., Fl. Brit. India 1 : 398. 1874; Deb in Bull. Bot. Surv. India 3 : 285. 1961.

Mani.: Limon.

Diffuse herbs; 20 - 50 cm tall. Leaves 6 - 9 × 3- 5 cm, ovate, ovate-elliptic or oblong, acuminate or acute, serrate; stipules subulate. Inflorescence cymose. Flowers ca 40 cm across, yellow, opposite the leaves; sepals linear-oblong; petals yellow, spatulate; stamens numerous; ovary linear, style short. Capsules 1.5 - 2.5 cm long, elongate, angled, beak 3-fid.

*Fl. & Fr.* : August - November.

*Specimens examined* : Imphal valley, *C.B. Clarke* 42095 (CAL).

**2. *Corchorus capsularis* L.**, Sp. Pl. 529. 1753; Masters in Hook. f., Fl. Brit. India 1 : 397. 1874; Kanjilal *et al.*, Fl. Assam 1 : 168. 1934; Deb in Bull. Bot. Surv. India 3 : 285. 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 485. 1993.

Mani.: *Limon.*

Erect annual herbs, 50 - 150 cm high. Leaves 7 - 12 × 2 - 4 cm, ovate-lanceolate or elliptic ovate to linear lanceolate, acute or acuminate, serrate with basal serrulations on each side developing into tail like appendages. Flowers *ca* 0.3 cm across, in short cymes; sepals narrowly ovate, acuminate; petals ovate, acuminate; stamens numerous. Capsules 1 - 1.5 cm, oblong, not beaked, 5-valved without transverse septa; seeds wedge shaped.

*Fl. & Fr.* : August - December.

*Specimens examined* : Imphal valley, *Deb* 1036 (CAL).

Under cultivation for its fibres.

**3. *Corchorus olitorius* L.**, Sp. Pl. 529. 1753; Masters in Hook. f., Fl. Brit. India 1 : 397. 1874; Kanjilal *et al.*, Fl. Assam 1 : 169. 1934; Deb in Bull. Bot. Surv. India 3 : 285. 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 487. 1993.

Mani.: *Limon.*

Erect herbs *ca* 100 cm tall. Leaves stipulate, 5 - 8 × 2 - 3 cm, ovate-lanceolate, acute or acuminate, serrate, basal serrulations produced into tail like appendages on both sides. Inflorescence solitary axillary or 2 or 3 flowered cymes. Flowers pale yellow. Capsules 4 - 5 cm long, cylindrical, glabrous, 10-ribbed, 5-valved with transverse septa; seeds angular.

*Fl. & Fr.* : August - October.

*Specimens examined* : Imphal, *Deb* 467; Kakching, *Deb* 1208 (CAL).

Under cultivation.

### 3. *Grewia* L.

- 1a. Inflorescence paniculate, terminal and axillary ..... 4. *G. nervosa*
- b. Inflorescence cymose, terminal or leaf opposed ..... 2
- 2a. Peduncles much shorter or as long  
as petioles ..... 1. *G. abutilifolia*
- b. Peduncles much longer than petioles ..... 3
- 3a. Plants with bisexual and unisexual flowers ..... 3. *G. hirsuta*
- b. Plants with unisexual flowers only ..... 4
- 4a. Leaves densely pubescent beneath; petals white  
or pale yellow; drupes stellate-hispid ..... 2. *G. denticulata*
- 4. Leaves glabrous or glabrescent;  
petals greenish-white; drupes glabrescent ..... 5. *G. serrulata*

**1. *Grewia abutilifolia*** Vent. ex A. L. Juss. in Ann. Mus. Nat. Hist. Nat. 4 : 92. 1804; Masters in Hook. f., Fl. Brit. India 1 : 390. 1874; Kanjilal *et al.* Fl. Assam 1 : 166. 1934; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 493. 1993. *G. macrophylla* non G. Don. 1831; Naray. & R. Rao in J. Ind. Bot. Soc. 29 : 187. 1950; Deb in Bull. Bot. Surv. India 3 : 286. 1961.

Shrubs up to 3 m in height, bushy, young parts stellate tomentose. Leaves broadly oblong, irregularly serrate, 3 nerved at the base; petioles densely tomentose; stipules subulate. Peduncle about as long as petioles, axillary, 3-4 flowered; pedicels elongating and enlarging in fruits; bud ellipsoid; sepals narrowly oblong, white turning yellow, glabrous; petals much shorter than the sepals; ovary villose. Drupes 2-4 lobed.

*Fl. & Fr.* : July - December.

*Specimens examined* : Keutemabi, *G. Watt* 6808; Karong, *C. B. Clarke* 42009. (CAL).

**2. *Grewia denticulata*** Wallich ex Prain in Ann. R. Bot. Gard. Calc. 9 : 10, t. 12. 1901; Kanjilal *et al.*, Fl. Assam 1 : 167. 1934; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 497. 1993. *G. nagensium* Prain in J. Asiat. Soc. Bengal 69 : 168. 1900.

Small trees or straggling shrubs. Leaves stipulate, bifarious, 10-17 × 5-8 cm, oblong-lanceolate, acuminate, serrate. Flowers white in peduncled umbellate cymes. Drupes 1.5-2.5 cm long, 8-16 cm across.

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

*Specimens examined* : Khangui valley, *G. Watt* 67094; Chingmairong, *Deb* 384 (CAL).

***Grewia hirsuta*** Vahl, Symb. Bot. 1 : 34. 1790; Masters in Hook. f., Fl. Brit. India 1 : 391. 1874; Kanjilal *et al.*, Fl. Assam 1 : 165. 1834; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 501. 1993.

Mani.: *Kukurhicha*.

Shrubs, spreading up to 3 m in height. Leaves petiolate, 5-12 × 1-2.2 cm, linear-oblong, acute or acuminate, closely serrate, stellate pubescent above; petioles very short. Flowers yellow, polygamous; sepals linear-oblong; petals obovate-oblong. Drupes 1-2 lobed.

*Fl & Fr.* : September - January.

*Specimens examined* : Khangui valley, *G. Watt* 6794; Lainakhang, *Deb* 534 (CAL).

**4. *Grewia nervosa*** (Lour.) Panigr. in Taxon 34 : 702. 1985; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 502. 1993. *Fallopia nervosa* Lour., Fl. Cochinch. 336. 1790. *Microcos paniculata* L., Sp. Pl. 514. 1753; Deb in Bull. Bot. Surv. India 3 : 286. 1961. *Grewia microcos* L., Syst. Nat. ed. 12. 2 : 602. 1767; Masters in Hook. f., Fl.

Brit. India 1 : 392, 1874; Kanjilal *et al.*, Fl. Assam 1 : 162, 1934.

Deciduous trees or tall shrubs up to 10 m in height. Leaves 7.5–18 × 2.5–8.5 cm, ovate, oblong, obovate-oblong or lanceolate, serrulate, oblique. Inflorescence terminal panicles. Flowers 1.5 cm across, pale yellow in head of 2 or 3 with involucre bracts: sepals obovate-oblong; petals oblong. Drupes 1–1.2 cm, globose, black when ripe.

*Fl. & Fr.* : May–November.

*Specimens examined* : Imphal, Deb 421 (CAL).

5. *Grewia serrulata* DC., Prodr. 1 : 510, 1824; Naray. & R. Rao in J. Bot. Soc. 29 : 187, 1950; Deb in Bull. Bot. Surv. India 3 : 286, 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 509, 1993. *G. laevigata* non Vahl 1790; Masters in Fl. Brit. India 1 : 381, 1874, incl. syns. *G. multiflora* non A. L. Juss. 1804; Masters in Hook. f., Fl. Brit. India 1 : 388, 1874.

Tall shrubs or trees. Leaves petiolate, 4–10 × 1.5–3.5 cm, elliptic lanceolate, acuminate, rounded at the base; serrate; petioles short. Flowers in axillary cymes, 1–3 flowered, white, small; sepals 1–1.7 cm; petals half the length of sepals; gynophore elongated, glabrous. Drupes 1–1.5 cm across, 2–4 lobed, globose, black.

*Fl. & Fr.* : September–February.

*Specimens examined* : Langul Hill, Deb 1181; Chingnairong, G. Wait 607 (CAL); Dibongkhuno, Malick 688 (BSIS).

#### 4. *Triumfetta* L.

- |     |   |                         |
|-----|---|-------------------------|
| 1a. | Leaves ovate or rhomboid, 3-lobed;<br>spines not pilose ..... | 3. <i>T. rhomboidea</i> |
| b.  | Leaves oblong-lanceolate, not lobed; spines pilose .....      | 2                       |
| 2a. | Capsules glabrous .....                                       | 1. <i>T. annua</i>      |
| b.  | Capsules hispid .....   | 2. <i>T. pilosa</i>     |

1. *Triumfetta annua* L., Mant. Pl. 1 : 73, 1753; Masters in Hook. f., Fl. Brit. India 1 : 396, 1874; Deb in Bull. Bot. Surv. India 3 : 286, 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 518, 1993.

Small herbs or slender shrubs, 1–2 m high with a line of hairs along one side, the side shifting at each joint. Leaves ovate to elliptic–lanceolate, acute to acuminate, toothed 10–12 × 5–10 cm, glabrous; petioles 0.5–2.2 cm long. Inflorescence 3-flowered; flowers ca 5 mm across, orange–brown; petals orange coloured. Fruits globose, covered with long hooked spines.

*Fl. & Fr.* : June–December.

*Specimens examined* : Barak, Meebold 6092; Imphal valley, Deb 48 & 62 (CAL); Nungba to Oinamlong, Malick 1292 (BSIS)



2. *Triumfetta pilosa* Roth, Nov. Pl. Sp. 223. 1821; Masters in Hook. f., Fl. Brit. India 1 : 394. 1874; Kanjilal *et al.*, Fl. Assam 1 : 168. 1934; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 519. 1993.

Mani.: *Langiteeching*.

Undershrubs, branches straight, hairy. Leaves 7-15 × 2-6 cm, upper ones smaller, ovate-lanceolate or lanceolate, acuminate, base rounded, sub-cordate or acute, serrate, 5-7 nerved from base, stellately hairy above, tomentose beneath. Inflorescence axillary, forming terminal leafy spikes. Flowers greenish-yellow, up to 1.5 cm in diam. Capsules ca 1.2 cm across, globose, covered with hooked, pilose spines.

Fl. & Fr. : November - February

*Specimens examined* : Karong, G. Watt 7137; Nungba, Mukerjee 2731; Nungba, Meebold 6106; Imphal, Deb 611; Laimukhong, Deb 550; Paphima, Meebold 5216 (CAL). Langu, S. N. Bal 471 (BSIS).

3. *Triumfetta rhomboidea* Jacq., Enum. Syst. Pl. 22. 1760; Masters in Hook. f., Fl. Brit. India 1 : 395. 1875; Kanjilal *et al.*, Fl. Assam 1 : 178. 1934; Malick & Safui in J. Econ. Tax. Bot. 10 : 3. 1987; Daniel & Chandrabose in Sharma *et al.*, Fl. India 3 : 520. 1993.

Mani.: *Leehing*.

Herbaceous or suffruticose, up to 2 m in height. Lower leaves usually 3 lobed, 4.5-7 cm across, cordate, irregularly serrate, rounded or crenate at the base, upper ones smaller and narrowed, not lobed, 2.5-4 cm long. Flowers yellow, in dense leaf opposed and terminal cymes; sepals hooked at the apex; petals shorter than sepals. Capsules 0.5-0.8 cm cross, globose, bristled.

Fl. & Fr. : October - January.

*Specimens examined* : Kangrendhar, Malick 1028 (BSIS).

### 34. ELAEOCARPACEAE

A. P. de Candolle, Prodr. 1 : 519. 1824 ("Elaeocarpace").

(R. Shanpru & A. S. Chauhan)

- 1a. Flowers solitary or fascicled; torus depressed; fruits 1-seeded echinate capsules ..... 2. *Stoanea*
- b. Flowers in racemes; torus raised; fruits more than 1-seeded drupes ..... 1. *Elaeocarpus*

#### 1. *Elaeocarpus* L.

- 1a. Petals broader at base, narrowed at apex ..... 2
- b. Petals narrowed at base, broader at apex ..... 3

- 2a. Branchlets glabrous; stamens  
15-30; ovary disc 3-5 lobed ..... 4. *E. prunifolius*
- b. Branchlets grey silky pilose;  
stamens 25-30; ovary disc 10 lobed ..... 7. *E. varunna*
- 3a. Anthers not bearded at apex; ovary 2 celled ..... 1. *E. braceanus*
- b. Anthers bearded with tuft of hairs at apex;  
ovary 3-5 celled ..... 4
- 4a. Branchlets with, persistent leaf scars;  
petals not ciliate ..... 5. *E. serratus*
- b. Branchlets without leaf scars;  
petals ciliate ..... 5
- 5a. Petals oblong-cuneate; stamens 40-50 ..... 6. *E. tectorius*
- b. Petals obtriangular; stamens less than 35 ..... 6.
- 6a. Branchlets glabrous; petiole with  
a pair of glands at the apex ..... 2. *E. floribundus*
- b. Branchlets pubescent; petiole  
without any glands at apex ..... 3. *E. lancifolius*

1. *Elaeocarpus braceanus* G. Watt ex C. B. Clarke in J. Linn. Soc. 25 : 8. 1899; Kanjilal *et al.*, Fl. Assam 1 : 177. 1934; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Murti in Sharma *et al.*, Fl. India 3 : 535. 1993.

Small trees. Leaves petiolate, 6-13 × 2-4.5 cm, elliptic-lanceolate or oblong lanceolate, cuneate to obtuse at base, acuminate at apices. Inflorescence arising from axils of fallen leaves; pedicels stout, short. Flowers ca 5 mm across, white, brown tomentose; stamens 30-40. Drupes ca 4 cm long, pointed at apex; pyrenes with 3 indistinct grooves.

Fl. & Fr. : September-June.

Specimens examined : Koupru, G. Watt 5876; Phelang, Meebold 7101; Mao, 1723 (CAL).

2. *Elaeocarpus floribundus* Blume, Bijdr. 120. 1825; Masters in Hook. f., Fl. Brit. India 1 : 401. 1874; Kanjilal *et al.*, Fl. Assam 1 : 173. 1934; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Murti in Sharma *et al.*, Fl. India 3 : 536. 1993.

Mani. : Chorphon.

Medium sized trees. Leaves petiolate, 7.5-15 × 3.5-6 cm, ovate-elliptic, cuneate or rounded at base, bluntly acuminate at apex. Inflorescence raceme arising from axils of fallen leaves. Flowers ca 7 mm across, white; sepals 5 mm long; petals 5 mm long; stamens 25-30. Drupes ca 3 cm long, oblong, pale green; pyrenes 3-grooved.

Fl. & Fr. : March-December.

Specimens examined : Imphal, Meebold 6657; G. Watt 7225, Deb 504 (CAL).

3. *Elaeocarpus lanceifolius* Roxb., Fl. Ind. 2 : 598, 1832; Masters in Hook. f., Fl. Brit. India 1 : 402, 1874; Kanjilal *et al.*, Fl. Assam 1 : 175, 1934; Murti in Sharma *et al.*, Fl. India 3 : 543, 1993.

Trees, 15 - 20 m high. Leaves 6 - 15 × 2 - 5 cm, oblong, lanceolate, acuminate, base cuneate, serrate, nerves 6 - 8 pairs; petiolate. Inflorescence in upper leaf axils. Flowers white; sepals oblong lanceolate; petals ciliate; filaments hairy; ovary and style hairy. Drupes ovoid, 2.5 - 3 × 2 cm.

Fl. & Fr. : April - December.

Specimens examined : Sirohee furat, G. Watt 6912 (CAL).

4. *Elaeocarpus prunifolius* (C. Muell.) Masters in Hook. f., Fl. Brit. India 1 : 407, 1874; Kanjilal *et al.*, Fl. Assam 1 : 180, 1934; Deb in Bull. Bot. Surv. India 3 : 286, 1961; Murti in Sharma *et al.*, Fl. India 3 : 549, 1993. *Monocera prunifolius* C. Muell. Annot. Fam. Elaeocarp. 15, 1849.

Medium sized trees. Leaves petiolate, 5 - 12 × 2.5 - 5.5 cm, oblong-lanceolate to elliptic lanceolate, cuneate at base, acuminate at apex, crenate, serrate or subentire, glabrous above. Inflorescence axillary. Flowers ca 8 mm across; white; sepals 5 - 6 cm, pilose or glabrate outside, pubescent within; petals as long as sepals; stamens 15 - 25. Drupes 1.5 - 2 cm long, oblong ovoid, pyrenes obscurely 3 angled.

Fl. & Fr. : March - October.

Specimens examined : Chingmairang, Deb 1167; Jirighat, Meebold 10848; Nong Shong Khong, G. Watt 6260 (CAL).

5. *Elaeocarpus serratus* L., Sp. Pl. 515, 1753; Masters in Hook. f., Fl. Brit. India 1 : 401, 1874; Murti in Sharma *et al.*, Fl. India 3 : 553, 1993. *E. cuneatus* Wight Illus. 1 : 83, 1840; Masters in Hook. f., Fl. Brit. India 1 : 402, 1874.

Mani. : *Chorphon*.

Trees up to 30 m.; branchlets with leaf-scars. Leaves 5 - 13 × 2 - 6 cm, oblong, elliptic, base cuneate, margin serrate, acuminate; petioles 2 - 3 cm. Inflorescence axillary, drooping. Flowers 1.5 cm across, cream coloured; sepals 5, lanceolate; petals 5, obovate, ciliate; stamens numerous; anthers oblong; ovary pilose. Drupes ellipsoid, 1 seeded.

Fl. & Fr. : April - February.

Specimens examined : Imphal, Meebold 10840 (CAL).

6. *Elaeocarpus tectorius* (Lour.) Poir. in Lam., Encycl. 2 : 704, 1812; Balakr., Fl. Jowai 1 : 106, 1981; Murti in Sharma *et al.*, Fl. India 3 : 559, 1993. *Craspedum tectorium* Lour., Fl. Cochinch. 256, 1790. *Elaeocarpus robustus* Roxb., Fl. Ind. 2 : 597, 1832; Masters in Hook. f., Fl. Brit. India 1 : 402, 1874; Kanjilal *et al.*, Fl. Assam 1 : 173, 1934.

Trees, 15 - 25 m. Leaves rounded, base cuneate, acute to acuminate, repand serrate, 5 - 18 × 3 - 8 cm; petioles 2 - 5 cm. Inflorescence racemose. Flowers white.

Drupes 2-3 celled, oblong, with 3 longitudinal grooves.

*Fl. & Fr.* : April-September.

*Specimens examined* : Imphal, Deb 3512 (CAL).

7. *Elaeocarpus varunna* Buch.-Ham. ex Masters in Hook. f., Fl. Brit. India 1 : 407. 1874; Kanjilal *et al.*, Fl. Assam 1 : 180. 1934; Deb in Bull. Bot. Surv. India 3 : 286. 1961; Murti in Sharma *et al.*, Fl. India 3 : 561. 1993.

Fairly large trees. Leaves petiolate 10-20 × 4.5-17.5 cm, elliptic-oblong, base rounded, acuminate at apex crenate to serrate. Inflorescence narrowly triangular; stamens 25-30. Drupes ca 2 cm long, oblong; pyrenes unilocular, 3 grooved.

*Fl. & Fr.* : March-October.

*Specimens examined* : Nungba, Meekold 5541 (CAL).

## 2. *Sloanea* L.

*Sloanea tomentosa* (Benth.) Rehder & Wilson in Sarg., Pl. Wilson. 2 : 362. 1916; Murti in Sharma *et al.*, Fl. India 3 : 568. 1993. *Echinocarpus tomentosus* Benth. in J. Proc. Linn. Soc. Lond. 5 Suppl. 2 : 72. 1861; Masters in Hook. f., Fl. Brit. India 1 : 400. 1874; Deb in Bull. Bot. Surv. India 3 : 286. 1961.

Large trees. Leaves petiolate, 15-20 × 7.5-10 cm, elliptic, acuminate, glabrous above, tomentose beneath along the nerves. Flowers ca 12 cm across; sepals 5, ovate, mucronate, pointed; petals oblong, 4-5 toothed at the apex; anthers apiculate. Capsules ca 3.5 cm across, 4-5 valved; seeds arillate.

*Fl. & Fr.* : July-February.

*Specimens examined* : Konpra, G. Watt 6011 (CAL).

## 35. LINACEAE

S. F. Gray, Nat. Arr. Brit. Pl. 2 : 622, 639. 1821 ("Lineae").

(R. Shanpru & A.S. Chauhan)

- 1a. Inflorescence terminal raceme ..... 1. *Anisadenia*
- b. Inflorescence axillary or terminal cymes ..... 2.
- 2a. Stipules 0 or replaced by glands ..... 2. *Linum*
- b. Stipules present, minute, subulate, caducous ..... 3. *Reinwardtia*

### 1. *Anisadenia* Wallich ex Meissn.

*Anisadenia saxatilis* Wallich ex Meissn., Pl. Vasc. Gen. Comment. 2 : 96. 1838; Hook. f., Fl. Brit. India 1 : 412. 1874; Kanjilal *et al.*, Fl. Assam 1 : 186. 1938; Deb in Bull. Bot. Surv. India 3 : 289. 1961; Hajra in Sharma *et al.*, Fl. India 3 : 573. 1993. *A. khasyana* Griffith, Nouv. Pl. Asiat. 4 : 534. 1854. & Icon. Pl. Asiat. t. 593. 1854.

Perennial herbs with weak ascending stems 45 cm high; lower parts often

creeping and rooting. Leaves 5.2 - 10 × 2 - 3 cm, lanceolate to oblanceolate or elliptic-lanceolate, attenuate at base, acute or shortly acuminate, margins entire or nearly so, glabrous above, slightly pubescent beneath. Flowers ca 10 mm, in 3 - 10 cm long terminal racemes, pink; ovary ca 2 mm long, ovoid with globose stigma.

*Fl. & Fr.* : June - November.

*Specimens examined* : Ukhrul. Mukerjee 3204 (CAL).

## 2. *Linum* L.

*Linum usitatissimum* L., Sp. Pl. 277, 1753; Hook. f., Fl. Brit. India 1 : 410, 1874; Deb in Bull. Bot. Surv. India 3 : 289, 1961; Hajra in Sharma *et al.*, Fl. India 3 : 580, 1993. *L. trinervium* Roth, Nov. Sp. 187, 1821.

Mani.: Thoiding.

Annuals with erect stems. Leaves sub-sessile, 1 - 4 cm long, attenuate at both ends, 3-nerved. Flowers ca 2 - 3 cm in diam., blue, purple or rarely white, in broad cymes; stamens 5 perfect; ovary 5-celled; styles free, ovary about as long as the acuminate sepals.

*Fl. & Fr.* : January - March.

*Specimens examined* : Imphal, Deb 1617 (CAL).

## 3. *Reinwardtia* Dumort.

*Reinwardtia indica* Dumort., Comm. Bot. 19, 1822; Hajra, Fas. Fl. India 13 : 11, 1983 & in Sharma *et al.*, Fl. India 3 : 581, 1993. *Linum trigynum* Roxb. in Asiat. Res. 6 : 357, 1799, non L. 1753. *Reinwardtia trigyna* (Roxb.) Planch. in Hook., Lond. J. Bot. 7 : 522, 1848; Hook. f., Fl. Brit. India 1 : 412, 1874; Deb in Bull. Bot. Surv. India 3 : 289, 1961.

Glabrous undershrub about 1 m high often with rooting lower branches. Leaves 2.5 - 12 × 2 - 3.5 cm, oblanceolate or oblong-lanceolate, decurrent into a short petiole at base, acute or mucronate at apex; lateral nerves 5 - 9. Flowers ca 2.5 cm across, yellow, scented, solitary or in axillary or in terminal cymes, ovary ovoid triangular, styles usually 3, rarely 4 - 5 or 7. Capsule globose, shorter than sepals, dehiscent into 6 - 8 cocci, cocci 1 - seeded; seeds thin, reniform. Fairly common in dry grass lands and foot hills ascending to 1800 m, sometimes cultivated in gardens.

*Fl. & Fr.* : September - March.

*Specimens examined* : Chingmairang Deb 811 & 1344 (CAL).

## 36. ERYTHROXYLACEAE

Kunth in H. B. & K., Nov. Gen. Sp. 5 : ed. Fol. 135; ed. qu. 175, 1822.

("Erythroxyloae").

(A. S. Chauhan)

### 1. *Erythroxyllum* P. Br.

*Erythroxyllum coca* Laut., Encycl. 2 : 393, 1890; Deb in Bull. Bot. Surv. India 3:

289. 1961; Chatterjee & Sharma in Sharma *et. al.*, Fl. India 3: 595, 1993.

Bushy shrubs, bark brown. Leaves alternate. 3-7 × 1-2.5 cm, distichous, obovate or oblanceolate; apex round; base tapering to a short petiole; stipules persistent, bracts numerous. Flowers axillary, ca 0.4 cm across, yellow or yellowish green, heterostylous; styles free. Fruits 1.2 × 0.4 cm, trigonous, red when ripe; seeds subtrigonous, endosperm abundant.

*Fl. & Fr.* : May - September.

*Specimens examined* : Mao, Deb 2397 (CAL).

Under cultivation.

### 37. MALPIGHJACEAE

A. L. de Juss. Gen Pl. 252, 1789 ("Malpighiac").

(R. Shanpru & A. S. Chauhan)

- 1a. Flowers in terminal and axillary racemes,  
irregular; calyx with a large gland adnate to the pedicel;  
carpels winged only at the apex ..... 2. *Hiptage*
- b. Flowers in terminal and axillary panicles.  
regular; calyx without glands;  
carpels winged throughout ..... 1. *Aspidopterys*

#### 1. *Aspidopterys* A. Juss.

- 1a. Leaves 10 - 25 cm long, acuminate,  
pubescent on the nerves beneath ..... 2. *A. nutans*
- b. Leaves 5 - 10 cm long, acute, brown,  
much tomentose beneath ..... 1. *A. indica*

1. *Aspidopterys indica* (Roxb.) Hochr. in Bull. Inst. Bot. Butzg. 19 : 45, 1904; Srivastava in Hajra *et al.*, Fl. India 4: 8, 1997. *Triopteris indica* Roxb., Pl. Corom. 1: 160, 1798. *Aspidopterys roxburghiana* A. Juss. in Ann. Sci. Nat. Bot. ser. 2, 13 : 267, 1840; Hook. f., Fl. Brit. India 1 : 420, 1874, p.p. *A. glabriuscula* auct. non A. Juss., 1840; Kanjilal *et al.*, Fl. Assam 1 : 189, 1936.

Climbing shrubs, bark brown, young parts brown tomentose. Leaves 5 - 10 × 3 - 5 cm, ovate or elliptic ovate, acute to short acuminate, base obtuse to cordate, petioles 10 - 15 cm long. Flowers 0.5 - 0.6 cm across; in axillary and terminal rusty tomentose panicles. bracts linear-subulate; calyx lobes 5, obovate-oblong to elliptic glandular, pubescent or glabrescent; petals 5, obovate-oblong, oblong-elliptic or ovate; stamens few, filaments filiform, jointed a little below the middle; ovary pilose or glabrescent. Fruits of 1 - 3 samaras, wings 3.

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

*Specimens examined* : Sakok, Meebold 7143; Chatrik, Mukerjee 3692; Nungba, Meebold 6102 (CAL).

2. *Aspidopterys nutans* (Roxb.) A. Juss. in Ann. Sci. Nat. Bot. ser. 2, 13 : 267. 1840; Hook. f., Fl. Brit. India 1 : 421. 1878, *p.p.*; Deb in Bull. Bot. Surv. India 3 : 288. 1961; Srivastava in Hajra *et al.*, Fl. India. 4: 9. 1997. *Hiraea nutans* Roxb., Fl. India 2: 448. 1824.

Woody climbers, young shoots and inflorescence adpressed, grey or brownish silky tomentose. Leaves 10 - 25 cm long, broadly ovate or sub-orbicular, acuminate. Flowers small *ca* 8 mm across, in panicles; calyx lobes *ca* 1 mm, ovate, glabrous; petals *ca* 4 mm, obovate, white; filaments *ca* 1.5 mm long. samaras 4 × 2.5 cm, usually oblong, sometimes almost orbicular, brown.

*Fl. & Fr.* : May - February.

*Specimens examined* : Chingmairong, Deb 1061 (CAL).

### 2. *Hiptage* Gaertn.

- 1a. Inflorescence in short panicles; wings of samaras equal, not longitudinally nerved ..... 2 *H. benghalensis*
- b. Inflorescence racemose; wings of samaras unequal, longitudinally nerved ..... 1. *H. acuminata*

1. *Hiptage acuminata* Wallich ex A. Juss. in Ann. Sci. Nat. Bot. ser. 2, 13; 269. 1840; Hook. f., Fl. Brit. India 1 : 419. 1874; Kanjilal *et al.*, Fl. Assam 1 : 89. 1934; Deb in Bull. Bot. Surv. India 3 : 289. 1961; Srivastava in Hajra *et al.*, Fl. India 4: 14. 1997.

Bushy shrubs. Leaves 7.5 - 20 × 2.2 - 6 cm, lanceolate, usually cordate, acuminate, base narrowed, silky tomentose; petioles 6 - 7 cm long. Inflorescence tomentose racemose, axillary. 2 - 4 cm long. Flowers *ca* 1.5 cm across, dull, yellowish white; samara generally 3-winged, wings unequal, 2 - 5.5 × 6 - 9 cm, calyx lobes *ca* 4 mm long, sub-orbicular above dark brown.

*Fl. & fr.* : April - August.

*Specimens examined* : Imphal, G. Watt 7232 (CAL).

2. *Hiptage benghalensis* (L.) Kurz in J. Asiat. Soc. Bengal 43 (2) : 136. 1874; Deb in Bull. Bot. Surv. India 3 : 289. 1961; Srivastava in Hajra *et al.*, Fl. India 4: 14. 1997. *Banisteria benghalensis* L., Sp. Pl. 427. 1753. *Hiptage madablota* Gaertn., Fruct. 2 : 169, t. 116. 1791; Hook. f., Fl. Brit. India 1 : 418. 1874; Kanjilal *et al.*, Fl. Assam 1 : 188. 1934.

Mani.: *Mudhabi*.

Large evergreen scandent shrubs. Leaves 10 - 15 × 3.5 - 6.5 cm, oblong or ovate lanceolate, acuminate. Flowers *ca* 2.5 cm across, white or dull white, in terminal and axillary racemes; calyx with large oblong gland outside; petals 4, white, fimbriate; stamens 10, one larger than the rest. Fruits winged; wings 3, median one larger 3 - 5 cm long.

*Fl. & Fr.* : February August

*Specimens examined* : Imphal, *G. Watt* 7226; Nambur, *Meebold* 5544; Imphal, *Meebold* 6379; Imphal, *Deb* 297 (CAL).

### 38. GERANIACEAE

A. L. de Juss., *Gen. Pl.* 268. 1789 ("Gerania").

(*R. Shanpru & A. S. Chauhan*)

*Geranium* L.

*Geranium nepalense* Sweet, *Geraniaceae* 1 : t. 12. 1820; Edgew. & Hook. f. in Hook. f., *Fl. Brit. India* 1 : 430. 1874; Deb in *Bull. Bot. Surv. India* 3 : 342. 1961; Malhotra in Hajra *et al.*, *Fl. India* 4: 75. 1997. *G. radicans* DC., *Prodr.* 1: 639. 1824.

Decumbent herbs, hairy or villous. Leaves 2 - 4 cm across, orbicular, 5-angled, palmately 3 - 5 nerved; petioles 2 - 15 mm; stipules 5 - 7 mm, subulate lanceolate. Flowers pink, axillary, solitary or paired on 2 - 4 cm long peduncles; sepals *ca* 4 mm long; petals *ca* 5 mm long; pink with 3 dark purple streaks inside; anthers violet blue. Capsules ellipsoid to subglobose, 5 lobed, hairy; seeds black.

*Fl. & Fr.* : May October

*Specimens examined* : Mao 1330m, *G. Watt* 61165; Maram, *Deb* 1921 (CAL).

### 39. OXALIDACEAE

R. Br. in Tuckey, *Narr. Exped. Congo.* 433. 1818 ("Oxalideae").

(*R. Shanpru*)

- 1a. Erect herbs, leaves pinnately compound  
more than 3 foliolate ..... 1 *Biophytum*
- b. Prostrate herbs; leaves palmately  
compound, 3-foliolate ..... 2. *Oxalis*

#### 1. *Biophytum* DC.

*Biophytum reinwardtii* (Zucc.) Klotzsch in Peters. *Reiz Mossamb. Bot.* 1 : 85. 1862; Edgew. & Hook. f. in Hook. f., *Fl. Brit. India* 1 : 437. 1874; Deb in *Bull. Bot. Surv. India* 3 : 342. 1961; Manna in Hajra *et al.*, *Fl. India* 4: 236. 1997. *Oxalis reinwardtii* Zucc. *Abh. Akad. Munch.* 1 : 274. 1830.

Small erect herbs, with reflexed hairy stems; stems, 7 - 10 cm high. Leaflets 3.5 - 12 cm long, sessile, oblong obovate, ciliate. Flowers yellow, in umbels 5-merous; sepals *ca* 2.5 mm long; petals *ca* 6 mm long, oblanceolate; lanceolate; stamens 10, filaments ciliate. Fruits dehiscent loculicidally; seeds ovoid, tubercled.

*Fl. & Fr.* : August November.

*Specimens examined* : Ukhrul, *Mukerjee* 3696 (CAL).



2. *Oxalis* L.

- 1a. Leaves obtriangular; flowers white ..... 1. *O. acetosella*  
 ..... subsp. *griffithii*
- b. Leaves obovate; flowers yellow ..... 2
- 2a. Peduncles with 2 or more flowers in cymes;  
 bracts not setaceous; capsule hairy ..... 2. *O. corniculata*
- b. Peduncles with subumbellate corymbs;  
 bracts setaceous; capsules tomentose ..... 3. *O. debilis*  
 ..... var. *corymbosa*

**1. *Oxalis acetosella*** L. subsp. *griffithii* (Edgew. & Hook. f.) Hara in J. Jap. Bot. 30 : 22. 1955. *O. griffithii* Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 436. 1974; Deb in Bull. Bot. Surv. India 3 : 342. 1961.

Perennial herbs with thick rhizomes. Leaves radical, 3-foliolate; leaflets 1 - 1.2 x 2 - 4 cm, obovate to obtriangular - retuse; stipules small. Peduncles 1-flowered. Flowers 5 - 6 mm long, white, cleistogamous; petals 1.5 - 1.8 cm long, white. Capsule ca 1.2 cm long, ovoid.

*Fl. & Fr.* : April - November.

*Specimens examined* : Chingsaw, G. Watt 6442; Ukhul, Mukerjee 2216 (CAL).

**2. *Oxalis corniculata*** L., Sp. Pl. 435. 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 436. 1874; Deb in Bull. Bot. Surv. India 3 : 342. 1961; Manna in Sharma *et al.*, Fl. India 4: 282. 1997.

Mani.: *Yensil*.

Diffuse herbs with procumbent branches; rooting at nodes. Leaves alternate, 1 - 2.5 cm long; leaflets 1.5 x 1 cm, obovate, cuneate at base, notched at apex, membranous; petioles 3 - 8 cm long; peduncles 2 or more flowered. Flowers ca 1 cm across, yellow, throughout the year; bracts linear or lanceolate. Capsules 1.5 - 2.5 cm long, cylindrical, pubescent; seeds ribbed, dark brown.

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

*Specimens examined* : Ukhul, Mukerjee 2808; Imphal, Deb 230 (CAL); Nungba, Malick 1169 & 1288 (BSIS); Ukhul, Chauhan 94903 (ASSAM).

**3. *Oxalis debilis*** H. B. K. var. *corymbosa* (DC.) Lourt in Ann. Miss. Bot. Gard. 67 : 840. 1980. *O. corymbosa* DC., Prodr. 1 : 698. 1824; Babu, Herb. Fl. Dehradun 103. 1977. *O. martiana* Zucc. in Denkschr. Akad. Muench. 9 : 144. 1823 - 1824; Deb in Bull. Bot. Surv. India 3: 342. 1961.

Perennial acaulescent herbs with brownish bulbous rootstock. Leaves radical; leaflets 2 - 4 cm wide, obovate, cuneate at base, deeply notched. Flowers sub-umbellate corymbs; peduncles 5 - 25 cm long, hairy; sepals 0.5 cm long, with two

orange dot like glands at the apices; petals 1.5 - 2 cm long, obovate-spathulate, yellow with dark purple streaks. Capsules *ca* 1 cm long, tomentose.

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

*Specimens examined* : Imphal, Deb 1253 (CAL).

#### 40. AVERRHOOACEAE

Hutch. Fam. Fl. Pl, ed. 2, 1 : 356. 1959.

(R. Shanpru)

*Averrhoa* L.

*Averrhoa carambola* L., Sp. Pl. 428. 1753; Edgew. & Hook. f. in Hook. f., Fl. Brit. India 1 : 439. 1874; Kanjilal *et al.*, Fl. Assam 1 : 192. 1934; Deb in Bull. Bot. Surv. India 3 : 305. 1961; Manna in Hajra *et al.*, Fl. India 4 : 257. 1997.

Mani. : *Heinojhom*.

Small tree up to 10 m high; crown compact. Leaves alternate, 7-18 cm long; leaflets 7-11, 1-6 × 0.5-3.5 cm (terminal largest), ovate, rhomboid or ovate-elliptic, acuminate, truncate or cuneate at base often oblique. Panicle up to 10 cm across. Flowers 3-5 mm long, pinkish-purple. Drupes deeply 5-lobed, oblong in outline, sourish.

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

*Specimens examined* : Imphal, Deb 2210 (CAL).

Under Cultivation.

#### 41. TROPAEOLACEAE

A. P. de. Candolle, Prodr. 1: 683. 1824

("Tropaeoleac").

(R. Shanpru)

*Tropaeolum* L.

*Tropaeolum majus* L., Sp. Pl. 345. 1753; Deb in Bull. Bot. Surv. India 3:342. 1961; Manna in Hajra *et al.*, Fl. India 4 : 258. 1997.

Herbs, climbing or creeping, succulent, glabrous. Leaves long petioled, 3 - 10 cm in diam., reniformed or orbicular, peltate, entire, 7 - 9 palmate veined. Flowers variously elliptic, *ca* 2 cm, acute, spurred; petals obovate, rounded at the apex, orange or red, shortly clawed. Fruits *ca* 12 cm in diam., striate.

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

*Specimens examined* : Imphal, Deb 251 (CAL)

Garden plant, under cultivation for its showy flowers.

42. BALSAMINACEAE

A. Richard, Dict., Class. Hist. Nat. 2 : 173, 1822

("Balsamineae")

(A. S. Chauhan)

**Impatiens L.**

1a.	Bracts deciduous .....	2
b.	Bracts persistent .....	3
2a.	Intrapetiolar glands present; sepals 2-4; lip trumpet shaped .....	13. <i>I. stenantha</i>
b.	Intrapetiolar glands absent; sepals always 2; lip funnel shaped .....	14. <i>I. teneriflora</i>
3a.	Flowers laxly racemed; spur posterior incurved .....	4. <i>I. cathcartii</i>
b.	Flowers not laxly racemed; spur anterior .....	4
4a.	Leaves all opposite .....	5
b.	Leaves alternate, sub-opposite or crowded at apices of branchlets .....	8
5a.	Petioles more than 1 cm long; flowers on long peduncles .....	6
b.	Petioles less than 8 mm long; flowers otherwise .....	7
6a.	Intrapetiolar glands rare or absent; seeds smooth, glabrous; .....	12. <i>I. spissiflora</i>
b.	Intrapetiolar glands present; seeds rough granulose. ....	15. <i>I. tripetala</i>
7a.	Stems glabrous; leaves linear-lanceolate; stipules setaceous; seeds smooth .....	5. <i>I. chinensis</i>
b.	Stems crisply pubescent; leaves oblong, lanceolate; stipules subulate; seeds tuberculate or granulate .....	3. <i>I. benthamii</i>
8a.	Bracts large ca 1.4 cm long; leaves crowded towards the apex of branchlets .....	9
b.	Bracts minute or absent; leaves alternate, opposite, rarely whorled .....	11
9a.	Herbs with ovate-oblong leaves; petioles 2-3 cm long .....	11. <i>I. rubrolineata</i>
b.	Shrubs with oblong-lanceolate leaves; petioles 3-5 cm long .....	10
10a.	Flowers yellowish-white; vexillum reniform; filaments 6-7 mm long .....	7. <i>I. laevigata</i>
b.	Flowers pale-yellow with red striation; vexillum orbicular; filaments 5 mm long.....	9. <i>I. odontosepala</i>

- 11a. Petioles with 2-angled at base; flowers pale-yellow with red striation; spur hooked ..... 10. *I. porrecta*  
 b. Petioles with several glands; flowers otherwise; spur not hooked ..... 12
- 12a. Leaves ciliate at base; spur posterior ..... 1. *I. arguta*  
 b. Leaves not ciliate at base; flowers otherwise; spur anterior ..... 13
- 13a. Spur incurved; capsules turgid in middle, densely tomentose ..... 2. *I. balsamina*  
 b. Spur straight not incurved; capsules fusiform; falcate; seeds rugulose ..... 14.
- 14a. Intrapetiolar glands absent; flowers golden yellow; sepals 4, oblong ..... 6. *I. gibbisezata*  
 b. Intrapetiolar glands present; flowers red; sepals 2, ovate ..... 8. *I. longirama*

**1. *Impatiens arguta*** Hook. f. & Thomson in J. Linn. Soc. 4 : 137. 1860; Hook. f., Fl. Brit. India 1 : 470. 1875; Deb in Bull. Bot. Surv. India 3 : 342. 1961; Chauhan in J. Meghalaya Sci. Soc. 5 : 6. 1982; Vivekananthan *et al.* in Hajra *et al.*, Fl. India 4: 120. 1997.

Erect glabrous or sparsely pubescent, succulent herb. Leaves ovate or lanceolate, strongly toothed, ciliated at the base; petioles glandular. Peduncles short 1-2 flowered; bracts setaceous, twisted. Flowers large, violet-red or bluish: sepals ovate, standard orbicular, spurred behind; terminal lobe of wings very long; lips elongate; spur short, stout, incurved. Capsules ca 2.5 cm long, slender.

*Fl. & Fr.* : July - October.

*Specimens examined* : Imphal valley, Deb 2520; Litan, Mukerjee 2587 (CAL).

**2. *Impatiens balsamina*** L., Sp. Pl. 938. 1753; Hook. f., Fl. Brit. India 1 : 453. 1874; Deb in Bull. Bot. Surv. India 3 : 342. 1961; Chauhan in J. Meghalaya Sci. Soc. 5 : 6. 1982; Vivekananthan *et al.* in Hajra *et al.*, Fl. India 4: 123. 1997.

*Mani.*: Khujag.

Pubescent or glabrate herbs. Leaves petioled narrowly lanceolate, acuminate, deeply serrate; petioles glandular. Flowers fascicled, rose coloured; sepals broad-ovate, minute; standard orbicular, retuse; wings very broad, lateral lobes much rounded; terminal sessile, very large; lips small conoid; spurs short or long slender, incurved. Capsules turgid in the middle, tomentose.

*Fl. & Fr.* : July - August.

*Specimens examined* : Ukhrul, Mukerjee 3241 (CAL); Stripurkhal, Malick 1079; Nungba, Malick 1294 (BSIS).

Cultivated as an ornamental plant in gardens.

**3. *Impatiens benthamii*** van Steenis in Bull. Bot. Jard. Botz. ser. 3, 17 : 385. 1984;

Vivekanathan *et al.* in Hajra *et al.*, Fl. India 4: 124. 1997. *I. salicifolia* Hook. f. & Thomson in J. Linn. Soc. 4: 124. 1860, *non* Turcz., 1859; Hook. f., Fl. Brit. India 1: 450. 1874; Deb in Bull. Bot. Surv. India 3: 343. 1961. *I. radicans* Benth. ex Hook. f. & Thomson in J. Linn. Soc. Bot. 4: 126. 1860, *non* Zoll. & Mart. 1854; Hook. f., *l.c.* 451. 1874.

Stems stout, 35 - 70 cm long with spreading branches. Leaves 5 - 12 cm long, oblong-lanceolate, acuminate at both ends, membranous, tomentose on both surfaces. Pedicels 1-flowered with subulate bracteole. Flowers dark purple nearly triangular in profile, and 2 cm from the tip of the spur to that of the standard. Capsules 2 cm, elliptic-lanceolate.

*Fl. & Fr.* : August - October.

West Manipur. C. B. Clarke (Specimens not seen).

4. *Impatiens cathcartii* Hook. f., Fl. Brit. India 1: 473. 1878; Deb in Bull. Bot. Surv. India 3: 342. 1961; Chauhan in J. Meghalaya Sci. Soc. 5: 4. 1982; Vivekanathan *et al.* in Hajra *et al.*, Fl. India 4: 130. 1997.

Erect much branched glabrous up to 60 cm high. Leaves petioled, elliptic-lanceolate, acuminate, crenate. Peduncles axillary, long stout; bracts small. Flowers large in lax raceme; sepals large, coloured, standard orbicular, gibbous or spurred on the back; wings short, 2 lobed; lip saccate with short stout incurved spur.

*Fl. & Fr.* : September - December.

*Specimens examined* : Gurima, Mukerjee 3641 (CAL); Litan. Chauhan 94862 (ASSAM).

5. *Impatiens chinensis* L., Sp. Pl. 937. 1753; Hook. f., Fl. Brit. India 1: 444. 1874; Deb in Bull. Bot. Surv. India 3: 342. 1961; Chauhan in J. Meghalaya Sci. Soc. 5: 5. 1982; Vivekanathan *et al.* in Hajra *et al.*, Fl. India 4: 131. 1997.

Mani.: Khujang.

Slender erect herbs, 15 - 40 cm; stems angled, rooting at the base. Leaves linear lanceolate, rounded or subcordate at base, acute to mucronate, shortly serrate at margin, 4 - 8 × 0.4 - 0.8 cm, white glaucous beneath. Flowers pink or reddish-pink, ca 2 cm across, axillary, solitary or in 2 - 3 flowered fascicles.

*Fl. & Fr.* : May - October.

*Specimens examined* : Mayang Khong, G. Watt 6822; Koupra, Meebold 5926; Bishenpur, Meebold 6555 (CAL); Keibul Lamjao National Park. Chauhan 95148 (ASSAM).

6. *Impatiens gibbisejala* Hook. f. in Bull. Misc. Inform. 1910: 298. 1910; Vivekanathan *et al.*, Hajra *et al.*, Fl. India 4: 151. 1997.

Slender erect herbs; stem branched, glabrous. Leaves alternate, 6 - 10 cm long, ovate or ovate lanceolate, caudate acuminate, attenuate at base; lateral nerves 8 - 10 on either side; intra-petiolar glands absent. Inflorescence pedunculate; peduncles

shorter than leaves, erect, few flowered. Flowers golden-yellow; sepals 4, outer two, 6-7 mm long, oblong, acute or cuspidate, produced at the base on one side into a prominent lobule; inner two subulate, hyaline; vexillum ca 6 mm long, ovate or oblong, acute; wings sessile; link of labellum short, boat shaped, narrowing into ca 3 cm long spur; filament short, broadly linear; anthers connate into head.

*Fl. & Fr.* : August - November.

*Specimens examined* : Kaprou 2440m, Meebold 9231 (K).

7. *Impatiens laevigata* Wallich ex. Hook. f. & Thomson in J. Linn. Soc. 4 : 146, 1860; Hook. f., Fl. Brit. India 1 : 473, 1875; Chauhan in J. Meghalaya Sci. Soc. 5 : 6, 1982; Vivekananthan *et al.* in Hajra *et al.*, Fl. India 4: 167, 1997.

Erect undershrubs; stems woody below, much branched. Leaves obliquely cuneate at base, acute to cordate-acuminate, distantly serrate with ciliate or mucronate crenations, 5-15 × 2-5 cm; petioles 0.5-4 cm long often glandular. Racemes dense; peduncles 1-2 cm. Flowers 2.5-3 cm, yellow with pink streaks. Capsules elongate, linear, ca 1.5 cm long; seeds ovoid, rugose.

1a. Flowers ca 2.6 cm across,  
yellow with pink streaked ..... var. *laevigata*

b. Flowers ca 4 cm across;  
yellowish-white ..... var. *grandiflora*

var. *laevigata*

*Fl. & Fr.* : July - December.

*Specimens examined* : Ukhrul. Mukerjee 2970 (CAL); Litan, Chauhan 94745 (ASSAM).

var. *grandiflora* Hook. f. in Kew Bull. 8 : 299, 1910.

Shrubs much branched; branchlets robust, terete, glabrous. Leaves alternate, crowded towards apex of branchlets, oblong, acuminate crenate, serrate; lateral nerves 7-8 on either side; intrapetiolar glands absent. Peduncles 4-5 cm long, with 1-2 bracteate at the middle. Flowers ca 4 cm across, fleshy, yellowish-white; sepals 4, outer two, 1.8-2 cm, orbicular, apiculate; inner two, 2 cm long, falcate, acute; vexillum large, reniform; wings sessile, 2.5 cm long; lip broadly funnel shaped, gradually attenuating to a robust, obtuse, incurved spur ca 2.5 cm long; filaments 6-7 mm long, slender; anthers obtuse; ovary sickle shaped, acuminate.

*Fl. & Fr.* : October - January.

*Specimens examined* : Barak 1229 m, Meebold 6272 (K).

8. *Impatiens longirama* Hook. f. in Bull. Misc. Inform. 1910. 297, 1910; Vivekananthan *et al.* in Hajra *et al.*, Fl. India 4: 175, 1997.

Herbs irregularly branched, glabrous or puberulous. Leaves opposite and ternately verticillate, 8-12 cm long, elliptic-lanceolate, acuminate at base and apex; lateral nerves 10-12 on either side; intrapetiolar glands present. Inflorescence simply pedicellate; pedicels ca 1.2 cm long. Flowers ca 2 cm across, red; sepals 2, ca 2 mm long.

ovate or ovate lanceolate, uninerved; vexillum *ca* 1.5 cm broad, oblate, orbicular, baccate; wings 2 - 3 cm long, stipitate; limb of labellum *ca* 2 mm long, saccate, with a short spur. Capsules *ca* 1.5 cm long, fusiform, terete, straight or falcate, few seeded; seeds 2 - 3 mm long, obovate, rugulose.

*Fl. & Fr.* : October - January.

*Specimens examined* : Irong 1220 m, Meebold 5867 (K).

**9. *Impatiens odontosepala*** Hook. f. in Bull. Misc. Inform. 1910 : 299, 1910; Vivekananthan *et al.* in Hajra *et al.*, Fl. India 4: 187, 1997.

Tall herbs or small shrubs, glabrous; branches and branchlets terete, fistulose. Leaves crowded at apices of branchlets, alternate, 1 - 1.5 cm long, oblong-lanceolate or oblanceolate, obtuse, acuminate, base narrowed into a slender petiole 3 - 5 cm long; lateral nerves 6 - 10 on either side; intrapetiolar glands absent. Peduncles short *ca* 3.5 cm long, 1 - 4 flowered. Flowers *ca* 4 cm across, fleshy pale-yellow with red; sepals 4, outer two 1.5 - 1.7 cm long, oblique ovate - oblong, cuspidate acuminate; inner ones, 1.5 - 2 cm long, narrowly linear - elongate, acuminate; vexillum *ca* 2.5 cm broad, orbicular, fleshy, acute; wings sessile, 2 - 2.5 cm long; labellum cylindric, thickly fleshy, base tapered into a short, robust incurved, obtuse spur; filaments *ca* 5 mm long, filiform; anthers obtuse.

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

*Specimens examined* : Koupru 2135 m, Meebold 6491 (K).

**10. *Impatiens porrecta*** Wallich ex. Hook. f. & Thomson in J. Linn. Bot. Soc. 4 : 138, 1860; Hook. f., Fl. Brit. India 1: 472, 1875; Deb in Bull. Bot. Surv. India 3 : 343, 1961; Chauhan in J. Meghalaya Sci. Soc. 5 : 6, 1982; Vivekananthan *et al.* in Hajra *et al.*, Fl. India 4: 195, 1997.

Stems simple, 30 - 45 cm long, succulent, creeping below. Leaves 4 - 6.5 cm, membranous; petioles 2.5 - 3 cm; peduncles shorter than the leaves. Flowers large, *ca* 4 cm long, pale-yellow, with red striations; lip triangular in profile, narrowed into a spur as long as itself; spurs posterior.

*Fl. & Fr.* : July - December

*Specimens examined* : Irong, Meebold 6713 (CAL).

**11. *Impatiens rubro-lineata*** Hook. f. in Bull. Misc. Inform. 1910: 300, 1910; Vivekananthan *et al.*, in Hajra *et al.* Fl. India 4: 205, 1997.

Erect herbs, glabrous. Leaves crowded at apex, alternate, 6 - 10 cm long, ovate-oblong, acuminate, narrowing into slender 2 - 3 cm long petiole; lateral nerves 6 - 8 on either side; intrapetiolar glands absent. Peduncles 2 - 4 flowered. Flowers *ca* 4 cm across, light yellow with red striations; sepals 4, outer two, 1.5 - 2 cm long, ovate-oblong, acuminate, 5 - 7 nerved; inner two longer, flaccid; vexillum *ca* 3 cm broad, orbicular or oblate; wings 3 - 3.5 cm long, cuneate at base; limb of lip thick, 2.5 - 3 cm long, broadly funnel shaped, horizontal or ascending; filaments 8 - 12 mm long, slender, anther large, connate, ovary more or less straight acute.

*Fl. & Fr.* : October - January.

*Specimens examined* : Laimatak 1525 m., Meebold 6275 (K).

**12. *Impatiens spissiflora*** Hook. f. in Bull. Misc. Inform. 1910: 296, 1910; Vivekanathan *et al.* in Hajra *et al.*, Fl. India 4: 211, 1997. Fig. 24

Tall herbs; branches rigid, glabrous or young leaves puberulous. Leaves opposite, shortly petiolate, 8 - 12 cm long, oblong acute or acuminate; lateral nerves 12 - 16 on either side interpetiolar glands few. Inflorescence pedunculate, with 2 - 6 flowers; peduncles 2 - 7 cm long. Flowers *ca* 3 cm, spreading; sepals 2, *ca* 4 - 6 mm long, ovate, erect or subfalcate, obtuse or acute, 5 nerved; vexillum *ca* 1.4 cm in diam., orbicular or oblate; wings *ca* 2.6 cm long, sessile or shortly stipitate, dorsal auricles large, reniform; limb of lip saccate, funnel shaped, *ca* 1.5 cm long. Capsules *ca* 2 cm long, narrowly fusiform; seeds *ca* 2.5 mm in diam., orbicular, compressed, glabrous.

*Fl. & Fr.* : September - December.

*Specimens examined* : Koupru, 1525 m. Meebold 5879; Barak 915 - 1220m, Meebold 6285, 6367 (CAL).

**13. *Impatiens stenantha*** Hook. f. Fl. Brit. India 1: 478, 1875; C. B. Clarke in J. Linn. Soc. 25: 9, 1889; Deb in Bull. Bot. Surv. India 3: 343, 1961; Chauhan in J. Meghalaya Sci. Soc. 5: 4, 1982; Vivekanathan *et al.* in Hajra *et al.*, 4: 212, 1997.

Tall erect much branched herbs. Leaves 5 - 12 cm long; petiole 1.2 - 7.5 cm; peduncles slender. Racemes short; bracts setaceous, caducous long before the opening of the flower, beaked at the tip. Flowers on short racemes; yellow, often speckled with red; standard orbicular or oblong; spur slender, not hooked. Capsules 1.2 cm, narrow, clavate.

*Fl. & Fr.* : September - October.

North Manipur, C. B. Clarke *s.n.*

(Specimen not seen).

**14. *Impatiens teneriflora*** Hook. f. in Bull. Misc. Inform. 1910: 296, 1910; Vivekanathan *et al.* in Hajra *et al.*, Fl. India 4: 215, 1997. Fig. 25

Tall branched herbs, branches and branchlets solid, glabrous. Leaves alternate, 3 - 8 cm long, oblong, lanceolate or linear oblong, long acuminate, sparsely setulose; long petioled; interpetiolar glands absent. Inflorescence 1 - 6 flowered, peduncle 3 - 5 cm long; pedicels filiform, 2 - 3 cm long. Flowers *ca* 4 cm, spreading; sepals 2, *ca* 8 - 10 mm long, broadly ovate or oblong, acute or acuminate, membranous, 3 - 5 nerves. vexillum oblong-ovate, obtuse; wings *ca* 2.5 cm long, cuneate at base; distal lobes broadly axe-shaped, obtuse, reniform; lobellum funnel shaped; spur 3 - 3.5 cm long, incurved. Capsules *ca* 2 cm long, compressed, attenuate at base, acuminate at apex, many seeded; seeds *ca* 1.5 mm long, oblong, brown.

*Fl. & Fr.* : September - December.

*Specimens examined* : Laimatak 1525, Meebold 6500 (K).





Fig. 24 - A flowering twig of *Impatiens spissiflora* Hook. f



Fig. 25 : A flowering twig of *Impatiens teneriflora* Hook. f.

**15. *Impatiens tripetala*** Roxb. ex DC., Prodr. 1 : 687. 1824; Hook. f., Fl. Brit. India 1 : 470. 1875; Deb in Bull. Bot. Surv. India 3 : 343. 1961; Chauhan in J. Maghalaya Sci. Soc. 5 : 5. 1982; Vivekananthan *et al.* in Hajra *et al.*, 4: 219. 1997.

Annual herbs; stems stout, succulent, 45 - 60 cm. Leaves opposite, 5 - 20 cm; petioles *ca* 10.5 cm long; pedicels 1.2 - 2.5 cm, glabrous. Flowers red or purple. 4 cm long from base of the lip to the tip of the standard; sepals small; standard galeate. wings with 2 sub-orbicular lobes; lips rounded at the base suddenly narrowed into a spur. Capsules 1.2 - 2 cm, ellipsoid.

- 1a. Leaves 5 - 20 cm long; flowers *ca* 4 cm long, red or purple ..... 1. var. *tripetala*
- b. Leaves 5 - 12 cm long; flowers *ca* 1.8 cm long, red ..... 2. var. *microsypha*

var. *tripetala*

*Fl. & Fr.* : August - December.

*Specimens examined* : Litau, Mukerjee 3179; Jirighat, Meebold 5687; Bishenpur, Meebold 6725 (CAL).

var. *microsypha* Hook. f. in Kew Bull. 8 : 298. 1910.

Tall slender herbs, more or less glabrous. Leaves opposite or alternate, 5 - 12 cm long, ovate or ovate-lanceolate, acuminate, sub-entire or minutely serrulate; lateral nerves 8 - 14 either side; intrapetiolar glands present. Inflorescence simple pedicellate; peduncles 0.5 - 1 cm long, 3 - 5 flowered. Flowers *ca* 1 cm long, red; sepals 2, *ca* 0.5 - 3 mm long, ovate or ovate-lanceolate, acuminate; vexillum orbicular, mucous; wings broad, 1.5 - 2 cm long, shortly stipitate; labellum 1.5 - 1.8 cm long, broadly funnel shaped, incurved; spur short, obtuse, incurved, white. Capsules *ca* 1 cm long, ellipsoid, medianly thickened, attenuate towards both sides, few seeded; seeds 3 mm long, obovoid, compressed minutely pillose.

*Fl. & Fr.*: September - December.

*Specimens examined*: Jirighat 450 m. Meebold 5687; Bishenpur, Meebold 6725 (K)

### 43. RUTACEAE

A. L. de Juss. Gen. Pl. 296. 1789.

(R. Shanpru & A. S. Chauhan)

- 1a. Perennial rooting herbs ..... 3. *Boehninghausenia*
- b. Perennial trees or shrubs ..... 2
- 2a. Trees or shrubs; unarmed or without prickles ..... 3.
- b. Trees or shrubs; armed with spines ..... 7.
- 3a. Leaves opposite ..... 4.
- b. Leaves alternate or spirally arranged ..... 5.

- 4a. Leaves trifoliolate; stamens 7-10 ..... 1. *Acronychia*  
 b. Leaves multifoliolate; stamens 4-5 ..... 8. *Tetradium*  
 5a. Petals 2-5 mm long, styles short. 3 mm long ..... 5. *Glycosmis*  
 b. Petals 8 - 28 mm long styles 2 - 9 mm long ..... 6.  
 6a. Ovaries and styles glabrous ..... 7. *Murraya*  
 b. Ovaries and styles hairy ..... 6. *Micromelum*  
 7a. Leaves alternate, 1- foliate ..... 4. *Citrus*  
 b. Leaves alternate, 3- foliate ..... 8.  
 8a. Leaflets sessile ..... 9. *Toddalia*.  
 b. Leaflets petioled ..... 9.  
 9a. Flowers small in axillary or terminal cymes ..... 10. *Zanthoxylum*  
 b. Flowers large, in axillary panicles ..... 2. *Aegle*

### 1. *Acronychia* J. R. & G. Forst. *nom. cons.*

*Acronychia pedunculata* (L.) Miq., Fl. Ind. -Bat. Suppl. 532. 1861; Deb in Bull. Bot. Surv. India 3: 303. 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 392. 1997. *Jambolifera pedunculata* L., Sp. Pl. 349. 1753. *Acronychia laurifolia* Blume, Cat. Gen. Buitenz. 63. 1823; Hook. f., Fl. Brit. India 1: 498. 1875; Kanjilal *et al.*, Fl. Assam 1:203. 1936.

Small tree. Leaves opposite; leaflets 7 - 18 x 2.5 - 7 cm, obtuse or acuminate, entire, thinly coriaceous, glabrous, glossy above, glaucous or pale green beneath; lateral nerves 12 - 16. Flowers ca 1 cm across, white, polygamous, in long peduncled, axillary corymbose cymes; calyx lobes 4, lanceolate; petals 4, valvate, hairy inside; stamens 8, alternately longer; ovary 4 - celled. Drupes ca 1 cm. 4-lobed, shortly beaked.

*Fl. & Fr.* : June - November.

Specimens examined : West Manipur, C. B. Clarke l. c.).

### 2. *Aegle* Correa, *nom. cons.*

*Aegle marmelos* (L.) Correa in Trans. Linn. Soc. London 5 : 223. 1800; Hook. f., Fl. Brit. India 1 : 516. 1875; Kanjilal *et al.*, Fl. Assam 1 : 215. 1936; Deb in Bull. Bot. Surv. India 3 : 304. 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 264. 1997. *Crateva marmelos* L., Sp. Pl. 444. 1753. *Aegle marmelos* (L.) Correa var. *mahurensis* Zate in Indian J. For. 5: 35. 1982.

Mani.: *Heirikhagok*

Small trees with straight axillary 2. 5 cm long spines. Leaves trifoliolate or digitately 5- foliolate; leaflets 4 - 8 x 1 - 3 cm, elliptic- lanceolate, elliptic or oblanceolate, cuneate at base, acuminate, glabrous. Flowers greenish - white, ca 2.5 cm across, few in short lateral panicles; petals 4 - 5, imbricate, gland-dotted; stamens numerous. Fruits 5- 16 cm in diam., woody, many seeded.

*Fl. & Fr.* : March - June ( following year).

3. *Boennighausenia* Reichb. ex Meissn. *nom. cons.*

*Boennighausenia albiflora* (Hook) Reichb. ex Meissn., Consp. 197. 1828 & Pl. Vasc. Gen. 2 : 44, 1837; Hook. f., Fl. Brit. India 1 : 486, 1875, *p.p.* Deb in Bull. Bot. Surv. India 3: 304, 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 357, 1997. Fig. 26

Slender branching perennial rooted herbs, 0.3 - 0.6 m, glabrous or somewhat pubescent. Leaves 2-3 pinnate; petioles slender; leaflets 0.5 - 1.5 cm, obovate or cordate, glaucous beneath, membranous. Cymes leafy, many flowered, flowered. 0.5 - 1 cm across, white; calyx very small; petals oblong, obtuse. Fruits 0.5 - 2 cm in diam.

*Fl. & Fr.*: August - December

*Specimens examined* : Ukhrul, Deb 3259, 3512 & 3574 (CAL).

4. *Citrus* L.

- 1a. Petioles wingless; fruits ellipsoid, longer than broad. .... 4. *C. medica*
- b. Petioles broadly winged; fruits not as above ..... 2
- 2a. Petioles narrowly marginate; leaflets attenuate at apex ..... 1. *C. indica*
- b. Petioles broadly winged; leaflets acute-subacute or rounded at apex ..... 3
- 3a. Small trees; fruits large, 15 -20 cm across; oil glands small ..... 3. *C. maxima*
- b. Big tree up to 15 m in height; fruits 3 - 15 cm across; oil glands large ..... 2. *C. latipes*

1. *Citrus indica* Tanaka, Stud. Citrol. 2: 164, 1928; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 281, 1997.

Shrubs or small trees, branchlets cylindrical, spreading, spiny. Leaves winged, articulated at apex; leaflets 6 - 11 x 2 - 4 cm, oblong or lanceolate, attenuate at apex. Flowers axillary, solitary rarely two, bisexual; petals 5, oblong, obtuse; stamens 20 - 25. Fruits small, depressed globose, deep orange to scarlet red.

*Fl. & Fr.*: March - December.

*Specimens examined*: Koupru, G. Watt 5847 (CAL).

2. *Citrus latipes* (Swingle) Tanaka in Stud. Citrol. 2:155, 1929; Balakr., Fl. Jowai 1:116, 1981; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 289, 1997. *C. ichangensis* Swingle subsp. *latipes* Swingle in J. Agric. Res. 1:2, 1913. *C. hystrix sensu* Hook. f., Fl. Brit. India 1:515, 1875, *p.p. auct. non* DC. 1813; Deb in Bull. Bot. Surv. India 3:304, 1961.

Mani.: *Heiribub*.

Trees up to 16 m high with ascending spines. Leaves 3-6 x 1.5 - 3.2 cm, ovate - elliptic or lanceolate, rounded at base, acute and submarginate, crenate to crenulate at margins; lateral nerves many, subparallel; petioles 3 - 5 x 1-3 cm, oblanceolate.

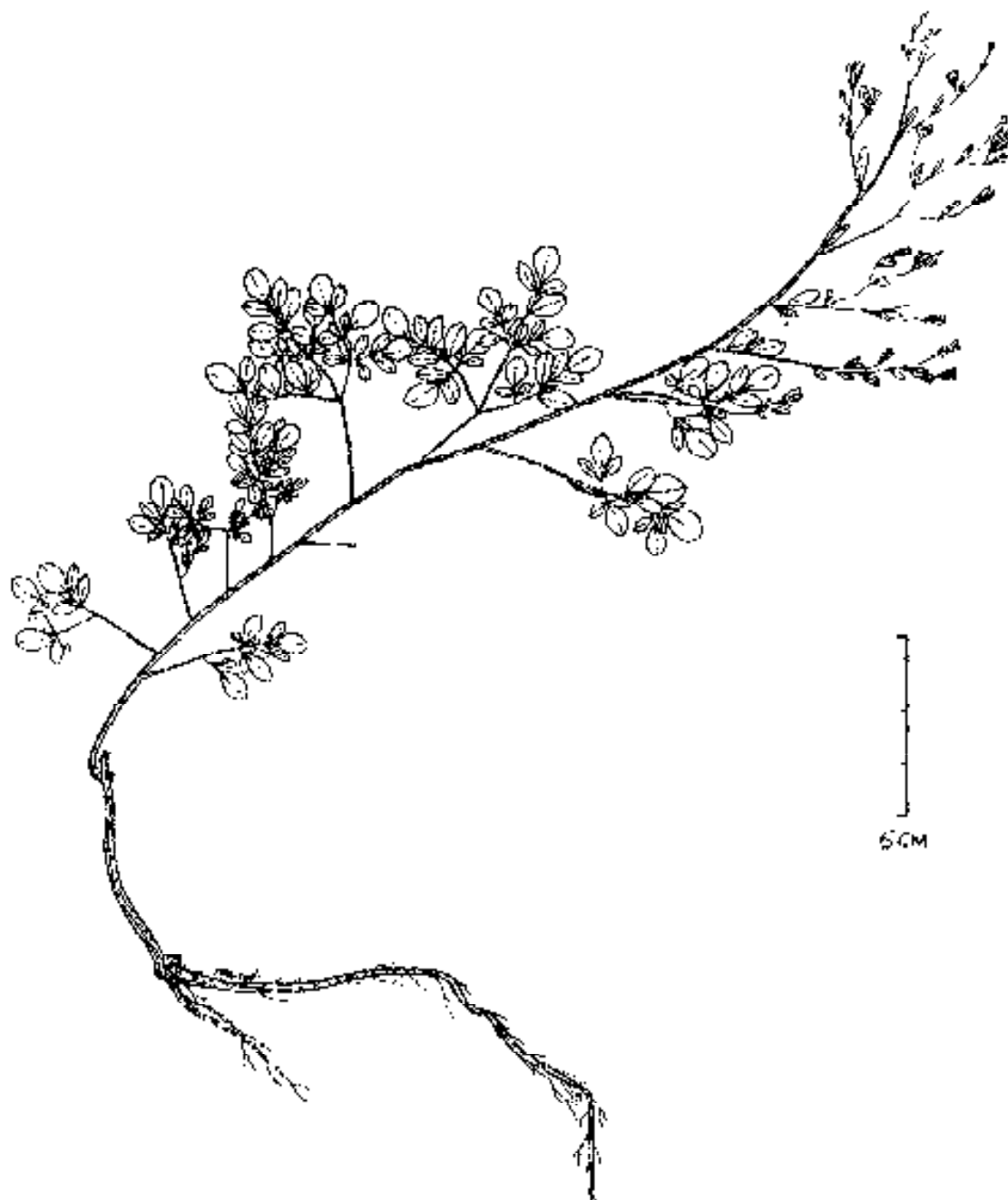


Fig. 26 : *Bueninghausenia albiflora* (Hook.) Reichb. ex Meissn. in flowering

emarginate at apex. Flowers *ca* 1.5 cm. across, white or pale-purple, axillary, solitary or 2-5 together; seeds *ca*. 1 cm. many.

*Fl. & Fr.* : March -December.

*Specimens examined* : West Manipur, D.C. *Kaith l.c.* (Specimens not seen)

**3. *Citrus maxima*** (Burm.) Merr., Interpret. Herb., Amboin. 46, 1917; Deb in Bull. Bot. Surv. India 3 : 304, 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 283, 1997. *Aurantium maximum* Burman, Auctarium Herb. Amboin. 16, 1755, *Citrus aurantium* Hook. f., Fl. Brit. India 1 : 516, 1875; Kanjilal *et al.*, Fl. Assam 1: 215, 1936; Deb in Bull. Bot. Surv. India 3 : 304, 1961.

Mani: *Kanila*.

Small profusely branched trees, young parts pubescent. Leaves unifoliate; leaflets 5-15 × 2.5-6.5 cm, ovate-oblong, crenate, shining above, pubescent beneath; petioles broadly winged. Flowers white, sweet scented. Fruits large, 15-20 cm across, globose or pyriform, yellowish when ripe, rind thick.

var. ***maxima***

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

*Specimens examined* : Singamai, Deb 2022 & 2203 (CAL); Ainadhat, Malick 961 (BSIS).

Under cultivation in the state for its fruits.

**4. *Citrus medica*** L., Sp. Pl. 782, 1753; Hook. f., Fl. Brit. India 1: 514, 1875; Kanjilal *et al.*, Fl. Assam 1 : 213, 1936; Deb in Bull. Bot. Surv. India 3 : 304, 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 284, 1997. *C. aurantium* L. var. *medica* Wight & Arn., Prodr. 98, 1834.

Bushy shrubs or small trees, with straight ascending spines. Leaves 10-15 × 4-7 cm, elliptic-ovate, elliptic-lanceolate, acute at base, sub-acute or obtuse at apex, crenate-serrate; lateral nerves 10-12 pairs. Flowers *ca* 1.5 cm, white tinged with pink or purplish; solitary or in axillary racemes. Berries *ca* 1.2 cm long, ellipsoid, obtuse or rounded and mamillate at apex; seeds 20-35.

*Fl. & Fr.* : February - December.

*Specimens examined* : Ukhrul, Mukerjee 2940; Singjamia, Deb 1456; Nachargard, Meebold 2517 (CAL).

### 5. *Glycosmis* Correa, *nom. cons.*

***Glycosmis pentaphylla*** (Retz.) DC., Prodr. 1: 538, 1824; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 343, 1997. *Limonia pentaphylla* Retz., Obs. Bot. 5: 24, 1788. *L. arborea* Roxb., Pl. Coronand. 60, t. 85, 1788. *Glycosmis arborea* (Roxb.) DC., Prodr. 1: 538, 1824; Deb in Bull. Bot. Surv. India 3: 304, 1961. *G. pentaphylla* auct. non DC, 1824; Hook. f., Fl. Brit. India 1: 499, 1875. *p.p.*

Small tree. Leaves pinnate, commonly 5-foliate; leaflets 3-5, oblong-lanceolate, cuneate or obtuse at base, acute or shortly acuminate, crenate, dentate or serrate, glabrous. Inflorescence axillary, panicles as long as or longer than the leaf

racinus; flowers in dense clusters, subsessile; sepals 5, suborbicular; petals 5, elliptic-ovate, creamy white; stamens 10, alternate ones shorter; ovary flask shaped, 5-celled. Fruits ca 1 cm in diam., globose, unicellular, 1-seeded.

**var. pentaphylla**

*Fl. & Fr.* : January - December.

*Specimens examined* : Bishenpur, G. Watt 7229; Jirighat, Meebold 5775 (CAL)

**6. Micromelum Blume nom. cons.**

**Micromelum integerrimum** (Roxb. ex DC.) M. Roem., Syn. Mon. Hesper. 1: 47. 1846 (as *M. integerrimum* Wight & Arn. 1834, nom. illegit); Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 349. 1997. *Bergera integerrima* Roxb. ex DC. var. *integerrima* (Roxb. ex DC.) Oliver in J. Linn. Soc. Bot. 5. Suppl. 2: 40. 1861. *Micromelium pubescens* auct. non Blume 1825; Hook. f., Fl. Brit. India 1: 50. 1875; p.p.; Kanjilal *et al.*, Fl. Assam 1: 280. 1936.

Small evergreen trees, 4.5 - 9 m in height. Leaves 20 -50 cm long, rachis terete; leaflets 7 - 15 alternate, 5 - 15 × 4 -6 cm, oblique, ovate-lanceolate, wavy or obscurely crenulate at the margins, glabrous above, tomentose beneath along the nerves, closely gland dotted. Flowers in terminal corymbosely decompound panicles of tomentose cymes; calyx truncate with triangular lobes; petals 5-valvate; stamens 10, alternately long and short. Fruits ca 1.2 cm, ellipsoid, orange red or yellowish red berry.

*Fl. & Fr.* : December - June.

*Specimens examined* : Sckmai, Deb 1399; Pephima, Meebold 5546; Barak, Meebold 5891 (CAL).

**7. Murraya Koenig ex L., nom. cons.**

**Murraya paniculata** (L.) Jack. Malay. Misc. 1: 31. 1820; Deb in Bull. Bot. Surv. India 3: 304. 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 352. 1997. *Chalcas paniculata* L., Mant. Pl. 1. 86. 1767, *M. exotica* L., Mant. Pl. 2: 563. 1771; Hook. f., Fl. Brit. India 1: 502. 1875; Kanjilal *et al.*, Fl. Assam 1: 207. 1936.

*Mani.*: Kamini-kusum.

Shrubs or small trees. Leaves 3-9 foliolate, rachis 4 - 10 cm long; leaflets 2.5 - 10 × 1.3 - 4.5 cm, oblique, acuminate, cuneate at base. Inflorescence with 3 - 6 flowers; flowers in terminal or axillary panicles; sometimes solitary axillary; sepal and petals 5 each, oblong-elliptic, glandular, glabrous; stamens 10, filaments dilated below, white. Berries ca 1 cm, ovoid-ellipsoid, rugose, red when ripe; 2-seeded.

*Fl. & Fr.* : December - June.

*Specimens examined* : Imphal, Deb 145 (CAL)

**8. Tetradium Lour.**

**Tetradium fraxinifolium** (Hook.) T.G. Hartley in Gard. Bull. Straits Settlement, 34: 102. 1981; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 371. 1997. *Phitragoma*



*fraxinifolia* Hook., Ic. Pl. 1: 710, 1848. *Evodia fraxinifolia* (Hook.) Benth., Fl. Hongkong 59, 1861; Hook. f., Fl. Brit. India 1: 490, 1875; Malick & Safui in J. Econ. Tax. Bot. 10: 3, 1987.

Small to moderate sized trees. Leaves 20-35 cm long; leaflets usually 9-11, 8-20 × 4-7 cm, lanceolate or oblong-lanceolate, finely acuminate, crenulate with a gland at the sinus. Inflorescence in cymes, panicles shorter than the leaves. Flowers ca 0.7 cm across, greenish white; sepals small, pubescent; petal 4, valvate, glabrous abaxially, villous adaxially along mid-rib; male flowers with 4 rudimentary carpels, filaments somewhat hairy; female flowers with 4 staminodes, ligulate, shorter than petals, ovary tetra-carpellary, glabrous. Follicles ca 1 cm across, 2 seeded, reddish, seeds dark brown.

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

*Specimens examined* : Nungba, Meebold 7329 (CAL); Pochao, Malick 736, (BSIS).

### 9. *Toddalia* Juss.

*Toddalia asiatica* (L.) Lam., Tabl. Encycl. Meth. 2: 116, 1797; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 403, 1997. *Paullinia asiatica* L., Sp. Pl. 365, 1753. *Toddalia aculeata* (Smith) Pers., Syn. 1: 249, 1805; Hook. f., Fl. Brit. India 1: 497, 1875. Kanjilal *et al.*, Fl. Assam 1: 203, 1936. *T. floribunda* Wallich, Pl. As. Rat. 3: 17, t. 23, 1832. *T. asiatica* (L.) Lam. var. *floribunda* (Wallich) Kurz. in J. Asiat. Soc. Bengal pt. 2, Nat. Hist. 44: 130, 1875.

Scandent shrubs, up to 8 m, prickles curved as well as straight, young shoots rusty tomentose. Leaves 3-foliolate; petioles 20-25 cm; leaflets 2-10 × 1.3 cm, oblong to lanceolate, cuneate at base, long acuminate. Cymes axillary or terminal, paniculate; panicles up to 8 cm. Flowers 6-8 mm across, white or pale yellow. Drupes ca 8 mm, globose, orange coloured; seed 1, reniform.

*Fl. & Fr.* : October - April.

*Specimens examined* : Ukhrul, Mukerjee 3275; Bishenpur, Meebold 472 (CAL).

### 10. *Zanthoxylum* L.

- 1a. Rachis with foliaceous wings; petals absent ..... 2
- b. Rachis without foliaceous wings; petals present ..... 3
- 2a. Leaflets glabrous; flowers greenish yellow ..... 2, *Z. armatum*
- b. Leaflets puberulous; flowers purple ..... 1, *Z. acanthopodium*
- 3a. Rachis 2-ridged; leaflets less than 6 cm long;  
spines recurved; flowers yellow ..... 3, *Z. oxyphyllum*
- b. Rachis not ridged; leaflets more than 6 cm long;  
spines straight or upcurved; flowers white ..... 4, *Z. rhetsa*

1. *Zanthoxylum acanthopodium* DC., Prodr. 1: 727, 1824; Hook. f., Fl. Brit. India 1: 439, 1875; Kanjilal *et al.*, Fl. Assam 1: 200, 1936; Deb in Bull. Bot. Surv. India 3: 304, 1961; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 378, 1997.

Mani.: *Mukhrubi*

Straggling thorny shrubs or small deciduous trees. Leaves imparipinnate; leaflets 5 - 9, opposite, 2.5 - 10 × 1.2 - 3 cm, smaller downwards elliptic, oblong or ovate, acute, acuminate or sub -acute at the apex. Cymes from the leaf axils, dense, about 1.2 cm long. Flowers ca 3 mm long, purplish-greenish -yellow; calyx 6 - 8 lobed; stamens 4 - 6. Follicles 2 - 5, ca 0.4 cm across, subglobose, 1 seeded.

*Fl. & Fr.* : June- November.

*Specimens examined* : Sirohee, Mukerjee 3234 (CAL).

**2. *Zanthoxylum armatum* DC., Prodr. 1 : 127. 1824; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 379. 1997. *Z. alatum* Roxb., Fl. Ind. 3 : 768. 1832; Hook f., Fl. Brit. India 1 : 493. 1875; Kanjilal *et al.*, Fl. Assam 1:199. 1936 ; Deb in Bull. Surv. India 3 : 304. 1961.** Fig. 27

Trees up to 8 m, prickles straight. Leaflets 5-11, elliptic to oblong, acute to acuminate, serrulate; rachis glabrous with foliaceous wings; wings broader upwards. Cymes paniculate. Flowers greenish-yellow, ca 3 mm across, perianth biseriate, glabrous, yellowish; stamens 6 - 8, exserted. Follicles 1 - 3, ovoid - sub -globose, apiculate; seeds black, shiny.

*Fl. & Fr.* : March - October.

*Specimens examined* : Lamatoke, Meebold 5957; Ukhrul, Mukerjee 2076; Langool hill, Deb 2099 (CAL).

**3. *Zanthoxylum oxyphyllum* Edgew. in Trans. Linn. Soc. London 20 : 42. 1846; Hook. f., Fl. Brit. India 1 : 497. 1875; Kanjilal *et al.*, Fl. Assam 1 : 201. 1936; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 385. 1997.**

Scrambling shrubs, with hooked prickles. Leaves up to 30 cm long; rachis with 2 ridges above, puberulous or glabrescent; leaflets 29 -33, 2 -4 × 1- 2 cm, ovate oblong, ovate-lanceolate or elliptic-oblong, cuneate or acute at base, acuminate, glabrous. Flowers yellowish-white, in axillary fascicles; sepals 4, obtuse, glabrous; petals 4, ovate- elliptic, fleshy; stamens 4, ca 6 mm long. Fruits with 2-4 tubercles; seeds globose, black.

*Fl. & Fr.* : March - October.

*Specimens examined* : Sirohee furar, G. Watt 6435 (CAL).

**4. *Zanthoxylum rhetsa* (Roxb.) DC., Prodr. 1 : 728. 1824; Hook. f., Fl. Brit. India 1 : 495. 1875; Kanjilal *et al.*, Fl. Assam 1. : 197. 1936; Narayanan & Nayar in Hajra *et al.*, Fl. India 4: 387. 1997. *Fagara rhetsa* Roxb., Fl. Ind. 1 : 438. 1820; *F. hutchingsii* Roxb., Fl. Ind. 1 : 437. 1820; Deb in Bull. Bot. Surv. India 3 : 304. 1961.**

Mami.; Ngang & Nagang.

Small evergreen trees, with a crown of branches and trunk covered with corky prickles. Leaves large, imparipinnate; leaflets 15 -21, opposite, oblong - lanceolate, oblique cordate-acuminate, crenulate, glabrous with a large reddish pedicelled dot at each sinus. Flowers minute, greenish white, tetramerous, in trichotomous cymes arranged in close set terminal panicles; sepals 4, ovate - triangular; petals 4, elliptic -



Fig. 27 : A twig of *Zanthoxylum armatum* DC.

oblong; stamens 4, ca 2.5 mm long. Follicles single, globose, 2-valved, reddish; seeds solitary, globose, bluish black.

*Fl. & Fr.* : March - December.

*Specimens examined* : West Manipur, *Kaith l.c.*

#### 44. SIMAROUBACEAE

A.p. de Candolle in Ann. Mus. Hist. Nat. Paris 17 : 422. 1811

("Simarubeae").

(*R. Shanpru & A. S. Chauhan*)

- 1a. Stipules present; sepals and petals persistent  
in fruit ..... 3. *Picrasma*
- b. Stipules absent; sepals and petals not persistent ..... 2
- 2a. Flowers pentamerous; stamens 10,  
hairy; fruits winged ..... 1. *Ailanthus*
- b. Flowers tetramerous; stamens 4,  
glabrous; fruits not winged ..... 2. *Brucea*

##### 1. *Ailanthus* Desf., *nom. cons.*

*Ailanthus integrifolia* Lam. subsp. *calycina* (Pierre) Nootb. in Steenis Fl. Males. ser. 1, 6(2) : 218. 1962; Basak in Hajra *et al.*, Fl. India 4 : 411. 1997. *Pongelion calycina* Pierre, Fl. For. Coch. 4. t. 294 A, 1893. *Ailanthus grandis* Prain in Ind. For. 28 : 131, 1. 1 & 210. 1902; Kanjilal *et al.*, Fl. Assam 1 : 216. 1936; Deb in Bull. Bot. Surv. India 3 : 304. 1961.

Tall trees, up to 50 m high. Leaves compound, paripinnate, clustered at the tips; rachis winged; leaflets 6 - 15 x 3 - 8 cm, ovate to ovate-lanceolate, shortly acuminate, oblique at base, sinuate. Flowers small, ca 0.7 cm, across, greenish-yellow, in axillary panicles; sepals ovate, pubescent; petals ciliate; stamens shorter than petals, hairy. Samaras 10 - 15 cm long, wings, thin; seeds flat.

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

*Specimens examined* : West Manipur, *Kaith s.n.* (CAL).

##### 2. *Brucea* J. F. Mill. *nom. cons.*

*Brucea mollis* Wallich ex Kurz in J. Asiat. Soc. Bengal 42 : 64. 1873; A. W. Bennett in Hook. f., Fl. Brit. India 1 : 521. 1875; Kanjilal *et al.*, Fl. Assam 1 : 218. 1936; Deb in Bull. Bot. Surv. India 3 : 304. 1961; Basak in Hajra *et al.*, Fl. India 4 : 415. 1997.

Shrubs or small trees with reddish brown stems. Leaves compound, imparipinnate; leaflets 4-15, 6-12 x 1-6 cm, ovate or oblong, oblong-lanceolate, caudate to acuminate, base rounded or unequal, pubescent on both surfaces. Flowers ca 0.3 cm across, greenish white in terminal or axillary panicles; calyx and corolla deciduous; sepals 4 connate at base; petals 4, free; stamens 4, naked; carpels, glabrous 4, styles linear. Drupelets ovoid, ca 1 cm across, orange red when ripe.

*Fl. & Fr.* : March - November.

*Specimens examined* : Ukhrul, *Mukerjee 3035* (CAL).

3. *Picrasma* Blume

*Picrasma javanica* Blume, Bijdr. 5: 248. 1825; A.W. Bennett in Hook. f., Fl. Brit. India 1: 520. 1975; Basak in Hajra *et al.*, Fl. India 4: 418. 1997.

Trees up to 20 m high. Leaves 8 - 22 cm long; leaflets opposite, 3 - 7, oblong - ovate or obovate - oblong, cuneate at base, acuminate at apex. Flowers tetramerous, dull - white in axillary, cymose panicles; sepals ca 1 mm long, ovate; petals ca 2 mm long, ovate - oblong; stamens 4, filaments short. Drupes ovoid - sub globose, black when ripe.

*Fl. & Fr.*: Throughout the year.

45. BURSERACESE

Kunth in Ann. Sci. Nat. Paris 2: 346. 1824.

(R. Shanpru & A. S. Chauhan)

- 1a. Fruits trigonous capsular ..... 1. *Boswellia*
- b. Fruits drupaceous ..... 2
- 2a. Flowers 3 merous ..... 2. *Canarium*
- b. Flowers 4 - 6 merous ..... 3
- 3a. Disk annular; drupes with 1 - 3 pyrenes ..... 4. *Protium*
- b. Disk cup shaped, adnate to calyx; drupes with 1 - 5 pyrenes ..... 3. *Garuga*

1. *Boswellia* Roxb. ex Colebr.

*Boswellia serrata* Roxb. ex Colebr. in Asiat. Res. 9: 379, t. 5. 1807; A. W. Bennett in Hook. f., Fl. Brit. India 1: 528. 1875; Malick & Safui in J. Econ. Tax. Bot 10: 3. 1987; Chithra & Henry in Hajra *et al.*, Fl. India 4: 432. 1997. *B. glabra* Roxb., Pl. Cor. 3, t. 207. 1811. *Boswellia serrata* var. *glabra* (Roxb.) A. W. Bennett in Hook. f., Fl. Brit. India 1: 528. 1875.

Trees 5 - 15 m high. Leaves 4 - 40 cm long, alternate, exstipulate; leaflets 8 - 23 pubescent, coarsely crenate-serrate, lanceolate or ovate acute or obtuse, equilateral, very variable in size, shape. Flowers white with pinkish tinge, fragrant. Drupes 1.2 cm long, trigonous, splitting into three valves, subtended by the woody disk.

*Fl. & Fr.*: March - July.

*Specimens examined*: Nungba. Malick 1166 (BSIS).

2. *Canarium* L.

- 1a. Leaflets serrulate, tomentose; panicles ferruginous tomentose ..... 1. *C. benghalense*
- b. Leaflets entire, glabrous; panicles thinly pubescent ..... 2. *C. strictum*

1. *Canarium benghalense* Roxb., Fl. Ind. 3: 136. 1832; A. W. Bennett in Hook. f., Fl. Brit. India 1: 534. 1875; Kanjilal *et al.*, Fl. Assam 1: 224. 1936; Deb in Bull. Bot. Surv. India 3: 304. 1961; Chithra & Henry in Hajra *et al.*, Fl. India 4: 435. 1997.

Mani.: *Mekruk*.

Large trees up to 20 m high. Leaves up to 90 cm long; leaflets 13 - 15, sometimes more, 8 - 20 × 2.5 - 8 cm, ovate oblong, lanceolate, bluntly acuminate, base oblique

cuneate, glabrous, shining above, glabrescent beneath. Panicles up to 30 cm long. Flowers ca 13 mm long, whitish; calyx cupular; petals obovate, oblong. Drupes 3 - 4 cm long, ellipsoid, 1 - 2 seeded.

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

*Specimens examined* : West Manipur; *Kaith s. n.* (CAL).

**2. *Canarium strictum* Roxb.**, Fl. Ind. 3 : 138, 1832; A. W. Bennett in Hook., f. Fl. Brit. India 1 : 534, 1875; Deb in Bull. Bot. Surv. India 3 : 304, 1961; Leenhouts in Blumea 9 : 414, 1959; Chithra & Henry in Hajra *et al.*, Fl. India 4 : 440, 1997. *C. sikkimensis* King in J. Asiat. Soc. Bengal, 62 (2) : 187, t11, 12, 1894. *C. resiniferum* Brace ex King in J. Asiat. Soc. Bengal 62 (2) : 188, t. 13, 1893; Kanjilal *et al.*, Fl. Assam 1 : 224, 1936.

Lofty trees up to 40 m high, buttressed at base. Leaves 3 - 5 (7), 20 - 60 cm long, pubescent; leaflets, 5 - 13, oblong-lanceolate, oblanceolate, obovate or elliptic, acuminate. Panicles supra-axillary, 20 - 30 cm long. Flowers brownish-yellow; calyx cup-shape, 2-3 mm long, lobes rounded; petals oblong, twice or thrice as long as calyx. Drupes ellipsoid, about 0.5 cm long.

*Fl. & Fr.* : July - February.

*Specimens examined* : West Manipur; *Kaith s. n.* (CAL)

*Mani.* : *Mekruk*.

### 3. *Garuga* Roxb.

***Garuga pinnata* Roxb.**, Pl. Coronandel 3 : 5, t. 208, 1811; A. W. Bennett in Hook. f., Fl. Brit. India 1 : 528, 1875; Kanjilal *et al.*, Fl. Assam 1 : 221, 1936.

*Mani.* : *Thingrot*

Medium sized deciduous trees. Leaves up to 40 cm long; leaflets 11 - 19, oblong, ovate lanceolate, oblique, caudate acuminate. Flowers pale yellow; calyx campanulate, 3 - 6 mm long, densely tomentose; petals 5, twice as long as sepals, linear-oblong, tomentose outside; stamens 10, in two series, inserted on calyx tube; ovary globose, pilose, 4 - 5 celled. Drupes ca 2.5 cm across, globose; pyrenes 2 - 3 : 1 - seeded.

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

*Specimens examined* : *Sinha* l.c.

### 4. *Protium* Brum. f., *nom. cons.*

***Protium serratum* (Wallich ex Colebr.) Engl.** in A. & C. DC., Monogr. Phan. 4 : 88, 1883; Chithra & Henry in Hajra *et al.*, Fl. India 4 : 451, 1997. *Bursera serrata* Wallich ex Colebr. in Trans. Linn. Soc. London 15 : 361, t. 41, 1827; A. W. Bennett in Hook. f., Fl. Brit. India 1 : 530, 1875.

Large deciduous trees; bark, greyish-brown. Leaves alternate 5-11-foliolate; leaflets opposite, 8 - 12 × 4 - 6 cm, ovate-oblong or elliptic-lanceolate, caudate, oblique more or less serrate, coriaceous. Flowers greenish, in axillary lax panicles; pedicels short; calyx and corolla pubescent, 5-lobed, disc annular crenate ovary hairy. Fruits on thick, peduncles ca 1.7 cm across, 2 - 3 furrowed; with 1-3 stones, pulp edible.

*Fl. & Fr.* : April - July.

*Specimens examined* : West Manipur; *Kaith s. n.* (CAL).

**46. MELIACEAE**

A. L. de Juss. Gen. Pl. 263. 1789 ("Meliac").

(R. Shanpru & A. S. Chauhan)

- 1a. Ovules 1-2 in each cell; seeds not winged ..... 2
- b. Ovules many in each cell; seeds winged ..... 7
- 2a. Fruits drupaceous; leaflets serrate ..... 3
- b. Fruits capsular or baccate; leaflets entire or nearly so ..... 4
- 3a. Leaves bi or tri-pinnate ..... 6. *Melia*
- b. Leaves simple pinnate ..... 3. *Azadirachta*
- 4a. Inflorescence a corymbose panicle; capsules 2-valved, 1-seeded ..... 8. *Trichilia*
- b. Inflorescence otherwise; capsules or berries more than 1 seeded ..... 5
- 5a. Stigma on an elongated style; disc conspicuous, enclosing the ovary ..... 5. *Dysoxylum*
- b. Stigma sessile ..... 6
- 6a. Petals 3 ..... 2. *Aphanamixis*
- b. Petals 4-5 ..... 1. *Aglaiia*
- 7a. Stamens free; disc present; capsules 5-valved ..... 7. *Toona*
- b. Stamens united to form a tube, disc absent; capsules 3-celled ..... 4. *Chukrasia*

**1. Aglailia Lour.**

*Aglailia spectabilis* (Miq.) S. S. Jain & Bennet in Indian For. 9: 271. 1986; Grierson & Long. Fl. Bhutan 2: 35. 1991; S.S. Jain & Bennett in Hajra *et al.*, Fl. India 4: 474. 1997. *Amoora spectabilis* Miq. in Ann. Mus. Bot. Lugduno - Batavam 4: 37. 1868; Hiern in Hook. f., Fl. Brit. India 1: 561. 1875. *A. wallichii* King in J. Asiat. Soc. Bengal Nat. Hist. 64: 56. 1895. *Aglailia hiernii* Visw. & Ramach. in Bull. Bot. Surv. India 24: 212. 1983, *non* King 1895.

Evergreen trees. Leaves 4-15 cm long; leaflets 11-13, 6-20 × 4-6 cm, opposite or sub-opposite, oblong or usually abruptly acuminate. Panicles axillary or supra axillary; male much branched and many flowered, 40-50 cm long; female 15-20 cm long. flowers very small, calyx very minute, obtuse, 3 lobed; petals 3, suborbicular; staminal tube glabrous; anthers usually 8, slightly exserted. Capsules 2.5-4 cm × 2-2.5 cm; pyriform, tomentose, 2-3 seeded.

*Fl. & Fr.* : March - October.

*Specimens examined* : West Manipur, Keith I. c

**2. Aphanamixis Blume**

*Aphanamixis polystachya* (Wallich) R. N. Parker in Ind. For. 57. 486. 1931; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 477. 1997. *Aglailia polystachya* Wallich

in Roxb., Fl. Ind. 2 : 429. 1924. *Amora rohituka* (Roxb.) Wight & Arn., in Wight, Cat. India Pl. 24. 1833 & Prodr. 119. 1884; Hiern in Hook. f., Fl. Brit. India 1 : 599. 1875; Kanjilal *et al.*, Fl. Assam 1:236. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961.

Mani.: *Heirang, Heiranggoi & Heirangkhoi.*

Medium sized trees, 10 - 15 cm high. Leaves 30 - 75 cm long; leaflets 7 - 19. 8 - 25 × 3.5 - 8 cm, oblong, ovate-oblong, lanceolate to obliquely lanceolate, acute. Male flowers in panicles; female flowers in racemes, up to 30 cm long. Flowers yellow or dull white, 3 - 5 mm across; calyx 5 - partite; petals 3; stamens 6, included. Capsules *ca* 3.5 cm across, yellow when ripe; seeds red, arillate.

*Fl. & Fr.* : October - March.

*Specimens examined* : West Manipur, *Kaith Lc.*

### 3. *Azadirachta* A. Juss.

*Azadirachta indica* A. Juss. in Mem. Mus. Nat. Hist. Paris. 19 : 221. t. 13. 5. 1830; Kanjilal *et al.*, Fl. Assam 1 : 227. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961; Whitmore in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 85. 1979; S. S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 478. 1997. *Melia azadirachta* L., Sp. Pl. 385. 1753; Hiern in Hook. f., Fl. Brit. India 1 : 544. 1875. *Melia indica* Brandis, For. Fl. N.W. India 67. 1874.

Mani.: *Seizrak & Seichrak.*

Middle sized trees with an ovoid, lax crown. Leaves 10 - 30 cm long; leaflets 5 - 13. 3 - 8 × 1.5 - 3 cm, obliquely lanceolate, ovate-lanceolate, acuminate, base cuneate, sharply dentate. Panicles 15 - 30 cm long. Flowers *ca* 1 cm across; calyx small, 5 - fid; petals *ca* 0.5 cm across, oblanceolate; staminal tube dilated at mouth. Fruits baccate, 1 seeded, pulpy, shiny yellow at maturity.

*Fl. & Fr.* : March - July.

*Specimens examined* : Imphal, Deb 2480 (CAL).

### 4. *Chukrasia* A. Juss.

*Chukrasia tabularis* A. Juss. in Mem. Mus. Nat. Hist. Paris 19 : 251. t. 22. f. 27. 1830; Hiern in Hook. f., Fl. Brit. India 1 : 568. 1875; Kanjilal *et al.*, Fl. Assam 1 : 241. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 481. 1997.

Mani. : *Taimareng.*

Large trees up to 40 m high; branchlets lenticellate. Leaves pinnate; leaflets 6 - 15 × 4 - 8 cm, ovate or ovate-oblong, acuminate, glabrous above, pubescent beneath; petiolules 4 - 10 mm long. Inflorescence terminal panicles. Flowers 10 - 15 mm across, 5 - merous, white; calyx dentate; petals oblong; staminal tube cylindrical 10 toothed at the apex; ovary 4 celled, hairy. Capsules 3 - 6 cm long, obovoid or ellipsoid, 3-valved, glabrous.

*Fl. & Fr.* : February - August.

*Specimens examined* : Barak, *Kaith s.n.* (CAL)



5. *Dysoxylum* Blume

- 1a. Panicles narrow, racemiform; leaflets alternate.....2. *D. binectariferum*.  
 b. Panicles spreading; leaflets opposite .....2
- 2a. Disc densely hairy at the mouth; fruits 6 cm in diam.....3. *D. gobarum*  
 b. Disc glabrous at the mouth; fruits  
 less than 4 cm in diam.....1. *D. alliarium*

1. *Dysoxylum alliarium* (Buch.-Ham.) Balakr. in J. Bombay Nat. Hist. Soc. 67 : 57. 1970; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 484. 1997. *Guarea alliarica* Buch.-Ham. in Mem. Wern. Nat. Hist. Soc. 6 : 305. 1832, *excl. syn. Rumph. Dysoxylum hamiltonii* Hiern in Hook. f., Fl. Brit. India 1 : 548. 1875; Kanjilal *et al.*, Fl. Assam 1 : 231. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961.

Large evergreen trees up to 25 m high. Leaves 30 - 40 cm long; leaflets 6 - 16. 8 - 16 × 5 - 9 cm, ovate, oblong-lanceolate, acute or acuminate, base oblique, glabrous or hairy beneath. Panicles 15 - 25 cm long. Flowers greenish-white; calyx distinctly 4-partite. Capsules ca 2.5 cm across, 4-celled, pale yellow or white; seeds with red aril.

*Fl. & Fr.* : March - December.

*Specimens examined* : West Manipur, Kaith I. c.

2. *Dysoxylum binectariferum* (Roxb.) Hook. f. ex Bedd. in Trans. Linn. Soc. Lond. 25 : 212. 1866; Hiern in Hook. f., Fl. Brit. India 1 : 546. 1875; Kanjilal *et al.*, Fl. Assam 1 : 232. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961. *Guarea binectarifera* Roxb., Fl. Ind. 2 : 240. 1832.

Large trees up to 30 m high. Leaves 35 - 75 cm long; leaflets 7 - 17 × 3 - 8 cm, obliquely ovate-oblong, shortly acuminate, cuneate at base, entire or obscurely dentate, glabrous. Panicles 20 - 30 cm long. Flowers 3 - 5 mm long, pale white; calyx cup-shaped, sub-pentapartite; petals velvety; staminal tube mealy. Capsules 2.5 - 3 cm, obovoid, 4-celled, pale yellow; seeds 3 with large, yellow hilum and white aril.

*Fl. & Fr.* : March - December.

*Specimens examined* : West Manipur, Kaith I. c.

3. *Dysoxylum gobarum* (Buch.-Ham.) Merr. in J. Arn. Arb. 23. 173. 1942; S. S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 487. 1997. *Guarea gobara* Buch.-Ham. in Mem. Wern. Nat. Hist. Soc. 6. 306. f. 1832. *Dysoxylum procerum* Hiern in Hook. f., Fl. Brit. India 1 : 547. 1875; Kanjilal *et al.*, Fl. Assam 1 : 231. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961.

Trees up to 25 m high. Leaflets 5 - 13, 10 - 25 × 7 - 10 cm, ovate, ovate-oblong, oblong-elliptic, acute, base rounded or cuneate, entire, glabrous. Panicles 30 - 50 cm long. Flowers 0.7 - 1 cm across, creamy-white, fragrant; calyx shortly lobed; petals oblong. Capsules 3 - 4 celled, pyriform, 5-6 cm in diam.; seeds black.

*Fl. & Fr.* : December - September.

*Specimens examined* : Ukhrul, Mukerjee 3340; Makru, Meebold 5549 (CAL).

### 6. *Melia* L.

- 1a. Branchlets slender; flowers lilac; drupelets  
ca 2 cm long ..... 1. *M. azedarach*
- b. Branchlets stout; flowers white; drupelets  
more than 2.5 cm long ..... 2. *M. dubia*

1. *Melia azedarach* L., Sp. Pl. 384. 1753; Hiern in Hook. f., Fl. Brit. India 1: 544. 1875; Kanjilal *et al.*, Fl. Assam 1 : 228. 1936; Deb in Bull. Bot. Surv. India : 305, 1961.

Mani.: *Selzrak*.

Medium sized trees upto 12 m high; crown lax; bark grey. Leaves bi or tri-pinnate, 30 - 70 cm long; leaflets 2 - 5 × 1.2 - 4.5 cm, oblanceolate, lanceolate or elliptic - lanceolate, acuminate, cuneate at base, oblique, serrate to entire. Flowers ca 1.5 cm across, lilac; calyx minute; petals deflexed; staminal tube purple, 20 toothed. Drupes fleshy, yellow at ripe. 1-4 seeded.

*Fl. & Fr.*: March - August.

*Specimens examined* : Imphal, Deb 2479 (CAL).

Cultivated in homestead compounds.

2. *Melia dubia* Cav., Diss. 7. 364 1789; Hiern in Hook. f., Fl. Brit. India 1 : 545. 1875; Deb in Bull. Bot. Surv. India 3 : 305. 1961; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 495. 1997. *M. composita* Willd., Sp. Pl. 2 : 559. 1799; Kanjilal *et al.*, Fl. Assam 1 : 228. 1936.

Large trees, ca 25 m high. Leaves 30 - 60 cm long, 2 - 3 pinnate; leaflets 3 16 × 1.5 - 3 cm ovate or lanceolate, acuminate, base oblique, serrate to entire. Panicles 12 - 18 cm long. Flowers 0.6 - 0.8 cm across, white; calyx 5 partite; petals linear, spatulate 0.5 cm across; staminal tube white, gibbous at base. Drupes ca 2.5 cm, yellowish pulpy, speckled with white dots, 1 - 6 seeded.

*Fl. & Fr.* : March - December.

*Specimens examined* : Koupru, Deb 2063; Imphal, G. Watt 7233 (CAL); Litan, Chauhan 94875 (ASSAM).

### 7. *Toona* (Endl.) M. Roem.

*Toona ciliata* M. Roem., Fam. Nat. Syn. Monogr. 1 : 139. 1846; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 504. 1997. *Cedrela toona* Roxb. ex Rottl. & Willd. in Ges. Natuf. Freunde Berlin Neue. Schrif. 4 : 198. 1803; Hiern in Hook. f., Fl. Brit. India 1 : 568. 1875; Kanjilal *et al.*, Fl. Assam 1 : 242. 1936. Fig. 28

Mani.: *Chingtairel*.

Evergreen trees ca 35 m high. Leaves up to 75 cm long; leaflets 5 - 25, 4.5 16 × 1.5 - 5 cm, obliquely ovate to lanceolate, acuminate, base obtuse, cuneate, entire or subentire. Panicles large. Flowers 0.6 - 0.8 cm across, white; calyx minutely

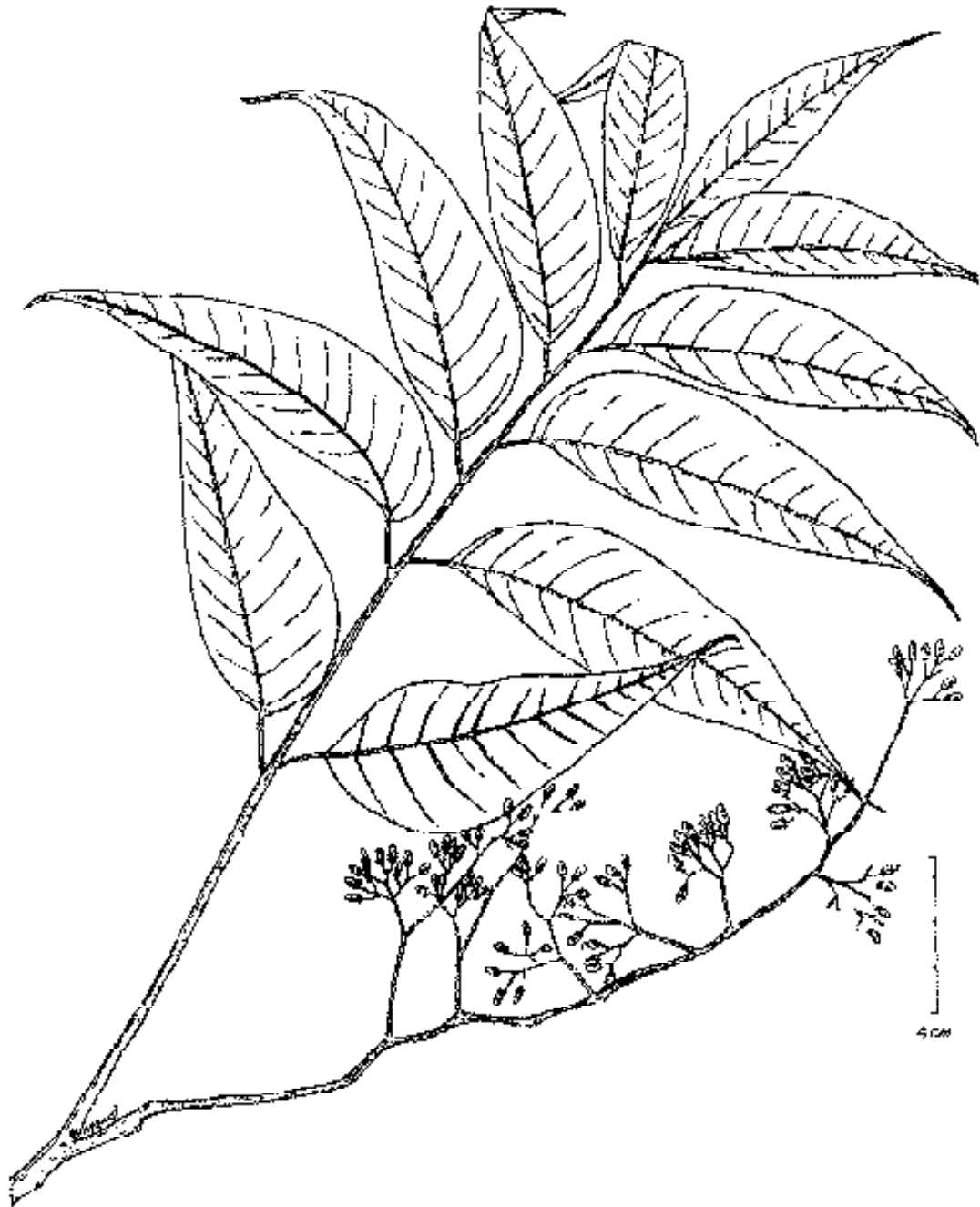


Fig. 28 : A twig of *Toona ciliata* M. Roem. in flowering

lobed or subentire; petals white, oblong erect or sub-erect; stamens 3, filaments hairy; stigma free. Capsules 2.5 - 3.5 cm long; oblong, 5-valved.

subsp. *ciliata* Bahadur. Monogr. Gen Toona 64. 1988. var. *ciliata*

*Fl. & Fr.* : December - September.

*Specimens examined* : Imphal, Deb 2084 (CAL); Litan, Chauhan 94876 (AS-SAM).

#### 8. *Trichilia* F. Browne

*Trichilia conuroides* (Wight & Arn.) Benthelzen in Acta. Bot. Neerl. 11 : 13. 1962; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 515. 1997. *Zanthoxylum conuroides* Wight & Arn., Prodr. Fl. Pen. Ind. Or. 148. 1834. *Heynea trijuga* Roxb. ex Sims in Curtis, Bot. Mag. 41 : t. 1738. 1815; Hiern in Hook. f., Fl. Brit. India 1 : 568. 1875.

Trees 10 - 15 m high, crown with dense foliate. Leaves 20 - 50 cm long; leaflets 5 - 11, 20 x 2 - 8 cm, 5 - 20 x 2 - 8 cm, ovate-oblong, ovate-lanceolate, acuminate, oblique, sub-acute at base. Cymes corymbosely paniculate. Flowers 0.2 - 0.4 cm cross, white; staminal tube with yellow lobes. Capsules 11 - 15 cm across, red, 1-celled, 2 valved; seeds 1, ovoid, white, turning brown at age.

*Fl. & Fr.* : March - December.

*Specimens examined* : Kungba, Meebold 7347 (CAL).

### 47. OLACACEAE

Mirbel ex A. P. de. Candolle. Prodr. 1 : 531. 1824

("Olacineae").

(A. S. Chauhan & R. Shanpru)

- 1a. Climbers with milky juice; leaves cordate or  
obcordate, hastate; fruits broadly winged ..... 1. *Cardiopteris*
- b. Trees without milky juice; leaves elliptic lanceolate,  
never hastate; fruits not winged ..... 2. *Schoepfia*

#### 1. *Cardiopteris* Wallich ex Blume

*Cardiopteris quinqueloba* (Hassk.) Hassk., Nat. Tijd. N 10 : 64. 1855. *Peripterygium quinquelobum* Hassk., Tijds. Nat. Gesch. Phys. 10 : 142. 1843. *Cardiopteris moluccana* Blume; Deb, Fl. Tripura 1 : 393. 1981. *C. lobata* R. Br. in Benn. & Br., Pl. Jav. Rar. 246, t. 49. 1852. *nom. illeg.*; Masters in Hook. f., Fl. Brit. India 1 : 597. 1975; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Climbers with milky juice. Leaves 6 - 11 x 5 - 7 cm, cordate or obcordate, hastate, lobed; petioles long. Flowers whitish, in axillary racemes or rarely cymes; calyx 5 -partite, imbricate; petals longer than sepals, 5 - lobed. Fruits broadly winged, 1 seeded.

*Fl. & Fr.* : November - February.

*Specimens examined* : Nungba, Meebold 5885 (CAL); Natun bepani, Malick 874 (BSIS).

## 2. Schoepfia Schreb.

- 1a. Trees tall, with angular branchlets;  
leaves cuneate at base; nerves  
raised; petals more than 1 cm long ..... 1. *S. fragrans*
- b. Trees small, without angular branchlets;  
leaves rounded at base; nerves not raised;  
petals less than 1 cm long ..... 2. *S. jasminodora*

1. *Schoepfia fragrans* Wallich in Roxb., Fl. Ind. 2 : 188. 1824; Masters in Hook. f., Fl. Brit. India 1 : 581. 1875; Kanjilal *et al.*, Fl. Assam. 1 : 249. 1936; Deb in Bull. Bot. Surv. India 3 : 298. 1961. *S. acuminata* Wallich ex DC., Prodr. 4 : 320. 1830; Masters in Hook. f., Fl. Brit. India 1 : 582. 1875; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Trees up to 15 m tall, with angular branchlets. Leaves 5-9 × 1.2-3.2 cm, ovate-lanceolate, elliptic-lanceolate or lanceolate, acuminate, cuneate at base, nerves raised on both surfaces, glabrous. Flowers ca 1 cm long, yellow; in 3 cm long simple racemes; calyx nearly entire; petals 1.5 cm long, yellow, tubular-campanulate; stamens 4-5, included. Drupes ca 1.5 cm long, ellipsoid, 1-seeded, white.

*Fl. & Fr.* : August-December.

*Specimens examined* : Khangkhia, Mukerjee 3724 (CAL).

2. *Schoepfia jasminodora* Sieb. & Zucc. in Abh. Akad. Muench. 4 (3) : 135. 1846; van Steenis in Reinwardtia 1 : 469. 1952; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Small trees, branches yellowish grey. Leaves 4-6 × 2-4 cm, ovate or broadly deltoid, caudately acuminate, rounded at base, coriaceous, entire; petioles broad, 4-7 mm long. Flowers orange-brown or yellow, sessile, in 3-4 flowered spikes; corolla tubular, 6-7 mm; ovary inferior. Drupes 1-1.2 cm long, 1-seeded.

*Fl. & Fr.* : April-October.

Kingdonward s. n. (Specimens not seen).

## 48. ERYTHROPALACEAE

Sleumer in Engler & Prantl, Nat. Pflanzenfam. ed 2, 20 b: 401. 1942.

(*R. Shanpru*)

### *Erythropalum* Blume

*Erythropalum scandens* Blume, Bijdr. 921. 1826; Masters in Hook. f., Fl. Brit. India 1 : 578. 1875; Kanjilal *et al.*, Fl. Assam 1 : 248. 1936; Deb in Bull. Bot. Surv. India 3 : 298. 1961. *E. populifolium* Masters in Hook. f., Fl. Brit. India 1 : 578. 1875. *E. vagum* (Griffith) Masters in Hook. f., Fl. Brit. India 1 : 578. 1875. *Modeccopsis vaga* Griffith, Notul. 4: 633. 1834.

Tall shrubs. Leaves 10-12 × 5-6 cm, alternate, petiolate, ovate or oblong-lanceolate, acuminate, 3 nerved at base. Flowers minute in axillary much branched panicles of lax cymes. Peduncles 7-10 cm; calyx cup shaped, 5 toothed; corolla 5 partite; stamens 5, opposite petals, filaments very short; anthers 2 celled, staminodes 5 alternating with the lobes of the calyx; ovary ovoid, unilocular, styles short. Fruits ovoid.

*Fl. & Fr.* : May - November.

*Specimens examined* - Laimatak, Meekbold 5149 & 5488 (CAL)

#### 49. AQUIFOLIACEAE

Bartling Ord. Nat. Pl. 228, 376. 1830.

(R. Shanpru & A. S. Chauhan)

##### *Ilex* L

- |     |  |                          |
|-----|--|--------------------------|
| 1a. | Leaves entire .....  | 5. <i>I. umbellulata</i> |
| b.  | Leaves crenate-serrate or serrulate .....  | 2                        |
| 2a. | Flowers in dense axillary cymes; stamens longer than petals; drupes 1-4 celled ..... | 3                        |
| b.  | Flowers in paniced cymes; stamens equalling the petals; drupes 4-6 celled .....      | 4                        |
| 3a. | Petioles 4-6 cm long; flowers white; drupes ca 1.5 cm long .....                     | 1. <i>I. dipyrrena</i>   |
| b.  | Petioles up to 0.5 cm long; flowers yellow; drupes ca 0.5 cm long .....              | 4. <i>I. odorata</i>     |
| 4a. | Umbels in repeatedly branched cymes; flowers pinkish-violet .....                    | 3. <i>I. khasiana</i>    |
| b.  | Umbels not repeatedly branched; flowers white .....                                  | 2. <i>I. embelioides</i> |

1. *Ilex dipyrrena* Wallich in Roxb., Fl. Ind. 1 : 473. 1820; Hook. f., Fl. Brit. India 1 : 599. 1875; Deb in Bull. Bot. Surv. India 3 : 297. 1961.

Evergreen trees. 9-12 m. Leaves shining; petioles 4-6 cm. Flowers 4-merous, ca 4 cm in diam., in axillary sub-globose clusters, white; calyx lobes broadly ovate, acute, ciliate; petals obovate, connate below in the male flowers, free in the female flowers; stamens inserted on the corolla; ovary ovoid, 2, rarely 3-4 celled. Drupes 1.5 cm long.

*Fl. & Fr.* : October - April.

*Specimens examined* : Chingsaw, G. Watt 6525; Ukhuri, Mukerjee 2220 (CAL).

2. *Ilex embelioides* Hook. f., Fl. Brit. India 1 : 601. 1875; Kanjilal *et al.*, Fl. Assam 1 : 258. 1936; Deb in Bull. Bot. Surv. India 3 : 297. 1961. Chauhan in Bull. Bot. Surv.

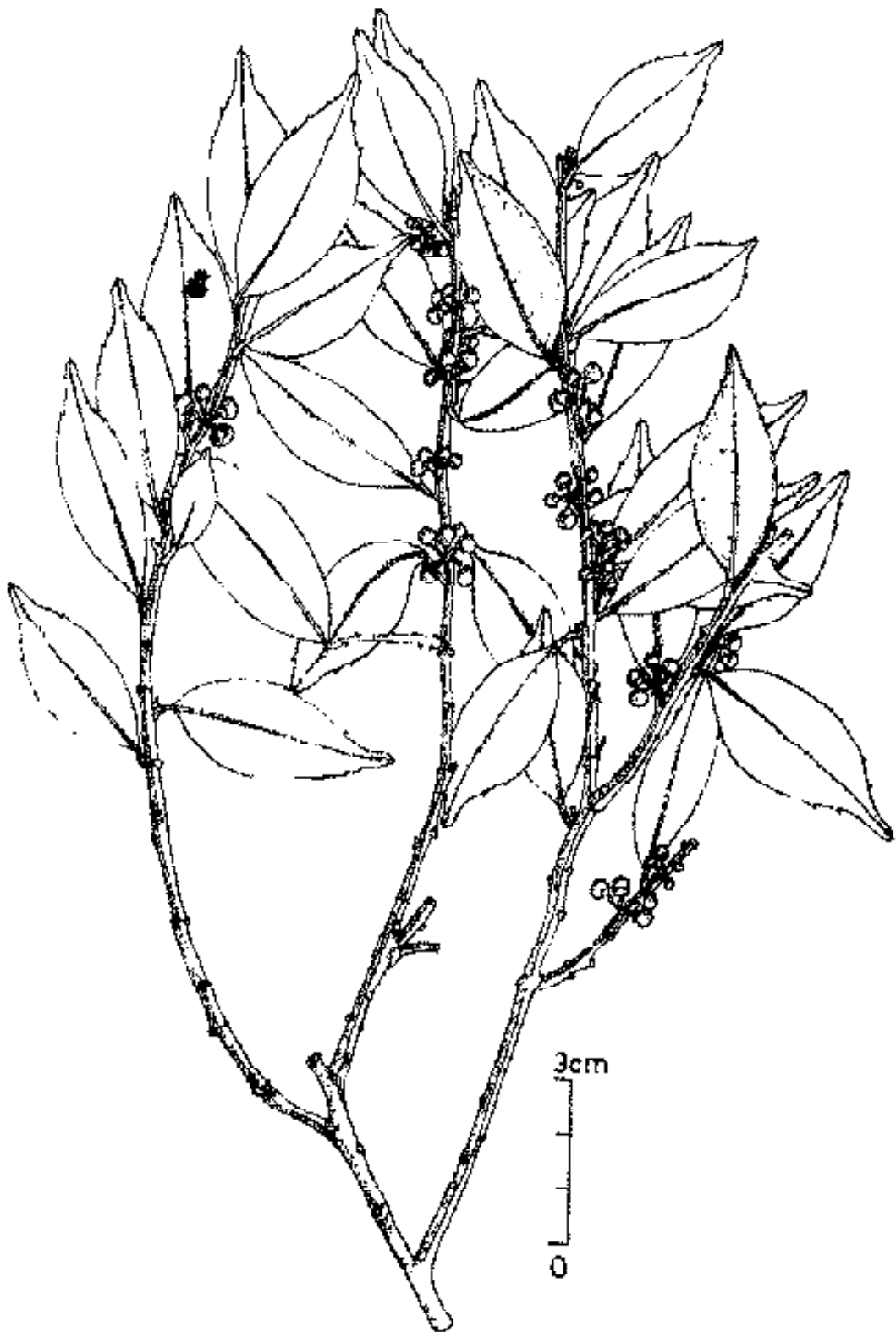


Fig. 29 : A fruiting twig of *Illex embelioides* Hook. f.

India 27 (1-4) : 238. 1985.

Fig. 29

Small trees. Leaves 3 - 8 × 1.5 - 2.5 cm, elliptic to oblong-lanceolate, caudate-acuminate, base cuneate. Male flowers umbellate, axillary at branch tips; female fascicled, white, ca 0.3 cm across; globose, brown.

*Fl. & Fr.* : April - November.

*Specimens examined* : Lamlong, Mukerjee 2976 (CAL).

3. *Ilex khasiana* Purkay. in Ind. For. 64(5) : 280. 1938; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Fig. 30

Trees 15 - 20 m high, crown lax. Leaves 6 - 12 × 2 - 3.5 cm, oblong-lanceolate, elliptic-oblong-lanceolate, acuminate to caudate-acuminate, base rounded, obtuse or cuneate. Umbels compound repeatedly forked. Flowers ca 0.3 m across, pinkish-violet; petals spreading or deflexed; stamens equalling the petals. Fruits ca 0.8 cm across, purplish, globose.

*Fl. & Fr.* : May - November.

*Specimens examined* : Kakching, Deb 1271 & 1319 (CAL).

4. *Ilex odorata* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 189. 1825, *auct. non* Hook. f., 1875. *I. gaultheriaefolia* Kurz in J. Asiat. Soc. Bengal 41 (2) : 259. 1872. *I. theaeifolia* Wallich ex Hook. f. in Hook. f., Fl. Brit. India 1 : 601. 1875; Kanjilal *et al.*, Fl. Assam 1 : 258. 1936; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Small trees, 5 - 7 m high. Leaves 3 - 8 × 5 - 7 cm long, oblong-lanceolate or ovate-lanceolate, shortly acuminate, base rounded or obtuse, glabrous. Flowers ca 0.4 cm across, dull yellow or yellow; calyx ovate, rounded; petals obovate-oblong; staminodes shorter than stamens. Drupes 0.5 - 0.6 cm across, globose, reddish-brown.

*Fl. & Fr.* : April - October.

*Specimens examined* : Mao, Deb 1792 (CAL); Nungba, Malick 114 (BSIS).

5. *Ilex umbellulata* (Wallich) Loesn., in Nov. Act. Acad. Caes. Leop. Carol. Nat. Cur. 78: 99. 1901; Balakr., Fl. Jawai 1 : 127. 1981. *Ehretia umbellulata* Wallich in Roxb., Fl. Ind. 2 : 344. 1824. *Ilex godajam* Wallich ex Hook. f., Fl. Brit. India 1 : 604. 1875; Kurz in J. Asiat. Soc. Bengal 44(2): 158. 1875. Kanjilal *et al.*, Fl. Assam 1 : 256. 1936; Deb in Bull. Bot. Surv. India 3 : 298. 1961. *I. sulcata* Wallich ex Hook. f., Fl. Brit. India 1: 604. 1875.

Trees up to 30 m high. Leaves elliptic-lanceolate, or oblong-elliptic, acute to acuminate, base cuneate, glabrous. Flowers ca 0.4 cm across, dull white, slightly ovoid crowned by the persistent style.

*Fl. & Fr.* : February - July.

*Specimens examined* : West Manipur, Kaith *s. n.* (Specimens not seen).





Fig. 30 : A fruiting branch of *Hex khasiana* Purkay.

## 50. CELASTRACEAE

R. Br. in Flinders, voy. Terra Austr. 2 : 554, 1814

("Celastrinae").

(R. Shanpru &amp; A. S. Chauhan)

- 1a. Leaves alternate; seeds fully enclosed by arils ..... 1. *Celastrus*  
 b. Leaves opposite; seeds not fully enclosed by arils ..... 2  
 2a. Leaves entire; flowers sessile; fruits 1-seeded; seeds not arillate ..... 3. *Microtropis*  
 b. Leaves serrate or crenate; fruits more than 3-seeded; seeds arillate ..... 2. *Euonymus*

1. *Celastrus* L.

- 1a. Branches not covered with lenticular warts; fruits 1 celled, 1 seeded ..... 1. *C. hindsii*  
 b. Branchlets covered with pale lenticular warts; fruits 3 celled, 3-6 seeded ..... 2  
 2a. Flowers in irregular racemose-cymes; petals with waxy margins; styles 3-lobed ..... 2. *C. hookeri*  
 b. Flowers in long panicles; petals entire; style simple ..... 3. *C. paniculatus*

1. *Celastrus hindsii* Benth. in Kew J. Bot. 3 : 334, 1851; Ding Hou in van Steenis, Fl. Males. 6(2) : 236, 1962. *C. monosperma* auct. non Roxb. 1824; M. Lawson in Hook. f., Fl. Brit. India 1 : 618, 1875; Kanjilal *et al.*, Fl. Assam 1 : 269, 1936; Deb in Bull. Bot. Surv. India 3 : 298, 1961. *C. venulosus* Wallich Cat. no. 4321, 1831, *nom. nud.*; M. Lawson in Hook. f., Fl. Brit. India 1 : 618, 1875.

Scandent shrubs, up to 10-12 m tall, branches glabrous, lenticellate, dark brown. Leaves 6-15 × 3-8 cm, variable elliptic to oblong or ovate, serrate, membranous, glabrous, nerves 5-7 on each side, curving towards the apex; petioles 5-15 cm long, minutely erose. Flowers small in short pedunculate axillary and terminal racemes; petals 5, oblong; stamens 5, inserted on the edge of the disk; ovary free from the disk; styles 3-lobed at the base. Capsules 3-valved, one seeded; seeds ellipsoid, enveloped in bright yellow arils.

Fl. & Fr. : August- November.

*Specimens examined* : Nongmaijing; Deb 2191; Tushar, Mukerjee 3434 (CAL).

2. *Celastrus hookeri* Prain in J. Asiat. Soc. Bengal 73 (2) : 197, 1904; Hara, Enum. Fl. Pl. Nepal 2 : 88, 1979. *C. stylosa* auct. non Wallich ex Roxb.; M. Lawson in Hook. f., Fl. Brit. India 1 : 618, 1875, *p.p.*

Scandent shrubs with terete branches. Leaves 5-10 × 2.5-5 cm, elliptic or ovate-oblong, acute or subacuminate, serrate. Flowers in short axillary or terminal, irregular racemose-cymes. Fruits yellow crowned with persistent styles.

*Fl. & Fr.* : February - October.

*Specimens examined* : Kaupru, Deb 1507 (CAL).

3. *Celastrus paniculatus* Willd., Sp. Pl. 1 : 1125. 1797; M. Lawson in Hook. f., Fl. Brit. India 1 : 617. 1875; Kanjilal *et al.*, Fl. Assam 1 : 268. 1936. Fig. 31

Large woody climber. Leaves 5 - 12 × 4 - 7 cm, obovate or oblong-ovate, acuminate, base round or acute; nerves raised on both surfaces. Inflorescence up to 15 cm long, lax paniced. Flowers minute, about 0.4 cm across, pale-green. Capsules 10 - 15 cm, globose, obscurely trigonous, orange - yellow.

*Fl. & Fr.* : April - October.

*Specimens examined* : Kongau, Mukerjee 3547; Litan, Deb 2631 (CAL).

## 2. *Euonymus* L.

- 1a. Leaves bullate; flowers deep red ..... 1. *E. bullatus*
- b. Leaves not bullate; flowers white or yellowish-white ..... 2
- 2a. Peduncles more than 2.5 cm long;  
style obsolete ..... 2. *E. frigidus*
- b. Peduncles less than 2 cm long; style not obsolete ..... 3
- 3a. Small trees; peduncles more than 1.5 cm long;  
capsules deeply 3 - 4 lobed ..... 3. *E. hamiltonianus*
- b. Climbing shrubs, peduncles up to 1 cm  
long; fruits globose or subglobose; not lobed ..... 4
- 4a. Leaves 3 - 10 cm long; veins raised  
on both surfaces; fruits angled ..... 4. *E. theifolius*
- b. Leaves 2 - 5 cm long; nerves inconspicuous;  
fruits tubercled ..... 5. *E. vagans*

1. *Euonymus bullatus* Wallich & Lodd. Bot. Cab. t. 1749. 1831; M. Lawson in Hook. f., Fl. Brit. India 1 : 610. 1875; Kanjilal *et al.*, Fl. Assam 1 : 263. 1936; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Medium sized trees, 10 - 15 m high. Leaves 6 - 18 × 4.5 - 9 cm, ovate-lanceolate, elliptic-lanceolate, oblanceolate, acute, base rounded to obtuse, cuneate. Flowers 4 merous, deep in colour, 0.4 - 0.5 cm across; sepals ovate rounded; petals ovate or rhomboid, thick; stamens shorter than petals. Capsules 4 - gonous, about 1 cm across.

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

*Specimens examined* : Linghi village, G. Watt 5019 (CAL).

2. *Euonymus frigidus* Wallich ex Roxb., Fl. Ind. (ed. Carey) 2 : 609. 1824; M. Lawson in Hook. f., Fl. Brit. India 1 : 611. 1875. f. *frigidus*; Deb in Bull. Bot. Surv. India 3 : 298. 1961.

Small trees, young shoots succulent. Flowers very small, tetra- merous, greenish-yellow, on weak succulent filiform peduncles; peduncles 1.2 cm long;



Fig. 31 : A flowering twig of *Celastrus paniculatus* Willd.

petals; orbicular, entire. Fruits leathery.

*Fl. & Fr.* : April - October.

*Specimens examined* : Sirohee furrar, *G. Watt* 6473; Keyange - Chingsaw, *G. Watt* 6704 (CAL)

3. *Euonymus hamiltonianus* Wallich in Roxb., *Fl. Ind.* (ed. Carey) 2 : 403. 1832; M. Lawson in Hook. f., *Fl. Brit. India* 1 : 612. 1875; Kanjilal *et al.*, *Fl. Assam* 1 : 263. 1936; Deb in *Bull. Bot. Surv. India* 3 : 298. 1961.

Medium sized trees, up to 15 m high. Leaves 8 - 16 × 3 - 6 cm, lanceolate, oblong-lanceolate or oblanceolate, acuminate, caudate-acuminate, base cuneate, finely crenate. Cymes 2 - 3 -chotomous, 3 - 5 cm across. Flowers dull white, 0.6 - 0.8 cm across: calyx sub-orbicular, rounded, broader; petals with deflexed margins. Capsules 0.8 - 1 cm across, deeply 3 - 4 lobed: seeds red, arillate.

*Fl. & Fr.* : April - November.

*Specimens examined* : Sirohee furrar, *G. Watt* 6498 (CAL).

4. *Euonymus theifolius* Wallich ex M. Lawson in Hook. f., *Fl. Brit. India* 1 : 612. 1875; Kanjilal *et al.*, *Fl. Assam* 1 : 264. 1936; Deb in *Bull. Bot. Surv. India* 3 : 298. 1961.

Small trees or shrubs. Leaves 5 - 10 × 2 - 4 cm, ovate, ovate-lanceolate, elliptic-lanceolate, acute or acuminate, base rounded or acute, distantly serrate, nerves raised on both surfaces. Flowers white or greenish-white, 4 - 8 mm across. Capsules 0.8 - 1.2 cm across, globose, obscurely angled; seeds orange-yellow, axillary.

*Fl. & Fr.* : April - January.

*Specimens examined* : Mao, *Deb* 1779; Ukhrul, *Mukerjee* 2536 (CAL).

5. *Euonymus vagans* Wallich ex Roxb., *Fl. Ind.* (ed. Carey) 2 : 412. 1824; M. Lawson in Hook. f., *Fl. Brit. India* 1 : 611. 1875; Deb in *Bull. Bot. Surv. India* 3 : 298. 1961.

Climbing shrubs: branches smooth and never radicans. Leaves 2 - 5 × 1 - 1.7 cm, ovate-lanceolate, acuminate, serrate. Flowers small, tetra-merous, greenish-white. Fruits nearly black, minutely tubercled.

*Fl. & Fr.* : March - July.

*Specimens examined* : Khongi, *G. Watt* 6754; Laimakhong, *Deb* 539; Ukhrul, *Mukerjee* 2470 (CAL).

### 3. *Microtropis* Wallich ex Meisn.

*Microtropis discolor* (Wallich) Arn. in *Ann. Nat. Hist.* 3 : 152. 1839; Kanjilal *et al.*, *Fl. Assam* 1 : 267. 1936; Deb in *Bull. Bot. Surv. India* 3 : 298. 1961. *Cassine discolor* Wallich in Roxb., *Fl. Ind.* 2 : 378. 1824; M. Lawson in Hook. f., *Fl. Brit. India* 1 : 614. 1875.

Trees up to 15 m high, occasionally shrubby. Leaves 8 - 14 × 3 - 7 cm, broadly elliptic-oblong-lanceolate or oblong-elliptic, caudate-acuminate, base narrowed cuneate. Cymes axillary or supra-axillary, corymbose or umbellate, 1 - 1.5 cm across. Flowers

0.3 - 0.5 cm across, greenish-white or purplish-green; calyx lobes minute, broadly orbicular; petals oblong, about 2 mm long. Capsules ellipsoid.

*Fl. & Fr.* : January - November.

*Specimens examined* : Kaithunabi, *G. Watt* 5817; Koupru, *G. Watt* 6012; Chingsaw, *G. Watt* 5185; Imphal, *Deb* 1457 (CAL).

## 51. HIPPOCRATEACEAE

A. L. Juss., *Ann. Mus. Natl. Hist. Nat.* 18: 486, 1811

("Hippocrateaceae").

(A. S. Chauhan)

### 1. *Salacia* L.

*Salacia floribunda* Wight, *Illus. Ind. Bot.* 1: 134, 1840; M. Lawson in Hook. f., *Fl. Brit. India* 1: 629, 1872; Kanjilal *et al.*, *Fl. Assam* 1: 275, 1936; Malick & Safai in *J. Econ. Tax. Bot.* 10: 3, 1987.

Scandent shrubs or nearly lianas. Leaves elliptic-lanceolate to oblong, acute to subobtusate at base, bluntly acuminate, sharply-serrate at margins, 8 - 15 × 3 - 6 cm; lateral nerves 9 - 12 pairs; petioles 8 - 12 mm. Cymes axillary, paniculate, peduncles 10 - 15 mm long; pedicels 5 - 7 mm; sepals 5, imbricate; petals 5, imbricate; stamens 3, inserted on the conical disk, alternating with the petals. Drupes subglobose to ellipsoid, 3 - 3.5 × 2 - 3 cm, red; seeds 1-4, embedded in mucilaginous pulp.

*Fl. & Fr.* : October - May.

*Specimens examined* : Sibpurikhal, *Malick* 1078 (BSIS).

## 52. RHAMNACEAE

A. L. Juss., *Gen. Pl.* 376, 1789 ("Rhamni").

(A. S. Chauhan & R. Shanpru)

- 1a. Plants with tendrils; disc lobed; ovary inferior; fruits winged ..... 2. *Gouania*
- b. Plants without tendrils; disc entire; ovary superior; fruits wingless ..... 2
- 2a. Scandent or scandent shrubs ..... 1. *Berchemia*
- b. Erect shrubs or trees ..... 3
- 3a. Disc lining the calyx tube not fleshy; pyrenes 2-4 ..... 3. *Rhamnus*
- b. Disc lining the calyx tube fleshy; pyrenes 1-3 ..... 3
- 3a. Leaves pinnately 5-8 nerved; pyrenes 3 ..... 4. *Sageretia*
- b. Leaves palmately 3-5 nerved; pyrene solitary ..... 5. *Zizyphus*

### 1. *Berchemia* A. P. DC. *nom. cons.*

1. *Berchemia floribunda* (Roxb.) Brongn. in *Ann. Sci. Nat. ser. 1*: 30, t. 18, 1. 1827; M. Lawson in Hook. f., *Fl. Brit. India* 1: 637, 1875; Kanjilal *et al.*, *Fl. Assam* 1: 282, 1936. *Zizyphus floribunda* Roxb., *Fl. Ind.* 2: 308, 1824.

Mani.; *Tovuni-rei*.

Scandent shrubs. Leaves 4-8 x 2-4 cm, ovate or oblong-ovate, rounded to cordate at base, acuminate; lateral nerves 10-12 pairs; stipules ca 3 mm, triangular-subulate, 2-fid at apex. Flowers ca 2.5 mm across, in terminal 10-20 cm long panicles, greenish white. Drupes ca 12 mm, oblong-ovoid; pyrens 2-celled; seeds 2.

*Fl. & Fr.*: May-September.

*Specimens examined.*: Sinha l.c.

## 2. *Gouania* Jacq.

*Gouania tiliacifolia* Lam., *Encycl. Meth. Bot.* 3 : 5. 1789; Balakr., *Fl. Jowai.* 1 : 133. 1981. *G. leptostachya* DC., *Prodr.* 2 : 40. 1825; M. Lawson in Hook. f., *Fl. Brit. India* 1 : 643. 1875; Kanjilal *et al.*, *Fl. Assam* 1 : 286. 1936; Deb in *Bull. Bot. Surv. India* 3 : 300. 1961.

Scandent shrubs with tendrils. Leaves 5-10 x 2-6 cm, ovate-orbicular, acuminate at apex, rounded to sub-cordate at base, serrate at margins; lateral nerves 5-6 pairs. Racemes simple, ca 30 cm long, interspersed with leaves. Flowers greenish-white, 5-6 mm across, 3-7 flowered, in clusters. Capsules ca 1.5 cm, 3-celled separating into 3-cocci crowned by persistent calyx; seeds 3-5 mm; laterally compressed.

*Fl. & Fr.* : July-December.

*Specimens examined.*: Ukhrul, Mukherjee. 3387; Imphal Valley, Deb 433, 482. (CAL).

*Fl. & Fr.* : March-November.

*Specimens examined.* : Imphal valley, G. Watt 377 & 3702 (CAL).

## 3. *Rhamnus* L.

- a. Spinescent shrubs or small trees;  
branches shining; flowers 4 merous ..... 2. *R. virgatus*
- b. Unarmed rambling shrubs, branches not shining;  
flowers 5 merous ..... 1. *R. napalensis*

1. *Rhamnus napalensis* (Wallich) M. Lawson in Hook. f., *Fl. Brit. India* 1 : 640. 1825; Kanjilal *et al.*, *Fl. Assam* 1 : 285. 1936; Deb in *Bull. Bot. Surv. India* 3 : 300. 1961. *Ceanothus napalensis* Wallich in Roxb., *Fl. Ind.* 2 : 375. 1824.

Bushy shrubs with many spreading branches, 3-8 m tall. Leaves 5-12 x 3-7 cm, elliptic or ovate, rounded at base, acuminate at tip, serrate at margins; lateral nerves 5-7 pairs. Racemes branched, 10-15 cm. Flowers ca 0.6 cm across, greenish-yellow; calyx persistent, accrescent. Drupes 5-6 mm, broadly obovate, dark red; jelly black when ripe; seeds 3 x 2 mm, obovoid, blackish-brown.

*Fl & Fr.* : July - February.

*Specimens examined.* : Imphal, Deb 428 & 1259; Lamlang, Mukerjee 2579; Barak, Meebold 6296; Mao, C. B. Clarke 41289 (CAL).

2. *Rhamnus virgatus* Roxb., *Fl. Ind.* 2 : 351. 1824; Deb in *Bull. Bot. Surv. India*

3 : 300. 1961; Momiyama in Hara, Fl. E. Himal. 198. 1966. *R. dahuricus* auct. non Pallas in Reiss. 3 : 721. 1776; M. Lawson in Hook. f., Fl. Brit. India 1 : 639. 1875; Kanjilal *et al.*, Fl. Assam : 235. 1936. *R. cathartica* Pallas in Reiss. 3 : 423. 1776, non L., 1753.

Trees ca 4.5 - 6 m, or shrubs, usually branched, very variable in habit and shape of the leaves; branches divaricate, the spikes terminating the branches and so often appearing in the forks. Leaves fascicled at the ends of the accedingly congested branchlets, 1.5 - 4.5 cm, obovate, acuminate to lanceolate, slightly pubescent beneath when young. Flowers ca 1.2 cm across, crowded in the axils of fascicled leaves; petals spathulate. Fruits ca 0.5 cm long, obovate-orbicular.

*Fl. & Fr.* : March - November.

*Specimens examined* : Imphal Valley. G. Watt 377 & 3702 (CAL).

#### 4. *Sageretia* Brongn.

*Sageretia parviflora* (Roem. & Schult.) G. Don, Gen. Syst. 2 : 29. 1832. *Rhamnus parviflora* Roem. & Schult., Syst. Veg. 5 : 295. 1819. *Ziziphus oppositifolia* Wallich in Roxb., Fl. Ind. 2 : 370. 1824. *Segeretia oppositifolia* Brongn. in Ann. Nat. Soc. ser. 1. 10. 360. 1827; M. Lawson in Hook. f., Fl. Brit. India 1 : 641. 1875; Deb in Bull. Bot. Surv. India 3 : 300. 1961.

Large shrubs or small trees, with long slender sub-sarmentose branches, tomentose when young. Leaves 5 - 10 × 1 - 4 cm, ovate-lanceolate or ovate - elliptic, acute or sub-acuminate, glabrous and dark green above, hairy on nerves beneath when young with a dense woolly tomentum, nerves 5 - 8 pairs; petioles ca 1 cm, villous. Flowers ca 5 mm across, in large terminal panicles. Fruits turbinate, 0.5 cm long, black, succulent, sweetish.

*Fl. & Fr.* : July - December.

*Specimens examined* : Kakching, Deb 1270; Loktak, Meebold 6248 (CAL).

#### 5. *Ziziphus* P. Mill.

- 1a. Leaves glabrous beneath; branchlets fasciculate; disc not pitted ..... 2. *Z. mauritiana*
- b. Leaves tomentose beneath; branchlets not fasciculate; disc pitted ..... 2
- 2a. Leaves more than 5 cm long, 5 nerved; fruits 13 mm in diam., ellipsoid ..... 1. *Z. incurva*
- b. Leaves less than 5 cm long, 3 - 4 nerved; fruits 0.7 mm in diam., globose ..... 3. *Z. oenophia*

1. *Ziziphus incurva* Roxb., Fl. Ind. 1 : 614. 1820; M. Lawson in Hook. f., Fl. Brit. India 1 : 635. 1875; Deb in Bull. Bot. Surv. India 3 : 300. 1961.

Trees. Leaves crenate-serrate, membranous, turning black in drying, 5 - 12 × 2.5 - 4.5 cm, ovate or ovate - oblong, acute or sub-acuminate, glabrous. Cymes 4.5



cm; calyx hairy outside, glabrous within; petals sub-cucullate; disc 10 lobed with a pit opposite each lobe; styles divided in the middle. Drupes ca 13 mm in diam., ellipsoid, woody, 2 celled, 2 seeded.

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

*Specimens examined* : Mao, Deb 1789 (CAL).

2. *Ziziphus mauritiana* Lam., *Encycl. Meth. Bot.* 3 : 319. 1789. *Z. jujuba* (L.) Gaertn., *Fruct.* 1 : 1788, non Mill. 1768; M. Lawson in Hook. f., *Fl. Brit. India* 1 : 632. 1875; Kanjilal *et al.*, *Fl. Assam* 1 : 279. 1936; Deb in *Bull. Bot. Surv. India* 3 : 300. 1961.

Small trees up to 10 m. Leaves 2.5 - 7 × 1.5 - 4 cm, broadly elliptic, obliquely orbicular or ovate, rounded at both ends, minutely crenate, shining and dark green above, densely brownish tomentose beneath, 3 nerved from base. Inflorescence short-fascicles or cymes. Flowers 3 - 5 mm across; disc 10 lobed. Drupes 1 - 2 cm, orange-yellow, turning deep red, pulpy acidic.

var. *mauritiana*

Mani.: *Boroi*

*Fl. & Fr.* : August - January.

*Specimens examined* : Inphal valley, Deb 35 (CAL); Dilcong, Malick 730 (BSIS).

3. *Ziziphus oenoplia* (L.) Mill. *Gard. Bot.* ed 8, *Ziziphus* 3. 1768; M. Lawson in Hook. f., *Fl. Brit. India* 1 : 634. 1875; Kanjilal *et al.*, *Fl. Assam* 1 : 280. 1936; Deb in *Bull. Bot. Surv. India* 3 : 300. 1961. *Rhamnus oenoplia* L., *Sp. Pl.* 194. 1753.

Thorny shrubs, branches somewhat zig-zag. Leaves 2.5 - 6.2 × 1.5 - 3.5 cm, ovate-lanceolate, acuminate, base slightly oblique, fulvous-tomentose above, softly pilose beneath, nerves 3 - 4 from base; spines recurved or straight. Cymes axillary, up to 2 cm across; petals shorter than sepals. Drupes 0.5 - 0.8 cm across, ovoid, globose, black when ripe.

var. *oenoplia*

*Fl. & Fr.* : July - December.

*Specimens examined*: North Manipur, C. B. Clarke s.n. (Specimens not seen).

### 53. VITACEAE

A. L. Juss., *Gen. Pl.* 267. 1789 ("Vites").

(P. Chakraborty & A. S. Chauhan)

- |     |  |                 |
|-----|--|-----------------|
| 1a. | Petals 5, connate into a deciduous cap. .... | 6. <i>Vitis</i> |
| b.  | Petals 4 - 5, free .....                     | 2               |
| 2a. | Leaves simple .....                          | 3               |
| b.  | Leaves compound .....                        | 5               |

- 3a. Flowers 4-merous; inflorescence without tendrils ..... 4. *Cissus*  
 b. Flowers 5-merous; inflorescence with tendrils ..... 4  
 4a. Stems jointed, thickened at nodes; flowers  
 in corymbose cymes..... 2. *Ampelopsis*  
 b. Stems not jointed; flowers in umbellate cymes;  
 fruits black 2-3 seeded..... 1. *Ampelocissus*  
 5a. Flowers bisexual; stigmas simple ..... 3. *Cayratia*  
 b. Flowers unisexual; stigmas 4-lobed ..... 5. *Tetrastigma*

### 1. *Ampelocissus* Planch.

*Ampelocissus divaricata* (M. Lawson) Planch. in Vigne Amer. Vitic. Eur. 8: 375. 1884 & in DC., Monogr. Phan. 5: 378. 1887; Deb in Bull. Bot. Surv. India 3: 300. 1961. *Vitis divaricata* M. Lawson in Hook. f., Fl. Brit. India 1: 657. 1875.

Extensive climbers, covered with dense woolly tomentum, when young, glabrescent when mature; stems hollow, cylindrical. Leaves digitately compound; leaflets 3, ovate-lanceolate, acuminate, cordate and lobed. Flowers 5-merous, red brown, in umbellate cymes; petals 5, recurved. Berries black, 2-3 seeded; seeds oblong or obovoid, black.

*Fl. & Fr.* : April - November.

*Specimens examined* : Kangchup, Deb 2319; Itong, Meehold 5974 (CAL).

### 2. *Ampelopsis* Hort.

*Ampelopsis glandulosa* (Wallich) Maniyama in H. Hara Fl. E. Himal. 2: 78. 1971. *Vitis glandulosa* Wallich in Roxb., Fl. Ind. 2: 479. 1824; M. Lawson in Hook. f., Fl. Brit. India 1: 652. 1875; Deb in Bull. Bot. Surv. India 3: 302. 1961. *Ampelopsis heterophylla* Sieb. & Zucc. var. *hancei* Planch. sub.var. *wallichii* Planch. in DC. Monogr. Phan. 5: 457. 1887.

Stems cylindrical, solid, jointed and thickened at the nodes, with greyish dotted bark. Leaves 7-15 × 4.5-10 cm. Flowers in small dichotomous corymbose cymes, shorter than the leaves. Fruits small, globose, dark purple, 3-4 seeded.

*Fl & Fr.* : April - December.

*Specimens examined* : Ukhrul, Mukerjee 2922 (CAL).

### 3. *Cayratia* A. L. Juss.

*Cayratia japonica* (Thunb.) Gagnep. in Lecomte, Notul. Syst. 1: 349. 1911; Raman in Nair & Henry, Fl. Tamil Nadu 1: 79. 1983. *Vitis japonica* Thunb., Fl. Jap. 104. 1784. *V. tenuifolia* Wight & Arn., Prodr. 129. 1834; M. Lawson in Hook. f., Fl. Brit. India 1: 660. 1875; Kanjilal *et al.*, Fl. Assam 1: 300. 1936; Deb in Bull. Bot. Surv. India 3: 301. 1961. *Cissus japonica* (Thunb.) Willd., Sp. Pl. 659. 1789. *Vitis mollis* Wallich ex M. Lawson in Hook. f., Fl. Brit. India 1: 660. 1875. *Columella japonica* (Thunb.) Gagnep. var. *mollis* (Wallich ex M. Lawson) Maniyama in H. Hara. Fl. E. Himal. 1: 199. 1966.

Slender climbers. Petioles 5-10 cm long; leaflets 2.5-8 × 1.5-5 cm, ovate.

ovate-lanceolate to obovate, shortly acuminate, base acute or cuneate. Peduncles 2.5-5 cm long. Flowers 0.2-0.3 cm across, green. Berries ca 0.5 cm across, turbinate, globose, white, turning purple when ripe.

*Fl. & Fr.* : April-August.

*Specimens examined* : Boishing, G. Watt 6742; Sepranaina, Deb 1126 (CAL); Chandl. Chauhan 94941 (Assam).

#### 4. *Cissus* L.

- 1a. Young shoots glabrous and glaucous ..... 5. *C. repens*  
 2a. Branchlets sub-angular ..... 3  
 b. Branchlets terete ..... 4  
 3a. Entire plant reddish; leaves variegated;  
 tendrils forked ..... 3. *C. discolor*  
 b. Entire plant green; leaves not variegated;  
 tendrils simple ..... 2. *C. assamica*  
 4a. Leaves broadly cordate; stipules sub-orbicular;  
 flowers greenish-yellow in compact cymes ..... 1. *C. adnata*  
 b. Leaves shallowly cordate, stipules oblong;  
 flowers reddish-brown in slender cymes ..... 4. *C. repanda*

1. *Cissus adnata* Roxb., Fl. Ind. 1 : 423, 1820; Momiyama in Hara & Williams, Enum. Fl. Pl. Nepal 2 : 94, 1979. *Vitis adnata* (Roxb.) Wight & Arn., Prodr. 126, 1834; M. Lawson in Hook. f., Fl. Brit. India 1 : 649, 1875 p.p.; Kanjilal *et al.*, Fl. Assam 1 : 291, 1936; Deb in Bull. Bot. Surv. India 3 : 301, 1961.

Mani. Kongngouyen.

Climbing shrubs; tendrils leaf opposed, bifid. Leaves 5-15 × 4-13 cm, ovate to orbicular, cordate at base, serrate at margins, lateral nerves 4-5 pairs. Inflorescence cymes. Flowers 3-4 mm across, greenish-yellow. Berries ca 1.8 cm across, obovoid, black, 1 seeded.

*Fl. & Fr.* : July-September.

*Specimens examined* : Irong, Deb 573; Irong, Meebold 5573 (CAL).

2. *Cissus assamica* (M. Lawson) Craib in Kew Bull. 1911 : 31, 1911; Deb in Bull. Bot. Surv. India 3 : 301, 1961. *Vitis assamica* M. Lawson in Hook. f., Fl. Brit. India 1 : 648, 1875; Kanjilal *et al.*, Fl. Assam 1 : 291, 1936.

Woody climbers. Leaves 8-16 × 5-9 cm, ovate, orbicular, bluntly acuminate, cordate at base, serrate; lateral nerves 5-6 pairs. Flowers 0.3-0.5 cm across, greenish yellow, tetramerous; in axillary umbellate cymes. Berries ovoid, dark blue; seeds 1, pyriform.

*Fl. & Fr.* : July-November.

*Specimens examined* : Imphal, Deb 1085; Jirighat, Meebold 6048 (CAL).

3. *Cissus discolor* Blume, Catalogus 39, 1923; Deb in Bull. Bot. Surv. India 3

: 301, 1961. *Cissus javana* DC., Prodr. 1: 628, 1824. *Vitis discolor* (Blume) Dalz. in Hook. Kew. J. Bot., 2: 39, 1850; M. Lawson in Hook. f., Fl. Brit. India 1: 647, 1875; Kanjilal *et al.*, Fl. Assam 1: 290, 1936.

Slender climbers. Leaves 5 - 13 × 3 - 7 cm, ovate-lanceolate, acute or acuminate, cordate at base, crenate at margins, white-blotched above, purplish beneath. Umbels compound, leaf-opposed. Flowers ca 4 mm across, greenish-yellow. Berries ovoid, turning black.

Fl. & Fr. : June - November.

Specimens examined : Litan, Mukerjee 3363; Imphal, Deb 482; Laimakhong, Deb 543 (CAL); Ukhrul, Chauhan 94892 (ASSAM).

4. *Cissus repanda* Vahl. Symb. Bot. 3: 18, 1794. *Vitis repanda* (Vahl) Wight & Arn., Prodr. 125, 1834; M. Lawson in Hook. f., Fl. Brit. India 1: 648, 1875; Kanjilal *et al.*, Fl. Assam 1: 292, 1936; Deb in Bull. Bot. Surv. India 3: 301, 1961. *V. rosea* Royle, III, Bot. Himal. 149, 1835. *Cissus rosea* (Royle) Walp. Rep. 1: 437, 1842.

Climbers. Leaves simple, 10 - 20 × 7 - 14 cm, ovate to orbicular, cordate, often repand, acuminate, broader than long, tendrils forked, inflorescence corymbosely branched; bracts and bracteoles curly. Flowers reddish-brown. Fruits pyriform, one-seeded.

Fl. & Fr. : August - November.

Specimens examined : Yangjing, Deb 2724 (CAL); Chandrapur, Malick 771 (BSIS).

5. *Cissus repens* Lam., Encycl. 1: 31, 1783; Malick & Safui in J. Econ. Tax. Bot. 10: 3, 1987. *C. cordata* Roxb., Fl. Ind. 1: 407, 1820. *C. glauca* Roxb., Fl. Ind. 1: 425, 1820. *Vitis repens* (Lam.) Wight & Arn. in Wight, Cat. 58, 1833; M. Lawson in Hook. f., Fl. Brit. India 1: 646, 1875; Kanjilal *et al.*, Fl. Assam 1: 290, 1936.

Climbing or trailing herbs, glabrous; tendrils leaf opposed, forked. Leaves 5 - 11 × 3 - 6 cm, ovate-cordate, acute, cuspidately serrate at margin. Flowers pinkish-white, in axillary umbels. Berries 0.3 - 0.5 cm in diam., ellipsoid, black when ripe, 1-seeded.

Fl. & Fr. : August - January.

Specimens examined : Ukhrul, Mukerjee 3418; Laimatak, Meebold 5809 (CAL); Jirinnuck, Malick 831; Sripurikhal, Malick 1074 (BSIS)

#### 5. *Tetrastigma* Planch.

- |     |  |                            |
|-----|--|----------------------------|
| 1a. | Leaves 3 foliolate .....   | 2                          |
| b.  | Leaves 5 foliolate .....   | 3                          |
| 2a. | Cymes lax; flowers pale- yellow .....                            | 1. <i>T. bracteolatum</i>  |
| b.  | Cymes dense; flowers yellowish- green .....                      | 7. <i>T. thomsonianum</i>  |
| 3a. | Large liana, corolla papillose .....                             | 5. <i>T. ramicispermum</i> |
| b.  | Slender or large climbers, tendrils branched or unbranched ..... | 4                          |

- 4a. Stender climbers; tendrils branched ..... 5
- b. Large climbers; tendrils unbranched ..... 6
- 5a. Branches with aerial rootlets; fruits 1 seeded ..... 4. *T. obtectum*
- b. Branches without aerials rootlets; fruits 2-4 seeded..... *T. serrulaum*
- 6a. Margin of leaves inciso-serrate,  
inflorescence equal or longer than petioles ..... 2. *T. dubium*
- b. Margin of leaves distantly cuspidately  
serrate, inflorescence shorter than petioles ... ..3. *T. leucostaphylum*

1. **Tetrastigma bracteolatum** (Wallich) Planch. in DC., Monogr. Phan. 5 : 428. 1887; Deb in Bull. Bot. Surv. India 3 : 301. 1961. *Vitis bracteolata* Wallich in Roxb., Fl. Ind. 2 : 483. 1824; M. Lawson in Hook. f., Fl. Brit. India 1 : 654. 1875; Kanjilal *et al.*, Fl. Assam 1 : 296. 1936.

Mani.: *Menjas-haimanabauri*.

Climbers. Leaves trifoliolate; leaflets elliptic-ovate, acuminate, crenate to serrate. Flowers minute, dioecious in axillary trichotomous cymes; calyx saucer shaped, 4-toothed; petals inflexed. Fruits 0.8 cm across, black.

*Fl. & Fr.* : April - November.

*Specimens examined* : Bishenpur, *Meebold* 6089; Jirighat, *Meebold* 10898; Imphal valley, *Deb* 1079 (CAL); Jakuredhar, *Malick* 943 (BSIS); Churachandpur, *Chauhan* 95007 (ASSAM).

2. **Tetrastigma dubium** (M. Lawson) Planch. in DC., Monogr. Phan. 5 : 437. 1887; Malick & Safui in J. Econ. Tax. Bot. 10 : 3. 1987. *Vitis dubia* M. Lawson in Hook. f., Fl. Brit. India 1 : 661. 1875. *Vitis oxyphylla* Wallich ex Prain, Bengal Pl. 337. 338. 1903; Kanjilal *et al.*, Fl. Assam 1 : 299. 1936.

Climbers, branches striate. Leaves 3 - 5 foliolate, membranous; leaflets ovate, lanceolate or elliptic; tendril simple. Inflorescence shorter than the petioles. Fruits 0.6 - 0.7 cm across, globose, black; seeds rugose.

*Fl. & Fr.* : April - November.

*Specimens examined* : Sirohee furrar. *G. Watt* 6355 & 6436 (CAL); Chandrapur, *Malick* 765 (BSIS).

3. **Tetrastigma leucostaphylum** (Dennst.) Alston ex Mabb. in Taxon 26 : 539. 1977. *Cissus leucostaphyla* Dennst. in Schluessel Hort. Malab. 17, 19, 33. 1818. *Vitis lanceolaria sensu*. M. Lawson in Hook. f., Fl. Brit. India 1 : 660. 1875, *pp.* non Roxb.; Kanjilal *et al.*, Fl. Assam 1 : 300. 1936; Deb in Bull. Bot. Surv. India 3 : 301. 1961. *V. leucostaphyla* (Dennst.) Jackson. Ind. Kew. 2 : 1216. 1985.

Woody climbers. Leaves 5- foliolate, coriaceous, terminal leaflet ca 20 × 6 cm, oblong to oblanceolate, coriaceous, glabrous; tendrils leaf-opposed. Flowers yellowish-white in sub-corymbose cymes. Fruits globose.

*Fl. & Fr.* : April - January.

*Specimens examined* : Nongusing, Deb 2123; Kongpokpi, Deb 2290; Koupru, Meebold 6605 (CAL).

4. *Tetrastigma obtectum* (Wallich ex M. Lawson) Planch. ex Franchet in Bull. Soc., Bot. Fr. 33 : 458, 1886. *Vitis obtecta* Wallich ex M. Lawson in Hook. f., Fl. Brit. India 1 : 657, 1875; Deb in Bull. Bot. Surv. India 3 : 302, 1961.

Young branches very slender, creeping, older with a roughish bark and covered with numerous short aerial rootlets. Leaflets ovate or obovate, sessile or nearly so, serrate, glabrous, membranous, lateral much smaller than the terminal; tendrils branched, very slender, short. Flowers unisexual, ca 3 cm long; style 0; stigma flat. Fruits one seeded.

*Fl. & Fr.* : April - February.

*Specimens examined* : Ukhrul, Mukerjee 2605 & 2826; Bishenpur, Meebold 10897; Koupru, Meebold 6609 (CAL).

5. *Tetrastigma runcisperrum* (M. Lawson) Planch. in DC., Monogr. Phan. 5 : 429, 1887. *Vitis runcisperma* M. Lawson in Hook. f., Fl. Brit. India 1 : 661, 1875; Kanjilal *et al.*, Fl. Assam 1 : 301, 1936; Deb in Bull. Bot. Surv. India 3 : 302, 1961.

Immense climbers. Leaves usually 5-foliolate, rarely 3-foliolate; petioles 7 - 16 cm; leaflets 3-15 × 2.5-6 cm, elliptic - lanceolate, serrate. Fruits black; seeds with a broad shallow groove on the back and a sharp ridge formed by the raphe on the face.

*Fl. & Fr.* : April - January.

*Specimens examined* : Koupru, Deb 2270 & 2251; Sirohce furar, G. Watt 6356; Laimatak, Meebold 5576; Khongui Hills, G. Watt 6757; Ukhrul, Mukerjee 2606 (CAL); Litan, Chauhan 94781 (ASSAM).

6. *Tetrastigma serrulatum* (Roxb.) Planch. in DC., Monogr. Phan. 5 : 432, 1887; Deb in Bull. Bot. Surv. India 3 : 301, 1961. *Cissus serrulata* Roxb., Fl. Ind. 1 : 432, 1820. *Vitis capreolata* D. Don, Prodr. Fl. Nep. 188, 1825; M. Lawson in Hook. f., Fl. Brit. India 1 : 659, 1875; Kanjilal *et al.*, Fl. Assam 1 : 299, 1936.

Extensive climbers. Leaflets 2 - 13 × 1 - 5 cm, rhomboid, obovate or lanceolate, acuminate at tip, obliquely cuneate at base. Peduncles 1.5 - 4 cm long. Flowers 0.4 - 0.5 cm across, green. Berries obovoid, 0.6 - 0.8 cm long, reddish-brown.

*Fl. & Fr.* : February - December.

*Specimens examined* : Lambud, Meebold 6843; Khongui Hills, G. Watt 6757; Mao, Deb 1859 (CAL).

7. *Tetrastigma thomsonianum* Planch. in DC., Monogr. Phan. 5 : 438, 1887; Deb in Bull. Bot. Surv. India 3 : 301, 1961. *Cissus angustifolius* Roxb., Fl. Ind. 1 : 408, 1820. *Tetrastigma angustifolia* (Roxb.) Deb, Fl. Tripura 1 : 416, 1981, non Planch. 1887. *Vitis angustifolia* (Roxb.) Wight Ic. Pl. Ind. Or. 1 : 9, t. 176, 1839; M. Lawson in Hook. f., Fl. Brit. India 1 : 654, 1875; Kanjilal *et al.*, Fl. Assam 1 : 297, 1936.

Slender climbers, tendrils simple. Leaflets elliptic-lanceolate, obliquely rounded

at base, acute to acuminate, 7-16 × 2-5 cm. Flowers yellowish-green, ca 4 mm across. Berries globose, ca 5 mm; seeds 2-4, furrowed on each face, rugose on sides.

*Fl. & Fr.* : March - November.

*Specimens examined* : Jirihat, Meebold 5802 (CAL).

6. *Vitis* L.

*Vitis heyneana* Roem. & Schult., Syst. Veg. 5 : 318. 1819. *V. lanata* Roxb., Fl. Ind. 2 : 474. 1824; M. Lawson in Hook. f., Fl. Brit. India 1 : 651. 1875; Kanjilal *et al.*, Fl. Assam 1 : 293. 1936; Deb in Bull. Bot. Surv. India 3 : 302. 1961.

Much variable in size. Leaves variable, 7-15 × 4-7 cm, almost quite glabrous. Flowers small, green, forming thyrsoid paniculate cymes; petals cohering at the apex, rarely separating. Fruits the size of a large pea, round, purple, 4-seeded.

*Fl. & Fr.* : May - September.

*Specimens examined* : Imphal, Deb 485; Khongui, G. Watt 6753 & 6752 (CAL).

54. LEEACEAE

Dumort., Anal. Fam. Pl. 21, 27. 1829.

(R. Shanpru)

*Leea* L.

- 1a. Flowers white or greenish ..... 2.
- b. Flowers bright red ..... 2. *L. alata*
- 2a. Undershrubs, secondary nerves one to each tooth ..... 3.
- b. Shrubs or small trees, secondary nerves several to each tooth ..... 5.
- 3a. Leaves trifoliate; corymbs bracteate ..... 4. *L. compactiflora*
- b. Leaves simple or pinnate; corymbs ebracteate ..... 4.
- 4a. Stems with wing; leaves pinnate, ovate ..... 3. *L. astatten*
- b. Stems unwinged; leaves simple, lanceolate ..... 6. *L. macrophylla*
- 5a. Leaflets glabrous, cuneate at base; semi-herbaceous shrubs ..... 5. *L. indica*
- b. Leaflets hairy, rounded or subcordate at base, gland dotted ..... 1. *L. aequata*.

1. *Leea aequata* L., Syst. Nat. ed. 12, 2: 627. 1767; Kanjilal *et al.*, Fl. Assam 1 : 307. 1936; Malick & Safui in J. Econ. Tax. Bot. 10 : 3. 1967. *L. hirta* Roxb. ex Hornem Hort. Hafn. 1: 231. 1813; M. Lawson in Hook. f., Fl. Brit. India 1 : 666. 1875. *L. kurzii* C.B. Clarke in J. Bot. 19: 165. 1881.

Shrubs, 1.5 - 3 m tall. Leaflets 20 × 7 cm, acuminate at apex. Inflorescence leaf-opposed or terminal, glandular. Fruits berry like, succulent, sub-globose; seeds crenate with a hard testa.

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

*Specimens examined* : Jirimukh, *Malick* 837 (BSIS).

2. *Leea alata* Edgew. in Trans. Linn. Soc. 20 : 36. 1846; M. Lawson in Hook. f., Fl. Brit. India 1 : 665. 1875; Kanjilal *et al.*, Fl. Assam 1 : 303. 1936.

Undershrubs. Leaves rachis reddish, grooved; leaflets 5 - 9, rarely 8 - 26 × 4 - 7 cm, oblong-lanceolate, oblong, rounded or obtuse at base, acute, serrate; lateral nerves oblique. Flowers in 15 cm long, corymbose cymes, 0.3 - 0.5 cm across, red. Berries ca 1 cm in diam., globose red or bluish-purple.

*Fl. & Fr.* : June - December.

*Specimens examined* : Bishenpur, *Meebold* 6419 (CAL).

3. *Leea asiatica* (L.) Ridsdale in Manilal, Bot. Hist. Hort. Maitab. 189. 1980. *Phytolacca asiatica* L., Sp. Pl. 474. 1753. *L. crispa* L., Syst. Nat. ed. 12. 2: 627. 1767; M. Lawson in Hook. f., Fl. Brit. India 1 : 665. 1875. *L. aspera* Edgew. in Trans. Linn. Soc. 20 : 36. 1846, non Wallich ex G. Don 1831; M. Lawson in Hook. f., Fl. Brit. India 1 : 665. 1875; Kanjilal *et al.*, Fl. Assam 1 : 306. 1936. *L. edgeworthii* Sant. in Rec. Bot. Surv. India 16 : 54. 1953; Deb in Bull. Bot. Surv. India 3 : 301. 1961.

Mani. : *Koknal*.

Undershrubs up to 2 m tall. Leaves 15 - 30 cm long; leaflets 3 - 5, 8 - 15 × 3 - 7 cm, elliptic-oblong to oblong-ovate, obliquely cordate or sub-cordate at base, acute to shortly acuminate at apex serrate; lateral nerves 10 - 12 on either side, parallel; petioles 5 - 12 mm long. Flowers ca 5 mm across, greenish-white or pale-yellow in corymbs. Berries ca 7 mm long, subglobose, grey, turning black, 5 - 6 seeded.

*Fl. & Fr.* : June - November.

*Specimens examined* : Singamai, *Deb* 185, 735 (CAL).

4. *Leea compactiflora* Kurz in J. Asiat. Soc. Bengal 42 (2) : 65. 1873. *L. trifoliata* M. Lawson in Hook. f., Fl. Brit. India 1 : 666. 1875; Deb in Bull. Bot. Surv. India 3 : 301. 1961. *L. bracteata* C. B. Clarke in J. Bot. 19: 164. 1881; Kanjilal *et al.*, Fl. Assam 1 : 308. 1936.

Small wiry plants, 0.3 - 0.6 m. Leaves 8-foliolate, leaflets shortly stalked, 2.2 - 2.5 × 1.5 - 7 cm, elliptic, sub-acuminate, sharply serrate, very thinly membranous, nerves slightly arcuate, one running to every other serrature. Cymes small; anthers distinct. Fruits black.

*Fl. & Fr.* : May - November.

*Specimens examined* : Barak, *C. B. Clarke* 42245 A (CAL).

5. *Leea indica* (Burm. f.) Merr. in Philp. J. Sci. Bot. 14 : 245. 1919; Deb in Bull. Bot. Surv. India 3 : 301. 1961; Ridsdale in Bluncea 22 : 95. 1974. *Staphylea indica* Burm. f., Fl. India 75. t. 23. f. 2. 1768. *Leea sambucina* (L.) Willd., Sp. Pl. 1 : 1177. 1798; M. Lawson in Hook. f., Fl. Brit. India 1 : 666. 1875, *p.p. Aquilegia sambucina*



L., Mant. Pl. 2 : 211. 1771. *Leea umbraculifera* C.B. Clarke in J. Bot. 19: 141. 1881; Kanjilal *et al.*, Fl. Assam 1: 306. 1936.

Rigid shrubs, 1.5 - 3 m tall. Leaves large, bipinnate; leaflets 18 × 6 cm, oblong-lanceolate, terminal one larger, serrate at margins, acuminate at tip. Inflorescence leaf-opposed, bright red. Fruits 3 - 6 celled, succulent, sub-globose; seeds cuneate with a hard testa.

*Fl. & Fr.* : June - December.

*Specimens examined* : Specimens not seen.

6. *Leea macrophylla* Roxb. ex Hornem, Hort. Hafn. 1: 231. 1813; M. Lawson in Hook. f., Fl. Brit. India 1: 664. 1875; Ridsdale in Blumea 22: 85. 1974. *L. aspera* Wallich ex G. Don, Gen. Syst. 1: 713. 1831; M. Lawson in Hook. f., Fl. Brit. India 1: 665. 1875.

Shrubs ca 1 m tall. Leaflets 5 - 8 × 7 - 15 cm, cordate, ovate, membranous. Cymes axillary corymbose, up to 10 cm long. Flowers light green. Berries globose, black.

*Fl. & Fr.* : June - November.

*Specimens examined* : Nungba to Bishenpur, Maltek 1220 (BSIS).

## 55. SAPINDACEAE

A. L. Juss., Gen. Pl. 246. 1789 ("Sapindi").

(A. S. Chauhan & P. Chakraborty)

- 1a. Climbing herbs; leaves biternate ..... 2. *Cardiospermum*
- b. Shrubs or trees; leaves not biternate ..... 2
- 2a. Leaves palmately compound, 3 foliolate ..... 1. *Allophylus*
- b. Leaves pinnately compound ..... 3
- 3a. Flowers pinkish or pinkish-red ..... 4. *Dabinea*
- b. Flowers otherwise ..... 4
- 4a. Petals absent ..... 5
- b. Petals present ..... 7
- 5a. Ovary 2 - 3 celled; fruits tubercled ..... 7. *Litchi*
- b. Ovary more than 3 celled; fruits not tubercled ..... 6
- 6a. Leaves stipulate; flowers in racemes ..... 8. *Mischocarpus*
- b. Leaves exstipulate; flowers in cymes ..... 5. *Dodonaea*
- 7a. Flowers actinomorphic; fruits tubercled ..... 3. *Dimocarpus*
- b. Flowers zygomorphic; fruits not tubercled ..... 8
- 8a. Fruits schizocarpic; pericarps saponiferous ..... 9. *Sapindus*
- b. Fruits drupaceous; pericarp not saponiferous ..... 6. *Lepisanthes*

### 1. *Allophylus* L.

- 1a. Plants ferruginous tomentose; racemes branched; leaflets sparsely serrate ..... 1. *A. cobbe*

- b. Plants villous; racemes unbranched;  
leaflets sharply serrate ..... 2. *A. villosus*

1. ***Allophylus cobbe*** (L.) Raeusch., Nomencl. Bot. ed. 3 : 108, 1797; Hiern in Hook. f., Fl. Brit. India 1 : 673, 1875, p.p. *Rhus cobbe* L., Sp. Pl. 267, 1753. *Allophylus cobbe* (L.) Raeusch. f. *racemosus* (L.) Hiern in Hook. f., Fl. Brit. India 1 : 674, 1875.

Mani.: *Lichi - manhi*.

Small trees or scandent shrubs, ferruginous tomentose. Leaflets 4-15 × 2-6 cm, ovate or elliptic-ovate, cuneate at base, acute, sparsely tomentose above, silvery tomentose beneath. Flowers 3 mm across, white, in axillary racemes; sepals and petals obovate. Fruits ca 5 mm, globose, glabrous, 1-seeded.

Fl. & Fr. : May - December.

*Specimens examined* : Imphal valley, Deb 2635; Nambishi, Meebald 7330 (CAL).

2. ***Allophylus villosus*** (Roxb.) Blume, Rumph. 3 : 132, 1847. *Ornitrophe villosus* Roxb., Fl. Ind. 2 : 26, 1832. *Allophylus cobbe* (L.) Raeusch f. *villosus* (Roxb.) Hiern in Hook. f., Fl. Brit. India 1 : 674, 1875. *A. aporeticus* Voigt ex Kurz in J. Asiat. Soc. Bengal 44 (2) : 185, 1875.

Shrubs up to 3 m tall. Leaflets 3-5, 8-20 × 4-8 cm, obliquely-oblong, lanceolate or elliptic-lanceolate, cuneate at base, acuminate, glabrescent above, villous beneath. Flowers ca 3 mm across, dull white or greenish-yellow, in 3-7 cm long racemes; peduncles densely brown-villous. Capsules ca 8 mm, orange-red, glabrous; cocci sub-globose.

Fl. & Fr. : May - November.

*Specimens examined* : West Manipur, C. B. Clarke 7039 (CAL).

## 2. *Cardiospermum* L.

***Cardiospermum halicacabum*** L., Sp. Pl. 366, 1753; Hiern in Hook. f., Fl. Brit. India 1 : 670, 1875; Deb in Bull. Bot. Surv. India 3 : 305, 1961. *C. microcarpum* Kunth, Nov. Gen. & Sp. Pl. 5 : 104, 1821.

Herbs with wiry stems and branches, climbing by tendrils. Leaves alternate, biternate; leaflets inciso-dentate, sparsely pubescent, acute or acuminate. Flowers irregular, poly-gamodioecious in axillary racemes, white; sepals 4, concave; petals 4 in 2 pairs, stamens 8; ovary 3 locular. Fruits ca 2 cm wide, pubescent; seeds globose.

Fl. & Fr. : November - February.

*Specimens examined* : Imphal valley, Deb 326 (CAL).

## 3. *Dimocarpus* Lour.

***Dimocarpus longan*** Lour., Fl. Cochinch. 293, 1790. *Euphoria longana* Lam., Encycl. 3 : 574, 1792. *E. longan* (Lour.) Steudel, Nomen. Bot. 1 : 328, 1821; Deb in Bull. Bot. Surv. India 3 : 305, 1961. *Nephelium longana* (Lam.) Camb. in Mem. Mus. Hist. Nat. Paris 18 : 30, 1829. Hiern in Hook. f., Fl. Brit. India 1 : 688, 1875; Kanjilal *et al.*, Fl. Assam 1 : 323, 1936.

Mani.: *Nongganhei*.

Trees, buttressed at base. Leaves paripinnate; leaflets 4-10, opposite, 3-15 × 1-4 cm, obliquely lanceolate, acute, cuneate at base, glabrous above, glaucous beneath. Inflorescence cymose clusters, finely pubescent. Flowers polygamodioecious, creamy white; filaments long. Fruits ca 2 cm, globose, purple in colour, tubercled.

*Fl. & Fr.* : May - November.

Specimens not seen.

#### 4. *Dobinea* Buch.-Ham.

*Dobinea vulgaris* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 249. 1825; Hiern in Hook. f., Fl. Brit. India 1 : 696. 1875; Deb in Bull. Bot. Surv. India 3 : 305. 1961.

Shrubs with terrate virgate branches. Leaves opposite, pubescent, exstipulate, serrate, pubescent, petioled, 7-17 × 2.5-5 cm; petioles 0.5-8 cm. Inflorescence pyramidal terminal panicle. Flowers 2-3 mm in diam., rose coloured; ovary sessile. Fruits compressed, shortly ciliate.

*Fl. & Fr.* : June - November.

*Specimens examined* : Ukhrul, Deb s.n. (Specimens not seen)

#### 5. *Dodonaea* L.

*Dodonaea viscosa* (L.) Jacq., Enum. Syst. Pl. Craib 19. 1760; Hiern in Hook. f., Fl. Brit. India 1 : 697. 1875; Deb in Bull. Bot. Surv. India 3 : 305. 1961. *Poetea viscosa* L., Sp. Pl. 118. 1753. Fig. 32

Shrubs. Leaves simple, alternate; stipules absent. Flowers yellowish-green, polygamous or polygamodioecious in lateral and terminal cymes; sepals 2-5; petals 0; stamens 5-10; ovary 3-6 locular. Capsules 2-6 seeded, membranous, compressed; seeds sub-globose or compressed.

*Fl. & Fr.* : June - December.

*Specimens examined* : Imphal, Deb 314 (CAL).

Planted as hedge plants.

#### 6. *Lepisanthes* Blume

*Lepisanthes senegalensis* (A. Juss. ex Poir.) Lecnh. in Blumea 17 : 85. 1969; Malick & Safui in J. Econ. Tax. Bot. 10 : 3. 1987. *Sapindus senegalensis* A. Juss. ex Poir., Encl. 6 : 666. 1805. *S. attenuatus* Wallich ex Hiern in Hook. f., Fl. Brit. India 1 : 684. 1875. *S. danura* Voigt, Suburb. Calcutta 94. 1845; Hiern in Hook. f., Fl. Brit. India 1 : 684. 1875. *S. bifolatus* Hiern in Hook. f., Fl. Brit. India 1 : 684. 1875. *S. rubra* Kurz, Fl. Brit. Burma 1 : 298. 1877. *Octophora panijuga* Hiern in Hook. f., Fl. Brit. India 1 : 68. 1875; Kanjilal *et al.*, Fl. Assam 1 : 321. 1936. *Aphania rubra* Radlk., Sitz. Ber. A.K. Wiss. Math.-Phy. Kl. Munch. 8 : 238. 1878; Kanjilal *et al.*, Fl. Assam 1 : 321. 1936.

Shrubs or small trees. Leaves paripinnate, crowded at tips of twigs; leaflets 8



Fig. 32 : A fruiting twig of *Dodonaea viscosa* (L.) Jacq.

10, 15 - 28 × 4-6 cm. opposite, very variable in size and shape, elliptic to oblong, acuminate at tip, entire, glabrous. Flowers purplish in large spreading panicle; sepals and petals ciliate; stamens 8; ovary 2 - 3 lobed. Fruits ellipsoid with purplish aril, edible.

*Fl. & Fr.* : March - August.

*Specimens examined* : Uchathal, Malick 620 (BSIS); Litan, Chauhan 94747 (ASSAM).

### 7. *Litchi* Sonn.

*Litchi chinensis* Sonn., Voy Ind. Or. Chine 2 : 230, t. 129. 1782; Deb in Bull. Bot. Surv. India 3 : 305. 1961; Mukherjee in J. Econ. Tax. Bot. 1 : 80, 1980. *Democarpus litchi* Lour., Fl. Cochinch. 233. 1790. *Nephellum litchi* (Lour.) Camb. in Mem. Mus. Hist. Nat. Paris 1 : 30. 1829; Hiern in Hook. f., Fl. Brit. India 1 : 687. 1875; Kanjilal *et al.*, Fl. Assam 1 : 323. 1936.

Small or medium sized trees. Leaves alternate, pinnate; leaflets 2 - 8, 4 - 15 × 2 - 4 cm, oblong to oblong-lanceolate, cuneate at base, acuminate. Inflorescence terminal panicles. Flowers regular, polygamous, dioecious; calyx 4 - 5; petals absent; stamens 6 - 8; ovary 2 - 3 -celled. Fruits tubercled, one lobed, aril edible.

*Fl. & Fr.* : February - July.

Under cultivation for its fruits.

### 8. *Mischocarpus* Blume, *nom. cons.*

*Mischocarpus pentapetalus* (Roxb.) Radlk., Sapind. Holl. Ind. 43. 1879. *Schleichera pentapetala* Roxb., Fl. Ind. 2 : 275. 1824. *Cupania pentapetala* Wight & Arn., Prodr. 113. 1834; Hiern in Hook. f., Fl. Brit. India 1 : 678. 1875. *C. sumatrana* Miq., Fl. India Bat. 1 (2) : 566. 1859; Hiern in Hook. f., Fl. Brit. India 1 : 678. 1875. *C. helferi* Hiern in Hook. f., Fl. Brit. India 1 : 697. 1875; Deb in Bull. Bot. Surv. India 3 : 305. 1961.

Tall shrubs. Leaflets 4, alternate, elliptic-oblong, sub-acuminate, glabrous, delicately reticulate, base obtuse; stipules pubescent not lobed. Flowers pentamerous in short patent racemes arranged in subterminal panicles, pubescent; calyx cleft, sub-clavate; petals absent; filaments pubescent; ovary pyriform.

*Fl. & Fr.* April - October.

*Specimens examined* : Karong, G. Watt 7138 (CAL).

### 9. *Sapindus* L.

*Sapindus emarginatus* Vahl, Symb. Bot. 3 : 54. 1794; Deb in Bull. Bot. Surv. India 3 : 305. 1961. *S. trifoliatu*s *auct. non* L., 1753; Hiern in Hook. f., Fl. Brit. India 1 : 682. 1875, *p. p.* *S. laurifolius* Vahl var. *emarginatus* (Vahl) Cooke, Fl. Bomb. 1 : 267. 1902. *S. trifoliatu*s var. *emarginatus* (Vahl) Radlk. in Das. Pflanzenreich 98. 1956.

Mani. : *Kekru*.

Trees. Leaves 12 - 30 cm; leaflets 3.5 - 20 × 2.5 - 10 cm. Flowers 3 mm long, white hairy; sepals elliptic, obtuse; petals 4 - 5, narrowed and rather longer than the sepals; stamens 8; anthers apiculate. Fruits *ca* 1 cm long, fleshy, 2 - 3 lobed.

*Fl. & Fr.* : February - April.

Specimens not seen.

## 56. ACERACEAE

A. L. de Juss., Gen. Pl. 250. 1789 (*Accra*) *non, fam. conx.*

(*R. Shanpru*)

### 1. *Acer* Tournef.

- 1a. Leaves lobed ..... 3. *A. sterculiaceum*  
 b. Leaves unlobed ..... 2.  
 2a. Petioles less than 1 cm long; upper surface  
 of leaf olive-green, lower surface brownish ..... 1. *A. laevigatum*  
 b. Petioles more than 1.5 cm long; upper surface  
 of leaf green, lower surface glaucous ..... 2. *A. oblongum*

1. *Acer laevigatum* Wallich, Pl. Asiat. Rat. 2 : 3, t. 104. 1830; Hiern in Hook. f., Fl. Brit. India 1 : 693. 1875; Kanjilal *et al.*, Fl. Assam 1 : 312. 1936; Deb in Bull. Bot. Surv. India 3 : 306. 1961.

Trees, 7 - 12 m tall. Leaves 4 - 12 × 2 - 5 cm, elliptic, oblong or ovate-lanceolate, acute, caudate-acuminate, prominently reticulate; lateral nerves 6 - 10 pairs, margins entire or remotely serrate. Inflorescence a raceme, terminal or axillary. Flowers white, 3 - 4 mm across; stamens 2 - 5; anthers dorsifixed; ovary villose, styles elongate. Fruits *ca* 3 - 5 cm with spatulate wings.

*Fl. & Fr.* : March - August.

*Specimens examined* : Ukhrul. Mukerjee 2832; Imphal, Deb 1982 (CAL).

2. *Acer oblongum* Wallich ex DC., Prodr. 1 : 593. 1824; Hiern in Hook. f., Fl. Brit. India 1 : 693. 1875; Deb in Bull. Bot. Surv. India 3 : 305. 1961. Fig. 33

Evergreen trees, 12 - 18 m, trunk 2.5 - 5 cm in diam., buttressed at base. Leaves persistent, dark green above, 4.5 - 17 × 3.5 - 7 cm. Flowers *ca* 4 mm across, white; sepals linear or lanceolate, 2 - 4 mm long; petals narrow, elliptic-lanceolate; stamens 8, exserted, glabrous; ovary hairy; carpels 2.5 - 3.5 cm long. Fruits *ca* 3.5 cm; samara 2-winged.

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

*Specimens examined* : Sirohee. G. Watt 7238; Meebold 6523; Ukhrul, Mukerjee 3271 (CAL).



Fig. 33 : A fruiting twig of *Acer oblongum* Wallich ex DC.

3. *Acer sterculiaceum* Wallich, Pl. Asiat. Raf. 2 : 3, 1. 105. 1830. *A. villosum* Wallich, Ic. 2 : 4. 1831, non Presl, 1822; Hiern in Hook. f., Fl. Brit. India 1 : 695. 1875. 1822.

Tall trees 10 - 15 m high, dioecious; branches brownish. Leaves 12 - 20 × 13 - 22 cm. 3 - 5 lobed, base deeply cordate, 5 - 7 nerved, acuminate, remotely serrate; petioles hairy, 6 - 12 cm long. Inflorescence fasciculate racemose, pendulous, hairy. Flowers 5 microns, hairy, greenish-yellow; stamens 5 - 8; perigynous, exserted; ovary greenish-brown. Samaras 4.5 × 1.5 - 2 cm, brownish.

*Fl. & Fr.* : February - May.

*Specimens examined* : Chingsaw forest, G. Watt 6563 (CAL).

### 57. STAPHYLEACEAE

Lindley, Syn. Brit. Fl. 75. 1829.

(R. Shanpru)

#### 1. *Turpinia* Vent., non cons.

*Turpinia pomifera* (Roxb.) DC., Prodr. 2 : 3. 1825; Hiern in Hook. f., Fl. Brit. India 1 : 698. 1875, p.p. ; Kanjilal *et al.*, Fl. Assam 1 : 309. 1936; Deb in Bull. Bot. Surv. India 3 : 306. 1961. *Dalrympetia pomifera* Roxb., Pl. Corom. 3. 76, t. 279. 1819.

Small trees. Leaves 3 - 9 foliolate, stipulate; leaflets 8 - 15 × 2 - 6 cm, ovate-oblong, elliptic-oblong, acuminate, margins dentate, glabrous. Flowers ca 0.5 cm across, yellow, in terminal, sub-terminal or axillary panicles; sepals unequal, fleshy; petals ca 0.4 cm long, oblong; stamens alternate with petals; ovary 3 loculed, with 6 ovules in each locule. Fruits globular, 3 grooved from the top, with thick pericarp.

*Fl. & Fr.* : March - October.

*Specimens examined* : Kegurima, G. Watt 6851; Chingsaw, G. Watt 6536; Sirohcc furat, G. Watt 6489; Kuthimabi, G. Watt 5825; Lamlang, Mukerjee 2593 (CAL); Litan, Chauhan 94839 (ASSAM).

### 58. SABIACEAE

Blume, Mus. Bot. Lugd.-Bat. 1 : 368. 1851.

(A. S. Chauhan & R. Shanpru)

- 1a. Climbers or scandent shrubs; sepals and petals equal;  
stamens 4 - 5, all perfect ..... 2. *Sabia*
- b. Erect shrubs or trees; sepals and petals unequal;  
stamens 5, only 2 fertile ..... 1. *Meliosma*

#### 1. *Meliosma* Blume

- 1a. Leaves simple; inner petals bifid ..... 2. *M. simplicifolia*
- b. Leaves compound; inner petals  
deeply bifid ..... 1. *M. pinnata*



1. *Meliosma pinnata* (Roxb.) Maxim. in Bull. Acad. Sci. St. Pet. 12 : 64 in obs. 1867; Hook. f. Fl. Brit. India 2 : 6. 1876; Kanjilal *et al.*, Fl. Assam 1 : 329. 1936; Nayar & Majumdar in Fasc. Fl. India 20 : 119. 1990. *Millingtonia pinnata* Roxb., Fl. Ind. 1 : 103. 1820.

Medium sized trees, up to 15 m tall. Leaves 6–11 jugate; leaflets 5–15 × 1–5 cm, lanceolate or oblong, acute, dentate, glabrous. Flowers ca 0.4 cm across, creamy white in erect lax panicles; sepals and petals 4–5, glabrous; ovary ca 1 mm long, glabrous. Fruits ca 0.6 cm across, globose.

- la. Leaves 3–7 jugate, pubescent;  
ovary pubescent ..... 2. subsp. *barbulata*
- b. Leaves 6–11 jugate, glabrous;  
ovary glabrous. .... 1. subsp. *pinnata*  
subsp. *pinnata*

Fl. & Fr. : April–October.

Specimens examined : Kobloug, C.B. Clarke 404 (CAL).

subsp. *barbulata* (Cufod.) Beus. in Dessanayake & Fosberg, Rev. Hamb. Fl. Ceylon 3 : 384. 1981. *M. theifolia* Maxim. subsp. *barbulata* Cufod. in Oest. Bot. Zeit. 88 : 254. 1939. *M. arnottiana* (Wight) Walp., Rep. 1 : 423. 1842; Hook. f. Fl. Brit. India 2 : 6. 1876. *M. wallichii* Planch. ex Hook. f. in Hook. f. Fl. Brit. India 2 : 6. 1876; Deb in Bull. Bot. Surv. India 3 : 306. 1961.

Small, evergreen trees, up to 15 m tall. Leaves 3–7 jugate; leaflets 3–15 × 2–5 cm, ovate to oblanceolate, ovate-oblong, base rounded to acute, acuminate, pubescent. Flowers ca 0.4 cm across, white or yellowish-white, in densely flowered, brown tomentose, panicles; inner petals deeply bifid. Fruits ca 0.5 cm across, globose, reddish when ripe.

Fl. & Fr. : May–October.

Specimens examined : West Manipur, Kaith *s.n.*

2. *Meliosma simplicifolia* (Roxb.) Walp., Rep. 1 : 103. 1842; Nayar & Majumdar in Fasc. Fl. India 20 : 122. 1990. *Millingtonia simplicifolia* Roxb., Pl. Corom. 3 : 50, t. 254. 1820. *M. pungens* Wallich ex Wight & Arn. Edinb. New Phil. J. 15 : 178. 1833. *M. simplicifolia* (Roxb.) Hook. f. Fl. Brit. India 2 : 5. 1876; Kanjilal *et al.*, Fl. Assam 1 : 327. 1936; Deb in Bull. Bot. Surv. India 3 : 305. 1961. *Meliosma thomsonii* King ex Brandis, Ind. Trees 195. 1906. Fig. 34

subsp. *simplicifolia*

Medium sized, evergreen trees, up to 20 m tall. Leaves 9–30 × 6–18 cm, ovate-oblong to ovate-lanceolate, cuneate at base, cuspidate at apex, entire, glabrous, nerves 8–23 pairs. Flowers ca 2 mm across, yellow or dull-white, in lax panicles; ovary glabrous. Drupes ca 5 mm in diam., subglobose, black.

Fl. & Fr. : December–June.

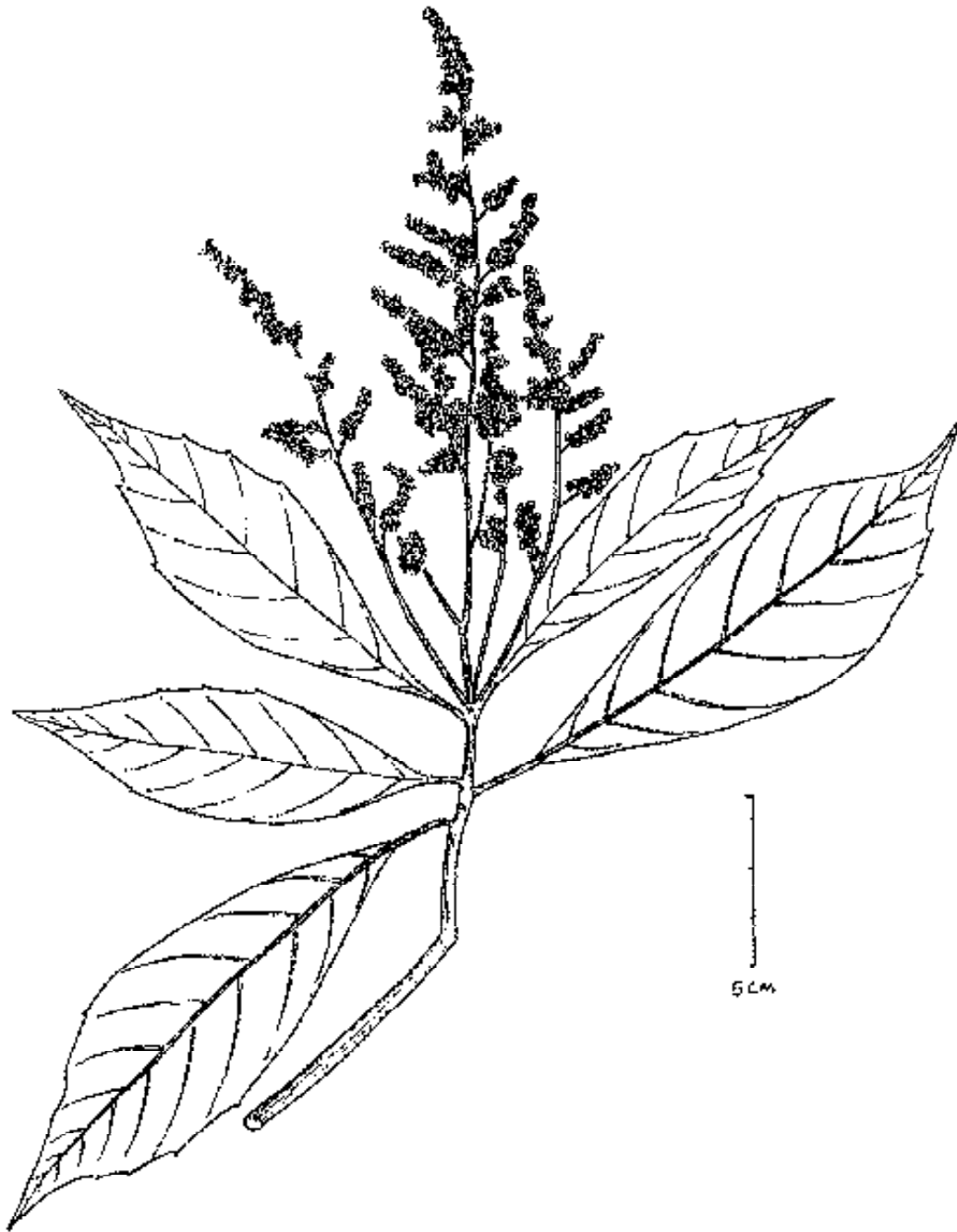


Fig. 34 : A flowering twig of *Meliosma simplicifolia* (Roxb.) Walp.

*Specimens examined* : Erong, C. B. Clarke 42207; Kosopom, Meebold 5579; Imphal, Deb 3531 (CAL).

## 2. *Sabia* Colebr.

- 1a. Flowers solitary ..... 1. *S. campanulata*  
 b. Flowers few to many ..... 2  
 2a. Inflorescence few flowered;  
 flowers purplish-green; stamens equal ..... 3. *S. purpurea*  
 b. Inflorescence many flowered; flowers white or  
 greenish-white; stamens unequal ..... 2. *S. lanceolata*

1. *Sabia campanulata* Wallich in Roxb., Fl. Ind. 2 : 311. 1824; Hook. f., Fl. Brit. India 2 : 1. 1876; Nayar & Majumdar in Fasc. Fl. India 20 : 128. 1990. *S. leptandra* Hook. f. & Thomson, Fl. India 1 : 209. 1855 & in Hook. f., Fl. Brit. India 2 : 2. 1876.

### var. *campanulata*

Scandent shrubs or lianas, young shoots pubescent. Leaves 3-10 x 1-3 cm, oblong-lanceolate or oblong-ovate, acute at base, acuminate at apex, nerves 4-6 pairs. Flowers solitary ca 3 cm long; petals 5-10 x 4-6 mm, obovate, obtuse; stamens 5, shorter than petals. Drupes ca 0.5 cm in diam., 1-2 lobed, reniform, wrinkled.

Fl. & Fr. : March-May.

*Specimens examined* : Sirohee furar, G. Watt 6463 (CAL).

2. *Sabia lanceolata* Colebr., Trans. Linn. Soc. Lond. 12 : 355. 1818; Hook. f. & Thomson, Fl. India 1 : 210. 1855 & in Hook. f., Fl. Brit. India 2 : 2. 1876; Kanjilal *et al.*, Fl. Assam 1 : 325. 1937; Van de Water in Blumea 26 : 41. 1980. *S. tomentosa* Hook. f., Fl. Brit. India 2 : 3. 1876.

### var. *lanceolata*

Mani.: *Khoi*.

Evergreen climbing shrubs. Leaves 5-18 x 2-6 cm, oblong-lanceolate or elliptic-oblong, caudate acuminate, glabrous, nerves 7-12 pairs; petioles up to 2.5 cm long. Flowers ca 6 mm across, greenish-white, sweet scented; solitary or in thyrsoid glabrous cymes; ovary glabrous. Drupes ca 1.5 cm long, obovoid, or sub-pyriform, blue when ripe.

Fl. & Fr. : October-March.

*Specimens examined* : Irong, Meebold 6119; Gouper, C. B. Clarke 4272 (CAL).

3. *Sabia purpurea* Hook. f. & Thomson, Fl. Ind. 1 : 209. 1855 & in Hook. f., Fl. Brit. India 2 : 2. 1876; Kanjilal *et al.*, Fl. Assam 2 : 124. 1936; Deb in Bull. Bot. Surv. India 3 : 306. 1961.

Climbing shrubs with purplish-green branchlets. Leaves 2-10 x 1.2-3.5 cm, oblong-ovate or oblong-lanceolate, base rounded or obtuse, acuminate, nerves 4-6 pairs. Flowers ca 4 mm across, purplish; solitary or 3-6 together in glabrous

cymes; sepals unequal; petals elliptic-oblong. Drupelets globular to obovoid, blue when ripe.

*Fl. & Fr.* : February - June.

Specimens examined : West Manipur, *Kaith s.n.*

### 59. ANACARDIACEAE

Lindley, *Intr. Nat. Syst. Bot.* 127, 1830.

(*A. S. Chauhan & R. Shanpru*)

- |     |   |                       |
|-----|---|-----------------------|
| 1a. | Leaves simple .....   | 2                     |
| b.  | Leaves imparipinnate .....  | 5                     |
| 2a. | Fruits on fleshy hypocarp .....   | 3                     |
| b.  | Fruits without fleshy hypocarp .....  | 4                     |
| 3a. | Flowers with 8 - 10 stamens; carpel-1 .....   | 1 <i>Anacardium</i>   |
| b.  | Flowers with 5 - 6 stamens; carpels 3 .....   | 7. <i>Semecarpus</i>  |
| 4a. | Fertile stamen only 1; ovary superior .....   | 4. <i>Mangifera</i>   |
| b.  | Fertile stamens 4 - 5; ovary inferior .....   | 2. <i>Drimycarpus</i> |
| 5a. | Climber; leaflets cordate or sub-cordate .....  | 5. <i>Pegia</i>       |
| b.  | Trees or erect shrubs; leaflets otherwise .....                                       | 6                     |
| 6a. | Leaflets with intramarginal veins;<br>ovary 4 - 6 celled; fruits not compressed ..... | 8. <i>Spondias</i>    |
| b.  | Leaflets without intramarginal veins;<br>ovary 1 -celled; fruits compressed .....     | 7                     |
| 7a. | Flowers appearing with leaves; fruits<br>less than 1 cm in diam .....                 | 6. <i>Rhus</i>        |
| b.  | Flowers when leafless; fruits more than 1 cm in diam .....                            | 3. <i>Lancea</i>      |

#### 1. *Anacardium* Rottb.

*Anacardium occidentale* L., *Sp. Pl.* 385, 1753; Hook. f., *Fl. Brit. India* 2 : 20, 1876; Deb in *Bull. Bot. Surv. India* 3 : 306, 1961.

Mani.: *Kaju*.

Small trees with short stout trunks. Leaves simple, alternate, rather large, obovate, entire, coriaceous. Flowers small, yellow streaked with pink, in terminal prominently bracteate panicles; calyx 5 partite, imbricate; petals 5, linear-lanceolate, recurved, imbricate; stamens 8 - 10, all fertile or some sterile, one longer than the others, filaments connate at the base and adnate to the disk; pistils monocarpellary; ovary obovoid, unilocular; styles filiform, eccentric; stigma minute, ovule solitary, ascending from a lateral funicle. Fruits reniform, nut seated on a large pyriform fleshy body formed of the entire disk and top of the peduncle.

*Fl. & Fr.* : February - June.

Under cultivation.

2. *Drimycarpus* Hook. f.

*Drimycarpus racemosus* (Roxb.) Hook. f. & Benth., Gen., Pl. 1 : 424, 1862; Hook. f., Fl. Brit. India 2 : 36, 1876; Kanjilal *et al.*, Fl. Assam 1 : 337, 1936; Deb in Bull. Bot. Surv. India 3 : 306, 1961. *Holigarna racemosa* Roxb., Fl. Ind. 2 : 82, 1832.

Large trees up to 20 m high, bark dark brown, rough branchlets covered with spindle-shaped lenticels. Leaflets 10-18 × 4-6 m, lanceolate, ovate-lanceolate, often falcate, acute or acuminate, base rounded obtuse or cuneate, shining above, glaucous, nerves prominent beneath, often undulate along margins. Panicles up to 15 cm long, usually fascicled, axillary or in fallen leaf axils. Flowers 4-5 mm across, white; petals ovate. Drupes ovoid-oblong, ca 2.5 cm long, red when ripe.

Fl. & Fr. : July - March.

Specimens examined : Moirang, Meebold 7199 (CAL).

3. *Lannea* A. Rich., *nom. cons.*

*Lannea coromandelica* (Houtt.) Merr. in J. Arn. Arb. 19 : 353, 1938; Deb in Bull. Bot. Surv. India 3 : 306, 1961. *Dialium coromandelicum* Houtt., Nat. Hist. ser. 2, 2 : 39, t. 5, f. 2, 1774. *Otina wodier* Roxb., Fl. Ind. 2 : 293, 1832; Hook. f., Fl. Brit. India 2 : 29, 1876. *Lannea grandis* (Dennst.) Engler in Engl. & Prantl. Pflanzenfam. 213, 1898; Kanjilal *et al.*, Fl. Assam 1 : 338, 1936. Fig. 35

Mani. : Aanan.

Large or medium sized trees with a straight bole; bark dark-grey or yellowish-black, rough, exfoliating in round flakes. Leaves crowded, up to 45 cm long; leaflets 5-9 × 3-5 cm, ovate, ovate-lanceolate or elliptic, glabrous, entire. Panicles tomentose, up to 25 cm long. Flowers 3-4 mm across, yellowish-green. Drupes up to 1.5 cm long, oblong, laterally compressed and with spotted stones.

Fl. & Fr. : February - June.

Specimens examined : Barak river side, Mukerjee 2087 (CAL).

4. *Mangifera* L.

*Mangifera indica* L., Sp. Pl. 200, 1753; Hook. f., Fl. Brit. India 2 : 13, 1876; Kanjilal *et al.*, Fl. Assam 1 : 335, 1936; Deb in Bull. Bot. Surv. India 3 : 306, 1961.

Mani. : Heinou.

Large or small trees up to 25 m tall. Leaves 8-21 × 2-6 cm, oblong-lanceolate, acute, cuneate at base, glaucous. Flowers ca 0.5 cm across, polygamous, greenish-yellow, fragrant; calyx pubescent outside; petals oblong, one stamen perfect, much larger than the rest; style sublateral. Drupes ovoid or oblong, fleshy; seed 1, stony.

Fl. & Fr. : February - July.

Specimens examined : Imphal, Deb 976; Khongal, G. Watt 7237; Imphal, Meebold 2968 (CAL).

5. *Pegia* Colebr.

*Pegia nitida* Colebr. in Trans. Linn. Soc. Lond. 15 : 364, 1827. *Tapiria hirsuta* (Roxb.) Hook. f. in Benth. & Hook. f., Gen. Pl. 1 : 423, 1862; Hook. f., Fl. Brit. India

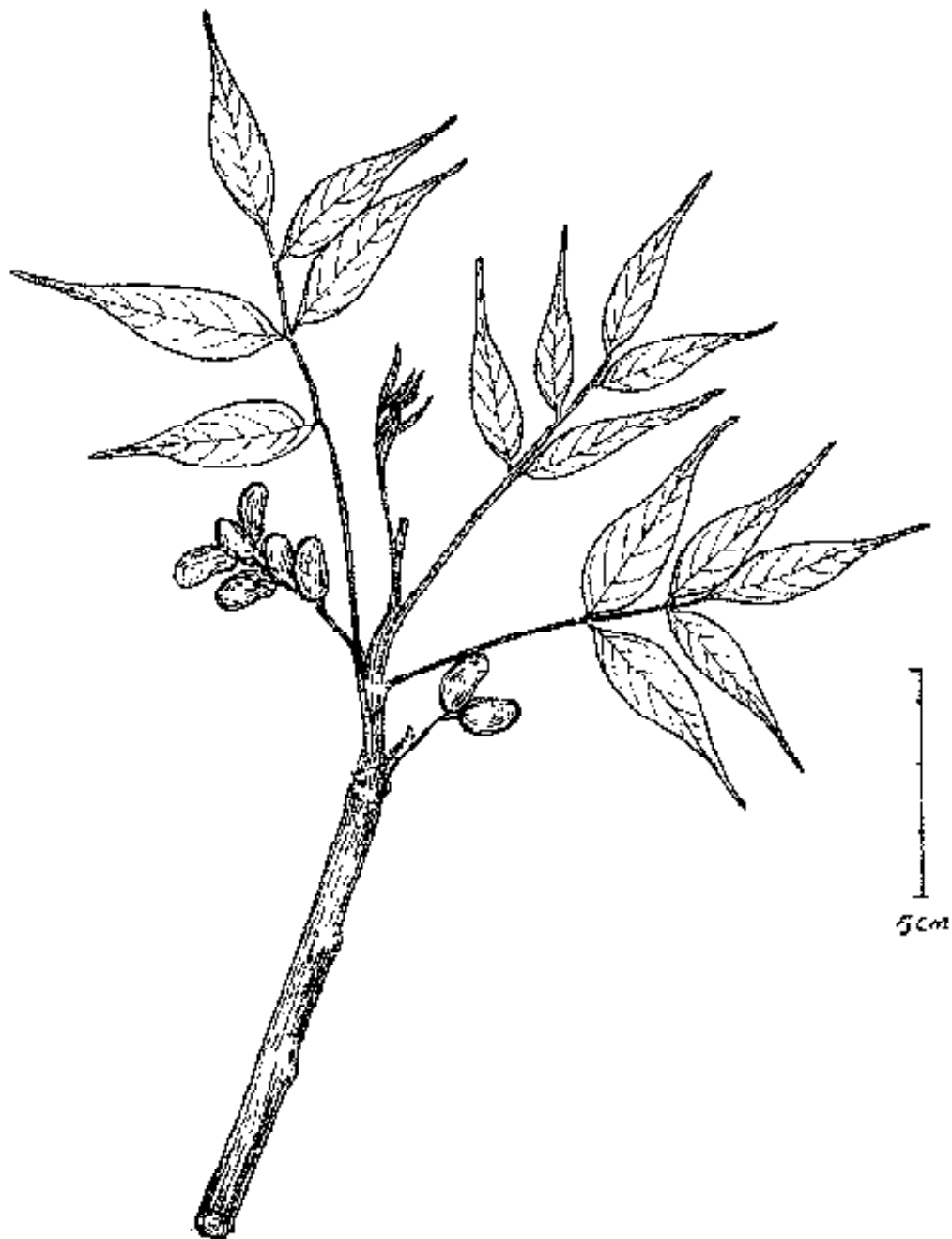


Fig. 35 : A fruiting branch of *Lannea coromandelica* (Houtt.) Merr.

2 : 28. 1876; Kanjilal *et al.*, Fl. Assam 1 : 359, 1936, *Roegneria hirsuta* Roxb., Fl. Ind. 2 : 455, 1832.

Scandent hairy shrubs. Leaflets 3 - 7 × 1 - 3 cm, oblong, oblong-lanceolate, densely pubescent, obscurely serrate at margins towards the apex, acuminate or caudate at tip, rounded at base. Panicles sub-terminal. Flowers *ca* 2 mm across, white or yellow, fragrant. Fruits *ca* 6 mm long, ovoid, black.

*Fl. & Fr.* : January - June.

*Specimens examined*: Chammu, Mukerjee 3063; Yakhoma, Meebold 5212 (CAL)

### 6. *Rhus* L.

- 1a. Leaves glabrous, glossy ..... 3. *R. succedanea*.  
 b. Leaves pubescent or tomentose beneath ..... 2.  
 2a. Leaflets entire; panicles simple; drupes glabrous ..... 2. *R. hookeri*  
 b. Leaflets crenate-dentate; panicles pyramidal;  
 drupes rusty-tomentose ..... 3. *R. semialata*

1. *Rhus hookeri* Sahni & Bahadur in Ind. For. 96 : 769, 1970; Balakr., Fl. Jowai 1 : 147, 1981, *R. insignis* Hook. f., Fl. Brit. India 2 : 11, 1876, *non* O. Liv., 1868; Kanjilal *et al.*, Fl. Assam 1 : 332, 1936; Deb in Bull. Bot. Surv. India 3 : 306, 1961.

Mani.: *Heimang*.

Medium sized trees, up to 12 m high, crown spreading. Leaves 25 - 50 cm long; leaflets 7 - 20 × 4 - 10 cm, ovate or oblong-lanceolate, abruptly acuminate, base rounded, unequal or cuneate, entire, rusty tomentose beneath. Panicles 16 - 40 cm long. Flowers 2 - 3 mm across, greenish-yellow. Drupes globose, 5 - 7 mm across, pericarp thin, dry, endocarp waxy, white.

*Fl. & Fr.* : April - September.

*Specimens examined* : Imphal valley, Deb 1155; Imphal, Meebold 6635 (CAL).

2. *Rhus semialata* Murray in Comm. Soc. Goetting. 5: 27, t. 3, 1784; Hook. f., Fl. Brit. India 2: 10, 1876; Kanjilal *et al.*, Fl. Assam 1: 331, 1936; Deb in Bull. Bot. Surv. India 3: 306, 1961. *R. javanica* L., Sp. Pl. 1 : 265, 1753. *p.p.*; Banerjee in J. Bombay Nat. Hist. Soc. 55 : 154, 1958.

Mani. *Heimng*.

Small sized trees up to 12 m high. Leaflets 4 - 15 × 2 - 7 cm, ovate or ovate-lanceolate, shortly acute, acuminate, base subcordate, truncate or rounded, crenate, or dentate, glabrescent above except the nerves, grey tomentose beneath. Panicles pyramidal, up to 45 cm long. Flowers 2 - 4 mm across, yellow, greenish-white; petals spreading or deflexed. Drupes 4 - 5 mm across, ovoid or orbicular, pink when ripe.

*Fl. & Fr.* : August - March.

*Specimens examined* : Ukhrul, Mukerjee 3312; Imphal, Deb 1825 & 2105 (CAL); Imphal, Chauhan 94636; Keibul, Chauhan 95102 (ASSAM).

3. *Rhus succedanea* L., Mant. 2: 221, 1767; Hook. f., Fl. Brit. India 2: 12, 1876; Kanjilal *et al.*, Fl. Assam 1: 332, 1936; Deb in Bull. Bot. Surv. India 3: 306, 1961; Hara & Press. in Enum. Fl. Pl. Nepal 2: 102, 1979, *Rhus acuminata* DC., Prodr. 2: 68, 1825; Balakr., Fl. Jowai 1: 147, 1981, *R. succedanea* L. var. *acuminata* (DC.) Hook. f., Fl. Brit. India 2: 12, 1876; Kanjilal *et al.*, Fl. Assam 1: 332, 1936; Deb in Bull. Bot. Surv. India 3: 306, 1961. Fig. 36

Mani. *Heimang*.

Deciduous trees. Leaves crowded at the tips of twigs, 7 - 13 foliate, 15 - 35 cm; leaflets 4 - 12 × 2 - 5 cm, oblong-lanceolate, acute or rounded at base, shortly acuminate, pinkish brown when young. Panicles drooping. Flowers ca 2 mm across, greenish, regular. Drupes ca 6 mm in diam., compressed, glabrous, yellow or brown.

*Fl. & Fr.* : March - October.

*Specimens examined* : Sirohce, Mukerjee 2729; Nongbi, Mukerjee 2729 (CAL); Chandel, Chauhan 94947 (ASSAM).

#### 7. *Semecarpus* L. f.

*Semecarpus anacardium* L. f., Suppl. Pl. 182, 1781; Roxb., Fl. Ind. 2: 83, 1832; Hook. f., Fl. Brit. India 2: 30, 1876; Kanjilal *et al.*, Fl. Assam 1: 333, 1936; Deb in Bull. Bot. Surv. India 3: 306, 1961.

Small trees with spreading branches. Leaves large, coriaceous, dark-green above, greyish-white tomentose beneath. Flowers greenish -white, in fascicles, on terminal, large panicles; sepals and petals 5 or 6; ovary 1 - celled; styles 3, densely hairy. Drupes ca 3 × 1 cm, oblique, black.

*Fl. & Fr.* : May - March.

*Specimens examined* : West Manipur.

#### 8. *Spondias* L.

*Spondias pinnata* (L. f.) Kurz, Prelim. Rep. For. Veg. Pegu, Append. A, 44, B, 42, 1875; Deb in Bull. Bot. Surv. India 3: 306, 1961; Airyshaw & Forman in Kew Bull. 21: 8, 1967. *Mangifera pinnata* L. f., Suppl. Pl. 156, 1781. *Spondias mangifera* Willd., Sp. Pl. 2: 751, 1799; Hook. f., Fl. Brit. India 2: 42, 1876. *S. acuminata* Roxb., Fl. Ind. 2: 453, 1832; Hook. f., l.c. 42, 1876. *S. macrophylla* Wallich ex Hook. f., l.c. 43, 1876.

Mani.: *Eikhoi*.

Medium sized trees, up to 25 m tall. Leaves up to 45 cm long, imparipinnate; leaflets 10 - 25 × 4 - 12 cm, oblong-elliptic or oblong-lanceolate, caudate acuminate or acute, oblique at base, glabrous. Flowers ca 5 mm across, yellowish or creamy white, in 10 - 30 cm long axillary or terminal panicles; stamens shorter than petals. Drupes ca 3 cm in diam., reniform, yellowish at maturity.

*Fl. & Fr.* : March - October.

*Specimens examined* : Imphal, Deb 2481 (CAL).



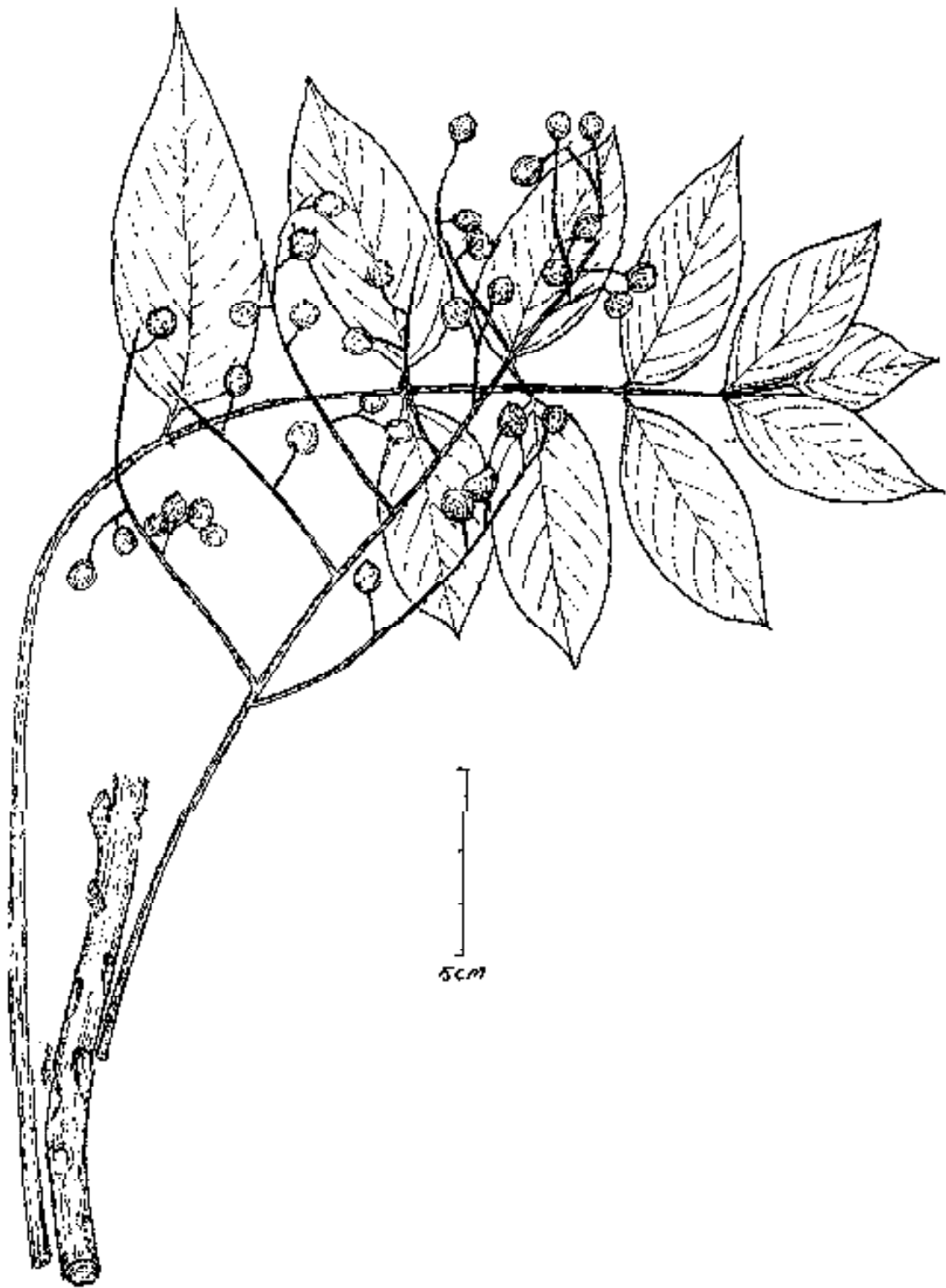


Fig. 36 : A fruiting twig of *Rhus succedanea* L.

**60. CORIARIACEAE**

A. P. de Candolle, Prodr. 1 : 739, 1824 ("Coriariace")

(A. S. Chauhan)

**CORIARIA L.**

*Coriaria nepalensis* Wallich, Pl. Asiat. Rar. 3:67, t. 289, 1832; Hook. f., Fl. Brit. India 2 : 44, 1876; Deb in Bull. Bot. Surv. India 3 : 258, 1961.  
Fig. 37

Mani.: Guipan.

Large deciduous shrubs up to 4 m tall; branches arching, reddish brown, quadrangular, glabrous. Leaves 3-10 × 1.5-6 cm, elliptic, elliptic-ovate, or ovate-oblong, acuminate, entire glabrous; lateral nerves 3-5 at base. Flowers ca 5 mm in diam., greenish, 1 or more in clusters in axils of fallen leaves or cauliflorous; sepals 5, petals 5, greenish first, later turning to purple; stamens and styles conspicuous, red purple. Fruits 5-7 mm in diam., compressed, dehiscent, black, enclosed by persistent petals.

Fl. &amp; Fr. : February - May.

*Specimens examined* : Khongui, G. Watt 6756; Mao, G. Watt 6103; Mukerjee 2514 (CAL).

**61. MORINGACEAE**

Dumort., Anal. Fam. PL. 43.48, 1829

(R. Shanpru)

**1. Moringa Adans.**

*Moringa oleifera* Lam., Encyc. Meth. Bot. 1 : 398, 1875; van. Steenis, Pl. Males. 5 : 554, 1953; Deb in Bull. Bot. Surv. India 3 : 281, 1961. *M. pterygosperma* Gaertn., Fruct. 2 : 314, 1791; Hook. f., Fl. Brit. India 2 : 45, 1876; Kanjilal *et al.*, Fl. Assam 1 : 342, 1936. Fig. 38

Mani. : Shajna.

Medium sized trees, bark greyish with black patches, warty. Leaves up to 1-m long; leaflets variable in size, 0.5-3 × 0.4-2.5 cm, ovate or obovate-orbicular or ovate-oblong, rounded or emarginate at tip, often oblique at base, glabrous, glaucous beneath. Panicles up to 30 cm long. Flowers 2.5-3 cm long, white, fragrant; sepals petaloid; petals white, spatulate, oblong. Capsules up to 75 cm long, linear-oblong; seeds 2.5-4 cm long, trigonous-oblong, winged along the angles.

Fl. &amp; Fr. : January - June.

*Specimens examined* : Imphal, Deb 2336 (CAL).



Fig. 37 : A flowering twig of *Cortaria nepalensis* Wallich



Fig. 38 : A fruiting twig of *Moringa oleifera* Lam.

**62. CONNARACEAE**

R. Brown in Tuckey, Narr. Exped. Congo, 431. MAR. 1818.

(A. S. Chauhan)

**ROUREA** Aublet *nom. cons.*

*Rourea minor* (Gaertn.) Alston in Trimen, Handb. Fl. Ceylon 6: 67, 1931; Leonh. in Fl. Males. ser. 1, 5: 514, 1958. *Aegiceras minus* Gaertn. Fruct. 1: 126, 1788. *Rourea caudata* Planch. in Linnaea 23: 419, 1850; Hook. f., Fl. Brit. India 2: 48, 1876; Kanjilal *et al.*, Fl. Assam 2: 2, 1938. *R. pulchella* Planch. *l.c.* 419; Hook. f., Fl. Brit. India 2: 48, 1875. *R. commutata* Planch. *l.c.* 420; Hook. f., Fl. Brit. India 2: 47, 1876; Kanjilal *et al.*, Fl. Assam 2: 2, 1938; Balakr., Fl. Jowai 1: 148, 1981.

Climbing shrubs. Leaves imparipinnate; leaflets 5 12 × 2.5 3.4 cm, elliptic or ovate lanceolate, caudate acuminate, acute at apex, base rounded. Flowers ca 1 cm across, white, in axillary or subterminal panicles; calyx persistent. Follicles ca 2.5 cm long, conical ovoid, falcately curved, chestnut brown, with solitary seed.

*Fl. & Fr.*: October March.

*Specimens examined*: Laimatak, Meebold 625 (CAL).

**63. FABACEAE**

Reichbenbach, Consp. Regni Veg. 149, 1828.

(Papilionaceae, Giseke *nom. alt.*)

(A. S. Chauhan)

1a.	Trees.....	2
b.	Herbs, undershrubs or shrubs; erect or twining .....	6
2a.	Leaves 3 foliate .....	3
b.	Leaves 5 or more foliate .....	4
3a.	Standard equalling the petals; stipels subulate; pods 1-2 -seeded .....	5. <i>Butea</i>
b.	Standard much exceeding the petals; stipels gland like; pods 3-8 seeded .....	21. <i>Erythrina</i>
4a.	Leaflets alternate; pods 1-4 seeded .....	13. <i>Dalbergia</i>
b.	Leaflets opposite or sub -opposite; pods 1 or 2 seeded .....	5
5a.	Vexillary stamen connate at base; anthers basifixed .....	31. <i>Milletia</i>
b.	Vesillary stamen free at base; anthers versatile .....	38. <i>Pongamia</i>
6b.	Stamens free .....	<i>Dalhausieu</i>
b.	Stamens in bundles .....	7

7a.	Leaves simply pinnate .....	8
b.	Leaves 1 and 2 or 3 -foliate .....	24
8a.	Leaves even- pinnate .....	9
b.	Leaves odd pinnate .....	17
9a.	Herbs climbing by means of tendrils .....	10
b.	Herbs not climbing by tendrils .....	11
10a.	Stipules larger than leaflets .....	37. <i>Pisum</i>
b.	Stipules shorter than leaflets .....	12
11b.	Stipules semisagitate; styles pubescent on inner side .....	25. <i>Lathyrus</i>
b.	Stipules triangular, fan shaped; styles pubescent at apex only .....	50. <i>Vicia</i>
12a.	Wings adnate to the keel and to the staminal tube .....	26. <i>Lens</i>
b.	Wings not adnate to the keel and stamen .....	13
13a.	Stamens monadelphous .....	14
b.	Stamens diadelphous .....	15
14a.	Climbing shrubs; stipels present; gynophore absent; stamens 9 .....	1. <i>Abrus</i>
b.	Prostrate herbs; stipels absent; gynophore present; stamens 10 .....	4. <i>Arachis</i>
15a.	Stipules basifixed; shrubs without sensitive leaves .....	43. <i>Sesbania</i>
b.	Stipules medifixed; herbs with sensitive leaves .....	16
16a.	Leaflets 3 - 8 pairs; pods closed within calyx .....	45. <i>Smithia</i>
b.	Leaflets 20 - 40 pairs; pods not enclosed by calyx .....	2. <i>Aeschynomene</i>
17a.	Herbs erect, woody at base but never climbing .....	18
b.	Shrubs erect, climbing or twining .....	19
18a.	Leaflets sharply serrate; stipules foliaceous; flower solitary .....	9. <i>Cicer</i>
b.	Leaflets entire; stipules not foliaceous; flowers in dense racemes .....	23. <i>Indigofera</i> ( <i>I. spicata</i> )
19a.	Herbs, twiners; petals unequal in size; anthers dimorphic .....	10. <i>Clitoria</i>
b.	Shrubs or woody climbers; petals almost equal in size; anthers uniform .....	20
20a.	Leaflets in pairs atleast alternately arranged on rachis; inflorescence paniculate .....	13. <i>Dalbergia</i>

b.	Leaflets opposite or sub-opposite; inflorescence not paniculate .....	21
21a.	Stamens monadelphous .....	22
b.	Stamens diadelphous .....	23
22a.	Stipels absent; stipules triangular, persistent; pods winged one or both sutures, glabrous .....	15. <i>Derris</i>
b.	Stipels present; stipules linear- lanceolate, deciduous; pods unwinged, pubescent .....	31. <i>Milletia</i>
23a.	Plants with medifixed hairs; leaflets 4-12 cm; pods linear septate within .....	23. <i>Indigofera</i>
b.	Plants with basifixed hairs; leaflets 4-16 cm, pods oblong not septate .....	48. <i>Tephrosia</i>
24a.	Leaves 1-foliolate .....	25
b.	Leaves 2-3 -foliate .....	32
25a.	Branches triguctrous; petiole broadly winged; pods 4-7 joints, densely hairy .....	47. <i>Tedehagi</i>
b.	Branches otherwise: petiole not winged .....	26
26a.	Stipels present, pods jointed; segments one seeded .....	27
b.	Stipels absent: pods not jointed .....	30
27a.	Pods twisted up; calyx acrescent .....	49. <i>Uraria</i>
b.	Pods not twisted up; calyx otherwise .....	28
28a.	Flowers umbellate, concealed by a pair of orbicular leafy bracts .....	35. <i>Phyllodium</i>
b.	Flowers not concealed by bracts .....	29
29a.	Pods joints turgid; calyx scarious .....	3. <i>Alysicarpus</i>
b.	Pods joints flat; calyx herbaceous .....	16. <i>Desmodium</i>
30a.	Stamens monadelphous; .....	12. <i>Crotalaria</i> ( <i>C. amagyroides</i> H.B.K. & <i>C. pallida</i> Dryed var. <i>pallida</i> )
b.	Stamens diadelphous .....	31
31a.	Roots tuberous; stipules inconspicuous; flowers solitary axillary .....	20. <i>Eriosema</i>
b.	Roots not tuberous; stipules present flowers in racemes, panicles or heads .....	22. <i>Flemingia</i>
32a.	Leaves 2-foliolate .....	25. <i>Lathyrus</i>
b.	Leaves 3 -foliate .....	33
33a.	Leaves digitately 3 or more foliate .....	34
b.	Leaves pinnately 3- foliate .....	41
34a.	Leaflets 7-11 usually 8; flowers bluish to pink or white .....	25. <i>Lupinus</i>

- b. Leaflets 3- foliate; flowers colour various ..... 35
- 35a. Flowers 1 or 2 arising from the rhizome ..... 33. *Parochetus*
- b. Flowers few or numerous: not arising  
from the rhizome ..... 36
- 36a. Stipules boat shaped, bifid; stamens free ..... 36. *Piptanthus*
- b. Stipules not bifid; stamens fused ..... 37
- 37a. Stamens diadelphous: anthers uniform ..... 38
- b. Stamens monadelphous: anthers dimorphic  
basifixed & versatile ..... 12. *Crotalaria*
- 38a. Stems usually less than 1 m tall, single:  
stipules setaceous: petioles 0.1 - 0.8 cm ..... 27. *Lespedeza*
- b. Stems usually more than 1 m tall, branched:  
stipules not setaceous: petioles 0.5 - 12 cm ..... 39
- 39a. Keel prominently beaked; stamens monadelphous  
anthers dimorphic ..... 39. *Priotropis*
- b. Keel not beaked; stamens diadelphous:  
anthers uniform ..... 40
- 40a. Keel with a short spur or pouch, on each side  
near base: pods septate, 2 - 12 seeded ..... 23. *Indigofera*
- b. Keels without spur or pouch: pods not septate:  
1 - 2 seeded ..... 22. *Flemingia*
- 41a. Prostrate or erect herbs, lateral leaflets  
symmetrical at base ..... 42
- b. Woody or herbaceous twiners; lateral leaflets  
usually asymmetric ..... 43
- 42a. Flowers purplish-white; petals twice as long  
as calyx: pods 1 seeded ..... 7. *Campylotropis*
- b. Flowers pale-pink; petals not twice as long  
as calyx; pods 3 - 11 seeded ..... 11. *Codariocalyx*
- 43a. Pedicels borne on glandular swelling ..... 44
- b. Pedicels not borne on swollen inflorescence ..... 52
- 44a. Styles bearded below stigma ..... 45
- b. Styles not bearded below stigma ..... 48
- 45a. Petals almost unequal in size ..... 10. *Clitoria*
- b. Petals almost equal in size ..... 46
- 46a. Keel curled; pods ca 0.5 cm broad;  
stigma oblique ..... 51. *Vigna*
- b. Keel hook shaped not curled; pods 0.6 cm  
or more broad; stigma terminal ..... 47
- 47a. Pods flattened, not winged ..... 24. *Lathlab*
- b. Pods rectangular, four winged ..... 40. *Psophocarpus*



- 48a. Stamens 9 + 1; ovary several ovuled ..... 42. *Pycnospora*
- b. Stamens otherwise; ovary not several ovuled ..... 49
- 49a. Inflorescence large panicles or pseudopanicles;  
    calyx toothed ..... 50
- b. Inflorescence racemose; calyx bilabiate ..... 51
- 50a. Flowers 4 - 8; wing petals shorter than  
    keel; anthers medifixed ..... 30. *Meizotropis*
- b. Flowers 2 - 5; wing petals shorter or longer  
    than keel; anthers basifixed ..... 46. *Spatholobus*
- 51a. Stamens monadelphous; anthers uniform ..... 8. *Canavalia*
- b. Stamens diadelphous; anthers dimorphic ..... 32. *Mucuna*
- 52a. Leaves gland dotted beneath ..... 53
- b. Leaves not gland dotted beneath ..... 54
- 53a. Twining herbs; pods 4 - 11 seeded ..... 19. *Dunbaria*
- b. Shrubs; pods 3 - 9 seeded ..... 6. *Cajanus*
- 54a. Calyx oblique, truncate; pods much  
    constricted between seeds ..... 18. *Dumasia*
- b. Calyx with distinct teeth; pods not  
    constricted between seeds ..... 55
- 55a. Standard with 2 appendages near midline ..... 56
- b. Standard without appendages ..... 57
- 56a. Standard bearing 2 fleshy hooked appendages;  
    keel incurved; style bearded at apex ..... 17. *Dolichos*
- b. Standard bearing a lamelliform appendage;  
    keel straight; style not bearded ..... 29. *Macrotyloma*
- 57a. Keel and style coiled spirally ..... 34. *Phaseolus*
- b. Keel and style straight ..... 58
- 58a. Claws of wing and keel petals  
    shorter than blade ..... 41. *Pueraria*
- b. Claws of wing and keel petals  
    longer than blade ..... 44. *Shuteria*

**1. *Abrus* Adanson**

- 1a. Inflorescence much longer than leaves;  
    pods strap shaped, 6 - 10 seeded; seeds  
    compressed, dark brown or black ..... 2. *A. pulchellus*
- b. Inflorescence usually shorter than leaves;  
    pods oblong, 3 - 5 seeded;  
    seeds round, red with black tips ..... 1. *A. precatorius*

**1. *Abrus precatorius* L.** Syst. Nat, ed. 12 : 472, 1767; Baker in Hook. f., Fl. Brit. India 2 : 175, 1876; Kanjilal *et al.*, Fl. Assam 2 : 62, 1938; Deb in Bull. Bot. Surv. India 3 : 264, 1961

Fig. 39

Mani. *Chaning*.

Profusely branched woody climbers, glabrous or thinly silky. Leaves paripinnate, 5 - 8.5 cm long; leaflets in 10 - 20 opposite pairs, 1 - 2.5 × 5 - 7 cm, linear or linear-oblong, minutely apiculate, membranous, glabrous above, thinly silky beneath; stipels minute. Flowers reddish or dull white, clustered on tubercles in dense pedunculate racemes, usually shorter than leaves; calyx 0.2 - 0.3 cm long, truncate, thinly silky; corolla 0.5 - 1.2 cm long, pink or white; stamens 9. Pods 2.5 - 4 × 1.2 cm, 3 - 5 seeded, oblong, with a sharp deflexed beak, thinly pubescent, turgid; seeds *ca* 0.7 cm across, round, very hard, red with black tips.

*Fl. & Fr.* : July - February.

*Specimens examined* : Lamboi, Mukerjee 3347; Laimekhing, Deb 490 (CAL).

*Note* : The roots, leaves and seeds are used medicinally; half or broken seeds are given to pet animals to save from the effect of cold. Red and black tipped seeds are also used for making 'eyes' of dolls. Jewellers use these seeds as their lowest unit of weight as 'ratti'

**2. *Abrus pulchellus* Wallich ex Thwaites.** Enum. Pl. Zeyl. 91, 1859; Baker in Hook. f., Fl. Brit. India 2 : 175, 1876; Kanjilal *et al.*, Fl. Assam 2 : 62, 1938; Deb in Bull. Bot. Surv. India 3 : 264, 1961,

subsp. *pulchellus*

Climbing shrubs; stems slender, glabrous. Leaves paripinnate, 7 - 15 cm; leaflets 6 - 30 pairs, oblong-ovate or obovate, 2 - 4.5 × 0.4 - 1.3 cm, base sub-cordate or cuneate, often oblique, apiculate, adpressed pubescent beneath. Flowers pinkish-white or purplish-yellow, in fascicles of lax racemes. Peduncles much longer than leaves; calyx *ca* 0.25 cm, campanulate, thinly silky; corolla 1.2 - 1.5 cm, slightly adnate to the staminal tube; stamens 9, the posterior one absent. Pods 2 - 7 × 0.8 - 1.2 cm, strap-shaped, 6 - 10 seeded, brown; seeds *ca* 0.5 cm in diam., compressed, ellipsoid, uniformly dark brown or black.

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

*Specimens examined* : Kabru hills, Deb 1432 (CAL).

## 2. *Aeschynomene* L.

- la. Stems spongy; calyx hispid ..... 1. *A. aspera*  
 b. Stems not spongy; calyx glabrous ..... 2. *A. indica*

**1. *Aeschynomene aspera* L.**, Sp. Pl. 713, 1753; Baker in Hook. f., Fl. Brit. India 2 : 152, 1876; Kanjilal *et al.*, Fl. Assam 2 : 38, 1938; Deb in Bull. Bot. Surv. India 3 : 264, 1961.



Fig. 39 : A flowering twig of *Abrus precatorius* L.

Stout, branched shrubs up to 4 m high, with bark warty, greenish. Leaves 8-15 cm long, imparipinnate; leaflets numerous, 1-1.6 × 0.2 cm, linear or linear-oblong, 1-nerved; stipels setaceous. Flowers ca 2 cm long, yellow, lax, on 4-8 cm long simple or branched racemes; calyx hispid, subtended by a pair of hairy bracteoles; corolla hispid. Pods 4-8 cm long, ca 0.8 cm broad, usually muriccate, 3-6 jointed, indented at both the sutures.

*Fl. & Fr.* : July - November.

*Specimens examined* : Kairengi, Deb 2574 (CAL).

2. *Aeschynomene indica* L., Sp. Pl. 713, 1753; Baker in Hook. f., Fl. Brit. India 2 : 151, 1876; Kanjilal *et al.*, Fl. Assam 2 : 37, 1938; Deb in Bull. Bot. Surv. India 3 : 264, 1961.

Mani. : *Chingong-lei*.

Suffruticose, annual herbs ca 1 m high; branches glabrous. Leaves 3-10 cm long, imparipinnate, 50-60 foliolate; leaflets 0.4-0.5 × 0.14-0.2 cm, linear or oblong, sub sessile, oblique at base, obtuse or sub-acute, glabrous, 1-nerved. Flowers ca 1.5 cm long, yellow to creamy, 1-4 flowered in axillary racemes; calyx glabrous; corolla twice the calyx; standard purple veined. Pods 2.5-4 × 0.2-0.3 cm, linear, straight or curved, 6-10 jointed.

*Fl. & Fr.* : August - November.

*Specimens examined* : Imphal, Deb 2579 & 284 (CAL); Dibong, Mallick 727 (BSIS)

### 3. *Alysicarpus* Desv., *nom. cons.*

*Alysicarpus vaginalis* (L.) DC., Prodr. 2 : 353, 1825; Baker in Hook. f., Fl. Brit. India 2 : 158, 1876; Deb. in Fl. Tripura 1 : 145, 1981. *Hedysarum vaginatum* L., Sp. Pl. 746, 1753. *A. vaginalis* (L.) DC. var *monantharifolius* Baker *l.c.* 1876. *A. rugosus* auct. non DC., 1825; Deb in Bull. Bot. Surv. India 3 : 264, 1961

Prostrate herbs up to 70 cm tall; stems glabrous, sometimes with few scattered hairs. Leaves 1-foliolate, 1.5-4.5 × 0.5-1.3 cm, variable, elliptic to oblong, lanceolate or ovate-oblong, acute, cordate at base, thinly pubescent beneath. Flowers ca 0.5 cm long, purple, in 6-12 cm long terminal racemes; calyx equal or slightly longer than first joint of pods, glabrescent. Pods ca 1.5 cm long, cylindrical, reticulately veined, 4-6 jointed.

*Fl. & Fr.* : August - December.

*Specimens examined* : Chingmairang, Deb 26 (CAL).

### 4. *Arachis* L.

*Arachis hypogaea* L., Sp. Pl. 741, 1753; Baker in Hook. f., Fl. Brit. India 2 : 161, 1876; Deb in Bull. Bot. Surv. India 3 : 264, 1961

Mani. : *Leihak hawai*.

Profusely branching, slightly hairy annuals. Leaflets 2 pairs, ovate or obovate, 3.5 - 6 cm long, obtuse or mucronate, entire; stipules linear, 2.5 cm or more long, adnate to the base of the petiole. Flowers solitary or few in the axils, yellow, cleistogamous; petals soon withering, standard broad, large, wings from the beaked keel; stamens diadelphous, 9 + 1. Pods 2 - 3.5 cm long, containing 1 - 3, rarely 4 seeds with constrictions.

*Fl. & Fr.* : October - January.

*Specimens examined* : Imphal, Deb 161, 459 (CAL).

Cultivated for the fruits and oil; seeds are edible; oil extracted from the seeds is a good cooking medium. The leaves and oil cake are used as fodder.

### 5. *Butea* Roxb. ex Willd.

*Butea monosperma* (Lam.) O. Kuntze, Rev. Gen. Pl. 1 : 202, 1891; Taubert in Engl. Pflanzenfam. 3(3) : 366, 1894; Deb in Bull. Bot. Surv. India 3 : 264, 1961; Santapan in Bull. Bot. Surv. India 3 : 12, 1962. *Erythrina monosperma* Lam., Encycl. 1 : 391, 1785. *Butea frondosa* Roxb. in Asiatic Res. 3 : 469, 1792; Baker in Hook. f., Fl. Brit. India 2 : 194, 1876; Kanjilal *et al.*, Fl. Assam 2 : 73, 1938. *Plaso monosperma* O. Kuntze, Rev. Gen. Pl. 1:202, 1891.

Fig. 40

Mani.: *Pang-gong*.

Medium sized deciduous trees, up to 12 m high, with compact, dense crown; young parts densely tomentose. Leaves 3 foliolate, up to 50 cm long; leaflets 12 - 25 × 10 - 18 cm, oblique ovate, rhomboid, apex obtuse, rounded at base, coriaceous, pubescent beneath, terminal obovate, rounded at apex. Flowers showy, bright red, 5 - 7 cm long, falcate in long rusty tomentose racemes; calyx campanulate, upper lip emarginate, lower with three deltoid teeth. Pods 10 - 15 × 3 - 4 cm, falcate oblong, rounded or sub-acute, silky tomentose; seeds oval, compressed, argenteo-cenescens, dark brown.

*Fl. & Fr.* : February - August.

*Specimens examined* : Imphal, Deb (under cultivation).

An avenue trees very attractive while in bloom, when the tree is almost devoid of leaves. Bark exudes a red gum. Flowers yield a dye. Roots form a source of fibres which are used for rope making; leaves used for wrapping and also as a fodder.

### 6. *Cajanus* DC.

- 1a. Erect shrubs ..... 1. *C. cajan*
- b. Twiners, woody or herbaceous ..... 2
- 2a. Leaflets 3 - 8 cm broad, ovate-rhomboid; peduncles 4 - 15 cm long; pods 3.5 - 7 cm ..... 2. *C. goensis*
- b. Leaflets 1 - 2 cm broad, obovate-oblong; peduncles 1 - 1.5 cm long; pods small, 1.5 - 3 cm long ..... 3. *C. scarabaeoides*

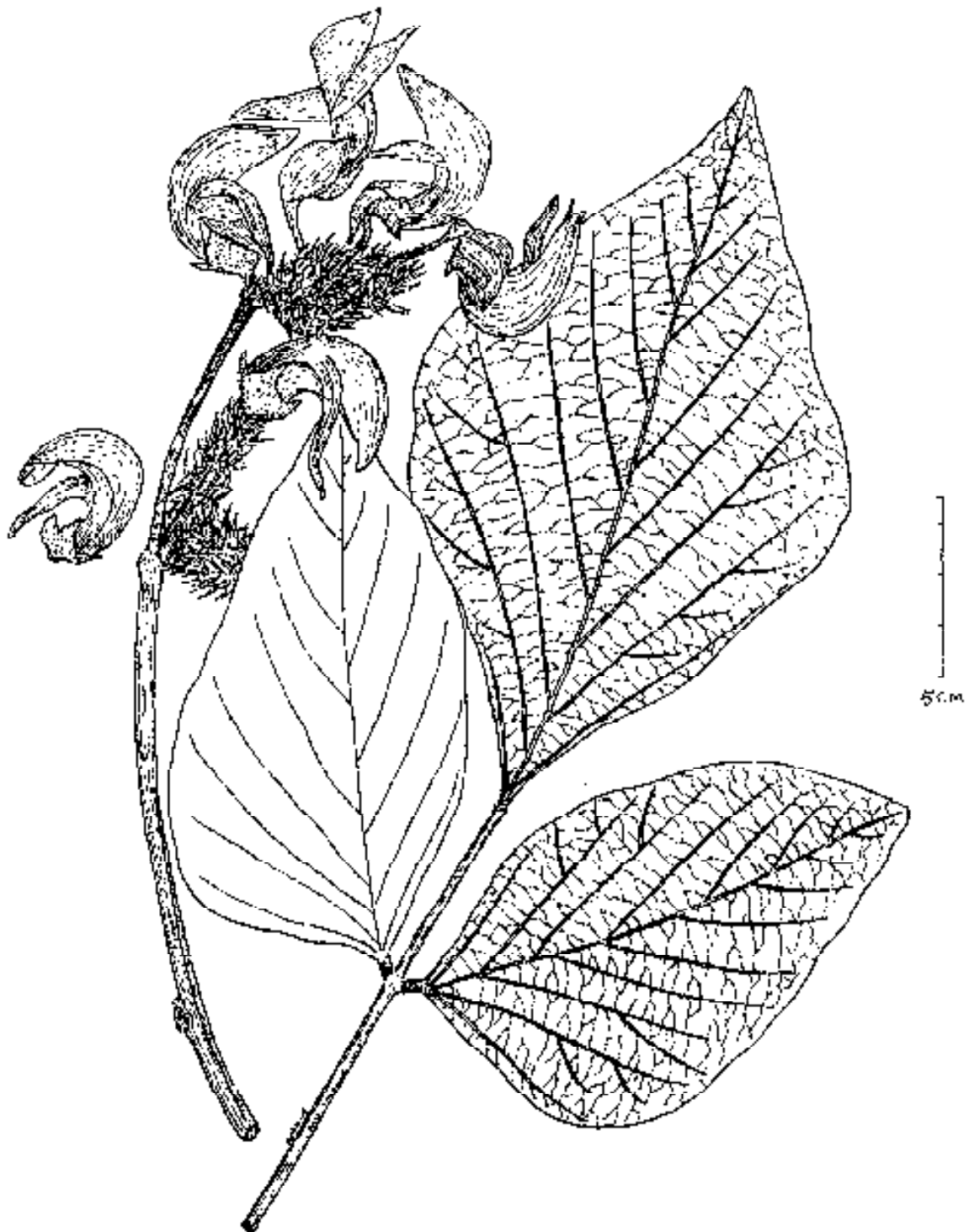


Fig. 40 : Leaf & flowers of *Butea monosperma* (Lam.) O. Kuntze

1. *Cajanus cajan* (L.) Huth in Helios 11 : 133. 1893; Millsp. in Field. Columb. Mus. Bot. 2 : 53. 1900; Deb in Bull. Bot. Surv. India 3 : 264. 1961. *Cytisus cajan* L., Sp. Pl. 739. 1753. *Cajanus indicus* Spreng., Syst. 3 : 248. 1826; Baker in Hook. f., Fl. Brit. India 2 : 217. 1876. *C. obcordifolia* Singh in Indian J. Agri. Sci. 12: 783. 1942.

Mani. : *Meuronghi*.

Erect shrubs up to 3.5 m high with many sulcate silky branches. Leaves 3-foliolate; leaflets oblong-lanceolate, entire, densely silky beneath, acute. Flowers dark yellow, in terminal panicles; corolla about 3 times the calyx, standard yellow with red stripes, keels truncate. Pods 4-7 cm long, deeply transversely lineate between seeds, acute.

Fl. & Fr. : January-April.

Specimens examined : Imphal valley, Deb 1308 (CAL); Borebakra, Malick 866 (BSIS).

Seeds are used in pulses and is most liked pulse in India. Leaves as fodder; under cultivation in different parts of the state.

2. *Cajanus goensis* Dalz. in Kew J. Bot. 2 : 264. 1850. *Dumbaria barbata* Benth. in Miq. Pl. Jungh. 2 : 242. 1852. *Atylosia goensis* (Dalz.) Dalz. in J. Linn. Soc. Lond. 13 : 186. 1873; Deb in Bull. Bot. Surv. India 3 : 264. 1961. *A. barbata* (Benth.) Baker in Hook. f., Fl. Brit. India 2 : 216. 1876; Kanjilal *et al.*, Fl. Assam 2 : 97. 1938.

Mani. : *Khahungbai*.

Woody climbers with densely pubescent terete branches. Leaves 3-foliolate; leaflets 2-10 × 3-8 cm, ovate-rhomboid, obtuse or abruptly sub-cordate at base, acuminate at apex, 3-6 lateral nerves, hispid above, softly pubescent beneath. Flowers yellow, terminal or axillary racemes; peduncles 4-15 cm; bracts ovate, acuminate ca 1 cm, densely hairy; calyx villous, teeth long; corolla yellowish-orange, ca 1.5 cm. Pods 3.5-7 × 1.2-1.5 cm, compressed, narrowly beaked, spreading, brown hairy, 4-6 seeded.

Fl. & Fr. : August-February.

Specimens examined : Chingmairang, Deb 1165; Mukerjee 3472 (CAL).

3. *Cajanus scarabaeoides* (L.) du Petit-Thou, Dict. Sci. Nat. 6 : 617. 1817 ('*Cajan scarabaeoide*') Van der Maesn. Agric. Univ. Wageningen Pap. 85-4 : 183-189. 1985. *Dolichos scarabaeoides* L., Sp. Pl. 726. 1753. *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungh. 245. 1852; Baker in Hook. f., Fl. Brit. India 2 : 215. 1876. *Rhynchosia scarabaeoides* DC., Prodr. 2 : 387. 1825. *R. biflora* DC. *l.c.* *Cantharaspermi pauciflorum* Wight & Arn., Prodr. 255. 1834.

Profusely branched pubescent, climbing herbs, branches slender. Leaves digitately 3-foliolate; leaflets sub-digitate, 2-4 × 1-2 cm, elliptic or obovate-oblong, obtuse, strongly 3-nerved, mucronate at apex, lateral ones smaller and somewhat oblique. Flowers yellow, axillary or few in a raceme; peduncles 1-1.5 cm; bracts

palmatifid *ca* 0.1 cm; calyx densely grey silky, teeth long; corolla yellow *ca* 1 mm; stamens diadelphous, 9 - 11. Pods small, 1.5 - 3 cm long, oblong, compressed, silky hairy, 4 - 6 seeded.

*Fl. & Fr.* : July - November.

*Specimens examined* : Yanging, Deb 2718; Palel, Deb 1364 (CAL); Imphal, Malick 1318 (BSIS); Keibul Lamjao National Park, Chauhan 95110 (ASSAM).

### 7. *Campylotropis* Bunge

*Campylotropis prainii* (Coll. & Hemsley.) Schneider in Fedde, Reper. 11 : 341, 1912; Deb in Bull. Bot. Surv. India 3 : 265, 1961. *Lespedeza prainii* Coll. & Hemsley, in J. Linn. Soc. Bot. Lond. 28 : 46, 1890; Prain, in J. Asiat. Soc. Bengal. 66 : 377, 1887.

Erect undershrubs. Leaves pinnately 3-foliolate; leaflets exstipulate, oblanceolate or ovate-lanceolate, acute, obtuse; stipules *ca* 3 mm; petioles 8 mm long. Flowers in long axillary fascicled raceme; calyx appressed hairy; corolla purplish-white. Pods *ca* 10 cm long, 1 seeded, adpressed hairy.

*Fl. & Fr.* : July - December.

*Specimens examined* : Ukhrul 1800 m, Deb 3486.

### 8. *Canavalia* DC., *nom. cons.*

*Canavalia gladiata* (Jacq.) DC., Prodr. 2 : 404, 1825; Deb in Bull. Bot. Surv. India 3 : 265, 1961. *Dolichos gladiatus* Jacq., Coll. Bot. 2 : 276, 1788. *Canavalia maxima* Thunb. in J. Bot. 1 : 78, 1813. *C. ensiformis* Baker in Oliver, Fl. Trop. Afr. 2 : 190, 1871 & in Hook. f., Fl. Brit. India 2 : 195, 1875. *p.p.*; Kanjilal *et al.*, Fl. Assam 2 : 77, 1938.

Naga : *Heppuateipt*.

Large perennial climbers with glabrous branches. Leaves 3-foliolate; petioles 8 - 15 cm long, grooved, base swollen; leaflets 8 - 20 × 7 - 13 cm, ovate to rhomboid-elliptic, terminal largest, laterals oblique, acute or acuminate at apex, cuneate at base, membranous, glabrous, 6 - 7 lateral nerves on each half. Flowers large, white with purple tinge, on 12 - 17 cm long axillary peduncles; calyx *ca* 1.2 cm long, bi-lipped, upper lip notched, lower 3 lobed; corolla 3 - 5 cm long, exserted; stamens 10, monadelphous. Pods up to 50 × 4.5 cm with two prominent longitudinal ridges along the upper suture; seeds 6 - 10, *ca* 2.5 cm across, compressed, pink or white.

*Fl. & Fr.* : August - December.

*Specimens examined* : Imphal valley, Deb 467, 1175 (CAL); Jirimukh, Malick 812; Nungba, Malick 1282 (BSIS).

### 9. *Cicer* L.

*Cicer arietinum* L., Sp. Pl. 728, 1753; Baker in Hook. f., Fl. Brit. India 2 : 176, 1876; Deb in Bull. Bot. Surv. India 3 : 265, 1961.

Much branched annuals. Leaves 2.5 - 5 cm, imparipinnate; stipules large; leaflets many, deeply toothed, strongly veined. Flowers small, solitary, axillary, bluish-



purple; calyx 0.5 - 0.8 cm, oblique, teeth unequal; corolla exerted; stamens diadelphous 9 + 1. Pods sessile, turgid. 2-seeded; seeds beaked, with a slender funicle; cotyledons fleshy, yellow.

*Fl. & Fr.* : December - March.

*Specimens examined* : Agri-garden, Deb 1990 (CAL).

Under cultivation; fruits and young leaves are used as vegetable. It is also a good green manure, and fodder for cattle.

#### 10. *Clitoria* L.

- la. Slender twiner; leaves 5 - 7 foliolate;  
flowers solitary; stamens 10.  
diadelphous; pods 6 - 10 seeded ..... 2. *C. ternatea*
- b. Scandent shrub; leaves 3-foliolate;  
flowers usually paired; stamens 9.  
monadelphous; pod 1 - 3 seeded ..... 1. *C. mariana*

1. *Clitoria mariana* L., Sp. Pl. 753, 1753; Baker in Hook. f., Fl. Brit. India 2 : 208, 1876; Kanjilal *et al.*, Fl. Assam 2 : 86, 1938; Deb in Bull. Bot. Surv. India 3 : 265, 1961.

Scandent undershrubs. Leaves 3-foliolate; petioles 4 - 7.5 cm long; leaflets 5 - 11 cm, elliptic ovate or lanceolate, acute or acuminate, mucronate, glabrous, green above, white pale beneath; lateral nerves 10 - 12 on each side; bracteoles 0.3 - 0.5 cm, lanceolate, membranous, acute. Flowers pale blue or whitish, usually 2 flowered on axillary peduncles; calyx 1.5 - 2.4 cm long, tubular, membranous, glabrous, lobes 0.5 - 0.6 cm long; corolla ca 5 cm long, pale blue or whitish, glabrous; stamens 9, one missing, monadelphous. Pods 2 - 3.5 cm long, elliptic, more turgid, glabrous. 1 - 3 seeded.

*Fl. & Fr.* : July - October.

*Specimens examined* : Tokoi, Mukerjee 2868 (CAL).

Plants are cultivated for its showy flowers.

2. *Clitoria ternatea* L., Sp. Pl. 753, 1753; Baker in Hook. f., Fl. Brit. India 2 : 208, 1876; Kanjilal *et al.*, Fl. Assam 2 : 87, 1938; Deb in Bull. Bot. Surv. India 3 : 265, 1961.

Slender twiners. Leaves 7.5 - 12 cm long, 5 - 7 foliolate; petioles 1 - 2.5 cm long; leaflets 2 - 5 cm long, ovate or oblong, obtuse, sub-coriaceous; bracteoles persistent, 0.5 - 1 cm long, obtuse. Flowers bright blue or white, solitary on axillary peduncles; calyx tubular, teeth lanceolate, as long as the tube; corolla 3.5 - 5 cm long, blue with an orange centre or white; stamens 10, diadelphous. Pod 5 - 10 cm long, flat, linear, 6 - 10 seeded.

*Fl. & Fr.* : July - November.

*Specimens examined* : Singamai, Deb 286 (CAL).

Cultivated in gardens for its showy durable flowers; seeds and root bark have medicinal value.

### 11. *Codariocalyx* Hassk.

- 1a. Shrubs up to 2.5 m high; branches terete;  
leaflets 3 - 7 cm; lateral nerves 5 - 7 pairs;  
pods with 8 - 13 compartments ..... 1. *C. gyroides*
- b. Shrubs up to 1.5 m high; branches straight;  
leaflets ca 4.5 cm; lateral nerves 7 - 10;  
pods with obscure compartments ..... 2. *C. motorius*.

1. *Codariocalyx gyroides* (Roxb. ex Link.) Hassk. in Fl. 25, Beibl. : 49. 1842, p. min. p.; Banerjee in Rec. Bot. Surv. India 19(2) : 36. 1966. *Hedysarum gyroides* Roxb. ex Link, Enum., Pl. Berol. 2 : 247. 1822. *Desmodium gyroides* (Roxb. ex Link.) DC., Prodr. 2 : 326. 1825; Baker in Hook. f., Fl. Brit. India 2 : 175. 1876; Deb in Bull. Bot. Surv. India 3 : 266. 1961.

Shrubs up to 2.5 m high; branches terete, densely grey hairy; rachis 1.5 - 3 cm; leaflets 1 - 3, 3 - 7 × 1.5 - 4.5 cm, ovate-elliptic or obovate, obtuse, truncate or cordate at base, lateral nerves 5 - 7 pairs; lateral leaflets absent or when present very small, bristle like. Flowers pale pink, in terminal or axillary, branches 3 - 15 cm raceme; bracts ovate, 0.3 - 0.6 cm; corolla pale pink or purple pink, ca 0.5 cm. Pods 2 - 4 × 0.3 - 0.4 cm, densely long hairy, joints 8 - 13; seeds reniform, black.

*Fl. & Fr.* : September - December.

*Specimens examined* : Shngnu, Deb 2602; Kakching, Deb 1227; Jirighat, Meebold 5722 (CAL).

2. *Codariocalyx motorius* (Houtt.) Ohashi in J. Jap. Bot. 40 : 367. 1965. *Hedysarum motorium* Houtt., Nat. Hist. 2, 10, 246. 1779. *H. gyrans* L. f., Suppl. Pl. 332. 1781. *Desmodium gyrans* (L. f.) DC., Prodr. 2 : 326. 1825; Baker in Hook. f., Fl. Brit. India 2 : 174. 1876. *D. gyrans* var. *roylei* (Wight & Arn.) Baker in Hook. f., Fl. Brit. India 2 : 175. 1876. *D. motorium* (Houtt.) Merr. in J. Arn. Arb. 19 : 345. 1938; Deb in Bull. Bot. Surv. India 3 : 267. 1961. *Codariocalyx motorium* var. *roylei* (Wight & Arn.) Ohashi in J. Jap. Bot. 40 : 368. 1965.

Undershrubs, ca 1.5 m high; branches striate; stems with hooked hairs at apex. Leaves 3-foliolate, terminal leaflets up to 5.5 × 3 cm narrowly oblong or oblong lanceolate, obtuse at both ends, glabrous above silky beneath; lateral nerves 7 - 10 pairs; lateral leaflets very small or obsolete; stipules subulate, broad at base, deciduous, acuminate. Flowers ca 7 mm long, pink or purplish often paniced in axillary or terminal racemes, elongated after flowering; calyx campanulate, glabrous, teeth shorter than the tube; corolla ca 0.5 cm, pink to orange. Pods 2 - 5 × 0.4

0.6 cm, falcate, indistinctly jointed; seeds 3 - 11, reniform.

*Fl. & Fr.* : August - December.

*Specimens examined* : Litan, *Deb* 1101; Kakching, *Deb* 1198; Shugnu, *Deb* 2600; Kasam, *Mukerjee* 3284; Ukhrul, *Mukerjee* 3302; Keibul Lamjao National Park, *Chakravorty* 86712 (ASSAM).

**12. *Crotalaria* L**

- 1a. Leaves 3-foliolate ..... 2
- b. Leaves simple ..... 3
- 2a. Flowers on 10 - 50 cm long racemes;  
  pods broadly oblong ..... 3. *C. anagyroides*
- b. Flowers on 10 - 15 cm long racemes;  
  pods narrowly falcate ..... 11. *C. pallida*
- 3a. Flowers in terminal heads or in  
  condensed racemes ..... 8. *C. khasiana*
- b. Flowers in long racemes never in heads ..... 4
- 4a. Racemes interpetiolar or leaf-opposed ..... 5
- b. Racemes terminal ..... 7
- 5a. Stems winged by decurrent stipules ..... 1. *C. alata*
- b. Stems not winged ..... 6
- 6a. Pods 2 - 5 cm long, linear-oblong;  
  seeds 20 - 40 ..... 5. *C. ferruginea*
- b. Pods 4 - 6 mm long, oblong;  
  seeds 6 - 8 ..... 6. *C. humifusa*
- 7a. Tall herbs or shrubs up to 2.5 m tall ..... 8
- b. Herbs or small shrubs up to 70 cm (-100 cm) ..... 12
- 8a. Flowers more than 3.5 cm long ..... 7. *C. juncea*
- b. Flowers less than 3 cm long ..... 9
- 9a. Flowers pale-bluish white:  
  pods ca 2 cm long ..... 12. *C. sessiliflora*
- b. Flowers yellow: pods more than 3 cm long ..... 10
- 10a. Branches straited; calyx glabrous,  
  split more than half ..... 4. *C. assamica*
- b. Branches not straited; calyx long hairy: split to base ..... 11
- 11a. Stems tetragonous; pods with 12-20 seeds ..... 14. *C. tetragona*
- b. Stems not tetragonous; pods with  
  20 - 40 seeds ..... 13. *C. spectabilis*
- 12a. Floral bracts up to 4 mm long; flowers and pods secund ..... 13

- b. Floral bracts more than 5 mm long;  
flowers and pods not secund ..... 9. *C. mysorensis*
- 13a. Stipules absent; flowers pale yellow ..... 2. *C. albida*
- 13b. Stipules present; flowers deep violet ..... 10. *C. occulata*

1. *Crotalaria alata* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 241, 1825; Baker in Hook. f., Fl. Brit. India 2 : 69, 1876; Kanjilal *et al.*, Fl. Assam 2 : 13, 1938; Deb in Bull. Bot. Surv. India 3 : 265, 1961. *C. bialata auct. non* Schrank, 1819; Roxb, Fl. Ind. 3 : 274, 1832.

Suberect under shrubs, up to 75 cm high, silky pubescent, winged. Leaves simple 2 - 8.5 cm long, sub-sessile, ovate-oblong or obovate, membranous, oblique at base, rounded or acute, mucronate, thinly silky beneath; lateral nerves 5 - 6 pairs; stipules decurrent. Flowers 1.3 - 1.8 cm, yellow, 2 - 5 flowered on leaf opposed racemes; calyx ca 1 cm, silky; corolla as long as calyx, pale yellow. Pods stalked, oblong or linear-oblong, 3 - 4 cm long, glabrous, 30 - 40 seeded.

*Fl. & Fr.* : August - December.

*Specimens examined* : Kakching, Deb 1230; Imphal, Deb 171; Piphima, Meebold 5332 (CAL); Kwab, Malick 1503, 1516 (BSIS); Singgot, Chauhan 95069 (ASSAM).

2. *Crotalaria albida* Heyne ex Roth, Nov. Pl. Ind. Or. 333, 1821; Baker in Hook. f., Fl. Brit. India 2 : 71, 1876; Balakr., Fl. Jowai 1 : 152, 1981.

Erect much branched herbs up to 70 cm high, branches slender, appressed silky hairy. Leaves 2 - 3.5 × 0.3 - 0.5 cm, linear-oblong to oblong-lanceolate, sub-sessile, cuneate at base, apex obtuse or mucronate, hairy beneath. Flowers 0.8 - 0.9 cm long, 6 - 20 flowered, in 2 - 18 cm long terminal racemes; calyx hairy; standard suborbicular, ca 0.8 cm. Pods 1.2 - 1.5 cm long, sessile, oblong, pale-brown 6 - 12 seeded.

*Fl. & Fr.* : November - March.

*Specimens examined* : Shebong, Meebold 7544 (CAL).

3. *Crotalaria anagyroides* H. B. K., Nov. Gen. Sp. 6 : 404, 1823; Balakr., Fl. Jowai 1 : 151, 1981.

Tall shrubs ca 3 m high. Leaves digitately 3-foliolate; petioles 3 - 8 cm; stipules ca 0.5 cm, linear; leaflets 4 - 10 × 0.5 - 0.4 cm, lanceolate or oblong-lanceolate, cuneate at base, sub-acute at apex, mucronate. Flowers ca 2 cm, yellow, on 10 - 50 cm long, terminal racemes; bracts ca 1 cm, linear; corolla yellow; standard 1.2 - 1.5 cm, yellow with brownish red streaks. Pods 3 - 4 cm, broadly oblong, black.

*Fl. & Fr.* : June - December.

*Specimens examined* : Churachandpur, Chauhan 94977 (ASSAM).

A native of tropical America, naturalised in this region and used as green manure.

4. *Crotalaria assamica* Benth. in Hook., Lond. J. Bot. 2: 481. 1843; Baker in Hook. f., Fl. Brit. India 2: 75. 1876; Kanjilal *et al.*, Fl. Assam 2: 15. 1938; Deb in Bull. Bot. Surv. India 3: 265. 1961.

Shrubs 1 - 2 m high, branches striated, silky. Leaves 5 - 12 × 2 - 4 cm, oblong, oblanceolate, cuncate at base, sub-acute and mucronate, rugose above, silky pubescent beneath, lateral nerves 10 - 12 pairs. Flowers golden yellow, 20 - 30 flowered on ca 25 cm long terminal racemes; calyx ca 2 cm, pubescent, teeth lanceolate; corolla slightly larger than calyx, golden yellow. Pods 3 - 6 cm long, oblanceolate, stalked, glabrous, many seeded.

*Fl. & Fr.* : August - January.

*Specimens examined* : Ukhrul, Mukerjee 2608 (CAL).

5. *Crotalaria ferruginea* R. Grah. ex Benth. in Hook., Lond. J. Bot. 2: 476. 1843; Baker in Hook. f., Fl. Brit. India 2: 68. 1876; Kanjilal *et al.*, Fl. Assam 2: 12. 1938; Deb in Bull. Bot. Surv. India 3: 265. 1961.

Much branched, diffuse herbs, ca 20 - 100 cm high; branches densely silky hairy, conspicuously winged with persistent decurrent stipules. Leaves simple, 1 - 5 × 0.5 - 2.5 cm, subsessile, obovate-oblong or linear-lanceolate, obtuse at base, acute or sub-acute at apex, brown hairy. Flowers yellow, 1 - 5 flowered on leaf opposed, 2 - 11 cm long racemes; calyx ca 1 cm long, silky; corolla yellow. Pods 2 - 5 cm long, linear-oblong, glabrous, 20 - 40 seeded.

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

*Specimens examined* : Maoling, Deb 1157; Palel Deb 1351; Kakching hills, Deb 1221; Kangchub, Deb 90; Imphal, Ibodi 150; Norgoam, C. B. Clarke 16704 (CAL); Litan, Chauhan 94611 (ASSAM).

6. *Crotalaria humifusa* R. Grah. ex Benth. in Hook., Lond. J. Bot. 2: 476. 1843; Baker in Hook. f., Fl. Brit. India 2: 67. 1876; Kanjilal *et al.*, Fl. Assam 2: 11. 1938; Deb in Bull. Bot. Surv. India 3: 265. 1961. *C. prostrata* auct. non Rottb.; D. Don, Prodr. Fl. Nep. 241. 1825.

Much branched slender herbs ca 30 - 35 cm high, densely clothed with yellow-brown silky hairs. Leaves simple, sub-sessile, 1 - 5 cm long, oblong, membranous, obtuse, glaucous beneath. Flowers small, yellow, 3 - 6 flowered in 3 - 9 cm long, leaf opposed racemes, densely silky; calyx ca 2 cm long, densely silky, teeth very long, linear, corolla shorter than the calyx, yellow. Pods stalked, 0.4 - 0.6 cm long, oblong, glabrous, 6 - 8 seeded.

*Fl. & Fr.* : September - December.

*Specimens examined*: Imphal Valley, Deb 222 (CAL).

7. *Crotalaria juncea* L., Sp. Pl. 714. 1753; Baker in Hook. f., Fl. Brit. India 2: 79. 1876; Kanjilal *et al.*, Fl. Assam 2: 14. 1938; Deb in Bull. Bot. Surv. India 3: 265.

1961. *C. benghalensis* Lam., *Encycl.* 2 : 196, 1790. *C. tenuifolia* Roxb. ex DC., *Prodr.* 2 : 126, 1825.

Tall undershrubs ca 1.5 m high; branches slender, sulcate, sparsely hairy. Leaves 4 - 13 × 1.5 - 1.7 cm, shortly stalked, linear or linear-oblong, obtuse, acute or mucronate, covered with brown hairs. Flowers ca 3 cm long, bright yellow, 10 - 20 flowered, in lateral or terminal racemes, up to 35 cm long; calyx ca 2 cm long, deeply toothed, brown velvety; corolla slightly longer than calyx, bright yellow, glabrous. Pods 2 - 4.5 cm long, linear-oblong, clothed with short spreading hairs, 10 - 15 seeded.

*Fl. & Fr.* : November - March.

*Specimens examined* : Imphal, Deb 460 (CAL); Nungba, Mallick 1153 (BSIS).

Cultivated as a fibre yielding plant and is also used as green manure; flowers and fruits are used as a vegetable.

8. *Crotalaria khasiana* Balakr. ex Thoth. & Ansari in *Bull. Bot. Surv. India* 20 : 180, 1979. *C. capitata* auct. non Lam., 1790; Benth. ex Baker in *Hook. f., Fl. Brit. India* 2 : 74, 1876; Kanjilal *et al.*, *Fl. Assam* 2 : 15, 1938; Deb in *Bull. Bot. Surv. India* 3 : 265, 1961.

Bushy caespitose scandent hispid herbs; stems scarcely branched. Leaves alternate, 1.5 - 3.5 × 0.3 - 0.9 cm long, obovate or oblanceolate, sub-acute or rounded at apex, glabrous above, silky beneath. Flowers violet blue, 6 - 20 flowers in terminal heads or in condensed racemes; calyx ca 1 cm long, densely brown silky; corolla blue or violet blue. Pods small, sessile, glabrous.

*Fl. & Fr.* : August - November.

*Specimens examined* : Kakching, Deb 1241; Kangoi, Meebold 6885; Tohingsaw, G. Watt 5930; Sirohec, Mukerjee 3520 (CAL).

9. *Crotalaria mysorensis* Roth, *Nov. Pl. Ind. Or.* 338, 1821; Baker in *Hook. f., Fl. Brit. India* 2 : 70, 1876; Kanjilal *et al.*, *Fl. Assam* 2 : 12, 1938; Deb in *Bull. Bot. Surv. India* 3 : 265, 1961. *C. stipulacea* Roxb., *Fl. Ind.* 3 : 264, 1832.

Erect diffuse herbs, 25 - 75 cm; branches silky brown hairy. Leaves simple, 2 - 7.5 × 0.3 - 1.8 cm, linear-oblong or elliptic-ovate, membranous, obtuse to sub-acute at apex, apiculate, hairy on both surfaces. Flowers 1.2 - 1.6 cm long, yellow, 3 - 12 flowered, in terminal or sub-terminal, 6 - 25 cm long lax racemes; bracts large ca 2 cm, lanceolate; calyx ca 1.5 cm, silky-hairy; corolla ca 2 cm long, yellow. Pods 1.5 - 2.8 cm, oblong, glabrous, pale-brown, 20 - 30 seeded.

*Fl. & Fr.* : September - November.

*Specimens examined* : Chingmairang, Deb 579 (CAL); Litan, Chauhan 94627 (ASSAM).

10. *Crotalaria ocellata* R. Griseb. ex Benth. in *Hook. Lond. J. Bot.* 2 : 565, 1843;

Baker in Hook. f., Fl. Brit. India 2 : 72. 1876; Kanjilal *et al.*, Fl. Assam 2 : 14. 1938; Deb in Bull. Bot. Surv. India 3 : 265. 1961.

Undershrub 0.6 - 1 m high, with ascending branches, silky hairy. Leaves simple, alternate, 2 - 9 × 0.8 - 2.7 cm, elliptic-oblong or oblanceolate, cuneate at base, apex apiculate, pilose on midrib above, grey silky beneath. Flowers deep violet, 6 - 25 flowered on 6 - 18 cm long terminal racemes, sometimes condensed at the terminal portions only; calyx *ca* 2 cm, densely brown silky; corolla *ca* 2.3 cm, violet or dark blue, glabrous. Pods 2 - 2.5 cm long, oblong, sessile, glabrous, 10 - 13 seeded, 0.2 - 0.3 cm across, kidney shaped.

*Fl. & Fr.* : August - October.

*Specimens examined* : Sepromine, S. C. Sinha 1118 (CAL).

**11. *Crotalaria pallida*** Ait., Hort. Kew 3 : 20. 1789; Polhill in Kew Bull. 22 : 262. 1968; Deb, Fl. Tripura 1 : 153. 1981. *C. mucronata* Desv. in J. de Bot. 3 : 76. 1814. *C. striata* DC., Prodr. 2 : 131. 1825; Baker in Hook. f., Fl. Brit. India 2 : 84. 1876; Kanjilal *et al.*, Fl. Assam 2 : 16. 1938. *C. saltiana* Prain ex King in J. Asiat. Soc. Bengal 66 (2) : 41. 1897, *non* T. Anderson 1811; Deb in Bull. Bot. Surv. India 3 : 265. 1961. *C. latifolia* Roxb. ex Wight & Arn., Prodr. 180. 1834.

Undershrubs, 0.6 - 1.2 m high, with slender sulcate, silky branches. Leaves 3-foliolate, long petioled; leaflets 5 - 8.5 × 2 - 3.5 cm, elliptic, ovate or ovate-oblong, membranous, cuneate at base, mucronate, glabrous above, sparsely adpressed hairy beneath. Flowers 2.5 cm long, yellow, streaked with purple. 20-50 flowers on 10-15 cm long racemes; calyx *ca* 1 cm, silky, teeth lanceolate; corolla *ca* 1.5 cm, yellow with red stripes, glabrous. Pods 2.5- 5 cm, oblong, deflexed, glabrous, 20 - 39 seeded.

var. *pallida*

Mani. : Mamharai

*Fl & Fr.* : October - February.

*Specimens examined* : Imphal, Deb 114. 1360 (CAL); Shaklaphai, Chauhan 95034; Keibul Lamjao National Park, Chauhan 95128 (ASSAM).

A native of tropical Central America, widely introduced in tropical Africa, Asia and Australia; it is used as a cover crop and green manure.

**12. *Crotalaria sessiliflora*** L., Sp. Pl. ed. 2 : 1004. 1763; Baker in Hook. f., Fl. Brit. India 2 : 73. 1876; Kanjilal *et al.*, Fl. Assam 2 : 12. 1938; Deb in Bull. Bot. Surv. India 3 : 265. 1961.

Robust perennial herbs, 0.5 - 2.2 m high. Leaves simple, alternate, 5 - 13 × 0.5 - 1.2 cm, linear-lanceolate, narrowed at both ends, sparsely hirsute above, thinly silky pilose beneath. Flowers pale bluish-white, densely 2 - 20 flowered in 2 - 20 cm long racemes or solitary from axils of leaves; calyx *ca* 1.2 cm, deeply divided in unequal lobes, densely silky; corolla pale bluish, standard violet, not exerted. Pods *ca* 2 cm long, oblong, glabrous, 5 - 25 seeded.

*Fl. & Fr.* : August - November.

*Specimens examined* : Koncpam, *Meebold* 5927 (CAL); Kcibul, Lamjao National Park, *Chauhan* 95149 (ASSAM).

**13. *Crotalaria spectabilis*** Roth, Nov. Sp. Ind. Or. 341, 1821; Deb, Fl. Tripura 1 : 154, 1981. *C. sericea* Retz., Obs. Bot. 5 : 26, 1789, *non* Baker. Burm in Hook. f., Fl. Brit. India 2 : 75, 1876; Kanjilal *et al.*, Fl. Assam 2 : 15, 1938; Deb in Bull. Bot. Surv. India 3 : 265, 1961. *C. leschenaultii* DC., Prodr. 2 : 125, 1825; Baker, *l.c.* 1876.

Robust undershrubs, 1.5 - 2.2 m high; branches short, striated. Leaves simple, 6 - 25 cm long, oblanceolate-ovate, cuneate at base, acute, glabrous above, finely grey pubescent beneath. Flowers yellow tinged with purple, 20 - 40 flowered in *ca* 30 cm long terminal racemes; bracts lanceolate or ovate, leafy; calyx *ca* 1 cm, glabrescent, teeth subulate; corolla *ca* 2 cm, yellow tinged with purple, much exerted. Pods 3 - 6 cm long, oblong, glabrous or thinly silky, seeds in two rows, 20 - 40, kidney shaped.

*Fl. & Fr.* : September - March.

*Specimens examined* : Imphal, *Deb* 285 (CAL); Nutanlalpani, *Malick* 924 (BSIS).

Cultivated for green manure.

**14. *Crotalaria tetragona*** Andrews, Bot. Rep. 10, t. 593, 1810; Baker in Hook. f., Fl. Brit. India 2 : 78, 1876; Kanjilal *et al.*, Fl. Assam 2 : 13, 1938; Deb in Bull. Bot. Surv. India 3 : 266, 1961. *C. grandiflora* Zolling in Miq., Pl. Ind. Bot. 1 : 133, 1861.

Shrubs *ca* 2 m high, with tetragonous stems and sulcate silky branches. Leaves 12 - 30 × 0.7 - 2.5 cm, linear or lanceolate, gradually narrowed into cuspidate tip, thinly pilose above, densely silky beneath, lateral nerves very oblique. Flowers showy, yellow, laxly 4 - 10 flowered on *ca* 25 cm long terminal racemes; calyx 2.5 cm, dense velvety with long teeth; corolla yellow, slightly exerted, glabrous. Pods 3 - 4.5 cm long, sub-sessile, brown-velvety, 12 - 20 seeded.

*Fl. & Fr.* : September - December.

*Specimens examined* : Tengmai, *C. B. Clarke* 42068; Laimosak, *Meebold* 5961 (CAL).

### 13. *Dalbergia* L. f., *nom. cons.*

- |     |  |                          |
|-----|--|--------------------------|
| 1a. | Trees .....  | 2                        |
| b.  | Climbing shrubs .....  | 4                        |
| 2a. | Leaflets 3 - 5; stamens 9 in one bundle.<br>monadelphous .....   | 3. <i>D. sissoo</i>      |
| b.  | Leaflets 9 - 12; Stamens in 2 bundles of 5 each .....  | 3                        |
| 3a. | Leaflets 15 - 21, oblong, elliptic;<br>flowers white or purplish-blue<br>in 10 - 15 cm long panicles;<br>pods 1 - 2 seeded ..... | 1. <i>D. lanceolaria</i> |



- b. Leaflets 9 - 11, lanceolate;  
flowers always white, in 3 - 5 cm long  
panicles; pods 1 seeded..... 5. *D. wattii*
- 4a. Leaflets 20 - 41; flowers white or  
greenish-white; 1 or rarely 2 seeded ..... 2. *D. pinnata*
- b. Leaflets 17 - 23; flowers pale blue in  
5 - 12 cm long panicles; pods 1 - 2 seeded..... 4. *D. stipulacea*

1. *Dalbergia lanceolaria* L. f. subsp. *lanccolaria* var. *assamica* (Benth.) Thoth, in Bull. Bot. Surv. India 25 : 171. 1983. *D. assamica* Benth. in Miq., Pl. Jungh. 1 : 256. 1852; Baker in Hook. f., Fl. Brit. India 2 : 235. 1876; Kanjilal *et al.*, Fl. Assam 2 : 102. 1938; Deb in Bull. Bot. Surv. India 3 : 266. 1961.

Trees ca 15 - 25 m tall, with spreading branches. Leaves 14.5 - 28.5 cm; leaflets 15 - 21, oblong-elliptic, 3 - 5.5 × 2 - 3 cm sub-cuneate at base, obtuse or sub-emarginate; lateral nerves 10 - 12 pairs. Flowers 6 - 9 mm long, white or purplish blue, in axillary panicles 10 - 15 cm, pedicels ca 0.4 cm long. Pods 4 - 7.5 cm long, linear oblong, indehiscent, strap shaped, acute at base, mucronate at apex, 1 - 2 seeded; seeds reniform, ca 0.5 cm, compressed.

*Fl. & Fr.* : March - January.

*Specimens examined* : Kasam, Mukerjee 3293, 3550; Irong, Meebold 5889 (CAL).

2. *Dalbergia pinnata* (Lour.) Prain in Ann. R. Bot. Gard. Calc. 10 : 48. 1904; Balakr., Fl. Jowai 1 : 168. 1981. *Derris pinnata* Lour., Fl. Cochinch. 432. 1790. *Dalbergia tamarindifolia* Roxb., Fl. Ind. 3 : 233. 1832; Baker in Hook. f., Fl. Brit. India 2 : 234. 1876; Kanjilal *et al.*, Fl. Assam 2 : 102. 1938; Deb in Bull. Bot. Surv. India 3 : 2866. 1961.

Woody climbing shrubs with a spreading crown; branchlets pubescent when young. Leaves 7 - 18 cm; leaflets 20 - 41, trapezoid-oblong, 0.8 - 2.5 cm, rounded and slightly emarginate, base oblique, hairy beneath. Flowers white or greenish-white, in axillary panicles, up to 8 cm long, densely puberulous. Pods 4 - 7 cm, stalked, oblong reddish-brown, 1 - 30 seeded, seeds 1.8 - 0.4 cm.

*Fl. & Fr.* : March - July.

*Specimens examined* : Imphal, Deb 366, 400; Langal, Deb 2102 (CAL).

3. *Dalbergia sissoo* Roxb. ex DC., Prodr. 2 : 416. 1825; Baker in Hook. f., Fl. Brit. India 2 : 231. 1876; Kanjilal *et al.*, Fl. Assam 2 : 100. 1938; Deb in Bull. Bot. Surv. India 3 : 266. 1961.

Mani.: *Sissu & Sissu*.

Large deciduous trees up to 30 m high; young parts densely pubescent; wood very hard, brown, heart wood dark brown or blackish. Leaves 8 - 20 cm long with zigzag petioles, pubescent; leaflets 3 - 5, alternate, obliquely ovate, 3.9 - 9 × 3 - 7

cm, acuminate or caudate-acuminate, glabrous, tomentose when young. Flowers small, 7 - 9 mm long, yellowish-white, sub-sessile, in axillary or terminal panicles which are shorter than leaves, standard long clawed. Pods 3.8 - 8.5 × 9.1 - 1.3 cm, flat, linear-oblong, cuneate at base, tip rounded; seeds 1 - 3, reniform brown to brownish-black, compressed.

*Fl. & Fr.* : March - February.

*Specimens examined* : Imphal, Deb 315 (CAL).

Wood is very hard, durable and good for furniture; pulp is also used in paper industry.

4. *Dalbergia stipulacea* Roxb., Fl. Ind. 3 : 233, 1832; Baker in Hook. f., Fl. Brit. India 2 : 237, 1876; Kanjilal *et al.*, Fl. Assam 2 : 107, 1938; Deb in Bull. Bot. Surv. India 3 : 266, 1961.

Large climbing shrubs or small trees, 10 - 16 m high; wood purplish brown. Leaves 11 - 20 cm long, stipulate; leaflets 17 - 23, elliptic-oblong, 2 - 4.5 × 0.8 - 1.7 cm, obtuse, cuneate and slightly oblique at base, glabrous above, sparsely hairy beneath. Flowers 8 - 10 mm long, pale-blue, in 7 - 12 cm long axillary panicles; pedicels longer than the calyx; stamens 10, isodiadelphous. Pod 5 - 12 × 1.8 - 3.2 cm, flat, oblong, obtuse at apex one seeded; seeds reniform, compressed, brown.

*Fl. & Fr.* : April - February.

*Specimens examined* : Imphal, Deb 1348, 1455; Kapru, Deb 2282; Kaupra, G. Watt 7256; Nungba, Malick 1162 (BSIS).

Roots and bark are used for fish poisoning.

5. *Dalbergia wattii* C. B. Clarke in J. Linn. Soc. 25 : 17, 1889; Prain in J. Asiat. Soc. Bengal 66 : 451, 1897; Deb in Bull. Bot. Surv. India 3 : 266, 1961; Thoth, in Taxon, Rev. Dalbergiaceae : 177, 1987. Fig. 41

Small trees up to 10 m tall; branches spreading, glabrous. Leaves 12.5 - 17 cm long, stipulate; leaflets 9 - 11, lanceolate, 4 - 7 × 1.0 - 1.5 cm, sub-opposite, narrowed at base, acute, glabrous above, puberulous below in the midrib. Flowers 6 - 8 mm long, white, in 3.5 - 5.5 cm long-axillary panicles. Pods 6 - 7 × 1.6 - 1.7 cm, oblong, narrowed to rounded below, obtuse above, 1-seeded; seeds 9 × 5 mm, compressed, black.

*Fl. & Fr.* : May - November.

*Specimens examined* : Mayung, C. B. Clarke 42034; Meitaphum, G. Watt 6830 (CAL).

#### 14. *Dalhousiea* R. Grah. ex Benth.

*Dalhousiea bracteata* (Roxb.) R. Grah. ex Wight l.c. t. 265, 1840; Baker in Hook. f., Fl. Brit. India 2 : 248, 1878; Kanjilal *et al.*, Fl. Assam 2 : 116, 1938; Deb in Bull. Bot. Surv. India 3 : 266, 1961. *Podolyria bracteata* Roxb., Pl. Corom. 3 : t. 259, 1820.

Large woody climbers; bark greyish-white; branchlets hairy. Leaves distichous, 1 foliolate, 4 - 10 × 4 - 8 cm, oblong, orbicular, ovate or sub-orbicular; leaflets ovate-

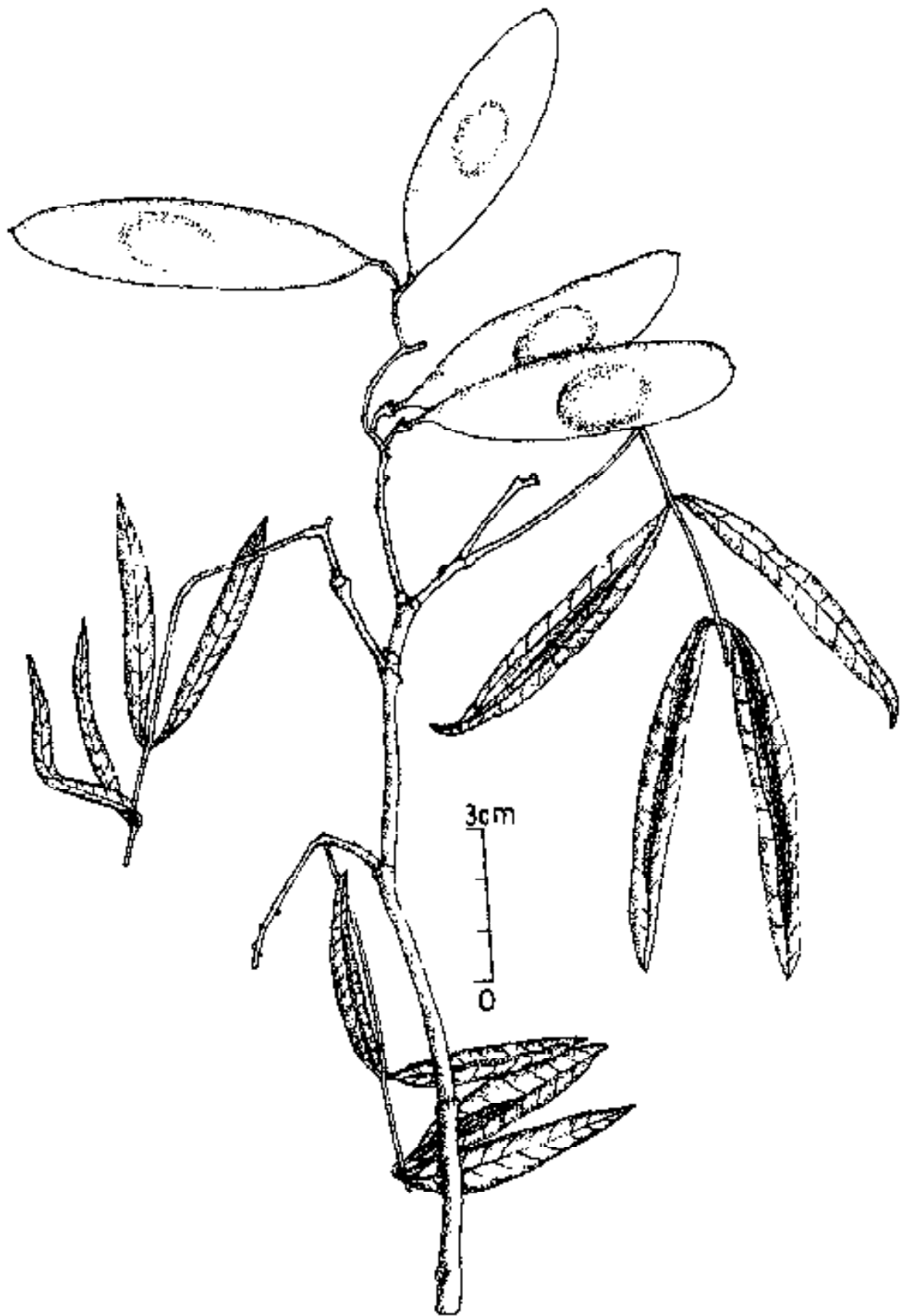


Fig. 41 : A fruiting twig of *Dalbergia wattii* C. B. Clarke

elliptic or oblong-elliptic, acuminate, sub-cordate at base, glabrous above, adpressed hairy along nerves beneath. Flowers white, sub-sessile, in lax *ca* 5 cm long, axillary corymbose-racemes, subtended by a pair of ovate bracts and ovate-orbicular bracteoles. Pod 7-10 × 3-4 cm, turgid, compressed, tapering at both ends, 1-3 seeded.

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

*Specimens examined* : Katanaga hills, G. Watt 7246 (CAL).

Leaves are used for wrapping biris.

#### 15. *Derris* Lour. *nom. cons.*

- 1a. Extensive climbers; leaflets 7-11 pairs;  
flowers red or purple ..... 2
- b. Trees; leaflets 20-25 pairs; flowers white ..... 2. *D. robusta*
- 2a. Flowers red or purple; pods 4-4.5 cm long,  
1-seeded ..... 1. *D. cuneifolia*
- b. Flowers white with purple tinge;  
pods 2.5-8 cm long, 1-5 seeded ..... *D. scandens*

**1. *Derris cuneifolia* Benth.** in Miq., Fl. Jungh. 1 : 253. 1852; Baker in Hook. f., Fl. Brit. India 2 : 243. 1878; Karjilal *et al.*, Fl. Assam 2 : 113. 1938; Thoth. in Fasc. Fl. India 8 : 13. 1982.

Large woody climbers, young parts tomentose. Leaves 15-30 cm long; leaflets 5-9, variable, 3.5-12.5 × 2.1-2.7 cm, ovate-oblong or elliptic-oblong, rounded or cuneate at base, shortly acuminate. Flowers 1.0-1.5 cm long, pale-purple or red, often fascicles in 5-8 cm long racemes; calyx densely ciliate; corolla *ca* 1.2 cm, red or purple. Pods 4-4.5 × 2.2-2.5 cm, obliquely ovate-elliptic or oblong turgid, usually one seeded, with a narrow and sharp wing.

*Fl. & Fr.* : April - November.

*Specimens examined* : Makim river bank, G. Watt 6929 (CAL).

**2. *Derris robusta* (Roxb. ex DC.) Benth.** in J. Linn. Soc. 4 (Suppl.) : 104. 1860; Baker in Hook. f., Fl. Brit. India 2 : 241. 1878; Karjilal *et al.*, Fl. Assam 2 : 111. 1938; Deb in Bull. Bot. Surv. India 3 : 266. 1961; Thoth. in Fasc. Fl. India 8 : 22. 1982. *Dalbergia robusta* Roxb. ex DC., Prodr. 2 : 417. 1825.

Mani.: *Kho*

Middle sized deciduous trees up to 10 m high. Leaves 8-20 cm long; leaflets 7-25, opposite, 1.5-4.5 × 1.5-2.5 cm, elliptic-oblong to elliptic-lanceolate or oblong, sub-acute, mucronate, narrowed at base; lateral nerves 4-6 pairs. Flowers *ca* 1.2 cm long, white, fascicled in axillary 10-25 cm long racemes; calyx red, golden hairy; corolla *ca* 1.2 cm long, white. Pods 2.5-8 × 2.1-2.8 cm, strap-shaped, winged along the upper suture, 1-5 seeded; seeds *ca* 2.5 mm, orbicular, brown.

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

*Specimens examined* : Imphal, Meebold 6152; Kongpokpi, Deb 2233; Maku river bank, G. Watt 6930 (CAL).

**3. *Derris scandens* (Roxb.) Benth.**, in J. Linn. Soc. 4 (Suppl.) : 103. 1860; Baker in Hook f., Fl. Brit. India 2 : 240 : 1876; Kanjilal *et al.*, Fl. Assam 2 : 116. 1938; Thoth. in Fasc. Fl. India 8 : 27. 1982. *Dalbergia scandens* Roxb., Pl. Coron. 2 : 1. 192. 1805 & Fl. Ind. 3 : 232. 1832.

Extensive climbers, with dark purple stems, young parts pubescent. Leaves 5-12 cm long, imparipinnate; leaflets 7-11, elliptic-oblong or obovate-oblong, 2.5-6.0 × 1.5-2.0 cm, acute to acuminate, sub-coriaceous, glabrous above, puberulous beneath. Flowers 0.8-1.4 cm long, white with pinkish-tinge in 10-22 cm long racemes; calyx minute, greyish, silky. Pods 2.5-6.5 cm long, oblong-lanceolate, winged along the upper suture only, 1-4-seeded, often sinuate between seeds.

*Fl & Fr.* : May - October.

*Specimens examined* : Karong, G. Watt 7132 (CAL).

**16. *Desmodium* Desv. *non. cons.***

1a.	Leaves unifoliate .....	2
b.	Leaves 3-foliate .....	6
2a.	Prostrate herbs: leaves broader than long .....	12. <i>D. renifolium</i>
b.	Shrubs or under shrubs: leaves longer than broad .....	3
3a.	Pods deeply indented along lower suture only .....	3. <i>D. gangeticum</i>
b.	Pods indented along both sutures .....	4
4a.	Flowers pale violet; pods minutely hooked hairy .....	19. <i>D. zonatum</i>
b.	Flowers purple; pods pubescent with straight hairs .....	5
5a.	Stipules 8-12 mm long, lanceolate; pods linear falcate .....	9. <i>D. oblongum</i>
b.	Stipules 2-7 mm long, triangular; pods oblong, not falcate .....	18. <i>D. velutinum</i>
6a.	Leaves 1-3 foliate, sometimes 1-foliate .....	7
b.	Leaves always 3-foliate .....	8
7a.	Decumbent herbs: leaflets 1.5 cm or less; pods 1-4 joints .....	7. <i>D. microphyllum</i>
b.	Prostrate shrubs: leaflets up to 7 cm long, pods 3-6 joints .....	15. <i>D. styracifolium</i>
8a.	Trailing herbs .....	9
b.	Erect herbs or under shrubs .....	10

- 9a. Pods more than 1.5 cm long,  
glabrescent; joints 4 - 5 ..... 5. *D. heterophyllum*
- b. Pods up to 1.5 cm long, pubescent;  
joints 3 - 4 ..... 17. *D. triflorum*
- 10a. Flowers in short axillary umbels ..... 16. *D. triangulare*
- b. Flowers in elongated racemes ..... 11
- 11a. Pods indented along lower suture ..... 12
- b. Pods indented along both sutures ..... 14
- 12a. Pods dehiscent ..... 4. *D. heterocarpon*  
..... subsp. *heterocarpon*
- b. Pods indehiscent ..... 13
- 13a. Leaflets ovate or ovate elliptic,  
acuminate or acute ..... 10. *D. podocarpum*  
..... subsp. *oxyphyllum*
- b. Leaflets elliptic or obovate,  
rounded or obtuse ..... 2. *D. concinnum*
- 14a. Stamens monadelphous; pods stalked ..... 15
- b. Stamens diadelphous; pods without stalked ..... 16
- 15a. Leaflets 6 - 15 cm long, not repand;  
pods swollen at sutures, with 1-2 joints ..... 11. *D. racemosum*
- b. Leaflets 1.5 - 5.5 cm long, repand;  
pods constricted at sutures with 2 - 4 joints ..... 13. *D. repandum*
- 16a. Pods with 4 - 15 joints; segments  
more or less isodiametric ..... 17
- b. Pods 2 - 8 joints; segments longer than broad ..... 18
- 17a. Leaflets appressed pubescent beneath;  
stipules subulate ..... 8. *D. multiflorum*
- b. Leaflets appressed pubescent both surfaces;  
stipules filiform ..... 14. *D. sequex*
- 18a. Pods 5 - 10 cm long, pendulous,  
not falcate; joints 6 - 12 ..... 1. *D. caudatum*
- b. Pods 3 - 5 cm long, not pendulous,  
falcate; joints 6 - 8 ..... 6. *D. laxiflorum*

**1. *Desmodium caudatum*** (Thunb.) DC., Prodr. 2 : 337. 1825; Van Meeuwen in Reinwardtia 6 : 248. 1962. *Hedysarum caudatum* Thunb., Fl. Jap. 286. 1784. *Desmodium laburnifolium* (Poiret) DC., Prodr. 2 : 337. 1825; Baker in Hook. f., Fl. Brit. India 2 : 163. 1876; Kanjilal *et al.*, Fl. Assam 2 : 47. 1938.

Under shrubs, up to 1.5 m tall. Leaves 3 - foliate; leaflets 2.5 - 10 × 1.5 - 3.0 cm, elliptic, oblong-lanceolate, cuneate at base, acuminate, appressed pubescent beneath; petioles 3 - 5 cm; stipules 6 - 10 × 1 mm, triangular at base. Flowers white

with 2-linear bracteoles at the base of calyx in axillary and terminal racemes; petals ca 1 cm long; white. Pods 5-10 cm, undulate along both the sutures, 6-12 segments, pubescent with minute hooked hairs.

*Fl. & Fr.* : August - November.

*Specimens examined* : Laimakhong, Deb 493 (CAL).

**2. *Desmodium concinnum* DC.**, Ann. Sci. Nat. Paris 4 : 101, 1825; Baker in Hook. f., Fl. Brit. India 2 : 170, 1876; Deb in Bull. Bot. Surv. India 3 : 266, 1961. *Hedysarum retusum* D. Don, Prodr. 245, 1825. *Desmodium retusum* (D. Don) Sweet, Hort. Brit. 479, 1827.

Erect slender, perennial herbs or undershrubs, up to 1.5 m, appressed pubescent. Leaflets 3-8 × 1.5-3.5 cm, elliptic-oblong, obovate, cuneate or acute at base, rounded or obtuse, pubescent beneath. Flowers ca 0.6 cm long, purple; in lax 10-30 cm long, racemes; stipules ca 1.5 cm, lanceolate; calyx 0.4 cm long, purplish; corolla purplish to pinkish-violet. Pods 2.5-3.5 cm long, 3-6 jointed, deeply indented along lower suture, hairy.

var *concinnum*

*Fl. & Fr.* : July - November.

*Specimens examined* : Litan, Mukerjee 3361; Tasent, Deb 1067 (CAL); Litan, Chauhan 94817 (ASSAM).

**3. *Desmodium gangeticum* (L.) DC.**, Prodr. 2 : 327, 1825; Baker in Hook. f., Fl. Brit. India 2 : 168, 1876; Kanjilal *et al.*, Fl. Assam 2 : 55, 1938; Deb in Bull. Bot. Surv. India 3 : 266, 1961. *Hedysarum gangeticum* L., Sp. Pl. 746, 1753. *H. maculatum* L., l.c. *Meibomia gangetica* O. Kuntze, Rev. Gen. Pl. 196, 1981. *Desmodium maculatum* (L.) DC., Prodr. 2 : 327, 1825. *D. gangeticum* var. *maculatum* (L.) Baker l.c. 1876.

Mani.: Parongkhok.

Sub-erect under shrub, ca 1.5 m tall, stem angular; branches clothed with appressed white hairs. Leaves 1-foliolate, petioles 1.5-2.8 cm, not winged; leaflets 4-15 cm long, oblong-lanceolate or elliptic-lanceolate, acute, rounded, truncate at base, glabrous above, grey puberulous beneath. Flowers purplish white, in 15-30 cm axillary or terminal fascicled racemes; rachis and pedicels puberulous; calyx very small, teeth longer than tube; corolla purplish-white, ca 0.5 cm long. Pod 1-2 cm, falcate, deeply indented on the lower suture, 5-7 jointed, indehiscent, clothed with minute hooked hairs.

*Fl. & Fr.* : August - December.

*Specimens examined* : Imphal, Deb 2323 (CAL).

**4. *Desmodium heterocarpon* (L.) DC. subsp. *heterocarpon* Ohashi** in Ginkgoana 1 : 213, 1973. *Hedysarum heterocarpon* L., Sp. Pl. 747, 1753. *Desmodium heterocarpon* (L.) DC., Prodr. 2 : 334, 1825; Balakr., Fl. Jowai 1 : 160, 1981. *D. polycarpum* (Poiret) DC., Prodr. 2 : 334, 1825; Baker in Hook. f., Fl. Brit. India 2 : 171, 1876; Kanjilal *et al.*, Fl. Assam 2 : 54, 1938. *D. heterocarpon* var. *heterocarpon*

DC., *Prodr.* 2 : 337. 1825; Deb in Bull. Bot. Surv. India 3 : 267. 1961. *D. griffithianum* auct. non Benth., 1852; Deb in Bull. Bot. Surv. India 3 : 266. 1961.

Under shrubs up to 1.5 m high; branches grey tomentose. Leaves 3-foliolate; rachis 2 - 4 cm; leaflets sub-equal, 2 - 9 × 1 - 3.5 cm, obovate or elliptic-oblong, rounded or notched at the apex, rounded or obtuse at base, glabrous above, adpressed hairy beneath, lateral nerves 7 - 9 on either side. Flowers 0.5 - 0.8 cm long, purplish-pink, in terminal and axillary racemes, 5 - 10 cm long, rather densely covered with hooked hairs; corolla bluish purplish. Pods ca 1.2 - 2.0 × 0.2 - 0.75 cm, ciliate at the tips; joints 5 - 8, about as long as broad, dehiscent.

- 1a. Inflorescence rachis bears spreading hooked hairs;  
bracts lanceolate or ovate-lanceolate ..... 1. var. *heterocarpon*
- b. Inflorescence rachis densely covered  
with appressed straight hairs;  
bracts broader ovate cuspidate ..... 2. var. *trichocaulon*

**1. var. heterocarpon**

*Fl. & Fr.* : August - December.

*Specimens examined* : Imphal, Deb 612 & 613; Kakching, Deb 227; Chingnairong, Deb 1022; Kangpokpi, Deb 953; Sirohi, Mukerjee 3217; Ukhrul, Mukerjee 3315 (CAL). Mt. Kwab, Malick 1505; Celjung, Malick 1426; Way to Nungba, Malick 1290 (BSIS); Keibul Lamjao National Park, Chakraborty 87002; Litan, Chauhan 94841 (ASSAM).

2. var. *trichocaulon* (DC.) Ohashi in Ginkgoana 1 : 215. 1973; Deb in Bull. Bot. Surv. India 3 : 267. 1961. *Desmodium polycarpum* (Poiret) DC. var. *trichocaulon* Baker in Hook. f., *Fl. Brit. India* 2 : 172. 1872; Kanjilal *et al.*, *Fl. Assam* 2 : 54. 1938.

*Fl. & Fr.* : July - December.

*Specimens examined* : Shugnu, Deb 2602 & 2605 (CAL).

5. *Desmodium heterophyllum* (Willd.) DC., *Prodr.* 2 : 334. 1825; Baker in Hook. f., *Fl. Brit. India* 2 : 173. 1876. excl. syn. cit; Deb in Bull. Bot. Surv. India 3 : 267. 1961. *Hedysarum heterophyllum* Willd., *Sp. Pl.* 3(2) : 1201. 1802. *H. reptans* Roxb., *Fl. Ind.* 3 : 354. 1832.

Profusely branched, trailing herbs up to 50 cm long, villous. Leaves 3-foliolate, up to 4.5 cm long; petiole 0.8 - 1.2 cm, pubescent; leaflets 1 - 2.5 × 0.8 - 1.0 cm long, obovate or elliptic-obovate, obtuse-minutely pubescent beneath. Flowers ca 1.5 cm long, purple, axillary, solitary or 2-together or 2 - 6 flowered in lax racemes; calyx teeth long, setaceous; corolla purple. Pod 1.2 - 3 × 0.3 - 0.4 cm, as broad as long; joints 4 - 5, glabrescent.

*Fl. & Fr.* : July - December.

*Specimens examined* : Imphal, Deb 151 (CAL); Keibul Lamjao National Park, Chauhan 94141 (ASSAM).

6. *Desmodium laxiflorum* DC. in *Ann. Sci. Nat. Paris* ser. 4 : 100. 1825 & *Prodr.* 2 : 335. 1825; Baker in Hook. f., *Fl. Brit. India* 2 : 164. 1876; Kanjilal *et al.*, *Fl. Assam*



2 : 48, 1938; Deb in Bull. Bot. Surv. India 3 : 265, 1961. *D. elongatum* Wallich, Cat. 196. n. 5714A, 1932, *nom. nud.* *Hedysarum recurvatum* Roxb., Fl. Ind. 3 : 358, 1832, *Desmodium recurvatum* (Roxb.) Grall. in Wallich Cat. 196. n. 5717; Wight & Arn., Prodr. Ind. Or. 226, 1834. *D. ornocarpoides nict. non DC.*, 1825. ; Deb in Bull. Bot. Surv. India 3 : 267, 1961.

Under shrubs up to 3 m high; branches angled, adpressed hairy; stipules long triangular, 1 - 1.5 × 0.2 - 0.3 cm. Leaves 3-foliolate; petiole 2.5 - 5 cm long, sulcate, grey hairy; leaflets 6 - 20 × 5 - 9 cm, terminal largest, elliptic-lanceolate, ovate lanceolate, acuminate, base narrowed, cuspidate, rounded at base, membranous, puberulous above, villous beneath. Flowers fascicled at nodes, 0.5 - 0.7 cm long, white to pink, in ca 35 cm long-panicled racemes; calyx villous, teeth longer than the tube; corolla ca 0.5 cm long purple. Pod falcate, 3 - 5 × 0.2 - 0.8 cm, 6 - 8 jointed; joints 3 - 4 times as long as broad, hooked, hairy.

*Fl. & Fr.* : August - December.

*Specimens examined* : Laimakhong, Deb 4912; Ukhrul, Mukerjee 3367; Shirighat, Meebold 5665 & 5691 (CAL) ; Dibong Khuna, Malick 708; Chandrapur, Malick 770 (BSIS).

7. *Desmodium microphyllum* (Thunb.) DC., Prodr. 2 : 337, 1825; Deb in Bull. Bot. Surv. India 3 : 267, 1961. *Hedysarum microphyllum* Thunb., Fl. Jap. 284, 1784. *Desmodium parvifolium* DC. in Ann. Sci. Nat. Paris ser. 1, 4 : 100, 1825; Baker in Hook. f., Fl. Brit. India 2 : 174, 1876. *Hedysarum tenellum* D. Don, Prodr. Fl. Nep. 243, 1825.

Much branched, decumbent, slender herb, often forming dense entangled masses; branches hairy. Leaves 1 - 3 foliolate; stipules 0.3 - 0.8 cm, scarious; leaflets ovate or oblong ovate, mucronate; terminal leaflets 0.3 - 1.5 × 0.2 - 0.4 cm; lateral leaflets small, orbicular and much crowded, both types of leaflets glabrous above, sparsely hairy beneath. Flowers blue or pinkish, in 1.2 - 5.5 cm long, terminal and lateral racemes; pedicels filiform, ca 1.5 cm long, rusty hairy; calyx very small, ca 0.3 cm long, teeth subulate, long hairy; corolla purplish-pink, keel spurred. Pods 0.4 - 1.2 × 0.2 - 0.3 cm, joints 1 - 4, puberulous when young.

*Fl. & Fr.* : September - November.

*Specimens examined* : Kongui, G. Watt 5802; Ukhrul, Mukerjee 2578 (CAL).

8. *Desmodium multiflorum* DC. in Ann. Sci. Nat. ser. 1, 4 : 101, (Jan.) 1825; Ohashi in Hara *et al.*, Fl. E. Himal. 2 : 65, 272, 1971; Haridasan & Rao, For. Fl. Meghalaya 1 : 297, 1985. *D. angulatum* DC. in Ann. Sci. Nat. ser. 1, 4 : 101, 1825. *Hedysarum sambuense* D. Don, Prodr. Fl. Nep. 243, 1825. *H. floribundum* D. Don, op. cit. 244, 1825. *Desmodium floribundum* (D. Don) Sweet ex G. Don, Gen. Syst. 2 : 297, 1832; Baker in Hook. f., Fl. Brit. India 2 : 167, 1878; Deb in Bull. Bot. Surv. India 3 : 266, 1961.

Shrubs up to 1.5 m high; branches obscurely angled, hairy along the angles. Leaves 3-foliolate; rachis 2 - 10 cm; stipules 0.5 - 1.2 cm, lanceolate; leaflets ovate

or oblong-obovate, rounded or narrowly obtuse at base, 3-8 × 1-4 cm, lateral nerves 6-8 pairs, adpressed hairy, silky beneath. Flowers 0.6-1.5 cm long, pinkish, in 7-15 cm long panicle racemes; corolla 0.5-0.7 cm, pink or pinkish-white. Pods 2-3 × 0.2-0.4 cm, 6-8 joints, adpressed hairy.

*Fl. & Fr.* : July - November.

*Specimens examined* : Shugna, Deb 2591; Litan, Deb 1102; Maching, Deb 999; Ukhrul, Mukerjee 3147 (CAL).

**9. *Desmodium oblongum*** Wallich ex Benth. in Miq. Pl. Jungh. 224, 1851; Baker in Hook. f., Fl. Brit. India 2 : 166, 1876; Kanjilal *et al.*, Fl. Assam 2 : 61, 1938; Deb in Bull. Bot. Surv. India 3 : 267, 1961.

Under shrubs, up to 3.5 m tall, stem hairy. Leaves 1-foliolate; leaflets 5-14 × 2-4 cm, ovate, elliptic or oblong, rounded at base, acute, adpressed pubescent beneath; stipules 8-10 × 2-3 mm, lanceolate, caducous; petioles 0.5-1.0 cm long. Flowers blue-purple, in 15-30 cm axillary or terminal lax much branched racemes; petals *ca* 1 cm long, bluish-purple. Pods *ca* 2.5 cm long, linear, falcate, deeply indented along both sutures, 5-6 jointed, finely pubescent.

*Fl. & Fr.* : August - February.

*Specimens examined* : Kussome, G. Watt 5083; Shibong, Meebold 6181 (CAL).

**10. *Desmodium podocarpum*** DC. subsp. *oxyphyllum* (DC.) Ohashi in Fl. E. Himal. 2 : 65, 1971 in Gingoana 1 : 150, t. 20, 1973. *D. oxyphyllum* DC. in Ann. Sci. Nat. ser. 1, 4 : 102, 1825; Baker in Hook. f., Fl. Brit. India 2 : 167, 1876; Deb in Bull. Bot. Surv. India 3 : 267, 1961.

Under shrubs up to 3 m high; branches slender, terete. Leaves 3-foliolate; rachis 2-6 cm; stipules ovate-lanceolate, 0.3-0.9 cm; leaflets 2-7 × 1-3.5 cm, ovate, obovate, obtuse at base, acute to short-acuminate, usually twice as long as broad, glabrous above, thinly silky beneath; lateral nerves 6-8 pairs. Flowers purplish, in much panicle, short-axillary and terminal racemes; pedicels filiform, 1-2 cm; calyx *ca* 0.1-0.2 cm sub-glabrous, teeth very short, corolla *ca* 1-1.5 cm, purple. Pods sub-sessile, 2-4 × 0.2-0.4 cm; joints 6-10, rather longer than broad.

var. *oxyphyllum*

*Fl. & Fr.* : July - January.

*Specimens examined* : Kongpokpi, Deb 970; Nongmaiching, Deb 2539 (CAL).

**11. *Desmodium racemosum*** (Thunb.) DC., Prodr. 2 : 337, 1825; Deb in Bull. Bot. Surv. India 3 : 267, 1961, *Hedysarum racemosum* Thunb., Fl. Jap. 285, 1784. *Desmodium podocarpum* DC. in Ann. Sci. Nat. Paris, ser. 1, 4 : 102, 1825; Baker in Hook. f., Fl. Brit. India 2 : 165, 1876 ex var. *laxum*, *D. laxum* non DC., 1825 *sensu* Kanjilal *et al.*, Fl. Assam 2 : 52, 1938.

Under shrubs up to 1.2 m tall. Leaves 3-foliolate; leaflets 6-15 × 3-6 cm, elliptic or obliquely lanceolate, cuneate at base, short acuminate, adpressed pubescent beneath; lateral nerves 4-5 pairs. Flowers purple, in 15-35 cm long, lax-flowered

panicles; corolla ca 0.4 cm long, pink. Pods ca 1 cm long, swollen at sutures, 1-2 joints, pubescent.

*Fl. & Fr.* : August - December.

*Specimens examined* : Sirohce, Mukerjee 3296 (CAL).

**12. *Desmodium renifolium* (L.) Schindler** in Fedde, Report. 22 : 262, 1926; Santapau in Rec. Bot. Surv. India 16 (1) : 63, 1967; Ohashi in Gingoana 1 : 230, t. 34, 1973. *Hedysarum renifolium* L., Syst. Nat. ed. 10, 2 : 1169, 1759. *H. reniforme* (L.) DC., Prodr. 2 : 327, 1825; Baker in Hook. f., Fl. Brit. India 2 : 173, 1876; Deb in Bull. Bot. Surv. India 3 : 267, 1961.

Prostrate herbs or weak shrubs up to 2 m tall. Leaves 1-foliolate, 0.5 - 2 × 1 - 4 cm, elliptic or reniform, cuneate or rounded at base, obtuse or acute, glabrous; stipules 3 - 5 mm, triangular. Flowers in 2 - 15 cm long, axillary or terminal racemes; petals ca 0.5 cm, white or bluish, standard obovate. Pods ca 2 cm, oblong, indented along lower suture, 3 - 5 segments glabrous.

*Fl. & Fr.* : September - March.

*Specimens examined* : Kakching, Deb 1213; Shugnu, Deb 2597 (CAL).

**13. *Desmodium repandum* (Vahl) DC.**, Prodr. 2 : 334, 1825; van Meenwen in Reinwardtia 6 : 258, 1962. *Hedysarum repandum* Vahl, Symb. Bot. 2 : 82, 1791. *Desmodium scalpe* DC., Prodr. 2 : 334, 1825; Baker in Hook. f., Fl. Brit. India 2 : 165, 1876; Deb in Bull. Bot. Surv. India 3 : 267, 1961.

Tall, erect herbs or undershrubs, branches sub-scandent, angular, slender, viscidly hairy; leaflets 3, 1.2 - 5.5 × 0.8 - 2.5 cm, ovate, membranous, central one 7 - 12 × 1.8 - 2.2 cm, ovate-oblong or obovate, membranous. Flowers purplish in terminal or lateral simple racemes; calyx teeth linear-lanceolate, finely hairy; corolla ca 1.5 cm, reddish. Pods stalked, up to 2 cm long, rhomboid, 2 - 4 articulated, deeply constricted along both sutures, hairy; hairs hooked.

*Fl. & Fr.* : October - February.

*Specimens examined* : Mapru, Meebold 6011 (CAL).

**14. *Desmodium sequex* Wallich**, Pl. Asiat. Rar. 2 : 46, t. 157, 1831; Baker in Hook. f., Fl. Brit. India 2 : 170, 1876; Deb in Bull. Bot. Surv. India 3 : 268, 1961. *D. strangulatum* Wight. & Arn. var. *sinuatum* Miq., Fl. Ind. Bot. 1 (1) : 225, 1855. *D. sinuatum* (Miq.) Baker in Hook. f., Fl. Brit. India 2 : 166, 1876.

Shrubs up to 4 m high; branchlets pubescent. Leaves 3-foliolate; rachis 2 - 6 cm; stipules ovate-lanceolate, 0.3 - 1.1 cm; leaflets 2.5 - 8 × 1.6 - 5 cm, ovate-rhomboid, obtuse or acute, base rounded or obtuse, adpressed pubescent, ciliate. Flowers 0.8 - 1 cm long, purple or purplish-pink, in 4 - 15 cm long, terminal or axillary paniced racemes; bracts lanceolate or subulate; corolla reddish violet to pale purple. Pods 2.5 - 3.5 × 0.2 - 0.3 cm, densely hairy; joints 6 - 12.

*Fl. & Fr.* : July - December.

*Specimens examined* : Imphal, Deb 581 (CAL).

**15. *Desmodium styracifolium* (Obs.) Merr.** in Amer. J. Bot. 3 : 580, 1916; van Meeuwen in Renwardtia 6 : 259, 1962. *Hedysarum styracifolium* Obs., Digbok, Ostind. Res. 247, 1757. *Desmodium retroflexum* (L.) DC. ; Baker in Hook. f., Fl. Brit. India 2 : 170, 1876. *D. capitatum* (Burm. f.) DC., Prodr. 2 : 336, 1825; Baker *l.c.* 1876; Deb in Bull. Bot. Surv. India 3 : 266, 1961.

Prostrate ascending shrubs, up to 2 m tall. Leaves 1 - 3 foliate; terminal leaflets 2 - 7 × 2.5 cm, elliptic to orbicular, rounded, mucronate, obtuse, lateral leaflets 7 - 20 × 5 - 15 cm long; stipules 10 - 15 mm, lanceolate. Flowers purple, in terminal or axillary racemes; bracts 3 - 4 mm long, ovate, white pilose; petals 4 - 5 mm long, purplish. Pods ca 2 cm, oblong, 3 - 6 jointed, pubescent.

*Fl. & Fr.* : August - December.

*Specimens examined* : Leimakhong, Deb 493 (CAL).

**16. *Desmodium triangulare* (Retz.) Merr.** in J. Arn. Arb. 23 : 170, 1942; Balakr., Fl. Jowai I : 156, 1981. *Hedysarum triangulare* Retz., Obs. Bot. 3 : 40, 1783. *H. cephalotes* Roxb., Fl. Ind. 3 : 360, 1832. *Desmodium cephalotes* (Roxb.) Wight & Arn., Prodr. 224, 1884; Baker in Hook. f., Fl. Brit. India 2 : 161, 1876; Kanjilal *et al.*, Fl. Assam 2 : 46, 1938.

*Mani.* : Machu-Ahum

Under shrubs, up to 2.5 m tall. Leaves 3-foliate; leaflets 5 - 12 × 2 - 6 cm, elliptic-oblong, elliptic-lanceolate, acute at both ends, densely pubescent beneath; lateral nerves 10 - 20 pairs; stipules 3 - 7 mm, filiform. Flowers solitary axillary or in umbels, pale-red; bracts linear, hairy; calyx teeth lanceolate; corolla ca 1 cm red. Pods sessile, ca 2.5 cm long, indented along both sutures, 4 - 5 joints, densely grey silky.

*Fl. & Fr.* : June - December.

*Specimens examined* : Imphal, Ibobi Singh 296; Nambal, Deb 296; Kasam, Mukerjee 3288 (CAL); Litan, Chauhan 94840; Sheklaphai, Chauhan 95064 (ASSAM).

**17. *Desmodium triflorum* (L.) DC.**, Prodr. 2 : 334, 1825 excl. syn. cit. *D. triflorum*; Baker in Hook. f., Fl. Brit. India 2 : 173, 1876; Deb in Bull. Bot. Surv. India 3 : 268, 1961. *Hedysarum triflorum* L., Sp. Pl. 749, 1753, *p.p.* excl. vars. *Meibonna triflora* O. Kuntze, Rev. Gen. Pl. 197, 1891.

Prostrate much branched herb, clothed with fine spreading hairs; rooting at nodes. Leaves 3-foliolate, ca 1.2 - 1.5 cm long; petiole short; stipule lanceolate; leaflets 0.4 - 0.6 × 0.3 - 0.4 cm, obovate, cuncate, truncate emarginate, membranous, glabrous above, sparsely adpressed pubescent beneath. Flowers minute, purple or purplish-white, mostly 1 - 3 together, rarely 2 - 5 flowered, axillary; calyx hairy, teeth long, setaceous; corolla ca 0.4 cm pink. Pods ca 1.2 × 0.2 cm, slightly falcate, pubescent; joints 3 - 4.

*Fl. & Fr.* : September - December.

*Specimens examined* : Imphal, Deb 596, Yanging, Deb 2697 (CAL); Uchathol, Malick 611, Dibongkhuma, Malick 660 (BSIS); Chandel, Chauhan 94950 (ASSAM).

**18. *Desmodium velutinum* (Willd.) DC. var. *longibracteatum* (Schindler.) van Meeuwen** in Reinwardtia 6 : 265. 1962. *D. longibracteatum* Schindler in Fedde, Rep. 21 : 7. 1925; Deb in Bull. Bot. Surv. India 3 : 266. 1961. *D. rufihirsutum* Craib in Kew Bull. 171. 1922; Deb *l.c.* 1961.

Shrubs 1 - 3.5 m tall. Leaves 1-foliolate; leaflets 4 - 12 × 3 - 5 cm, broadly ovate, densely pale pubescent beneath; stipules 2 - 6 × 1 - 3 mm, triangular, abruptly narrowed from base to apex. Flowers purple, in fascicles of 2 - 5, in dense racemes; calyx 2 - 3 mm; petals 4 - 6 mm, purplish, standard 4 - 5 mm, obovate. Pods 1.5 - 3.2 cm, oblong, indented along both sutures, 5 - 7 segments, densely pubescent.

*Fl. & Fr.* : August - February.

*Specimens examined* : Imphal valley. Deb 1067; Josen, Mukerjee 3606 (CAL).

**19. *Desmodium zonatum* Miq., Fl. Ind. Bot. 1 (1) : 250. 1855; van Meeuwen** in Reinwardtia 6 : 97. 1961. *D. ornocarpoides* auct. non DC. ; Baker in Hook. f., Fl. Brit. India 2 : 164. 1876; Kanjilal *et al.*, Fl. Assam 2 : 55. 1938; Deb in Bull. Bot. Surv. India 3 : 267. 1961.

Slender erect undershrubs; stem usually unbranched, angled. Leaves unifoliolate; leaflets 10 - 18 × 3 - 6 cm; ovate or lanceolate; acute, sub-coriaceous, downy beneath; petiole 2 - 2.8 cm long. Flowers in few flowered distant fascicles in 15 - 25 cm long, terminal racemes; bracts minute; calyx minute with short deltoid teeth; corolla pale-violet. Pods 7 - 12 cm long, pendulous, constricted along both sutures; joints 6 - 8, flattened, twice as long as broad, covered with minute hooked hairs.

*Fl. & Fr.* : August - February.

*Specimens examined* : Jhirighat 450 m, Meebold 5665 (CAL).

### 17. *Dolichos* L.

***Dolichos trilobus* L., Sp. Pl. 726. 1753; Verc. in Taxon 17 : 170. 1968, & in Kew Bull. 24 : 422. 1970; Malick & Safui in J. Econ. Tax. Bot. 10 : 4. 1987. *D. falcatus* Willd., Sp. Pl. 3 : 1047. 1802; Baker in Hook. f., Fl. Brit. India 2 : 211. 1876; Kanjilal *et al.*, Fl. Assam 2 : 85. 1938.**

Perennial, climbing herbs with tuberous roots; stem very slender, glabrous; petioles up to 11 cm long; stipules basifixed, lanceolate, leaflets 2.3 - 7.5 cm, ovate acute or acuminate, entire, 3 lobed, the terminal leaflets equal-sided at the base, the lateral ones distinctly unequal-sided, 3 nerved. Flowers ca 1.5 cm in diam., pink or purple, 2 - 8 on an axillary peduncles; calyx glabrous, with deltoid teeth; corolla ca 1.1 cm, lilac or pink. Pods up to 8 cm long, linear, somewhat peltate, more or less recurved, flattened, glabrous; seeds 6 - 8, reniform, brownish.

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

*Specimens examined* : Nungba, Malick 1156, Dinamlong, Malick 1280 (BSIS).

### 18. *Dumasia* DC.

***Dumasia villosa* DC. in Ann. Sci. Nat. Paris ser. 1. 4 : 257, t. 44. 1825 & Prodr. 2 : 241. 1825; Baker in Hook. f., Fl. Brit. India 2 : 183. 1876; C.B. Clarke in J. Linn.**

Soc. 25 : 16. 1889; Deb in Bull. Bot. Surv. India 3 : 268, 1961. *D. congesta* Griseb. ex Wight & Arn., Prodr. Fl. Ind. Or. 206, 1834.

Slender twiner, stem villous. Leaves 3-foliolate; petiole 2-4 cm long, very slender; stipules ca 0.5 cm; leaflets 5-9 × 2-5 cm, ovate, obtuse and obscurely mucronate, sub-truncate or rounded at base, slightly pilose on both surfaces; lateral nerves 4-6 pairs. Flowers ca 2.5 cm long, yellow or purple, in 3-18 cm long axillary racemes; corolla yellow, 1-1.5 cm long. Pods 3-4 cm, linear, straight, velvety, torulose between seeds.

var. *villosa*.

Fl. & Fr. : September-April.

Specimens examined : North Manipur, C. B. Clarke l.c.

### 19. *Dunbaria* Wight & Arn.

- 1a. Leaves oblong; flowers yellow;  
 pods straight ..... 1. *D. debilis*
- b. Leaves ovate-rhomboid; flowers pinkish;  
 pods recurved ..... 2. *D. rotundifolia*

1. *Dunbaria debilis* Baker in Hook. f., Fl. Brit. India 2 : 218. 1874; C. B. Clarke in J. Linn. Soc. 25 : 17. 1889; Kanjilal *et al.*, Fl. Assam 2 : 96, 1983; Deb in Bull. Bot. Surv. India 3 : 268, 1961.

Slender, twining herbs; stem finely pubescent; stipules setaceous, persistent. Leaves pinnately, 3-foliolate; leaflets 1-3 × 0.5-1 cm, oblong, orbicular, glabrous above, pubescent beneath; petioles ca 1 cm, acute. Flowers solitary axillary, yellow; calyx ca 0.6 cm, greyish-pubescent; corolla ca 1.2 cm, yellow. Pods 3-5 cm long, linear-oblong, compressed, glabrescent 4-11 seeded.

Fl. & Fr. : October-May.

Specimens examined : North Manipur, C. B. Clarke s.n.

2. *Dunbaria rotundifolia* (Lour.) Merr. in Philip. J. Sci. 15 : 242. 1919; Deb, Fl. Tripura 1 : 166. 1981. *Indigofera rotundifolia* Lour., Fl. Cochinch. 458. 1790. *Dolichos punctatus* Wight & Arn., Prodr. 247. 1834. *Dunbaria conspersa* Benth. in Miq., Pl. Jungh. 242. 1852. Baker in Hook. f., Fl. Brit. India 2 : 218. 1876; Deb in Bull. Bot. Surv. India 3 : 268. 1961.

Herbs filiform, twining; stem downy. Leaves 3-foliolate; stipules minute, setaceous; leaflets orbicular-rhomboid, coriaceous, glabrescent above, downy gland dotted beneath, terminal one acute, distinctly petioled. Flowers sub-sessile, axillary, solitary or few on short peduncles, pinkish; pedicels very short; corolla reddish, ca 0.5-1 cm, with beaked keel. Pods 3-5 cm, recurved, linear, 6-8 seeded, without depressed lines between the seeds.

Fl. & Fr. : October-February

Specimens examined : Pallicl. Deb 1388 (CAL).

20. *Eriosema* (DC.) G. Don, *nom. cons.*

*Eriosema himalaicum* Ohashi in J. Jap. Bot. 41 : 96. 1966; Batak. Fl. Jowai 1 : 165. 1981. *E. chinense auct non* (Vogel) Baker in Hook. f., Fl. Brit. India 2 : 219. 1876, *p.p.*; Kanjilal *et al.*, Fl. Assam 2 : 94. 1938; Deb in Bull. Bot. Surv. India 3 : 268. 1961.

Erect under shrub, *ca* 1 m high; rootstock tuberous. Leaves unifoliate; stipules subulate, 2 - 3 mm, persistent; leaflets 2 - 5 × 0.3 - 0.5 cm, linear, mucronate at apex, recurved and pilose at margins. Flowers *ca* 0.8 cm, solitary, axillary, pedicels 6.0 - 10 cm; calyx pubescent; corolla yellowish, purple-veined, fading to reddish purple. Pods *ca* 1.2 cm, oblong or orbicular, flattened, densely long hairy, 1 - 2 seeded.

*Fl. & Fr.* : June - November.

*Specimens examined* : Imphal valley, Deb 172, 2595 (CAL).

21. *Erythrina* L.

- 1a. Branches with conical thorns;  
flowers deep-red; pods 7 - 15  
cm long, 2 - 3 seeded ..... 2. *E. stricta*
- b. Branches with minute prickles;  
flowers scarlet; pods 15 - 25 cm  
long, 6 - 12 seeded ..... 1. *E. orientalis*

1. *Erythrina orientalis* L., Herb. Amboin. 10. 1754; Krukoff in J. Arnold Arb. 53 : 132. 1972. *E. variegata* L. var. *orientalis* (L.) Merr. Interp. Herb. Amb. 276. 1917; Deb in Bull. Bot. Surv. India 3 : 268. 1961. *E. indica* Lam., Encycl. 2 : 391. 1875; Baker in Hook. f., Fl. Brit. India 2 : 188. 1876.

Medium sized, deciduous trees, 8 - 10 m tall, prickly, with thin yellowish bark, wood white, soft; prickles minute, conical black. Leaves 15 - 20 cm long; petiole 10 - 20 cm, unarmed; leaflets 10 - 20 × 6 - 12 cm, broadly rhomboid ovate, membranous, glabrescent, terminal roundish, cuspidate, truncate or rhomboidal at the base; racemes dense, about 10 - 15 cm long, on spreading woody peduncles; pedicels 0.6 - 0.8 cm long, downy. Flowers brilliant scarlet; calyx spathaceous with very oblique mouth, recurved, 5 toothed at the narrow tip, corolla 5 - 7 cm long. Pods 15 - 25 cm, sub-cylindric, beaked, curved, tomentose, 6 - 12 seeded, stellate pubescent.

*Fl. & Fr.* : February - June.

*Specimens examined* : Imphal, Deb 915 (CAL).

The bark fibers used for cordage; flowers yield a red dye and pods are also edible.

2. *Erythrina stricta* Roxb., Fl. Ind. 3 : 251. 1832; Baker in Hook. f., Fl. Brit. India 2 : 189. 1876. Kanjilal *et al.*, Fl. Assam 2 : 70. 1938; Deb in Bull. Bot. Surv. India 3 : 268. 1961

Large deciduous trees, *ca* 30 m high; crown oval, lax, branches horizontally spreading; bark yellowish grey, vertically fissured with conical thorns. Leaves

pinnately trifoliolate, up to 50 cm long; leaflets 12–20 × 4.5–18 cm, broader than long, rhomboid-orbicular or ovate, lateral ones oblique, acuminate, base broadly cuneate, truncate, minutely pubescent along the nerves beneath. Flowers 3.5–4.5 cm long, deep red, usually one sided in 15–22 cm long racemes; peduncles ca 15 cm long. Pods 8–15 cm long, obscurely torulose, glabrous, 2–3 seeded; seeds reniform, blackish-red.

*Fl. & Fr.* : February–June.

*Specimens examined* : Imphal, Deb 1991; Nungba, Meekold 5154 (CAL).

## 22. *Flemingia* Roxb. ex Ait., nom. cons.

- 1a. Leaves 1-foliolate ..... 2
- b. Leaves digitately 3–5-foliolate ..... 3
- 2a. Shrubs with striate branches:  
flowers white in 7–18 cm long racemes,  
not enfolding by bracts ..... 1. *F. fruticulosa*
- b. Shrubs with terete branches:  
flowers pink, 3–4 in cymes,  
enfolding by bracts ..... 4. *F. strobilifera*
- 3a. Branches sharply angled; leaflets 17–30 cm,  
acuminate, stipules large ca 5 mm long,  
exceeding the flower ..... 3. *F. stricta*
- b. Branches not sharply angled; leaflets  
6–10 cm, abruptly acuminate; stipules small  
not exceeding the flower ..... 2. *F. macrophylla*

1. *Flemingia fruticulosa* Wallich ex Benth. in Pl. Jungh. 243. 1852; Deb, Fl. Tripura 1 : 176. 1981. *F. strobilifera* R. Br. ex Ait. var. *fruticulosa* Baker in Hook. f., Fl. Brit. India 2 : 227. 1876. *Moghania fruticulosa* (Wallich ex Benth.) Mukerjee in Bull. Bot. Soc. Bengal 6 (1) : 12. 1952; Deb in Bull. Bot. Surv. India 3 : 269. 1961.

Under shrubs with trailing branches, striate, grey tomentose. Leaves unifoliolate, ovate or elliptic, cordate at base, acute or obtuse at apex, glabrescent above, pubescent beneath; petiole very short ca 0.5 cm long, stout, pubescent, stipules 0.5–1 cm long, persistent, lanceolate, striate; racemes 7–18 cm long, terminal; rachis zigzag; bracts membranous, folded, enclosing the small cluster of flowers; calyx ca 0.5 cm, silky, teeth longer than the tube; corolla longer than the calyx, white. Pod ca 1 cm long, pubescent.

*Fl. & Fr.* : September–December.

*Specimens examined* : Imphal, Deb 244 (CAL).

2. *Flemingia macrophylla* (Willd.) Prain in J. Asiat. Soc Bengal. 66 (2) : 440. 1897; Balakr., Fl. Jowai 1 : 165. 1981. *Crotalaria macrophylla* Willd., Sp. Pl. 3 : 982. 1802. *Flemingia congesta* Roxb., Fl. Ind 3 : 340. 1832; Baker in Hook. f., Fl. Brit. India 2 : 228. 1876. *F. semialata* Roxb., Pl. Corom. 3 : t. 249. 1815. *F. congesta* var. *semialata*



(Roxb.) Baker in Hook. f., Fl. Brit. India 2 : 229, 1876. *Moghania macrophylla* (Willd.) O. Kuntze, Rev. Gen. Pl. 1 : 199, 1891; Deb in Bull. Bot. Surv. India 3 : 269, 1961. *M. semialata* (Roxb.) Mukerjee in Bull. Bot. Soc. Bengal 6 (1) : 16, 1952; Deb in Bull. Bot. Surv. India 3 : 269, 1961.

Erect shrubs up to 3 m high; bark brown; branchlet angular or obscurely ribbed, grey tomentose. Leaves digitately 3-foliolate up to 25 cm long; petioles flattened, 3-10 cm; stipules linear lanceolate, 1.0-1.5 cm; leaflets 6-10 × 3-6.5 cm, elliptic-ovate or oblanceolate, obovate-lanceolate, abruptly acuminate, base truncate or rounded, greyish tomentose above and ferruginous tomentose along nerves beneath, 5-7 nerved from base; petiole winged; bracts 1-2 cm, ferruginous. Flowers ca 1.4 cm long, purplish yellow, in dense axillary racemes; calyx silky, corolla 1.2 cm long, pinkish-white. Pods ca 1.4 cm long, turgid, brown-velvety, apiculate, usually 2-seeded; seeds black.

*Fl. & Fr.* : April - January.

*Specimens examined* : S. I. Meebold 5340; Singjamai, Deb 244 (CAL); Maohing, Deb 533; Monigmaigin, Deb 2592; Litan, Chauhan 94617, 94809; Tuilaphai, Chauhan 95014 (ASSAM).

**3. *Flemingia stricta*** Roxb. (Hort. Beng. 56, 1814, *nom. nud.*) Pl. Corom. t. 248, & Fl. Ind 3 : 340, 1832; Baker in Hook. f., Fl. Brit. India 2 : 228, 1876. *Moghania stricta* (Roxb.) O. Kuntze., Rev. Gen. Pl. 1 : 199, 1891; Mukerjee in Bull. Bot. Soc. Bengal 6 (1) : 15, 1952; Deb in Bull. Bot. Surv. India 3 : 269, 1961.

Shrubs with triquetrous branches, adpressed pubescent. Leaves 3-foliolate; leaflet 15-30 cm long, oblong narrowed to both ends, glabrous above, pubescent on nerves beneath; petiole 10-13 cm long, triquetrous, sulcate; stipules large, lanceolate. Racemes 5-10 cm; bracts linear 1-1.2 cm, much exceeding the buds; calyx teeth linear, lowest longest; corolla as long as the lowest calyx. Pods ca 1.3 cm, glabrescent; seeds black, compressed.

*Fl. & Fr.* : January - October.

*Specimens examined* : Moreh, Deb 686; Nambar forest, Meebold 5342 (CAL).

Preventive of flies.

**4. *Flemingia strobilifera*** (L.) R. Br. in Ait. Hort. Kew ed. 2, 4 : 350, 1812; Baker in Hook. f., Fl. Brit. India 2 : 277, 1876. *Hedysarum strobiliferum* L., Sp. Pl. 764, 1753. *Moghania strobilifera* (L.) St. Hil ex O. Kuntze., Rev. Gen. Pl. 1 : 199, 1891; Deb in Bull. Bot. Surv. India 3 : 269, 1961. *Flemingia fruticulosa* Wallich ex Benth., in Miq. Pl. Jungl. 245, 1852, p.p.

Erect shrub, up to 2.5 m high; bark blackish; branches terete. Leaves unifoliolate; leaflets 4-18 × 3-11 cm, oblong to ovate-lanceolate, rounded or subcordate at base, acute to acuminate, glabrescent above, gland dotted beneath; petiole very short, ca 0.5 cm long, stout, pubescent, stipules linear-lanceolate, 0.5-1 cm. Cymes 3-4 flowered, often concealed by the bracts; arranged in 5-20 cm

long racemes; calyx ca 0.5 cm, velvety; corolla 0.6 - 0.9 cm, white or pale-yellow with reddish streaks. Pods 0.7 - 1.2 × 0.6 - 0.7 cm, oblong, pubescent, 2-seeded.

*Fl. & Fr.* : February - October.

*Specimens examined* : Bishenpur, *Meebold* 5341; Kongai, *Mukerjee* 3544; Sepramaena, *Deb* 1341 (CAL); Litan, *Chauhan* 94846 (ASSAM).

### 23. *Indigofera* L.

- 1a. Leaflets 21 - 31 numbers ..... 5. *I. stachyodes*.
- b. Leaflets less than 20 numbers ..... 2
- 2a. Racemes often borne on old wood with a cluster of scales at base of peduncles ..... 2. *I. cassioides*
- b. Racemes borne on young wood without a cluster of scale at base ..... 3
- 3a. Pods falcate or subfalcate ..... 4
- b. Pods straight ..... 5
- 4a. Petals more than 6 mm long, yellow; pods 2 - 6 seeded ..... 6. *I. suffruticosa*
- b. Petals less than 5 mm long, pink; pods 8 - 10 seeded ..... 7. *I. tinctoria*
- 5a. Bracts minute 1 - 2 mm, subulate ..... 4. *I. spicata*
- b. Bracts large 3 - 7 mm, not subulate ..... 6
- 6a. Leaflets 3 - 6 × 1.2 - 2.5 cm; racemes 10 - 40 cm long ..... 1. *I. atropurpurea*
- b. Leaflets 1 - 2 × 0.5 - 1.2 cm; racemes 3 - 10 cm long ..... 3. *I. nigrescens*

1. *Indigofera atropurpurea* Buch.-Ham. ex Hornem., Hort. Reg. Bot. Hafn. Suppl. 152. 1819; Baker in Hook. f., Fl. Brit. India 2 : 101, 1876; Kanjilal *et al.*, Fl. Assam 2 : 20, 1938; Deb in Bull. Bot. Surv. India 3 : 268, 1961.

Under shrub, ca 2 m high. Leaves imparipinnate; petiole 1.2 - 5 cm long; leaflets opposite, 8 - 17, oblong or obovate-oblong, mucronate, glabrous above, thinly hairy beneath; racemes 10 - 15 cm long, dense towards the apex elongating in fruits; bracts broad, lanceolate, exceeding the subtended buds; pedicels short. Flowers ca 1 cm across, crimson-red; calyx obliquely campanulate with scattered white hairs outside. Pods ca 4 cm long, slightly compressed, narrowed at apex into short curved beak; 6 - 10, orbicular, red seeded.

*Fl. & Fr.* : June - November.

*Specimens examined* : Laimakhong, *Deb* 492; Surangi, *Deb* 2563 (CAL); Tuilaphai, *Chauhan* 95039 (ASSAM).

2. *Indigofera cassioides* Rottl. ex DC., Prodr. 2 : 255, 1825; Deb, Fl. Tripura 1. : 170, 1981. *I. leptostachya* DC., Prodr. 2 : 255, 1825; Baker in Hook. f., Fl. Brit. India

2 : 100. 1876; Kanjilal *et al.*, Fl. Assam 2 : 19. 1938; Deb in Bull. Bot. Surv. India 3 : 269. 1961, *I. pulchella sensu* Baker in Hook. f., Fl. Brit. India 2 : 101. 1876, *p.p.*, *non* Roxb., 1832; Deb in Bull. Bot. Surv. India 3 : 269. 1961.

*Mani.*: *Neem.*

Shrubs *ca* 2.5 m high; branches striate, alternate. Leaves 8 - 10 cm, imparipinnate; leaflets 13 - 19, opposite, oblong or elliptic, obtuse, glabrescent. Racemes long peduncled up to 10 cm long, with sterile scales at the base. Flowers cbracteate; corolla *ca* 1 cm long, pale-red. Pod 2 - 4 cm, 6 - 8 seeded, turgid, straight, glabrous.

*Fl. & Fr.* : June - October.

*Specimens examined* : Waifai, Deb 1031; Singjamai, Ibobi Singh 186 (CAL).

**3. *Indigofera nigrescens*** Kurz ex. King & Prain in J. Asiat. Soc. Bengal 67 : 286. 1898; Deb in Bull. Bot. Surv. India 3 : 268. 1961; Balakr., Fl. Jowai 1 : 166. 1981. Fig. 42

Erect shrub, *ca* 2 m high with dark branches. Leaves 10 - 15, imparipinnate with slender rachis; leaflets 7 - 15, opposite, 1 - 22 × 0.5 - 1.2 cm, oblong-ovate or elliptic-oblong, shortly petioled, mucronate. Racemes axillary, erect, many flowered, dense; bracts 2.0 - 2.5 mm, linear-lanceolate; corolla crimson - red. Pods 1.5 - 3.0 cm, 6 - 8-seeded, terete, straight, dark brown hairy.

*Fl. & Fr.* : August - December.

*Specimens examined* : Ukhrul, Mukerjee 3481 (CAL); Mt. Kawab, Malick 1504 (BSIS).

**4. *Indigofera spicata*** Forsk., Fl. Agypt. Arb. 138. 1775; Gandhi in Sald. & Nicols, Fl. Hassan 258. 1976. *I. endecaphylla* Jacq. Coll. 2 : 358. 1788; Baker in Hook. f., Fl. Brit. India 2 : 98. 1876; Deb in Bull. Bot. Surv. India 3 : 268. 1961.

Diffuse or suberect, 30 - 90 cm tall herbs with dark brown branches. Leaves 2 - 4.5 cm long, pinnate; leaflets 9 - 15, sub-sessile, 0.8 - 2.5 × 0.3 - 1.2 cm, oblanceolate to obovate, adpressed grey pubescent. Flowers *ca* 0.4 cm long, violet-purple, in 3 - 8 cm long, axillary, dense racemes; calyx *ca* 1 cm, teeth setaceous. Pods 1.5 - 2.7 cm long, linear, deflexed, 4-gonous, glabrescent, straight, 6 - 10 seeded.

*Fl. & Fr.* : June - December.

*Specimens examined* : Imphal valley, Deb 614 (CAL); Uchathol, Malick 647 (BSIS).

**5. *Indigofera stachyodes*** Lindley in Bot. Reg. 1843 : 14, t. 14. 1843; Ohashi in Hara, Fl. E. Himal. 158. 1966. *I. dasua* Buch.-Ham. ex D. Don, var. *tomentosa* Baker in Hook. f., Fl. Brit. India 2 : 102. 1876; Kanjilal *et al.*, Fl. Assam 2 : 20. 1938; Deb in Bull. Bot. Surv. India 3 : 268. 1961. Fig. 43

Much branched woody shrub, 50 - 150 cm tall, densely hairy or tomentose. Leaves sub-sessile, 2.5 - 18.2 cm; stipules 2 - 3 mm; leaflets 21 - 31, opposite, 15

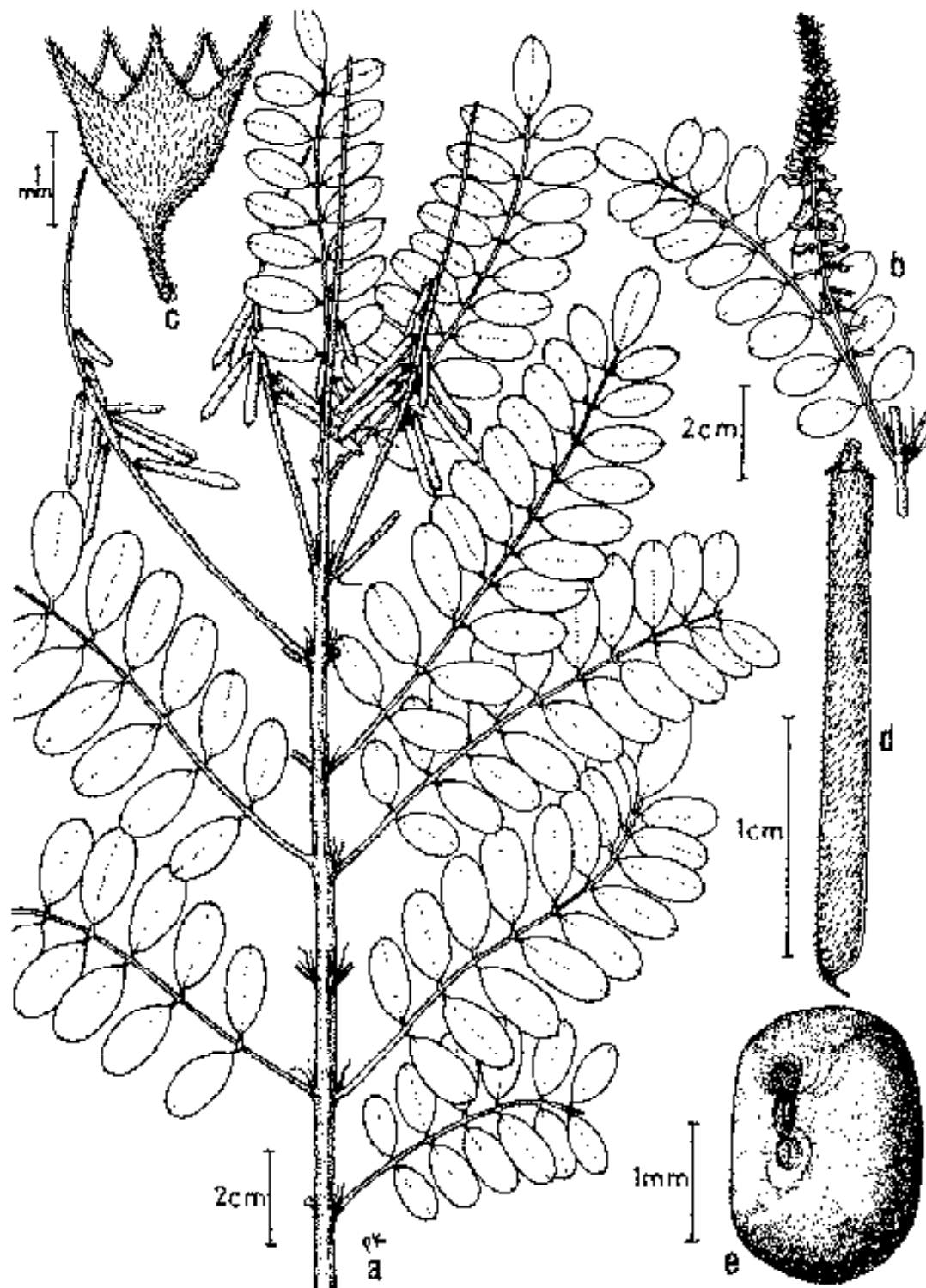


Fig. 42 : *Indigofera nigrescens* Kurtz ex King & Prain

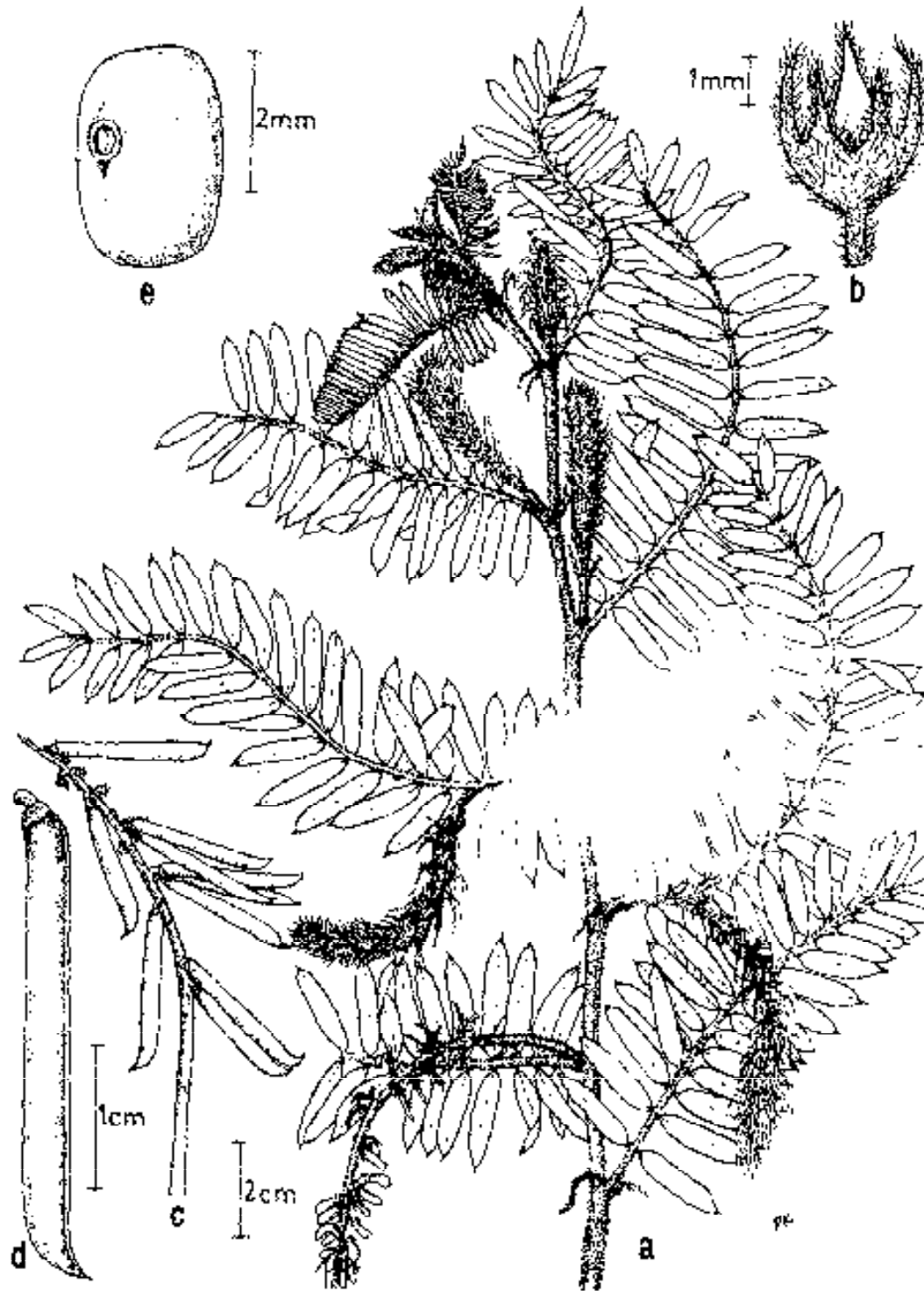


Fig. 43: *Indigofera stachyodes* Lindley.

- 20 × 3 - 4 mm. linear-oblong to elliptic-oblong, sub-acute at base, acute to apiculate at apex; racemes axillary, dense flowered, 4 - 10 cm; bracts lanceolate, cuspidate; corolla bright red or pink-purple, glabrous. Pods terete, 2 - 4 cm, 8 - 12 seeded, straight, shortly beaked, glabrescent.

*Fl. & Fr.* : June - October.

*Specimens examined* : Khamisang, Mukerjee 2851 (CAL).

6. *Indigofera suffruticosa* Mill., Gard. Diet. ed. 8, no. 2, 1768. *I. amil* L., Mant. Pl. 2 : 272, 1767; Kanjilal *et al.*, Fl. Assam 2 : 23, 1938; Deb in Bull. Bot. Surv. India 3 : 268, 1961.

Small shrub up to 1.2 m tall; copiously branched, straight, woody, deeply sulcate, thinly silvery; stipules small, setaceous. Leaves 5 - 9 cm long; petioles *ca* 1.5 cm long; leaflets 5 - 15 pairs, 2 - 2.5 cm long, oblong-obovate, cuspidate, sub-coriaceous, glabrous above, hairy beneath. Flowers sessile, in racemes; bracts small, subulate; calyx teeth small, lanceolate; corolla yellow, fugacious, four times longer than calyx. Pods *ca* 1.2 cm long, sub-falcate, compressed, shortly beaked, glabrous, 2 - 6 seeded.

*Fl. & Fr.* : August - December.

*Specimens examined* : Laimakhong, Deb 598 (CAL).

7. *Indigofera tinctoria* L., Sp. Pl. 751, 1753; Baker in Hook. f., Fl. Brit. India 2 : 99, 1876, *p.p.* : Deb in Bull. Bot. Surv. India 3 : 269, 1961. *I. sumatrana* Gaertn., Fruct. 2 : 317, t. 148, 1791.

Mani.; Neem.

Shrub *ca* 2 m high, branches angular, adpressed with grey hairs. Leaves 2.5 - 7 cm long; leaflets 9 - 13, sub-opposite, 1.2 - 2.0 × 0.6 - 0.9 cm, obovate, apex rounded and apiculate, glabrous above, pubescent beneath; stipules minute. Racemes erect, lax, shorter than leaves, 3 - 4 cm long; bracts subulate. Flowers small on short pedicels; calyx hairy; corolla exserted, *ca* 0.4 cm long, pink or reddish-yellow. Pods 1.8 - 2.5 cm long, linear, slightly curved, 8 - 10 seeded, sparsely hairy.

*Fl. & Fr.* : September - November.

*Specimens examined* : Shugnu, Deb 2601 (CAL).

#### 24. Lablab Adans.

*Lablab purpureus* (L.) Sweet. Hort. Brit. ed. 1 : 481, 1827; Verde, in Kew Bull. 24 : 410, 1970. *Dolichos purpureus* L., Sp. Pl. ed. 2, 1021, 1763. *D. lablab* L., Sp. Pl. 725, 1753; Baker in Hook. f., Fl. Brit. India 2 : 209, 1876; Kanjilal *et al.*, Fl. Assam 2 : 86, 1938; Deb in Bull. Bot. Surv. India 3 : 268, 1961.

Climbing shrub. Leaves 3-foliolate, 10 - 30 cm long; stipules basifixed; leaflets 5 - 15 × 6 - 8 cm, rhomboid, ovate or lanceolate, acute to acuminate, cuneate at base, glabrous. Flowers *ca* 1.5 cm long, purplish-blue in 12 - 25 cm long axillary racemes; bracts caducous; style thickened upwards and bearded along the inner edge. Pod

6 15 × 1.8 - 2 cm, cylindrical, tip slightly curved, white, pink or purple.

*Fl. & Fr.* : October - February.

*Specimens examined* : s. loc., G. Watt 7259 (CAL).

Fruits are used as vegetable.

### 25. Lathyrus L.

- 1a. Flowers 1 - 3, fragrant; leaflets ovate-oblong;  
pods inconspicuously winged ..... 1. *L. odoratus*
- b. Flowers solitary, not fragrant;  
leaflets elliptic-oblanceolate;  
pods conspicuously winged ..... 2. *L. sativus*

1. *Lathyrus odoratus* L., Sp. Pl. 732. 1753; Bailey, Manual Cult. Pl. ed. 2, 551, 1949; Deb in Bull. Bot. Surv. India 3 : 269. 1961.

Mani : *Thuranghari*

Annual climbing herb, glabrescent; stem winged; leaflets 3 - 5 × 1.2 - 3 cm, in a pair, ovate, oblong or elliptic, glabrous above, thinly hairy along the nerves beneath; petiole ca 3 cm long; stipule small, falcate, semi-sagittate at the base, tendrils branching, Flowers 1 - 3 on long peduncles, various coloured, pedicels short, fragrant; calyx cleft half way down; corolla standard purple with light wings, 2.5 - 3.2 cm. Pods oblong, slightly curved above, pubescent.

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

*Specimens examined* : Imphal, Deb 360 (CAL).

Cultivated as an ornamental plant in the gardens for its sweet scented various coloured flowers.

2. *Lathyrus sativus* L., Sp. Pl. 730. 1753; Baker in Hook. f., Fl. Brit. India 2 : 179. 1876; Deb in Bull. Bot. Surv. India 3 : 269. 1961. *L. sativus* var. *stenophyllus* Boiss., Fl. Orient. 2 : 607. 1872.

Mani.: *Pakhong-lai*

Much branched annual herb with winged stem. Leaves paripinnate, ending in a trifid tendril; petiole 2 - 3 cm long, winged; stipules auricled, acuminate; leaflets 1-pair, 3 - 7 × 1.5 cm, elliptic or oblanceolate, cuneate at base, acute; peduncles longer than the petiole, one flowered, calyx teeth twice longer the tube; corolla reddish-purple or blue; standard broader than long, emarginate. Pod 3 - 4.2 cm long with a conspicuous wing on the back; seed 4 - 5, compressed, yellowish.

*Fl. & Fr.* : January - April.

*Specimens examined* : Mataiphum, G. Wat 6086; Imphal, Deb 1191 (CAL).

Seeds are used as pulse.

### 26. Lens Mill.

*Lens culinaris* Medic., Vorles Churpf. Phys. Ges 2 : 361. 1787. Deb, Fl. Tripura

1 : 173, 1981; Ohashi in Hara & Williams, *Enum. Fl. Pl. Nepal* 2 : 124, 1979. *Ervum lens* L., *Sp. Pl.* 738, 1753; Baker in Hook. f., *Fl. Brit. India* 2 : 179, 1876. *Lens esculenta* Moench., *Meth. Pl.* 136, 1794. Deb in *Bull. Bot. Surv. India* 3 : 269, 1961.

Annual herb with angular branches; leaflets 4 - 6 pairs, sub-opposite, pubescent, lanceolate. Flowers axillary, usually two on short peduncles, white or pale blue, wings adnate to the keel and to the staminal tube. Pod oblong, rhomboidal, glabrous with two compressed seeds.

*Fl. & Fr.* : January - April.

*Specimens examined* : Imphal, Deb 378 & 27499 (CAL).

Under cultivation for its seeds, which are used as pulse.

### 27. *Lespedeza* Michx.

*Lespedeza juncea* (L.f.) Pers. var. *sericea* (Thunb.) Forbes & Hemsley in *J. Linn. Soc. Bot.* 23 : 181, 1887; Ohashi in Hara & Williams, *Enum. Fl. Pl. Nepal* 2 : 124, 1979. *Hedysarum sericeum* Thunb., *Fl. Jap.* 287, 1784, *auct. non* Mill., 1768. *Lespedeza sericea* (Thunb.) Miq. in *Ann. Mus. B. Lugd.-Bat.* 3 : 49, 1867; Baker in Hook. f., *Fl. Brit. India* 2 : 142, 1876; Deb in *Bull. Bot. Surv. India* 3 : 269, 1961.

Herbs or undershrubs, 0.5 - 1.0 m. Leaves trifoliolate; petioles 1 - 8 mm; stipules setaceous, 3 - 5 mm; leaflets 5 - 20 × 2 - 8 mm, obovate to linear-oblanccolate, cuneate at base, obtuse-mucronate; lateral nerves 5 - 8 pairs. Flowers solitary, axillary or 2 - 4 nate, 5 - 6 mm; ellipsoid or ovoid, thinly silky, 1-seeded.

*Fl. & Fr.* : November - May.

*Specimens examined* : Myithipini, C. B. Clarke 41937 B; Saithu, Meebold 6507 (CAL).

### 28. *Lupinus* L.

*Lupinus perennis* L., *Sp. Pl.* 721, 1753; Deb in *Bull. Bot. Surv. India* 3 : 269, 1961.

Annual herb, ca 1 m high, pubescent; leaflets 7 - 11, usually 8, oblanceolate, 2.5 - 4 cm long, obtuse, mucronate. Flowers bluish to pink and white, ca 1.2 cm long, in loose racemes up to 25 cm long. Pod ca 3.8 cm long; pubescent; seeds 4 - 6.

*Fl. & Fr.* : March - May.

*Specimens examined* : Imphal, Deb 307 (CAL).

Cultivated as garden plant.

### 29. *Macrotyloma* Lam.

*Macrotyloma uniflorum* (Lam.) Verdc. in *Kew Bull.* 24 : 322, 1970. *Dolichos uniflorus* Lam., *Encycl.* 2 : 299, 1786; Deb, *Fl. Tripura* 1 : 166, 1981. *D. biflorus non* L.; Baker in Hook. f., *Fl. Brit. India* 2 : 210, 1976; Kanjilal *et al.*, *Fl. Assam* 2 : 85, 1938; Deb in *Bull. Bot. Surv. India* 3 : 268, 1961.

Slender, climbing, pubescent herbs. Leaves trifoliolate; leaflets 2.4 - 5 × 1.5 - 3 cm, ovate, rhomboid or elliptic-ovate, cuneate at base, sub-acuminate or acute, softly pubescent. Flowers ca 1.6 cm long, yellow or greenish-yellow, rarely creamy,



1 - 3 together in fascicles, axillary, rarely solitary; bracts longer than pedicels; calyx densely pubescent. Pods 3 - 5 cm long, linear, recurved or falcate, densely hairy, with 4 - 6 reniform seeds.

*var. uniflorum*

*Fl. & Fr.* : September - December.

*Specimens examined* : Pallel, Deb 1371 (CAL).

Seeds used as pulse.

### 30. *Meizotropis* Voigt

*Meizotropis buteiformis* Voigt, Hort. Subrub. Cal. 239, 1845. *Butea buteiformis* (Voigt) Grierson & Long in Note Roy. Bot. Gard. Edinb. 37 : 346, 1979; Mabb. in Bot. & Hist. Hort. Malabar. New Delhi (ed. K. S. Manilal) 96, 1980. *B. minor* Ham. ex. Baker in Hook. f., Fl. Brit. India 2 : 195, 1876; Deb in Bull. Bot. Surv. India 3 : 264, 1961.

Erect shrub, 1 - 5 m high with tendril like tips; young parts covered with grey tomentosa. Leaves 3-foliolate, up to 75 cm long; leaflets 10 - 35 × 8 - 30 cm, elliptic-ovate or obovate, acute to rounded at tip, base truncate or rounded adpressed hairy above and silky tomentose-beneath; lateral nerves 5 - 9 pairs. Flowers 1.5 - 2.3 cm, sub-falcate, orange-red, fascicled in axillary or terminal simple, 15 - 50 cm long racemes, often branched at base. Pod 7 - 12 × 2.5 - 4 cm, obovate-elliptic, silky tomentose; seeds 1.3 - 2.4 cm, obovate, dark brown.

*Fl. & Fr.* : July - January.

*Specimens examined* : Imphal, Deb 468; Ukhrul, Mukerjee 3170; Kanglatangbi, Meebold 6576 (CAL); Chingbenthao, Mallick 1524 (BSIS); Trilaphai, Chauthan 95031 (ASSAM).

Leaves used as packing materials.

### 31. *Millettia* Wight & Arn.

- |     |  |                         |
|-----|--|-------------------------|
| 1a. | Small trees or shrubs .....  | 5. <i>M. pulchra</i>    |
| 1b. | Woody climber .....  | 2                       |
| 2a. | Standard auricled at base;<br>stamens monadelphous .....                         | 3                       |
| 2b. | Standard not auricled at base;<br>stamens monadelphous or diadelphous .....      | 4                       |
| 3a. | Leaves up to 30 cm long; leaflets 7 - 9;<br>flowers white; pods tomentose .....  | 2. <i>M. extensa</i>    |
| b.  | Leaves 30 - 60 cm long; leaflets 9 - 11;<br>flowers reddish; pods glabrous ..... | 3. <i>M. fruticosa</i>  |
| 4a. | Leaflets 3 - 12 cm long; standard<br>pubescent dorsally; pods tomentose .....    | 1. <i>M. cineria</i>    |
| b.  | Leaflet 6 - 20 cm long; standard glabrous<br>dorsally; pods glabrous .....       | 4. <i>M. pachycarpa</i> |

1. *Millettia cinerea* Benth. in Miq., Pl. Jungh, 1 : 249, 1852; Baker in Hook. f., Fl. Brit. India 2 : 106, 1876; Kanjilal *et al.*, Fl. Assam 2 : 28, 1938.

Large woody climber, pubescent when young, later becomes glabrescent. Leaves 15 - 30 cm; stipules *ca* 0.4 cm long, subulate; leaflets 5 - 7, 3 - 12 × 2.5 - 5.5 cm ovate, ovate-oblong, oblong-elliptic or elliptic, obtuse or cuneate at base, acute or shortly acuminate; lateral nerves 7 - 9 pairs. Flowers *ca* 1.5 cm across, red, in 10 - 20 cm long panicles; corolla *ca* 1.2 cm long, grey silky. Pods *ca* 13 cm long, torulose, densely tomentose, 1 - 3 (-8) seeded, deeply constricted between seeds.

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

*Specimens examined* : Lingh, G. Watt 5032 (CAL).

2. *Millettia extensa* (Benth.) Baker in Hook. f., Fl. Brit. India 2 : 109, 1876. *Otosema extensa* Benth. in Miq., Pl. Jungh, 249, 1852, *Millettia auriculata* Baker ex Brandis, For. Fl. Ind. 138, 1874; Kanjilal *et al.*, Fl. Assam 2 : 29, 1938; Deb in Bull. Bot. Surv. India 3 : 269, 1961.

Large woody climber with finely silky tomentose branches. Leaves imparipinnate, 30 - 60 cm long, crowded at the ends of branches; petiole 10 - 15 cm long, swollen at the base; leaflets 7 - 9, opposite, 8 - 20 cm long, obovate-oblong, acuminate, chartaceous, glabrescent above, minutely pubescent beneath; stipules minute, setaceous. Flowers dull white in dense axillary racemes near the ends of branches, fascicled on a downy rachis, bracts minute; calyx campanulate, shortly toothed, densely brown silky; corolla *ca* 0.8 cm, silky all over, standard auricled; stamens monadelphous, the tube slightly split in the front; ovary pubescent, style filiform, glabrous, incurved. Pod 10 - 15 × 2.5 - 4 cm, strap shaped, brown velvety with very thick suture, 2 - 4 seeded.

*Fl. & Fr.* : April - February.

*Specimens examined* : Shugnu, Deb 2604 (CAL).

It is used as fish poison. The powdered root is also used to kill vermin in cattle.

3. *Millettia fruticosa* (DC.) Benth. ex Baker in Hook. f., Fl. Brit. India 2 : 109, 1876; C. B. Clarke in J. Linn. Soc. 25 : 15, 1889; Kanjilal *et al.*, Fl. Assam 2 : 30, 1938; Deb in Bull. Bot. Surv. India 3 : 269, 1961, *Tephrosia fruticosa* DC., Prodr. 2 : 249, 1825. *Robinia fruticosa* (DC.) Roxb., Fl. Ind. 3 : 328, 1832. *Otosema fruticosa* (DC.) Benth. in Miq., Pl. Jungh, 249, 1852.

Woody climber, branches finely pubescent. Leaves imparipinnate, 15 - 30 cm long; leaflets 9 - 11, ovate-oblong, or elliptic, obtuse or sub-acute, 10 - 15 × 3 - 5 cm, glabrous above, silky pubescent beneath; shortly stipitate. Flowers subsessile, reddish, in short dense axillary and terminal racemes; calyx *ca* 2 cm long, finely pubescent; corolla *ca* 0.6 cm long, pinkish, densely silky. Pods *ca* 16 cm long, woody, glabrescent.

*Fl. & Fr.* : April - November.

*Specimens examined* : C. B. Clarke l. c.

**4. *Millettia pachycarpa*** Benth. in Miq., Pl. Jungh. 250. 1852; Baker in Hook. f., Fl. Brit. India 2 : 106, 1876; Kanjilal *et al.*, Fl. Assam 2 : 27, 1938; Deb in Bull. Bot. Surv. India 3 : 269, 1961.

Mani.: *Ngannhyai*.

Large climbers, young parts brown velvety. Leaves up to 35 cm long; leaflets 6-20 × 2.5-7 cm, oblong-lanceolate to oblanceolate, abruptly acuminate, base cuneate, glabrous above, glaucous beneath; stipules minute, caducous. Racemes up to 25 cm long, brown velvety, often paniced. Flowers in axillary racemes, ca 2.5 cm across, light mauve; pedicels short; calyx silky; corolla densely tomentose, standard auricled. Pods 8-15 × 2-3 cm, 1-3 seeded, often indented between seeds.

Fl. & Fr. : March-December.

*Specimens examined* : Litan, Deb 1071, 2331 (CAL); Churachandpur, Chauhan 94978 (ASSAM).

**5. *Millettia pulchra*** (Benth.) Kurz in J. Asiat. Soc. Bengal 43 (2) : 69, 1873; Baker in Hook. f., Fl. Brit. India 2 : 104, 1876; Kanjilal *et al.*, Fl. Assam 2 : 25, 1938; Deb in Bull. Bot. Surv. India 3 : 269, 1961. *Mundulea pulchra* Benth. in Miq., Pl. Jungh. 2 : 248, 1852.

Small trees or shrubs up to 10 m high; bark brownish; young parts brown tomentose. Leaves 6-25 cm long; leaflets 1.8-6 × 0.5-1.2 cm, linear-lanceolate or elliptic-lanceolate, acute at both ends, silky pubescent and bluish grey beneath; lateral nerves ca 7 pairs. Racemes axillary, 8-20 cm long, often paired. Flowers 1-1.5 cm across, white or reddish-purple; calyx hairy; corolla ca 1.2 cm, purple. Pods 5-10 × 1-1.5 cm, adpressed hairy, 2-3 seeded.

Fl. & Fr. : February-November.

*Specimens examined* : Nongmajing, Deb 2125; Koupru, Deb 2298; Laviwain, G. Watt 6252; Maram, Meehold 5337 (CAL); Tuilaphai, Chauhan 95021 (ASSAM).

### 32. *Mucuna* Adans.

- 1a. Leaves densely appressed pubescent beneath; pods neither winged nor plaited, 3-6 seeded, ..... 2
- b. Leaves glabrous or shortly pubescent on the veins beneath; pods winged and plaited, 2-4 seeded, ..... 3
- 2a. Calyx lobes linear; pods without longitudinal furrows, not torulose ..... 1. *M. bracteata*
- b. Calyx bilipped; pods longitudinally furrowed, torulose ..... 4. *M. pruriens*
- 3a. Bracts 2.5-3 cm broad; calyx tube ca 2 cm broad; pods with 6-12 robust lamellae, 2-seeded ..... 2. *M. imbricata*
- b. Bracts up to 2 cm broad; calyx tube 1-1.5 cm broad; pods with 18 or more oblique lamellae, 2-4 seeded ..... 3. *M. nigricans*

1. *Mucuna bracteata* DC. ex Kurz in J. Asiat. Soc. Bengal 42 : 231, 1873; Baker in Hook. f., Fl. Brit. India 2 : 186, 1876; Kanjilal *et al.*, Fl. Assam 2 : 68, 1938; Deb in Bull. Bot. Surv. India 3 : 269, 1961.

Climbers, young parts pubescent. Leaves 3-foliolate, 14 - 31 cm long; petiole 0.10 - 0.12 cm long, slender, almost glabrous; leaflets 6 - 14 × 5 - 12 cm, terminal rhomboid, lateral deltoid, oblique, acute, glabrescent above, finally adpressed pubescent beneath. Racemes 14 - 25 cm long; bracts ovate, pubescent with scattered bristles. Flowers usually 2-together with numerous bracts, 3.5 - 4.5 cm long, blackish-purple; keel exceeding the wings. Pods 7.5 - 10 cm, linear but tapering towards tips, greyish brown, tomentose, 4 - 6 seeded, covered with reddish bristles; seeds compressed, oblong-ovoid.

*Fl. & Fr.* : January - December.

*Specimens examined* : Moreh, Deb 709, Jirighat, Meebold 6049 (CAL); Nungba, Malick 1285 (BSIS).

2. *Mucuna imbricata* DC. ex Baker in Hook. f., Fl. Brit. India 2 : 185, 1876; Kanjilal *et al.*, Fl. Assam 2 : 66, 1938; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *Stizolobium imbricatum* (DC. ex Baker) O. Kuntze, Rev. Gen. Pl. 1 : 208, 1891. *Mucuna monosperma* Deb in Bull. Bot. Surv. India 3 : 270, 1961, (*non* DC. & Wight, 1930).

Climbers, large, woody, young parts glabrescent. Leaves up to 30 cm long; leaflets 5 - 28 × 4 - 15 cm, ovate-lanceolate, elliptic-lanceolate, rounded at base, acute or shortly acuminate, glabrous above, glabrescent beneath. Inflorescence some times arising from old wood up to 16 cm long. Flowers 5 - 6 cm long, dark purple; pedicels ca 1 cm long, golden, adpressed hairy; calyx 7 - 8 × 0.9 - 1.0 cm, broadly cup-shaped, pubescent out side. Pods 7 - 12 × 4 - 6 cm, oblong-elliptic, leathery, twice or more long as broad, densely hairy, 2 seeded, 6 - 12 robust lamellae on each face; seeds 2.5 - 3.5 cm long, pinkish or reddish-brown.

*Fl. & Fr.* : June - March.

*Specimens examined* : Chingnairang, Deb 1176 (CAL).

3. *Mucuna nigricans* (Lour.) Steud., Nomencl. Bot. ed. 2 : 163, 1841; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *Ciffa nigricans* Lour., Fl. Cochinch. 456, 1790. *Carpopogon imbricatum* Roxb., Hort. Beng. 54, 1814, *nom. nud.* *Mucuna imbricata* DC., Prodr. 2 : 406, 1825; Baker in Hook. f., Fl. Brit. India 2 : 185, 1876, p.p. : Haridasan & Rao, For. Fl. Meghalaya 1 : 308, 1985. *Stizolobium imbricatum* (DC. ex Baker) O. Kuntze, Rev. Gen. Pl. 208, 1891, p.p. *Zoophthalmum nigricans* Prain in J. Asiat. Soc. Bengal 6 (2) : 65, 1897. Fig. 42

Large climbers with slender branches; bark greyish-brown. Leaves 3 - foliolate, 2 - 45 cm long; stipules linear; petiole 8 - 12 cm long, slender; leaflets 6 - 30 × 4 - 15 cm, ovate-oblong or elliptic-lanceolate, acute or acuminate, glabrous above,

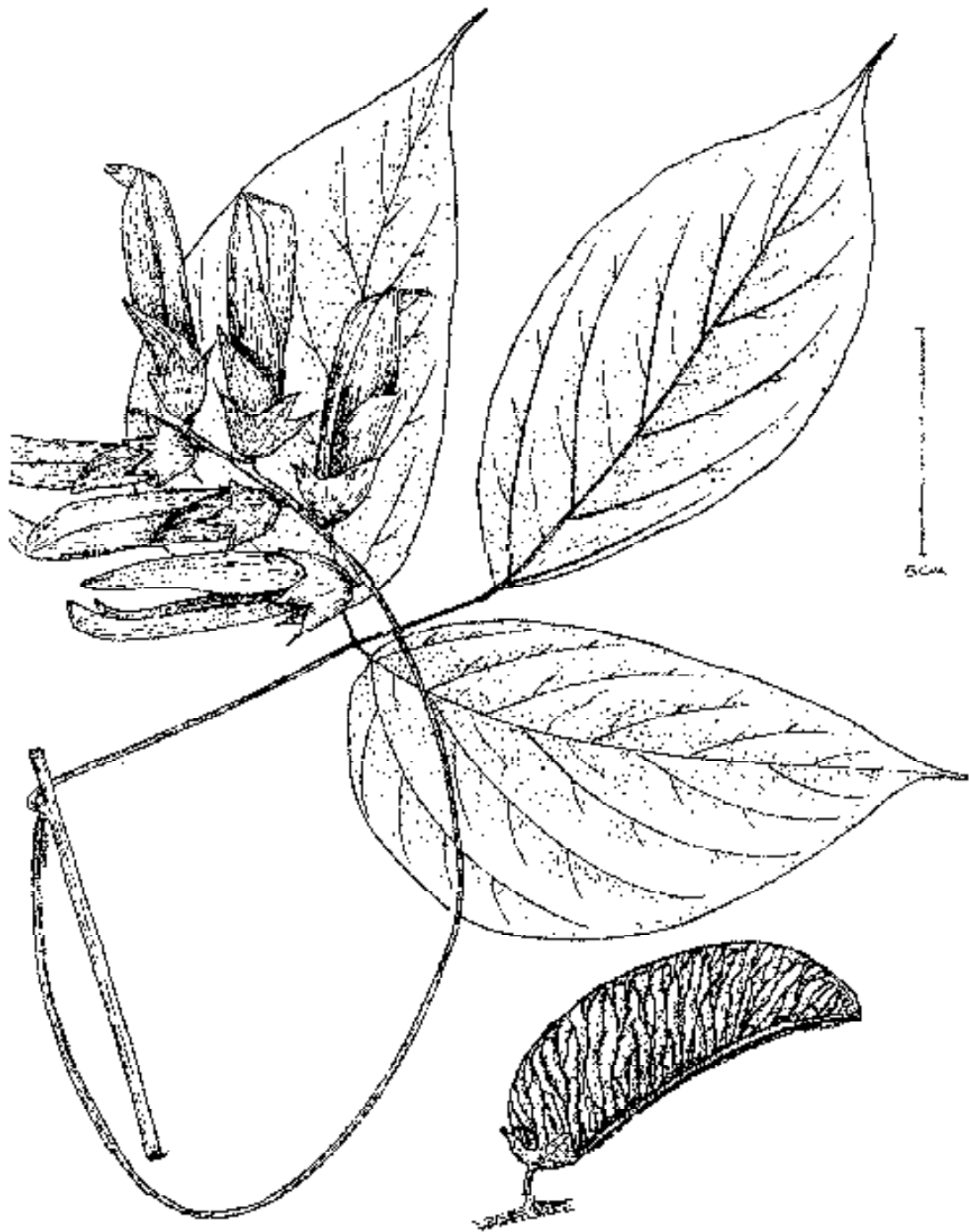


Fig. 42 : A flowering twig and fruit of *Mucuna nigricans* (Lour.) Steud.

sparsely hairy beneath; lateral nerves 3 - 5 on each half. Racemes up to 20 cm long. Flowers 5 - 6 cm long, dull-purple; bracts large; pedicels *ca* 1.2 cm long, pale hairy; calyx campanulate, teeth as long as tube; keel reflexed at the tip; corolla purple, 3 - 3.6 cm long. Pods 7 - 15 × 4 - 6 cm, oblong, winged at both sutures, more than 18 obliquely lamellae, densely covered with ferruginous bristles, 2 - 4 seeded.

var. *nigricans* Tetsishi & Ohashi in Bull. Mag. Tokyo 94 : 100, 1981.

*Fl. & Fr.* : June - March.

*Specimens examined* : Ukhul. Mukerjee 2515 (CAL).

4. *Mucuna pruriens* (L.) DC., Prodr. 2 : 405, 1825; Baker in Hook. f., Fl. Brit. India 2 : 187, 1876; Haridasan & Rao, For. Fl. Meghalaya 1 : 309, 1985. *Dolichos pruriens* L. in Sückman, Diss. Herb. Amb. 23, 1754. *Mucuna prurita* Hook., Bot. Misc. 2 : 348, 1831; Deb in Bull. Bot. Surv. India 3 : 270, 1961.

Climbers slender, with adpressed pubescent branches: up to 4 m tall. Leaves up to 40 cm long; petioles 10 - 15 cm long; leaflets 6 - 20 × 5 - 12 cm, lateral obliquely ovate or deltoid, terminal ovate, rhomboid, acute or sub-acute, truncate, rounded or acute, sparsely hairy or glabrescent above, grey silky beneath. Racemes 10 - 20 cm long. Flowers 2 - 3 together, purple, in drooping short peduncled racemes; bracts and bracteoles small; calyx bi-lipped, grey tomentose, wing shorter than the incurved keel. Pod 5 - 7.5 cm, linear, turgid, longitudinally rigid, torulose, clothed with dense grey bristles, 3 - 6 seeded.

var. *pruriens* Wilmot in Kew Bull. 42 : 40, 1987.

*Fl. & Fr.* : October - June.

*Specimens examined* : Slugnu, Deb 2596 (CAL); Mallei. Mukerjee 3694 (CAL); Kangrandhar, Mallick 1021 (BSIS).

### 33. *Parochetus* Buch.-Ham. ex. D. Don

*Parochetus communis* Buch. -Ham. ex. D. Don, Prodr. Fl. Nep. 2 : 240, 1825; Baker in Hook. f., Fl. Brit. India 1 : 86, 1876; Kanjital *et al.*, Fl. Assam 2 : 17, 1938; Deb in Bull. Bot. Surv. India 3 : 270, 1961.

Slender creeping herbs. Leaflets 3, sub-sessile, 0.5 - 2.5 × 0.5 - 2.5 cm, broadly obovate or obcordate, cuneate at base, retuse, mucronate, glabrous above, pubescent beneath; petiole 2 - 10 cm, slender, erect, slightly hairy; stipules *ca* 0.6 cm, lanceolate, membranous; peduncles 1 - flowered, arising from the rhizome, equal or longer than petioles; sepals *ca* 0.6 cm, glabrous, toothed, not reaching halfway down; petals 1.5 - 2.2 cm, blue or pale -purplish, obovate. Pods 1.5 - 2 cm, linear, straight, glabrous, many seeded, blackish.

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

*Specimens examined* : Mao, G. Watt 6122, Ukhul. Mukerjee 2567; Hunling, Mukerjee 2905 (CAL).

**34. Phaseolus L.**

**Phaseolus angularis** (Willd.) W. F. Wight, U.S. Deptt. Agr. Bur. Pl. Ind. Bull. 137 : 17, 1909; Deb in Bull. Bot. Surv. India 3 : 270, 1961; Santapau in Rec. Bot. Surv. India, 3, 16 : 69, 1969. *Dolichos angularis* Willd., Sp. Pl. 3 : 1051, 1803. *Phaseolus mungo auct. pl.* (non L. 1753). *P. radiatus auct. pl.* (non L. 1753).

Suberect or decumbent-ascending, hairy, annuals; whole plant brown hairy. Leaflets 10-12 × 5-6 cm, ovate-lanceolate, oblong, acute or acuminate, cuneate at base thinly hairy. Flowers in dense racemes; calyx ca 0.4 cm long, divided half-way down; corolla ca 1.2 cm long, yellowish. Pods linear-oblong, patent, densely hairy.

*Fl. & Fr.*: September - November.

Under cultivation for its seeds, which is used as pulse.

**35. Phyllodium Desv.**

**Phyllodium pulchellum** (L.) Desv. in J. de Bot. ser. 2, 1 : 124, t. 5, f., 24, 1813; Ohashi in Ginkgoana 1 : 276, t. 39b, 1973. *Hedysarum pulchellum* L., Sp. Pl. 747, 1753. *Dicerma pulchellum* (L.) DC. in Ann. Sci. Nat. 4 : 236, 1825. *Desmodium pulchellum* (L.) Benth., Fl. Hongk. 83, 1861; Baker in Hook. f., Fl. Brit. India 2 : 162, 1876; Kanjilal *et al.*, Fl. Assam 2 : 47, 1938; Deb in Bull. Bot. Surv. India 3 : 267, 1961.

Shrubs 1-3 m high, with slender terete or ribbed grey downy branches. Leaves up to 12 cm long, 3-foliolate, dimorphic, lateral leaflets 1.2-6.4 × 1.4 cm, terminal 3.5-10 × 1.2-4.2 cm, fertile laterals 0.6-1.4 cm broad, ovate or oblong-lanceolate, obtuse or sub-acute at tip, rounded or sub-cordate at base, coriaceous, glabrous above, finely downy beneath. Flowers small ca 0.6 cm across, white or yellowish often red tipped, in clusters of 2-6 in erect terminal and axillary racemes up to 30 cm long, each cluster concealed by a pair of orbicular leaf like bracts; calyx hairy, teeth longer than tube; corolla white or tinged with pink. Pod 0.5-0.8 cm, brown when ripe, glabrate or downy, joints usually 2, 2-seeded, apiculate.

*Fl. & Fr.*: June - December.

*Specimens examined*: Moreh, Deb 701 (CAL).

Bark and flowers are medicinal.

**36. Piptanthus Sweet**

**Piptanthus nepalensis** (Hook.) Sweet, Brit. Flow. Gard. 3 : t. 264, 1828; Baker in Hook. f., Fl. Brit. India 2 : 62, 1876; Deb in Bull. Bot. Surv. India 3 : 270, 1961.; Turner in Brittonia 32 : 282, 1980. *Baptista nepalensis* Hook., Exot. Fl. 1, 131, 1824. *Piptanthus leicarpus* Stapf.; Razi in Rec. Bot. Surv. India 18 (1) : 41, 1959.

Deciduous shrubs up to 3 m high, young parts densely pubescent; leaflets 4-7.5 × 1.5-2.7 cm, elliptic-ovate, cuneate at base, acuminate, glabrous above, densely pubescent beneath; petioles 1-3 cm; stipules 7-10 mm; boat shaped, bifid. Flowers yellow, in 20-50 cm long racemes; calyx tube ca 1 cm, teeth lanceolate; petals 2-3 cm, yellow. Pods 0.8-1.4 cm, linear, compressed, pubescent; seeds 4

10. reniform, blackish.

*Fl. & Fr.* : April - October.

*Specimens examined* : Chigswa hill, *G. Watt* 6562 (CAL).

### 37. *Pisum* L.

*Pisum sativum* L., Sp. Pl. 272. 1753; Baker in Hook. f., Fl. Brit. India 2: 181. 1876; Deb in Bull. Bot. Surv. India 2: 270. 1961.

*Mani.* : *Honwaitharak*.

Annual herbs with hollow stem, glabrous. Leaves paripinnate, rachis ending in a tendril; stipule large, ovate, semicordate, irregularly toothed at the base; leaflets 4 - 6. Peduncles 1 - few-flowered, exceeding the stipules; flowers white. Pods 10 - 15 cm long, slightly apiculate, turgid; seeds usually ca 1 cm in diameter, globose.

*Fl. & Fr.* : January - April.

*Specimens examined* : Imphal, *Deb* 1977 (CAL).

Under cultivation, used as vegetable and pulse.

### 38. *Pongamia* Vent., *nom. cons.*

*Pongamia pinnata* (L.) Pierre, Fl. For. Cochinch. Sub. t. 385. 1899; Thoth. in Bull. Bot. Surv. India 3 : 417. 1960; Verdc. in Kew Bull. 32 : 250. 1977. *Cytisus pinnatus* L., Sp. Pl. 743. 1753. *Pongamia glabra* Vent., Jard. Malm. t. 28. 1803; Baker in Hook. f., Fl. Brit. India 2 : 240. 1876. *Galedupa indica* Lam., Encycl. 2 : 594. 1788. *Derris indica* (Lam.) Bennett in J. Bombay Nat. Hist. Soc. 68 : 303. 1971; Malick & Safui in J. Econ. Tax. Bot. 10 : 3. 1987.

Evergreen trees up to 10 m tall, bark smooth. Leaves 10 - 15 cm long, imparipinnate; leaflets 5 - 7, ovate-oblong, or elliptic, 5 - 10 × 3 - 6 cm, acute at base, shortly acuminate, glabrous. Flowers ca 2.0 cm long, pinkish-white, in axillary racemes; calyx truncate, brownish pubescent; corolla standard auricled. Pods 3 × 6 cm, obliquely oblong, woody compressed, 1-seeded.

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

*Specimens examined* : Nungba, *Malick* 1222 (BSIS).

Seeds yield oil, commonly used for burning and for medicinal purposes.

### 39. *Priotropis* Wight & Arn.

*Priotropis cytisoides* (Roxb.) Wight & Arn., Prodr. 1 : 180. 1834; Baker in Hook. f., Fl. Brit. India 2 : 65. 1876; Kanjilal *et al.*, Fl. Assam 2 : 9. 1938; Deb in Bull. Bot. Surv. India 3 : 270. 1961. *Crotalaria cytisoides* Roxb., Fl. Ind. 3 : 276. 1832.

Bushy shrubs up to 5 m high; bark greyish-brown. Leaves 5 - 12 cm long; petioles 1.2 - 4.0 cm; leaflets 2 - 7 × 0.5 - 2.5 cm, elliptic or elliptic-lanceolate, acute at both ends, puberulous along nerves beneath; lateral nerves 8 - 10 pairs. Racemes terminal or leaf opposed, 4 - 12 cm long; 10 - 45 flowered. Flowers 1 - 1.9 cm across, yellow with red streaks; corolla 7 - 8 mm, yellow, brownish-red. Pods oblong, 2 - 3.8 × 0.8 - 1.2 cm, oblanceolate, narrowed at both ends; 1 - 8 seeded, brown.



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

*Specimens examined* : Ukhrul, Mukerjee 3314, 3120 (CAL); Litan, Chauhan 94777; Tuilaphai, Chauhan 95012 (ASSAM).

#### 40. *Psophocarpus* Neck. ex DC., *nom. cons.*

*Psophocarpus tetragonolobus* (L.) DC., Prodr. 2 : 403, 1825; Baker in Hook. f., Fl. Brit. India 2 : 211, 1876; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *Dolichos tetragonolobus* L., Sp. Pl. ed. 2, 1020, 1763. *Botor tetragonolobus* O. Kuntze, Rev. Gen. Pl. 162, 1891.

Small climber with large tuberous roots. Leaves 3-foliolate; stipules lanceolate, attached above at the base; leaflets 8-16 × 4-13 cm, ovate, acute, deltoid at base. Flowers large, in lax racemes, lilac; peduncles ca 12 cm long; bracteole ovate; calyx glabrous, teeth shorter than tube; corolla much exserted, keel much incurved. Pods 12-20 × 2.0-2.5 cm, septate between seeds, winged; wings crisped.

*Fl. & Fr.* : March - December.

*Specimens examined* : Imphal, Deb 105 (CAL).

#### 41. *Pueraria* DC.

- 1a. Large climbers; calyx 5-7 mm; stipules basifixed; flowers bluish-purple ..... 1. *P. lobata*  
 b. Annual twining herbs; calyx 8-12 mm; stipules medifixed; flowers purplish ..... 2. *P. phaseoloides*

1. *Pueraria lobata* (Willd.) Ohwi in Bull. Nat. Sci. Mus. Tokyo, no. 18 : 16, 1847; Balakr., Fl. Jowai 1 : 160, 1981. *Dolichos lobatus* Willd., Sp. Pl. 3 (2) : 1047, 1802. *Pachyrrhizus thunbergianus* Sieb. & Zucc. in Abhand. Akad. Much. 4 (3) : 237, 1846. *Pueraria thunbergianus* (Sieb. & Zucc.) Benth. in J. Linn. Soc. Bot. 9 : 122, 1865; Kanjilal *et al.*, Fl. Assam 2 : 81, 1938; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *P. thomsonii* Benth. in J. Linn. Soc. Bot. 9 : 122, 1865; Baker in Hook. f., Fl. Brit. India 2 : 198, 1876.

Large climbers; branches deflexed, brown hairy; petioles 10-15 cm. Leaves up to 30 cm long; leaflets 12-30 × 8-25 cm, ovate rhomboid, sub-cuneate or rounded at base, sharp acuminate, entire. Flowers ca 2.5 cm long; bracts paired, lanceolate; calyx purplish green; corolla bluish-purple or reddish. Pods 8-13 × 0.7-1.3 cm, flat oblong, densely brown hairy; 8-12 seeded.

*Fl. & Fr.* : September - December.

*Specimens examined* : Koirengi, Deb 2575; Maohing, Deb 979 (CAL).

2. *Pueraria phaseoloides* (Roxb.) Benth. in J. Linn. Soc. Bot. 9 : 125, 1867; Baker in Hook. f., Fl. Brit. India 2 : 199, 1876; Kanjilal *et al.*, Fl. Assam 2 : 82, 1938; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *Dolichos phaseoloides* Roxb., Fl. Ind. 3 : 316, 1832. *Pueraria subspicata* Benth. l.c. 1867.

Annual twining herbs, young shoot covered with brown hairs; petiole 5-10

cm. Leaves pinnately 3-foliolate; stipules basifixed, lanceolate, ciliate with long brown hairs; leaflets 5-12 cm. as long as broad, rhomboid to broad ovate, lateral oblique, obtuse or acute; lateral nerves 3-5. Racemes long peduncled, simple, 10-30 cm; calyx ca 1 cm long, adpressed hairy-outside; corolla purplish, vexillary. Pods linear, 8-12 cm long, black, clothed with stiff hairs, 10-15 seeded; seeds black, transversely oblong.

*Fl. & Fr.* : August-December.

*Specimens examined* : Ukhrul, Mukerjee 3122 (CAL).

#### 42. *Pycnospora* R. Br. ex Wight & Arn.

*Pycnospora lutescens* (Poiret) Schindler in J. Bot., 64 : 145, 1926; van Moerwen in Reinwardtia 5 : 457, 1961; Deb, Fl. Tripura 1 : 183, 1981. *Hedysarum lutescens* Poiret in Lam., Encycl. Method. 6 : 417, 1805. *Pycnospora hedysaroides* R. Br. ex Wight & Arn., Prodr. 197, 1834; Baker in Hook. f. Fl. Brit. India 2 : 153, 1876; Karjilal et al., Fl. Assam 2 : 38, 1938; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *P. nervosa* (Grah.) Wight & Arn., Prodr. 197, 1834.

Perennial herb. Leaves pinnately 3-foliolate; petiole flattened, sparsely ciliate; leaflets stipelate, 0.7-3.2 cm long, obovate. Flowers in axillary or terminal racemes, small, purplish; bracts deciduous, membranous; calyx deeply cleft. Pods ca 1.2 cm long, turgid, 6-10 seeded; seeds small, minutely strophiolate.

*Fl. & Fr.* : July-November.

*Specimens examined* : Kakching, Deb 1236 (CAL).

#### 43. *Sesbania* Adans., *nom. cons.*

- |     |   |   |
|-----|---|---|
| 1a. | Branches and leaves with prickles; leaflets 6-15 mm, oblong-lanceolate; pods twisted not torulose .....           | 1. <i>S. hispinosa</i><br>var. <i>hispinosa</i>                   |
| b.  | Branches and leaves without prickles; leaflets 20-25 mm, linear-oblong; pods not twisted, slightly torulose ..... | 2. <i>S. sesban</i><br>subsp. <i>sesban</i><br>var. <i>sesban</i> |

1. *Sesbania hispinosa* (Jacq.) W. F. Wight, in U. S. Dept. Agr. Bur. Pl. Ind. Bull. 137 : 15, 1909; Deb in Bull. Bot. Surv. India 3 : 270, 1961. *Aeschynomene hispinosa* Jacq., Ic. Pl. Rar. 3 : 12, t. 564, 1793. *Sesbania aculeata* (Willd.) Poiret in Lam., Encycl. 7 : 128, 1806; Baker in Hook. f., Fl. Brit. India 2 : 114, 1876 (excl. vars.)

Robust shrub like annual ca 3 m high; branches and leaf rachis armed with hooked prickles. Leaves 15-30 cm; leaflets 0.6-1.5 × 0.25-0.3 cm, oblong lanceolate, oblique at base, obtuse-mucronate, glabrous on both sides. Flowers small, yellow, 2-6 flowered in short racemes. Pods 10-20 cm, linear, slightly falcate.

not twisted, beaked, glabrous.

var. *hispidosa* Gillet in Kew Bull. 17 : 129. 1963.

*Fl. & Fr.* : August - October.

*Specimens examined* : Shugnu, Deb 2599 (CAL).

Grow in wet land, also grown in the gardens as an ornamental plant.

2. *Sesbania sesban* (L.) Merr. in Philip. J. Sci. Bot. 7 : 235. 1912; Deb in Bull. Bot. Surv. India 3 : 271. 1961. *Aeschynomene sesban* L., Sp. Pl. 714. 1753. *Coronilla sesban* Willd., Sp. Pl. 3 : 147. 1803. *Sesbania aegyptiaca* Poiret in Lam., Encycl. 7 : 128. 1806; Baker in Hook. f., Fl. Brit. India 2 : 114. 1876. *Emerus sesban* Kuntz, Rev. Gen. Pl. 180. 1891.

Mani.: *Chuchurangmei*.

Robust shrub, glabrous, soft wooded with slender terete branches. Leaves paripinnate 7.2 - 16 cm long; leaflets many, 2 - 2.5 cm long, linear-oblong, membranous, shortly petioluled. Flowers 6 - 10 in axillary racemes, pale yellow or purple. Pods 12 - 20 cm, twisted, torulose.

subsp. *sesban* var. *sesban*

*Fl. & Fr.* : March - October.

*Specimens examined* : Imphal, Deb 2074; Ithobi Singh 352 (CAL).

#### 44. *Shutteria* Wight & Arn. *nom. cons.*

- 1a. Stems densely brown hirsute; leaflets ovate, acuminate, 3 veined at base; pods *ca* 2 cm long, 12 - 14 seeded ..... 1. *S. hirsuta*
- b. Stems hirsute; leaflets sub-rhomboid, rounded or sub-acute, 5 - 6 pinnately veined; pods 2 - 3 cm, 5 - 6 seeded ..... 2. *S. involucreta*

1. *Shutteria hirsuta* Baker in Hook. f., Fl. Brit. India 2 : 182. 1876; Kanjilal *et al.*, Fl. Assam 2 : 64. 1938; Deb in Bull. Bot. Surv. India 3 : 271. 1961.

Climbing herbs; stem densely hairy. Leaves 3-foliolate; leaflets 15 × 8.5 cm, ovate, cuspidate, membranous, adpressed hairy on both surfaces. Flowers *ca* 1.2 cm long, purple, lax in 5 - 7 cm long densely hairy racemes; bracts and bracteoles long, linear-setaceous; calyx *ca* 0.5 cm long, thinly hairy, teeth shorter than tube; corolla *ca* 1 cm long, purple. Pods *ca* 2 cm long, linear, recurved, densely hairy, many seeded.

*Fl. & Fr.* : July - December.

*Specimens examined* : Ukhrul, Mukerjee 3262 (CAL).

**2. *Shuteria involucrata*** (Wallich) Wight & Arn., Prodr. Fl. Ind. 207, 1834. *Glycine involucrata* Wallich, Pl. Asiat. Rar. 3 : 22, t. 241, 1832. *G. vestita* Grah. in Wallich Cat. 190, n. 5812, 1834; Baker in Hook. f. Fl. Brit. India 2 : 181, 1876; Deb in Bull. Bot. Surv. India 3 : 271, 1961.

Slender climber, with spreading hairs on the stems. Leaves pinnately -3 foliolate; rachis 2 - 7 cm, very slender, patently hairy; leaflets 2 - 6 cm, sub-rhomboid or oblong-ovate, sub-obtuse at base, glabrescent above, grey pubescent beneath; lateral nerves 5 - 6 pairs. Flowers axillary, solitary or in 2.5 - 7.5 cm long racemes, sessile purplish or reddish; bracts small, persistent; calyx tube campanulate, pubescent, teeth slender than the tube. Pods 2 - 3 cm, linear compressed, shaggy with rusty hairs, 5 - 6 seeded.

var. *vestita* f. *vestita* Ohashi in J. Jap. Bot. 50 : 305, 1975.

Fl. & Fr. : August - January.

*Specimens examined* : Moreh, Deb 689; Mao, Deb 1627; Chamoo, G. Watt 6684 (CAL).

#### 45. *Smithia* Aiton, *nom. cons.*

- 1a. Perennial; stems bristly; leaflets 8 - 15 mm long; flowers in panicled racemes; pods twisted ..... 1. *S. blanda*
- b. Annual; stem not bristly; leaflets ca 6 mm long; flowers in simple racemes; pods not twisted ..... 2. *S. sensitiva*

**1. *Smithia blanda*** Wallich ex. Wight & Arn., Prodr. 221, 1834; Baker in Hook. f., Fl. Brit. India 2 : 151, 1876; Kanjital *et al.*, Fl. Assam 2 : 37, 1938; Balakr., Fl. Jowai 1 : 154, 1981.

Perennial, suffruticose herb, ca 1.0 m high; stem clothed with fine yellow bristles. Leaves paripinnate, 2 - 3 cm; stipules 8 - 12 cm; leaflets 6 - 10, oblong-oblanccolate, 0.8 - 1.5 × 4.0 - 0.8 cm, narrowly rounded at base, obtuse-mucronate. Flowers in 3 - 6 cm bright yellow; lax terminal or upper axillary, paniculate racemes; bracts 0.3 - 0.5 cm, linear, ciliate at the margins; corolla ca 1.2 cm, bright yellow. Pods 1.2 - 1.6 cm, twisted, 5 - 6 jointed, dark brown.

Fl. & Fr. : May - October.

*Specimens examined* : Maopong, G. Watt 7193; Karopan, Meebold 5924 (CAL).

**2. *Smithia sensitiva*** Ait., Hort. Kew ed. 1, 3 : 496, 1789; Baker in Hook. f., Fl. Brit. India 2 : 148, 1876; Deb in Bull. Bot. Surv. India 3 : 271, 1961. *Damapana ciliata* Kuntze, Rev. Gen. Pl. 179, 1891.

Much branched, semi-woody, prostrate herbs. Leaves paripinnate; rachis ending in a bristle, stipules scarious, persistent; leaflets 4 - 12 (-20), linear or oblanccolate, ca 0.6 cm long, mucronate, bristly along the midrib below. Flowers 1 - 5 together in axillary racemes, yellow, peduncles slender, longer than the leaves; pedicel short; bracts and bracteoles persistent, scarious; calyx 2-lipped with few

scattered bristles. Pods flattened, 4-6 jointed, papillose; joints one seeded.

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

*Specimens examined* : Imphal, Deb 628; Pallel, Deb 1309 (CAL).

#### 46. *Spatholobus Hassk.*

*Spatholobus parviflorus* (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 205. 1891; Ohashi in Fl. E. Himal. 164. 1966, *Butea parviflora* Roxb., Fl. Ind. 3 : 248. 1832; Deb in Bull. Bot. Surv. India 3 : 264. 1961. *Spatholobus roxburghii* Benth. in Miq., Pl. Jungh. 238. 1852; Baker in Hook. f., Fl. Brit. India 2 : 193. 1876.

Large climber. Leaves 3-foliolate; petiole ca 10 cm long; leaflets 10-25 cm long, ovate to rhomboid or obovate, cuspidate, laterals oblique, pubescent beneath, glabrous above; 7-10 lateral nerves which are slightly arched. Flowers white or cream coloured or reddish, 2-2.2 cm long in large terminal panicles up to 1 m long; calyx campanulate, upper two teeth connate. Pods 7-15 × 1.5-4 cm, 1 seeded constricted, narrowed at the base into a short stalk.

*Fl. & Fr.* : June - November.

*Specimens examined* : Shugnu, Deb 2608; Laimatak, Meebold 5039 (CAL).

Fibres used for ropes.

#### 47. *Tedehagi Ohashi*

*Tedehagi triquetrum* (L.) Ohashi in Ginkgoana 1 : 290, t. 41-42. 1973. *Hedysarum triquetrum* L., Sp. Pl. 746. 1753. *Desmodium triquetrum* (L.) DC., Prodr. 2 : 326. 1825; Baker in Hook. f., Fl. Brit. India 2 : 163. 1876; Kanjilal *et al.*, Fl. Assam 2 : 56. 1938; Deb in Bull. Bot. Surv. India 3 : 268. 1961. *D. alatum* DC., Prodr. 2 : 326. 1825; Deb l. c. 266. 1961.

Under shrubs up to 2.5 m tall; branches triquetrous; stipules 1.5-2.2 cm, lanceolate; leaflets 3-12 × 2-5 cm, ovate-lanceolate or ovate-oblong, acute or short acuminate, rounded or sub-cordate at base, sparsely hairy above; lateral nerves 13-17 pairs; petiole 2-4 cm long, winged. Flowers 3-6 mm long, purplish-pink, in 8-30 cm long, terminal or axillary racemes; bracts sessile, 4-5 mm, linear-lanceolate; corolla ca 8 cm, purplish-pink. Pods 2.5-4 × 0.4-0.6 cm, strap shaped, indented along lower or both sutures; joints 4-7, densely hairy.

- 1a. Leaves more than 3-times longer than broad; pods pubescent all over ..... 1. subsp. *triquetrum*  
 b. Leaves less than 3 times longer than broad; pods pubescent along sutures only ..... 2. subsp. *pseudotriquetrum*

1. subsp. *triquetrum*

*Fl. & Fr.* : August-March.

*Specimens examined* : Cachar hills, Malick 602; Nungba to Bishenpur, Malick 1206; Dibong, Malick 722; Chandrapur, Malick 764 (BSIS).

2. subsp. *pseudotriquetrum* (DC.) Ohashi in *Ginkgoana* 1 : 295. t. 426. 1973. *Desmodium pseudotriquetrum* DC. in *Ann. Sci. Nat.* 4:100. 1825. *D. triquetrum* DC.: Baker in Hook. f., *Fl. Brit. India* 2 : 163. 1876, *p.p.*; Deb in *Bull. Bot. Surv. India* 3 : 268. 1961. *D. triquetrum* (L.) DC. subsp. *pseudotriquetrum* (DC.) Prain in *J. Asiat. Soc. Bengal.* 66 (2) : 390. 1897; Balakr., *Fl. Jowai* 1 : 157. 1981. *Pteroloma triquetrum* Benth. in *Miq., Pl. Jungh.* 220. 1852, *p.p.*

*Fl. & Fr.* : July - December.

*Specimens examined* : Ukhrul, *Mukerjee* 3325; Imphal, *Ibobi Singh* 182; Jirighat, *Meebold* 5783 (CAL); Jirimukh, *Malick* 811; Imphal, *Malick* 1350 (BIS); Litan, *Chauhan* 94646 & 94766 (ASSAM).

#### 48. *Tephrosia* Pers., *nom. cons.*

*Tephrosia candida* (Roxb.) DC., *Prodr.* 2 : 249. 1825; Baker in Hook. f., *Fl. Brit. India* 2 : 11. 1876; Deb in *Bull. Bot. Surv. India* 3 : 271. 1961. *Robinia candida* Roxb., *Fl. Ind* 3 : 327. 1832.

Much branched robust shrub up to 4 m high; branch grooved, clothed with brown velvety pubescence. Leaves imparipinnate, 15 - 25 cm long; rachis grey silky; leaflets 13 - 29, elliptic-lanceolate, 2.8 - 8 × 0.8 - 1.5 cm, base acute, mucronate, subcoriaceous, glabrescent above, pubescent beneath. Racemes terminal or upper axillary, 10 - 20 cm. Flowers 2 - 2.5 cm across, creamy white; calyx tube campanulate, teeth shorter than the tube, brown tomentose. Pods 8 - 10 × 0.6 - 0.8 cm, linear-oblong, adpressed silky, 8 - 12 seeded, slightly curved, densely covered with brown hairs.

*Fl. & Fr.* : August - January.

*Specimens examined* : s.loc. Deb 82; Kasom, *Mukerjee* 3287; Piphima, *Meebold* 5333 (CAL); Uchathol, *Malick* 621; Jirimukh, *Malick* 1106 (BIS); Litan, *Chauhan* 94634 & 94878 (ASSAM).

#### 49. *Uraria* Desv.

- |     |  |                        |
|-----|--|------------------------|
| 1a  | Leaves 3 - 7 foliate; bracts long cuspidate,<br>densely long ciliate .....         | 2. <i>U. crinita</i>   |
| b.  | Leaves 1 - 3 foliate; bracts not cuspidate,<br>short hairy .....                   | 2                      |
| 2a. | Leaves 3 - foliate; leaflets oblong;<br>bracts caducous .....                      | 3. <i>U. facei</i>     |
| b.  | Leaves 1 - 3 foliate; leaflets elliptic; bracts deciduous .....                    | 3                      |
| 3a. | Stipules setaceous; flowers in paniculate racemes;<br>pedicels 3 - 4 mm long ..... | 4. <i>U. rufescens</i> |
| b.  | Stipules not setaceous; flowers in simple  |                        |

racemes; pedicels 8-10 mm long ..... 1. *U. arboreum*.

1. *Uraria arboreum* (D. Don) G. Don, Gen. Syst 2 : 287. 1832; Balakr., Fl. Jowai 1 : 155. 1981, *Hedysarum arboreum* D. Don, Prodr. 243. Oct. 1825. *Uraria lagopus* DC., Prodr. 2 : 324. Nov. 1825; Baker in Hook. f., Fl. Brit. India 2 : 156. 1876; Deb in Bull. Bot. Surv. India 3 : 271. 1961.

Under shrub up to 2 m high. Leaves compound, 1-3 foliate, stipules 0.6-1.2 cm, subulate; leaflets 2.8-9 × 1-3.8 cm, oblong-lanceolate or orbicular, rounded or cordate at base, obtuse, sub-acute or mucronate; lateral nerves 6-10 pairs. Flowers ca 0.5 cm long, purple, in simple terminal, deep purple 10-20 cm long racemes, bracts ovate or lanceolate. Pods articulated into 2-8 joints, black.

Fl. & Fr. : August-December.

Specimens examined : Singamaï, Deb 425; Shugm, Deb 2598; Pallel, Deb 1310; Ukhral, Mukerjee 3419 (CAL).

2. *Uraria crinita* (L.) Desv., J. de Bot. 1 : 123. 1813; Baker in Hook. f., Fl. Brit. India 2 : 155. 1876; Kanjilal et al., Fl. Assam 2 : 40. 1938. *Hedysarum crinitum* L., Mant. Pl. 1 : 102. 1767.

Shrubs, 1-2 m tall, stem stout, striate. Leaves 12-22 cm long; leaflets 5-15 × 1.2-4.2 cm, oblong, rounded or sub-acute at base, apex acute or mucronate, glabrous. Flowers ca 1.2 cm long, purple or purplish-blue, in 10-35 cm long, densely hairy, terminal, simple racemes; bracts ca 1.5 cm, ovate, long cuspidate; calyx segments plumose, hairy. Pods 4-6 opaque segmented, brownish.

Fl. & Fr. : May-November.

Specimens examined : Imphal, Deb 376; s. loc. Meebold 5332 (CAL).

3. *Uraria lacei* Craib in Kew Bull. 1910 (8) : 276. 1910; Kanjilal et al., Fl. Assam 2 : 42. 1938; Deb in Bull. Bot. Surv. India 3 : 271. 1961. *U. clarkii* Gagnep. in Lecomte, Fl. Gen. Indo-China 2 : 542. 1920; Kanjilal et al., Fl. Assam 2 : 42. 1938; Deb in Bull. Bot. Surv. India 3 : 271. 1961.

Shrubs up to 1.5 m tall, stems more or less sulcate, ferruginous hairy. Leaves pinnately 3-foliate, stipules ca 4 mm, subulate filiform; leaflets 8-10 × 4-5 cm, ovate-lanceolate, obtuse, mucronate, rounded at base; terminal 10-12 × 5-6 cm, crenate, pilose on the nerves beneath; petioles 2-3.5 cm long, hairy. Flowers in 42 cm long terminal paniculate racemes; rachis ferruginous hairy; bracts 7 × 5 mm, ovate, acuminate, caducous; pedicels ca 7 mm long; calyx ca 4 mm, lobes lanceolate, acute, two upper short. Pods up to 6 segments, glabrescent.

Fl. & Fr. : October-December.

Specimens examined : Lamatak 900-1200 m, Meebold 6245 (K.); Imphal, Deb 585 (CAL).

4. *Uraria rufescens* (DC.) Schindler in Fedde, Reper. 21 : 14. 1925; Balakr., Fl.

Jowai 1 : 154, 1981. *Desmodium rufescens* DC. in Ann. Sci. Nat. ser. 1 : 4, 101, 1825. *Doodia hamosa* Roxb., Fl. Ind. 3 : 367, 1832. *Uraria hamosa* (Roxb.) Wight & Arn., Prodr., Fl. Ind. Or. 222, 1834; Baker in Hook. f., Fl. Brit. India 2 : 156, 1876; Deb in Bull. Bot. Surv. India 3 : 271, 1961.

Mani.: Luipa.

Diffuse woody under shrubs up to 2 m high, young parts clothed with long hairs and short hooked bristles; stipules setaceous. Leaves 1 - 3 foliolate; leaflets 5 - 13.5 × 2 - 7 cm, oblong-elliptic or ovate-lanceolate, cordate at base, apex acute or mucronate, glabrous above, downy beneath; lateral nerves 10 - 18 pairs. Flowers purple, in 10 - 25 cm long paniculate racemes; bracts densely silky pubescent; calyx teeth unequal, long hairy; corolla ca 8 mm long, pink or pale-purple. Pods ca 1 cm long, 4 - 8, joints, puberulous, brown or black.

Fl. & Fr. August - February.

Specimens examined : Jakurodhar, Malick 941 (BSIS).

#### 50. *Vicia* L.

- 1a. Leaves ending in a twisted tendril; flowers 3 - 6 in axillary racemes; pods 1.2 cm long, with 2-seeds ..... 1. *V. hirsuta*  
 b. Leaves ending in 2 - 3 fid tendril; flowers 1 - 3 in axillary racemes; pods 3-7 cm long, with 6-8 seeds..... 2. *V. sativa*

1. *Vicia hirsuta* (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2 : 614, 1821; Baker in Hook. f., Fl. Brit. India 2 : 177, 1876; Deb, Fl. Tripura 1 : 189, 1991. *Ervum hirsutum* L., Sp. Pl. 738, 1753.

Prostrate, annual herbs, with pubescent stems. Leaves paripinnate, ending in a twisted tendril; leaflets 5 - 8 pairs, truncate 1.3 - 2.6 cm. Flowers 3 - 6 in peduncled axillary racemes; calyx tube campanulate, teeth long, unequal; corolla exerted. Pod ca 1.2 cm, oblong, oblique, turgid, pubescent, 2-seeded, black.

Fl. & Fr. : November - February.

Specimens examined : Mataiphum, G. Watt 6094 (CAL).

2. *Vicia sativa* L., Sp. Pl. 736, 1753; Baker in Hook. f., Fl. Brit. India 2 : 178, 1876; Deb in Bull. Bot. Surv. India 3 : 271, 1961.

Prostrate or climbing herbs; stems fistular, sub-erect, glabrous or glabrescent. Leaves paripinnate, ending to 2 - 3 fid tendrils, leaflets 4 - 12 pairs, 1.5 - 3.0 × 0.3 - 0.8 cm, lanceolate, obovate or oblique, emarginate, apiculate, ligulate; stipules ovate-lanceolate, lacinate. Flowers 1 - 2 cm long, reddish-blue, 1 - 3, axillary; calyx teeth, lanceolate, subulate, equal or longer than the tube. Pods 3 - 7 cm long, linear, flat, glabrescent, yellow, 6 - 8 seeded.

var. *sativa*

Fl. & Fr. October - February.

Specimens examined : Ukhrul, Mukerjee 2623 (CAL).



51. *Vigna* Savi.

- 1a. Roots fusiform; flowers pink or purple ..... 6. *V. vexillata*  
 b. Roots not fusiform; flowers yellow ..... 2  
 2a. Pods more than 10 cm long,  
 glabrous; seeds white ..... 5. *V. unguiculata*  
 subsp. *cylindrica*  
 b. Pods less than 10 cm long, pubescent; seeds not white ..... 3  
 3a. Racemes shorter than the leaves;  
 flowers yellow with red streaks ..... 1. *V. fusca*  
 b. Racemes longer than leaves; flowers without red streaks. .... 4  
 4a. Pods more than 5 cm long,  
 linear, seeds 6 - 12, brown ..... 4. *V. umbellata*  
 b. Pods less than 5 cm long, sub-cylindric;  
 seeds 4 - 6 greenish or black. .... 5  
 5a. Pods unseptate between seeds;  
 seeds mottled grey or greenish ..... 2. *V. mungo*  
 b. Pods septate between seeds; seeds black ..... 3. *V. radiata*  
 var. *sublobata*

1. *Vigna fusca* (Wallich) Chauhan *comb. nov. Phaseolus fuscus* Wallich, Pl. Asiat. Rar. 1 : 6, t. 6. 1830; Deb in Bull. Bot. Surv. India 3 : 270. 1961. *Dunbaria fusca* (Wallich) Kurz in J. Asit. Soc. Bengal 43 (2) : 186. 1873.

Twining herbs; stem grooved; leaflets 7.5 - 12.2 cm, ovate, rounded at base, acute, entire, membranous, pubescent beneath. Flowers ca 1.6 cm, yellow with red-brown streaks, in 5 - 9 cm long few lax flowered racemes, shorter than leaves; calyx teeth ciliate, shorter than the tube. Pods 5 - 7 cm, linear, brown, pubescent, many seeded.

*Fl. & Fr.* : July - November.

*Specimens examined* : Imphal, Deb 416 (CAL).

2. *Vigna mungo* (L.) Hepper in Kew Bull. 11 : 128. 1956; Malick & Safui in J. Econ. Tax. Bot. 10 : 4. 1987. *Phaseolus mungo* L., Mant. Pl. 101. 1767; Baker in Hook. f., Fl. Brit. India 2 : 203 1876. *p.p.*

*Mani.*: *Shogae hawai*.

Sub-scandent herb, covered with reddish-brown hairs. Leaves 3-foliolate; leaflets 4.5 - 8.6 cm, ovate, sub-obtuse, deltoid or rounded at base, membranous. Flowers yellow at the end of short peduncles. Pods 1.5 - 3.5 cm, sub-cylindric, slightly recurved, unseptate between seeds, tomentose, 4 - 6 seeded, seeds mottled grey or greenish.

*Fl. & Fr.* : September - November.

*Specimens examined* : Kakching, Deb 1255; Imphal, Deb 1192 (CAL); Jirimukh, Malick 810 (BSIS).

Seeds are used as a pulse.

3. *Vigna radiata* (L.) Wilczek, var. *sublobata* (Roxb.) Verdc. in Kew Bull. 24 : 559. 1970. *Phaseolus sublobatus* Roxb., Fl. Ind. 3 : 288. 1832; Deb in Bull. Bot. Surv. India 3 : 270. 1961. *P. trinervius* Heyne ex Wight & Arn., Prodr. 245. 1834; Baker in Hook. f. Fl. Brit. India 2 : 203. 1876.

Mani.: *Mung-hawai*.

Erect or twining climbers. Leaves 3-foliolate; stipules ovate; leaflets 2 - 10 × 2.5 - 5.0 cm, ovate-elliptic or ovate-rhomboid, scattered adpressed hairs on both side, sub-obtuse, deltoid at base, membranous. Flowers ca 1.0 cm long, yellow, in the end of short peduncles; pedicels very small; calyx tooth lanceolate; corolla 1.2 - 1.5 cm long. Pods 2.2 - 3.8 cm, sub-cylindric, slightly recurved, septate between seeds, sparsely tomentose; seeds 4 - 6 black.

Fl. & Fr. : September - December.

Specimens examined : Aglapur, Malick 713 (BSIS).

4. *Vigna umbellata* (Thunb.) Ohwi & Ohashi in J. Jap. Bot. 44 : 31. 1969; Balakr., Fl. Jowai 1 : 170. 1981. *Dolichos umbellatus* Thunb. in Trans. Linn. Soc. 2 : 339. 1794. *Phaseolus pubescens* Blume Cat. Gew. Butzg. 93. 1823. *P. calcaratus* Roxb., Fl. Ind. 2 : 289. 1832; Baker in Hook. f., Fl. Brit. India 2 : 203. 1876; Deb in Bull. Bot. Surv. India 3 : 270. 1961. *Vigna calcarata* (Roxb.) Kurz in J. Asiat. Soc. Bengal 45 : 247. 1876. *Azukia umbellata* (Thunb.) Ohwi, Fl. Jap. 691. 1953.

Slender herbs, climbing up to 2 m. Leaves 3-foliolate; petioles 12 - 15 cm; stipule sub-falcate, 6 - 14 mm; leaflets 4 - 8 × 2 - 3 cm, ovate-lanceolate to rhomboid-ovate, sub-lobate, cuneate at base, acute to acuminate; lateral nerves 5 - 6 pairs. Flowers ca 1.5 cm long, yellow, in long axillary racemes, 6 - 10 cm, 10 - 20 flowered. Pods ca 6 cm long, compressed, linear, slender; seeds 8 - 12, brown.

Fl. & Fr. : August - December.

Specimens examined : Ukhrul, Mukerjee 3406(CAL); Jirimirki, Malick 819 (BSIS); Churachandpur, Chaitan 95010 (ASSAM).

5. *Vigna unguiculata* (L.) Walp. subsp. *cylindrica* (L.) Eselt. in Hedrick. Vegetables New York 1 (2) : 11. 1931; Verdc. in Kew Bull. 24 : 544. 1970. *Phaseolus cylindricus* L., Herb. Amb. 23. 1754. *Dolichos catjang* Burm. f., Fl. Ind. 161. 1768. *Vigna catjang* (Burm. f.) Walp. in Linnæa 13 : 533. 1839; Baker in Hook. f., Fl. Brit. India 2 : 205. 1876, p.p.

Twining herb, with glabrous stem. Leaves 3-foliolate, leaflets 7.5 - 12 cm, ovate rhomboid, variable, acute, membranous, entire. Flowers ca 2.0 cm long, yellow or purplish, 3 - 6 flowered in short capitate racemes. Pods 10 - 60 cm, depressed between seeds, glabrous; seeds sub-terete, white.

Fl. & Fr. : October - January.

Specimens examined : Loktak, Meebold 6452 (CAL).

Fruits are used as vegetable and pulse.

6. *Vigna vexillata* (L.) A. Rich., Hist. Fis. Polit. Nat. Isla Cuba (Spanish ed.) 11 : 191. 1845; Baker in Hook. f., Fl. Brit. India 2 : 206. 1876; Deb in Bull. Bot. Surv. India 3 : 271. 1961, *Phaseolus vexillatus* L., Sp. Pl. 724. 1753.

Slender twiner with sparsely pubescent stems, roots fusiform. Leaves 3-foliolate, pinnate, petioles 3-10 cm; leaflets 2.8-8.5 × 1.8-3.5 cm, ovate, oblong-lanceolate or linear-lanceolate, rounded at base, acuminate; lateral nerves 4-5 pairs. Flowers 2.0-2.5 cm, pale-pink, in 10-20 cm long, racemes, 5-10 flowered, congested at the end of peduncles; calyx glabrous. Pods 6-10 × 0.4-0.6 cm, oblong compressed, glabrescent; seeds 8-15, brown or black.

*Fl. & Fr.* : March-December.

*Specimens examined* : Shugnu, Deb 2593 (CAL).

#### 64. CAESALPINIACEAE

R. Br. in Tuckey, Narrat. Exped. Congo 430. 1818

("Caesalpinae").

(A. S. Chauhan)

- 1a. Leaves bipinnate ..... 2
- b. Leaves pinnate, 1-many foliate ..... 3
- 2a. Armed; inflorescence panicled racemes ..... 2. *Caesalpinia*
- b. Unarmed; inflorescence corymbose ..... 4. *Detonix*
- 3a. Leaves imparipinnate ..... 4
- b. Leaves 1-foliolate, 2-lobed ..... 1. *Bauhinia*
- 4a. Petals present; calyx segments not petaloid ..... 5
- b. Petals absent; calyx segments  
petaloid; stamens 7-8 ..... 5. *Saraca*
- 5a. Petals 5; stamens unequal; anthers basifixed ..... 3. *Cassia*
- b. Petals 3; stamens monadelphous;  
anthers versatile ..... 6. *Tamarindus*

#### *Bauhinia* L.

- 1a. Climbers or stragglers with tendrils;  
sepals not spathaceous ..... 2. *B. glauca*  
subsp. *tenuiflora*
- b. Tall shrub or small trees without  
tendrils; sepals spathaceous ..... 2
- 2a. Leaves connate about 2/3 upwards;  
fertile stamens 10 ..... 1. *B. acuminata*
- b. Leaves connate about 1/2 or 1/3  
upwards; fertile stamens 3-5 ..... 3

- 3a. Flowers white leaves; flower buds  
with 5-ridges; fertile stamens 3 ..... 3. *B. purpurea*
- b. Flowers white leafless; flower buds  
without ridges; fertile stamens 5 ..... 4. *B. variegata*

1. *Bauhinia acuminata* L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. India 2 : 276. 1878; Kanjilal *et al.*, Fl. Assam 2 : 139. 1939; Deb in Bull. Bot. Surv. India 3 : 261. 1961.

Mani. : *Kanchan & Chingthao*

Large erect shrub, young parts pubescent. Leaves 7 - 13 cm long, united about 2/3 way upwards ending in obtuse or sub-obtuse lobes, base cordate, glabrous above, pubescent beneath; petiole 1.5 - 3.5 cm long, pubescent with subulate stipules. Flowers white, ca 6 cm across, leaf opposed in short racemes; bracts and bracteoles linear, pubescent; calyx spathaceous, 5-toothed at the apex. Pods 8 - 13 × 1.2 - 2 cm long, widest above and tapering downwards, beaked.

Fl. & Fr. : April - December.

Specimens examined : Imphal, Deb 111 (CAL).

Plants having ornamental value.

2. *Bauhinia glauca* (Wallich, ex Benth.) Benth. subsp. *tenuiflora* (G. Watt ex C. B. Clarke) K. & S. Larsen in Nat. Hist. Bull. Siam. Soc. 25 (102) : 10. 1973. *B. tenuiflora* G. Watt ex C. B. Clarke in J. Linn. Soc. 25 : 18. t. 6, 1889; Kanjilal *et al.*, Fl. Assam 2 : 146. 1938; Deb in Bull. Bot. Surv. India 3 : 261. 1961. *Phanera tenuiflora* (C. B. Clarke) de Wit in Reinwardtia 3 : 490. 1956.

Mani. : *Nga-hia-Ubo & Chingthao*.

Large woody climber with tendrils. Leaves 6 - 10 cm, sub-orbicular, bilobed up to 1/4 way down, base sub-cordate, sometimes truncate, acuminate, usually 9-nerved from base. Flowers white, in terminal or lateral rusty tomentose corymbs; peduncle 2 - 5 cm long; calyx tube 2 - 3 cm with 5 lanceolate lobes. Pods 18 - 25 cm, oblong, beaked with 15 - 20 seeded.

Fl. & Fr. : October - May.

Specimens examined : s.l. C.B. Clarke 42304, 42342; Makru, Meebold 6340; Imphal, Deb 2439; Kalanaga hills, G. Watt 6915 (CAL).

3. *Bauhinia purpurea* L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. India 2 : 284. 1878; Kanjilal *et al.*, Fl. Assam 2 : 241. 1938; Deb in Bull. Bot. Surv. India 3 : 261. 1961.

Mani. : *Chingthao & angangba*.

Large shrub or medium sized trees. Leaves 7.5 - 12 cm across, connate about 1/2 - 1/3 upwards, glabrous above, minutely puberulous on the nerves beneath, with wide sinus and acute or sub-acute or blunt lobes. Flowers pinkish purple, in terminal 6 - 12 cm long corymbose or paniculate; bracts and bracteoles small, tomentose,

spathaceous. Pods 15 - 25 × 1.5 - 2 cm. flat, sub-falcate, greenish - purple, pubescent along the suture; seeds 12 - 15, flattened roundish, dark brown, ca 5 mm across.

*Fl. & Fr.* : September - April.

*Specimens examined* : Lingamai, Deb 576; Namber forest Meebold 5329 (CAL); Uchathal-Jinbam, Malick 623 (BSIS).

Bark is used for fibre and tannin; flower buds and fruits are used as vegetable; the tree yields gum; cultivated as an ornamental plant.

**4. *Bauhinia variegata* L.**, Sp. Pl. 1 : 375. 1753; Baker in Hook. f., Fl. Brit. India 2 : 284. 1878; Kanjilal *et al.*, Fl. Assam 2 : 140. 1938; Deb in Bull. Bot. Surv. India 3 : 261. 1961. Fig. 43

Mani.: *Chingthao-angouba & Mai-how-lei.*

Middle sized trees with tomentose young shoots. Leaves ovate, sub-orbicular, cordate at base, glabrous above puberulous along the nerves beneath, united about 1/3 upwards. Flowers appearing before leaves, white, pink or purplish-pink, in few flowered corymbose racemes, from leafless axils; bracts and bracteoles deltoid; calyx spathaceous, 5 toothed at the apex, tomentose; ovary pubescent. Pods flat 1.5 - 2.0 cm across, glabrous, distinctly veined when dry.

*Fl. & Fr.* : September - April.

*Specimens examined* : Ukhrul, Mukerjee 2884; Karong, G. Watt 7252 (CAL).

Wood moderately hard, used for agricultural implements.

## 2. *Caesalpinia* L.

- 1a. Pods covered with prickles ..... 2
- b. Pods not covered with prickles ..... 3
- 2a. Scandent shrubs; pinnae 5 - 10 pairs;
  - fruits wiry prickly, 2 - 3 seeded ..... 1. *C. bonduca*
- b. Climbing shrubs; pinnae 12 - 23 pairs;
  - fruits without prickles, 3 - 6 seeded ..... 4. *C. enneaphylla*
- 3a. Straggling shrubs; pinnae 6 - 12 pairs;
  - pod up to 8 cm long, unwinged ..... 4
- b. Scandent shrubs; pinnae 12 - 20 pairs;
  - pod more than 8 cm long, winged ..... 2. *C. decapetala*
- 4a. Flowers bright yellow in axillary and terminal racemes;
  - pod 2 - 6 cm long, 1 - 2 seeded ..... 3. *C. digyna*
- b. Flowers orange or yellowish-orange in
  - subcorymbose racemes; pod 5 - 8 cm
    - long, 6 - 8 seeded ..... 5. *C. pulcherrima*

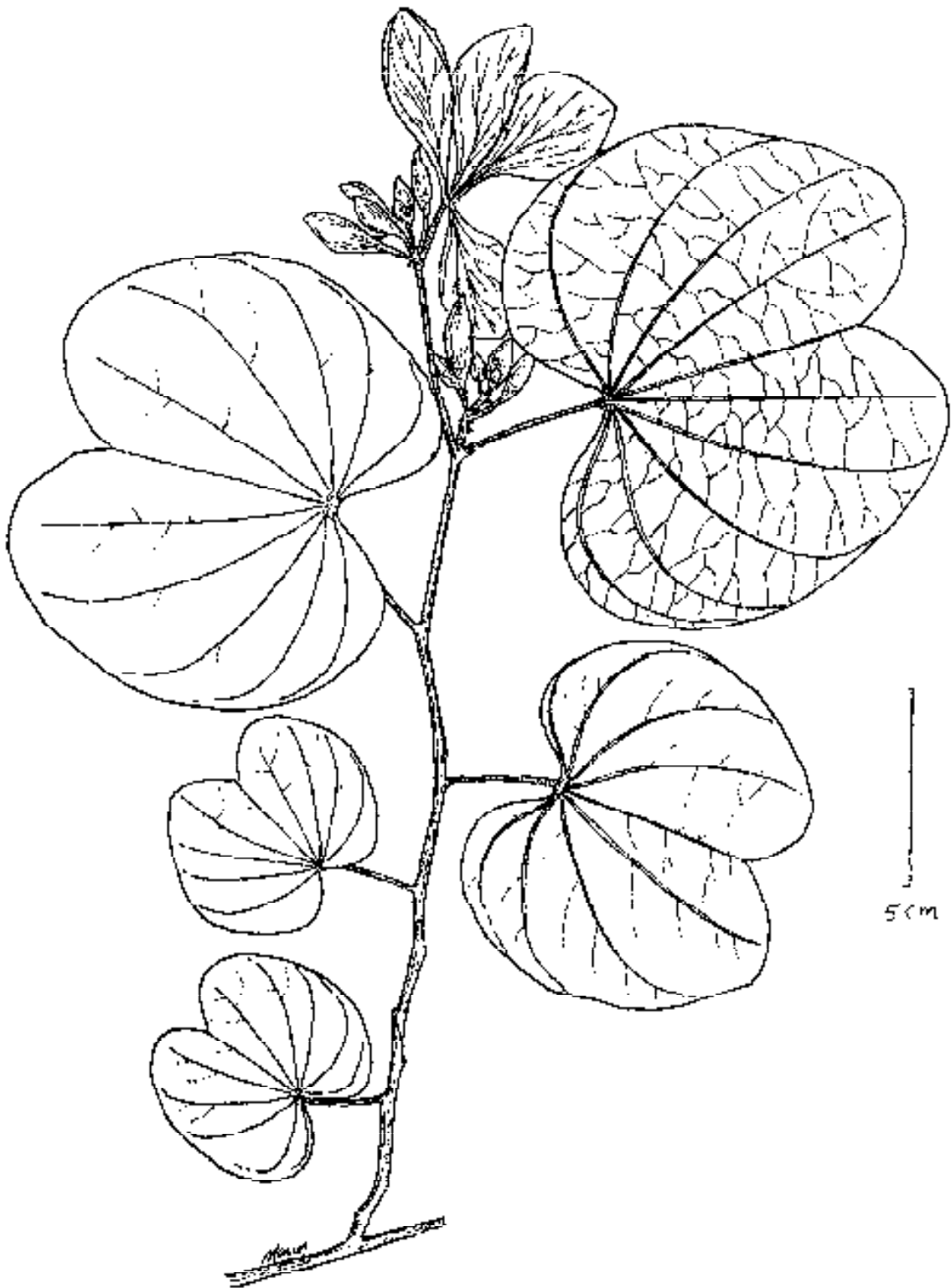


Fig. 43 : A twig of *Bauhinia variegata* L. in Budd.

1. *Caesalpinia bonduc* (L.) Roxb., Fl. Ind. 2 : 362, 1832, emend. Dandy & Exell in J. Bot. 76 : 179, 1938; Deb, Fl. Tripura I : 115, 1981. *Guilandina bonduc* L., Sp. Pl. 381, 1753. *Caesalpinia bonducella* (L.) Flem. in Asiat. Res. 11 : 159, 1810; Baker in Hook. f., Fl. Brit. India 2 : 254, 1878.

Mani. : *Tinshibi*

Scandent shrub, armed with straight or curved, strong prickles. Leaves bipinnate, 30 - 45 cm, rachis brown, pubescent; stipules foliaceous; leaflets 5 - 10, opposite pairs, 2 - 4 × 1.2 - 1.5 cm, elliptic-oblong, puberulous, mucronate. Flowers yellow with red tinge, in supra axillary and terminal 15 - 30 cm long racemes. Pods 4 - 8 × 4 - 5 cm, coriaceous, covered with sharp wiry prickles, 2 - 3 seeded.

Fl. & Fr. : June - January.

*Specimens examined* : Imphal, Deb 280 (CAL); Uchathol, Malick 635 (BSIS).

Seeds yield medicinal oil; leaves used for tape worm also, cultivated as a hedge plant.

2. *Caesalpinia decapetala* (Roth.) Alston in Trimen, Handb. Fl. Ceylon 6 (Suppl.) : 89, 1931; Hattink in Reinwardtia 9 : 24, 1974. *Reichardia decapetala* Roth, Nov. Sp. Pl. 212, 1821. *Caesalpinia sepiaria* Roxb., Fl. Ind. 2 : 360, 1832; Baker in Hook. f., Fl. Brit. India 2 : 256, 1878; Deb in Bull. Bot. Surv. India 3 : 262, 1961.

Scandent or scrambling shrubs or small trees; branches and leaf rachises armed with recurved prickles, brown pubescent. Leaves 9 - 15 cm long, bipinnate; pinnac 12 - 20 pairs; stipules ovate, acute, deciduous; leaflets 8 - 24 pairs, oblong, 1.2 - 2.2 × 0.5 - 0.7 cm, obtuse at both ends, glabrous above, hairy beneath. Flowers bright yellow, in simple axillary and terminal racemes. Pods 8 - 12 cm long, falcate-oblong, turgid, slightly winged, brown, constricted between the seeds; seeds 6 - 8 glabrous.

Fl. & Fr. : August - January.

*Specimens examined* : Khangkhom, Mukerjee 2519 (CAL).

3. *Caesalpinia digyna* Rottl. in Ges. Naturf. Freunde Neue Schr. 4 : 200, 1803; Baker in Hook. f., Fl. Brit. India 2 : 256, 1878; Kanjilal *et al.*, Fl. Assam 2 : 121, 1938, Malick & Safui in J. Econ. Tax. Bot. 10 : 4, 1987. *C. oleosperma* Roxb., Hort. Beng. 32, 1814, *nom. nud.* & Fl. Ind. 2 : 357, 1832.

Scandent or straggling shrub with hooked prickles. Leaves 12 - 30 cm, pinnac 8 - 12 pairs, 3 - 6 cm long; leaflets 7 - 10 pairs on each pinna, oblong, minutely pubescent, oblique at base, obtuse. Flowers bright yellow in supra axillary and terminal racemes. Pods unarmed, 2 - 6 × 1 - 3 cm, fleshy, constricted 1 - 2 dark brown seeded.

Fl. & Fr. : September - December.

*Specimens examined* : Uchathol, Malick 629; Kangpokpi, Malick 1404 (BSIS).

The roots and fruits are used in tanning.

4. *Caesalpinia enneaphylla* Roxb., Fl. Ind. 2 : 363, 1832; Hattink in Reinwardtia

9 : 30. 1974; *Mezoneuron enneaphyllum* (Roxb.) Wight & Arn. ex Benth. in Miq., Pl. Jungl. 258. 1852; Baker in Hook. f., Fl. Brit. India 2 : 258. 1878; Kanjilal *et al.*, Fl. Assam 2 : 123. 1938; Deb in Bull. Bot. Surv. India 3 : 262. 1961.

Straggling shrub with hooked prickles. Leaves bipinnate, rachis prickly; stipules small, stipels absent; pinnae 12 - 23; leaflets 4 - 8 × 2 - 3 cm, oblong or obovate-oblong, 6 - 10 pairs, obtuse, oblique at base, glabrous. Flowers bright yellow, 1.5 cm across, bracts narrow, bracteoles absent. Fruits thin flattened lomentum, winged along the upper suture, 3 - 6 seeded, compressed.

*Fl. & Fr.* : October - April.

*Specimens examined* : Imphal, Deb 1050 (CAL).

5. *Caesalpinia pulcherrima* (L.) Sw., Obs. Bot. Ind. Occ. 166. 1791; Baker in Hook. f., Fl. Brit. India 2 : 255. 1878; Kanjilal *et al.*, Fl. Assam 2 : 122. 1938; Deb in Bull. Bot. Surv. India 3 : 262. 1961. *Painciana pulcherrima* L., Sp. Pl. 380. 1753.

Much branched straggling shrub, lower branches prickly. Leaves with 6 - 9 pairs or pinnae; leaflets 6 - 12 pairs, 1.1 - 2 cm long, oblong or obovate-oblong, glabrous, emarginate, mucronate. Flowers yellow or orange in axillary and terminal sub-corymbose racemes. Pods ca 5 - 8 cm long, unarined, flattened and compressed, 6 - 8 seeded.

*Fl. & Fr.* : Almost throughout the year.

*Specimens examined* : Kakching, Deb 1218 (CAL).

Horticulturally important plant.

### 3. *Cassia* L.

- |     |   |   |
|-----|---|---|
| 1a. | Stamens 10, all antheriferous; pods indehiscent .....                   | 2   |
| b.  | Stems 6 - 7, fertile; pods dehiscent .....                              | 3   |
| 2a. | Leaflets 4 - 8 pairs; flowers yellow in racemes .....                   | 4. <i>C. fistula</i>                                |
| b.  | Leaflets 10 - 12 pairs, flowers<br>pink in corymbose racemes .....      | 8. <i>C. nodosa</i>                                 |
| 3a. | Foliar glands present .....   | 4   |
| b.  | Foliar glands absent or rudimentary .....                               | 9   |
| 4a. | Leaves with a gland near the base of petiole .....                      | 5   |
| b.  | Leaves with 1 or 2-glands between lower most<br>pairs of leaflets ..... | 7   |
| 5a. | Mature leaves and pods hirsute;<br>sutures of pods not thickened .....  | 6. <i>C. hirsuta</i>                                |
| b.  | Leaves and pods glabrous; sutures<br>of pods thickened .....            | 6   |
| 6a. | Rachis winged; leaflets<br>40 - 60 pairs .....                          | 7. <i>C. mimosoides</i><br>subsp. <i>mimosoides</i> |



- b. Rachis terete; leaflets 3 - 5 pairs ..... 9. *C. occidentalis*  
 7a. Leaflets acuminate ..... 5. *C. floribunda*  
 b. Leaflets obtuse ..... 8  
 8a. Erect foetid herbs; leaflets 3 pairs  
 with obtuse apex; pods without lines ..... 10. *C. tora*  
 b. Shrubs; leaflets 2 - 4 pairs with acute apex;  
 pods with horizontal lines ..... 2. *C. bicapsularis*  
 9a. Flowers in dense spicate heads, not  
 closeley packed by bracts, pods winged ..... 1. *C. alata*  
 b. Flowers 1 or 2 - 3, closely packed  
 by bracts; pods not winged ..... 3. *C. didymobotrya*

1. *Cassia alata* L., Sp. Pl. 378. 1753; Baker in Hook. f., Fl. Brit. India 2 : 264. 1878; Haridasan & Rao, For. Fl. Meghalaya 1 : 319. 1985; Malick & Safui in J. Econ. Tax. Bot. 10 : 4. 1987. *Senna alata* Roxb., Fl. Ind. 2 : 319. 1832.

Mani.: *Daopata*.

Shrubs up to 4 m high with thick downy branches; bark greenish. Leaves without glands, rachis stout, channelled with slightly margined ridges; stipules persistent, auricled at base, leaflets 4 - 15 × 2.5 - 6 cm, larger towards the tip, oblong, obovate-oblong, emarginate or rounded, mucronate at tip, unequal at base, glabrous above, slightly downy beneath; nerves much prominent beneath. Racemes up to 30 cm long, dense flowered. Flowers bright yellow in dense spike. Pods 10 - 20 cm, compressed, with a crenulate wing along the middle on each valve, appearing 4-angled.

Fl. & Fr. : September - April.

*Specimens examined* : Aglapur, Malick 710; Kangpokpi, Malick 1398 (BSIS); Imphal, Deb 1049 (CAL)

Leaves are used for skin diseases; plant is poisonous to livestock and fish.

2. *Cassia bicapsularis* L., Sp. Pl. 376. 1753; Baker in Hook. f., Fl. Brit. India 2 : 263. 1878; Kanjilal *et al.*, Fl. Assam 2 : 132. 1938; Deb in Bull. Bot. Surv. India 3 : 261. 1961.

Shrubs ca 1.5 m high; leaf rachis with one or two glands between the lower pairs of leaflets; leaflets 2 - 4 pairs, 2 - 3 × 1 - 2 cm, obovate, obtuse or rounded at apex, membranous, glabrous, glaucous, beneath. Flowers in peduncled racemes, yellow; petals just twice the length of calyx. Pods 7.5 - 14 × 1 - 1.5 cm, turgid cylindric, marked with horizontal lines; seeds compressed.

Fl. & Fr. : September - February.

*Specimens examined* : Imphal valley, Deb 911 (CAL).

A native of tropical America, naturalised in the waste lands in the state.

3. *Cassia didymobotrya* Fresen in Gl. 22 : 53. 1839; Deb in Bull. Bot. Surv. India 3 : 261. 1961.

Mani. : *Daopata*.

Tall shrubs or small trees, ca 3 m high; young shoots puberulous first than pubescent. Leaves 15 - 30 cm long; rachis eglandular or with a rudimentary glands between leaflets; leaflets 8 - 16 pairs, ovate-oblong or oblanceolate-oblong, oblique at base, obtuse or mucro at apex, pubescent. Flowers closely packed with elliptical or ovate imbricating caducous bracts, solitary or 2 - 3 at the end of the branches; sepals equal in length, the posterior broader; petals obtuse; legumes 2-valved, linear flat, oblong.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Imphal valley, *Deb* 2736 (CAL).

4. *Cassia fistula* L., Sp. Pl. 377, 1753; Baker in Hook. f., Brit. India 2 : 161, 1878; Deb in Bull. Bot. Surv. India 3 : 261, 1961, *C. rhombifolia* Roxb., Fl. Ind. 2 : 334, 1832.

Fig. 44

Mani. : *Chaohi, Chahu & Chahui*.

Deciduous medium sized trees with spreading crown; bark grey, smooth, with horizontal wrinkles. Leaves compound with 4 - 8 pairs, leaflets, opposite, ovate or elliptic-oblong, cuneate at base, glabrous above, silvery pubescent beneath. Flowers yellow, 4 - 5 cm across, in axillary lax drooping racemes; stamens 10, all antheriferous. Pods cylindrical, 30 - 60 × 2.5 cm, indehiscent.

*Fl. & Fr.* : April - February.

*Specimens examined* : Chingnairong, *Deb* 752 (CAL); Chandrapur, *Maliek* 776 (BSIS).

Wood very hard, durable and used for house posts; fruits are medicinal, bark is used for tanning.

5. *Cassia floribunda* Cav., Deser. 132, 1802; Balakr., Fl. Jowai 1 : 175, 1981. *C. laevigata* Willd., Enum. Hort. Berol. 441, 1809; Kanjilal *et al.*, Fl. Assam 2 : 132, 1938; Deb in Bull. Bot. Surv. India 3 : 262, 1961.

Mani. : *Thounam*.

Under shrub, 1 - 4 m high, leaflets 3 - 5 pairs, ovate-elliptic, rounded or cuneate at base, acuminate, sometimes acute; rachis 5 - 13 cm with more than 1-gland. Flowers 2 - 3 cm across, yellow, in 5 - 12 cm long, corymbose racemes. Pods sub-cylindrical, 5 - 10 × 1 - 1.5 cm, linear with 40 - 55 seeds.

*Fl. & Fr.* : January - December.

*Specimens examined* : Imphal, *Deb* 911 (CAL); Imphal, *s.loc.*, *Bal* 4465 (BSIS).

6. *Cassia hirsuta* L., Sp. Pl. 378, 1753; Baker in Hook. f., Fl. Brit. India 2 : 263, 1878; Kanjilal *et al.*, Fl. Assam 2:131, 1938; Deb in Bull. Bot. Surv. India 3 : 261, 1961.

Mani. : *Thounam*.

Tall herbs or an under shrub ca 1.5 m high, all parts hirsute with densely spreading hairs; leaf rachis 10 - 15 cm long, with a solitary gland at the base; leaflets



Fig. 44 : A flowering twig of *Cassia fistula* L.

3 - 5 pairs, 2.5 - 6 × 1.75 - 3.75 cm, ovate - oblong, oblong - lanceolate, oblique at base, acuminate. Flowers in axillary or terminal short peduncles, ca 1.6 cm across, yellow; stamens 10, upper 3 reduced to the staminodes. Pods 7 - 13 × 0.3 - 0.5 cm, sub-falcate, indented between seeds, thickened at sutures; seeds 20 - 30, pale-brown.

*Fl. & Fr.* : July - December.

*Specimens examined* : Kangchok, Deb 128 (CAL).

7. *Cassia mimosoides* L., Sp. Pl. 379, 1753; Baker in Hook. f., Fl. Brit. India 2 : 266, 1878; Kanjilal *et al.*, Fl. Assam 2 : 133, 1938; Deb in Bull. Bot. Surv. India 3 : 262, 1961.

Tall herb or under shrub. Leaves 3 - 12 × 0.8 - 1.5 cm, serrate; leaflets 40 - 60 pairs, oblong, 0.3 - 0.8 × 0.1 - 0.2 cm, truncate at base, acute - mucronate. Flowers yellow ebracteolate in axillary or extra-axillary racemes; stamens 10, all fertile. Pods 2.5 - 5 × 0.3 - 0.5 cm, flat, dehiscent with 18 - 25, brown seeded.

subsp. *mimosoides*

*Fl. & Fr.* : April - October.

*Specimens examined* : Ukhrul, Mukerjee 3305; Irong, Meebold 6344; Imphal valley, Deb 1054, 1109 (CAL); Litan, Chauhan 94628 (ASSAM).

8. *Cassia nodosa* Buch.-Ham, ex Roxb., Fl. Ind. 2 : 336, 1832; Baker in Hook. f., Fl. Brit. India 2 : 261, 1878; Deb in Bull. Bot. Surv. India 3 : 262, 1961.

Mani.: *Chohui*.

Middle sized trees with dark brown bark, wood moderately hard, red. Leaves 20 - 50 cm long; stipules crescent shaped, cuspidate, deciduous; leaflets 12 - 16 pairs, oblong or elliptic-oblong, 2.5 × 1.3 cm, retuse or emarginate, glabrous above, pubescent beneath; stipules narrow, falcate. Flowers pink in corymbose racemes; bracts and bracteoles pubescent; calyx red, pubescent; stamens 10, all antheriferous not produced into a mucro. Pods 20 - 35 × 1.3 cm, transversely ribbed.

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

*Specimens examined* : Manipur valley, Deb 2485 (CAL); Chandrapur, Mallick 782 (BSIS).

Avenue tree.

9. *Cassia occidentalis* L., Sp. Pl. 377, 1753; Baker in Hook. f., Fl. Brit. India 2 : 262, 1878; Deb in Bull. Bot. Surv. India 3 : 262, 1961. *C. planisiliqua* L., Sp. Pl. 377, 1753. *Senna occidentalis* (L.) Roxb., Fl. Ind. 2 : 345, 1832.

Mani. : *Thaonani*

Annual herb or under shrub with foetid smell; leaf rachis channelled with a gland at the base, stipule obliquely cordate, acuminate; leaflets 3 - 5 pairs, ovate to oblong-lanceolate, acute to acuminate, ciliate at margin, glabrous above, pubescent beneath. Flowers yellow, in 2 - 4 flowered axillary or terminal corymbose

racemes. Pods linear, sub-falcate. 8-12 × 6-8 cm; seeds 20-30, compressed, pale brown.

*Fl. & Fr.* : April - January.

*Specimens examined* : Imphal, *Deb* 250 (CAL); Litan, *Mukerjee* 3352 (CAL); Imphal, *Malick* 1341, Kangrendhar, *Malick* 1009 (BSIS); Litan, *Chauhan* 94822 & 94829 (ASSAM).

Plant part - roots, leaves and seeds are medicinal.

10. *Cassia tora* L., Sp. Pl. 376. 1753; Baker in Hook. f., Fl. Brit. India 2 : 263. 1878, *p.p.*; Deb in Bull. Bot. Surv. India 3 : 262. 1961. *Senna tora* (L.) Roxb., Fl. Ind. 2 : 240. 1832.

Mani. : *Thaonam - Macha*.

An erect foetid herb or under shrub, 0.3-1.5 m. Leaf rachis grooved, puberulous, with 2 subulate glands between two lower pairs of leaflets; leaflets 3-pairs, smaller downwards, obovate, mucronate, obliquely cuneate at base, acute, glabrous above, pubescent beneath. Flowers yellow, about 1.5 cm across, in pairs on short axillary peduncles; pedicels 0.5-1 cm; stamens 7, rounded at the apex. Pods 10-12 cm long, terete, sub-tetragonous, imperfectly septate between seeds, 20-30 seeded; seed arcole broad, 1.5-2 mm wide, testa not muricated.

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

*Specimens examined* : Imphal, *Deb* 132 (CAL); Nungba to Bishenpur, *Malick* 1235 (BSIS); Keibul Lamjan National Park, *Chauhan* 95128 (ASSAM).

Seeds having medicinal value and also used for tanning.

#### 4. *Delonix* Rafin.

*Delonix regia* (Boj. ex Hook.) Rafin, Fl. Tellur. 2 : 92. 1837; Deb in Bull. Bot. Surv. India 3 : 262. 1961. *Poinciana regia* Boj. ex Hook. in Mag. 56 : t. 2884. 1829; Baker in Hook. f., Fl. Brit. India 2 : 260. 1878.

Medium sized deciduous trees up to 30 m high with spreading crown. Leaves 20-75 cm long; leaflets 0.5-2 × 0.5 cm, oblong, obtuse, adpressed pubescent or glabrescent beneath. Flowers 7-9 cm across, dark red with posterior petal white or variegated, in terminal corymbs; stamens 10, declinate, free, long exerted, filaments villous below. Pods long, laterally compressed, 30-100 × 4-10 cm, black when ripe, many seeded.

*Fl. & Fr.* : March - August.

*Specimens examined* : Imphal, *Deb* 1218 (CAL).

#### 5. *Saraca* L.

*Saraca asoca* (Roxb.) de Wilde in Blumea 15 : 393. 1967; Balakr., Fl. Jowai 1 : 174. 1981. *Tmesia asoca* Roxb. in Asiat. Res. 4 : 365, t. 1, 1799. *Saraca indica* non L.; Bedd., Fl. Sylv. 1 : 57, t. 57. 1869; Baker in Hook. f., Fl. Brit. India 2 : 271. 1878; Kanjilal *et al.*, Fl. Assam 2 : 136. 1938; Deb in Bull. Bot. Surv. India 3 : 262. 1961.

Mani. : *Ashok*.

Middle sized evergreen trees up to 12 m tall, with umbrella shaped canopy. Leaves 8 - 12 foliolate; leaflets 3 - 6 pairs, 6 - 18 × 3 - 6 oblong-lanceolate, cuneate or rounded at base, acute to acuminate, glabrous. Flowers bright yellow, orange or red, 2.5 - 3.5 cm across, in compact 3 - 15 cm corymbose cymes, fragrant; petals absent; sepals petaloid; stamens much exserted, anthers purple. Pods oblong, 4 - 20 × 2 - 5 cm, compressed, tapering at both ends, 4 - 8 ovoid seeded.

*Fl & Fr* : March - October.

*Specimens examined* : Jiri area, *G. Watt s.n.*, (CAL).

### 6. *Tamarindus* L.

*Tamarindus indica* L., Sp. Pl. 34, 1753; Baker in Hook. f., Fl. Brit. India 2:273, 1878; Kanjilal *et al.*, Fl. Assam 2:135, 1938; Deb in Bull. Bot. Surv. India 3 : 262, 1961.

Large trees up to 20 m high, crown umbrella shaped, bark rough and warty, dark-grey. Leaves 5 - 12 cm long, paripinnate; stipules linear-lanceolate, caducous; leaflets 10 - 15 pairs, 0.7 - 1.8 × 0.3 - 0.6 cm, oblong, ovate-oblong, notched or slightly mucronate at apex, obliquely cuneate at base, glabrous. Flowers yellow with reddish tinged, 1 - 3 cm long, in 3 - 6 cm long terminal racemes; stamens only 3, fertile, deep red, versatile. Pods 5 - 20 × 2 - 2.5 cm, indehiscent, slightly laterally compressed, bearded with reddish-brown pulp.

*Fl. & Fr* : April - November.

*Specimens examined* : Cultivated in Imphal valley, *Deb* 2477 (CAL).

Fruits edible and medicinal, unripe fruit is a source of tartaric acid; bark and leaves are used for tanning.

## 65. MIMOSACEAE

R. Br. in Flinders Voy. Terra Austr. 2: 551, 1814

("Mimoseae").

(*A. S. Chauhan.*)

- |     |   |                    |
|-----|---|--------------------|
| 1a. | Stamens definite, usually 5 - 10 in number .....                    | 2                  |
| b.  | Stamens indefinite .....  | 6                  |
| 2a. | Liana with deciduous tendrils;<br>flowers in elongated spikes ..... | 5. <i>Entada</i>   |
| b.  | Trees or scandent shrubs or woody herbs; flowers in heads .....     | 3                  |
| 3a. | Armed shrubs or under shrubs;<br>flowers in heads, pink .....       | 7. <i>Mimosa</i>   |
| b.  | Unarmed trees or shrubs .....                                       | 4                  |
| 4a. | Aquatic or semi-aquatic; anthers<br>with apical glands .....        | 8. <i>Neptunea</i> |
| b.  | Terrestrials; anthers without apical glands .....                   | 5                  |
| 5a. | Stamens monadelphous; flowers pale-yellow .....                     | 9. <i>Parkia</i>   |
| b.  | Stamens free; flowers white .....                                   | 6. <i>Leucaena</i> |

- 6a. Stamens free; heads usually yellow ..... 1. *Acacia*
- b. Stamens monadelphous ..... 7
- 7a. Shoots bearing stipular spines; sutures of pods thickened ..... 4. *Calliandra*
- b. Trees without spines; sutures of pods usually not thickened ..... 8
- 8a. Pods straight; seeds ex-arillate ..... 2. *Albizia*
- b. Pods coiled; seeds arillate ..... 3. *Archidendrou*

**I. Acacia Mill.**

- 1a. Climbing or scandent shrubs ..... 2
- b. Erect shrubs or trees ..... 3
- 2a. Branchlets pruinose; heads yellow ..... 5. *A. pennata*
- b. Branchlets not pruinose; heads pale-white. .... 6. *A. pruinescens*
- 3a. Leaves reduced to simple elliptic petioles i. e. phyllodes ..... 3. *A. melanoxylon*
- b. Leaves bipinnate ..... 4
- 4a. Leaves with glands on petioles; branchlets unarmed ..... 1. *A. decurrens*
- b. Leaves without glands on petioles; branchlets with long straight spines ..... 5
- 5a. Ovary pilose; pods moniliform ..... 4. *A. nilotica*  
subsp. *indica*
- b. Ovary glabrous; pods not moniliform ..... 2. *A. farnesiana*

1. *Acacia decurrens* Willd., Sp. Pl. 4 : 1072. 1806. *A. mearnsii* De Willd., Pl. Bequaert, 3 : 61. 1925; Deb in Bull. Bot. Surv. India 3 : 263. 1961.

Trees, up to 10 m tall; branches angled, pubescent. Leaves bipinnate, 10 - 15 cm; pinnae 8 - 15 pairs; leaflets 30 - 40 pairs, 2 - 12 × 0.6 - 1.2 mm. linear, sub-acute, glabrous or finely pubescent, gland at base of each pinnae. Flower heads globose, ca 5 mm diam., in axillary racemes or terminal panicles; sepals ca 0.5 mm; petals ca 1 mm; stamens ca 2.5 mm. Pods 8 - 12 cm long, linear-oblong, compressed, narrowed between the seeds; seeds 7 - 12, ellipsoid, black.

*Fl. & Fr.* : February - May.

*Specimens examined* : Imphal valley. Deb 1406 (CAL).

Introduced by the State Forest Department, Manipur for its timber and bark which are used for tanning.

2. *Acacia farnesiana* (L.) Willd., Sp. Pl. 4 : 1083. 1806; Baker in Hook. f., Fl. Brit. India 2 : 292. 1878; Ohashi, Fl. E. Himal. 3 : 54. 1975. *Mimosa farnesiana* L., Sp. Pl. 521. 1753. *Vachellia farnesiana* (L.) Wight & Arn.: Prodr. 272. 1834; Deb in Bull. Bot. Surv. India 3 : 264. 1961.

Mani.: Bilaitt Babul & Chingong lei.

Shrubs ca 3 m tall with slender zigzag branches with dots; spines stipular, straight, dull white; rachis with petiolar glands. Leaves with 3 - 4 pairs of pinnae; leaflets 10 - 22 pairs, 0.3 - 0.4 × 0.1 cm, linear-oblong, greyish-green, coriaceous. Flowers bright-yellow, fragrant, in 1 cm across heads. Pods 4 - 7.5 cm, oblique, cylindrical, dullbrown, 2-seeded.

Fl. & Fr. : October - February.

*Specimens examined* : Imphal valley, Deb 1095 (CAL).

3. *Acacia melanoxylon* R. Br. in Ait., Hort. Kew ed. 2. 5 : 462. 1813; Deb in Bull. Bot. Surv. India 3 : 263. 1961.

Small trees, 5 - 7 m high. Leaves reduced to elliptic flattened petioles (phyllodes), 8 - 12 × 0.5 - 2.5 cm, leathery, glabrous, usually curved. Flower heads ca 0.7 cm in diam., 2 - 5 in short axillary or terminal racemes; calyx small ca 1 mm; petals ca 2 mm, stamens ca 3 mm. Pods ca 5 - 10 cm long, compressed, leathery, falcate; seeds 5 - 10, ellipsoid, black, glossy.

Fl. & Fr. : December - March.

*Specimens examined* : Koupru, Deb 1543 (CAL); Litan, Chauhan 94601 (ASSAM).

Planted as an avenue tree on both sides of the Imphal-Ukhrul road, timber is dark brown, valuable.

4. *Acacia nilotica* (L.) Willd. ex Delile subsp. *indica* (Benth.) Brenan in Kew Bull. 12 : 84. 1957; Deb, Fl. Tripura 1 : 126. 1981. *A. arabica* (Lam.) Willd. var. *indica* Benth. in Hook., Lond. J. Bot. 1 : 500. 1842. *A. arabica sensu* Baker in Hook. f., Fl. Brit. India 2 : 293. 1878; Deb in Bull. Bot. Surv. India 3 : 262. 1961.

Small trees with dark brown branchlet finely grey downy. Leaves 2 - 6 cm long, main rachis with several glands; leaflets 10 - 20 pairs, coriaceous; peduncles bracteate above the middle, short, densely grey downy. Flowers yellow, fragrant; calyx campanulate. Fruits a lomentum, solitary 6 - 15 cm, densely grey downy, constricted between the seeds, 8 - 12 seeded.

Fl. & Fr. : June - December.

*Specimens examined* : Singhagat, Chauhan 95073 (ASSAM).

Bark used for tanning, plants is a good source of gum; leaves are fodder for goat; under cultivation.

5. *Acacia pennata* (L.) Willd., Sp. Pl. 4 : 1090. 1806; Baker in Hook. f., Fl. Brit. India 2 : 297. 1878; Haridasan & Rao, For. Fl. Meghalaya 1 : 329. 1985; Malik & Safui in J. Econ. Tax. Bot. 10 : 4. 1987. *Mimosa pennata* L., Sp. Pl. 1507. 1753. *Acacia pennata* var. *arrophula* (D. Don) Baker in Hook. f. l. c. 2 : 298. 1878.

Scandent shrubs, prickly, young parts pubescent; bark grey. Leaf rachis up to 20 cm long, with a large cup shaped gland near the base and 2 - 4 smaller ones between the upper pinnae; pinnae 4 - 10 cm long, 8 - 15 pairs; leaflets 30 - 50 pairs; 0.4 - 0.7 × 0.05 cm, linear-oblong or oblong, apex obtuse; midribs oblique. Flowers



in pedunculate heads on large terminal leafy panicles, pale-white. 0.8 - 1.4 cm across, 1 - 4 together. Pods 10 - 15 × 2.5 - 5.2 cm, strap shaped, reddish to dark brown, shining when mature; seeds 8 - 14.

*Fl. & Fr.* : July - January.

*Specimens examined* : Pacho, *Malick* 739; Jirimukh, *Malick* 844 (BSIS); Way to Charmao, *G. Watt* 5170 (CAL).

Leaves and bark are medicinal; stem and fruits are used for fish poison.

6. *Acacia pruinescens* Kurz in *J. Asiat. Soc. Bengal* 45 (2) : 296, 298, 1876; Deb in *Bull. Bot. Surv. India* 3 : 263, 1961; Balakr., *Fl. Jowai* 1 : 179, 1981.

Naga : *Te-Bam*.

Large climbing prickly shrub. Leaves bipinnate, main rachis 10 - 25 cm long; pinnae 4 - 10 cm, pinnules 40 - 60 pairs, linear - oblong, cordate or sub-cordate at base, acute, basal gland large, terminal one or two smaller. Flowers yellow in axillary terminal paniced heads. 0.8 - 4.3 cm across; bracts linear - lanceolate, tomentose; pedicels pubescent. Pods elliptic - oblong, flat, brown.

*Fl. & Fr.* : April - November.

*Specimens examined* : Chingmairong, *Deb* 767 (CAL).

## 2. *Albizia* Durazz.

- 1a. Liana or large straggling shrubs; not pulvinus ..... 5. *A. myriophylla*
- b. Erect trees; pulvinus ..... 2
- 2a. Leaves usually with 1-pair of pinnae; leaflets 1 - 3 pairs ..... 3. *A. lucidior*
- b. Leaves with more than 1-pair of pinnae; leaflets more than 5 paired ..... 3
- 3a. Flower head in corymbose racemes; flowers pedicillate ..... 4
- b. Flower heads in axillary or terminal panicles; flowers sessile ..... 5
- 4a. Leaflets 5 - 12 pairs; oblique at base; stamens greenish-white ..... 2. *A. lebbeck*
- b. Leaflets 10 - 20 pairs, truncate at base; stamens pink or purple ..... 4. *A. mollis*
- 5a. Stipule small or minute; leaflets up to 15 pairs ..... 6
- b. Stipules large; leaflets 20 - 60 pairs, falcate ..... 1. *A. chinensis*
- 6a. Pinnae 2 - 6 pairs; rachis & calyx teeth glabrous ..... 7. *A. procera*
- b. Pinnae 10 - 15 pairs; rachis & calyx teeth pubescent ..... 6. *A. odoratissima*

1. *Albizia chinensis* (Ozb.) Merr. in Amer. J. Bot. 3 : 575. 1916; Deb in Bull. Bot. Surv. India 3 : 263. 1961; Balakr., Fl. Jowai 1 : 177. 1981. *Mimosa chinensis* Osb., Dag. Ostind. Resa 233. 1757. *M. stipulata* Roxb., Fl. Ind. 2 : 549. 1832. *Albizia stipulata* (Roxb.) Boivin in Encycl. 19 (2) : 33. 1838; Baker in Hook. f., Fl. Brit. India 2 : 300. 1878; Kanjilal *et al.*, Fl. Assam 2 : 167. 1938.

Mani. : *Luang Khoi & Jairi & Khok.*

Trees up to 30 m high; crown spreading. young branches, rachis and inflorescence yellow, pubescent; bark grey or dark brown. Leaves bipinnate; rachis 9-45 cm, one large gland at base, one or more in between pinnae at tip, pubescent; stipules large, obliquely cordate, acuminate; leaflets 20-40 pairs, oblique, oblong lanceolate, base truncate, ciliate, broader or acute at both ends, midrib very close to upper edge. Flowers sessile, yellowish or pinkish-white, 15-25 flowers together in 1.5-2.0 cm across heads. Pods 7.5-20 × 1-3 cm, oblong, light brown, flat.

Fl & Fr. : May - October.

Specimens examined : s. loc. Deb 2420 (CAL).

Wood is used for furniture and tea-boxes; source of gum.

2. *Albizia lebbeck* (L.) Benth. in Hook., Lond. J. Bot. 3 : 87. 1844; Baker in Hook. f., Fl. Brit. India 2 : 298. 1879; Deb in Bull. Bot. Surv. India 3 : 263. 1961.; Kanjilal *et al.*, Fl. Assam 2 : 165. 1938; Balakr., Fl. Jowai 1 : 177. 1981. *Mimosa lebbeck* L., Sp. Pl. 516. 1753. Fig. 45

Mani. : *Khok & Uil.*

Large deciduous trees up to 20 m tall, with a spreading crown, bark greyish; rachis 7-15 cm long, glandular at base and near the tip; pinnae 5-20 cm, 2-6 pairs; leaflets 5-12 pairs, 3.4-1.9 cm, obovate, oblong, obtuse or retuse, oblique base, pubescent beneath, midrib not close to upper edge, 2-3 nerved at base. Flowers ca 1.5 cm long, greenish-white, solitary or 15-30 flowers in globose umbellate heads. Pods 15-30 × 3-4.5 cm, yellowish-brown, thickened at sutures. 3-12 seeded.

Fl. & Fr. : April - January.

Specimens examined : Imphal valley. Deb 2419 (CAL).

Wood hard and durable, good for construction, furniture and also used as fire wood.

3. *Albizia lucidior* (Stuedner) Nielson in Adansonia 19 (2) : 222. 1979; Ohashi in Hara & Williams, Enum. Fl. Pl. Nepal 2 : 105. 1979; Haridasan & Rao, For. Fl. Meghalaya 1 : 334. 1985. *Inga lucidior* Stuedner, Nom. Bot. ed. 2 : 810. 1840. *Albizia lucida* (Roxb.) Benth. in Hook., J. Bot. 3 : 86. 1844; Baker in Hook. f., Fl. Brit. India 2 : 299. 1878; Kanjilal *et al.*, Fl. Assam 2 : 162. 1938; Deb in Bull. Bot. Surv. India 3 : 263. 1961. *Mimosa lucida* Roxb., Fl. Ind. 3 : 544. 1832.

Mani. : *Luang - Khoi.*

Middle sized evergreen trees up to 20 m high, branches spreading, acute; bark dark brown, hard. Leaves bipinnate; rachis 1.5-5 cm long, with a prominent cup

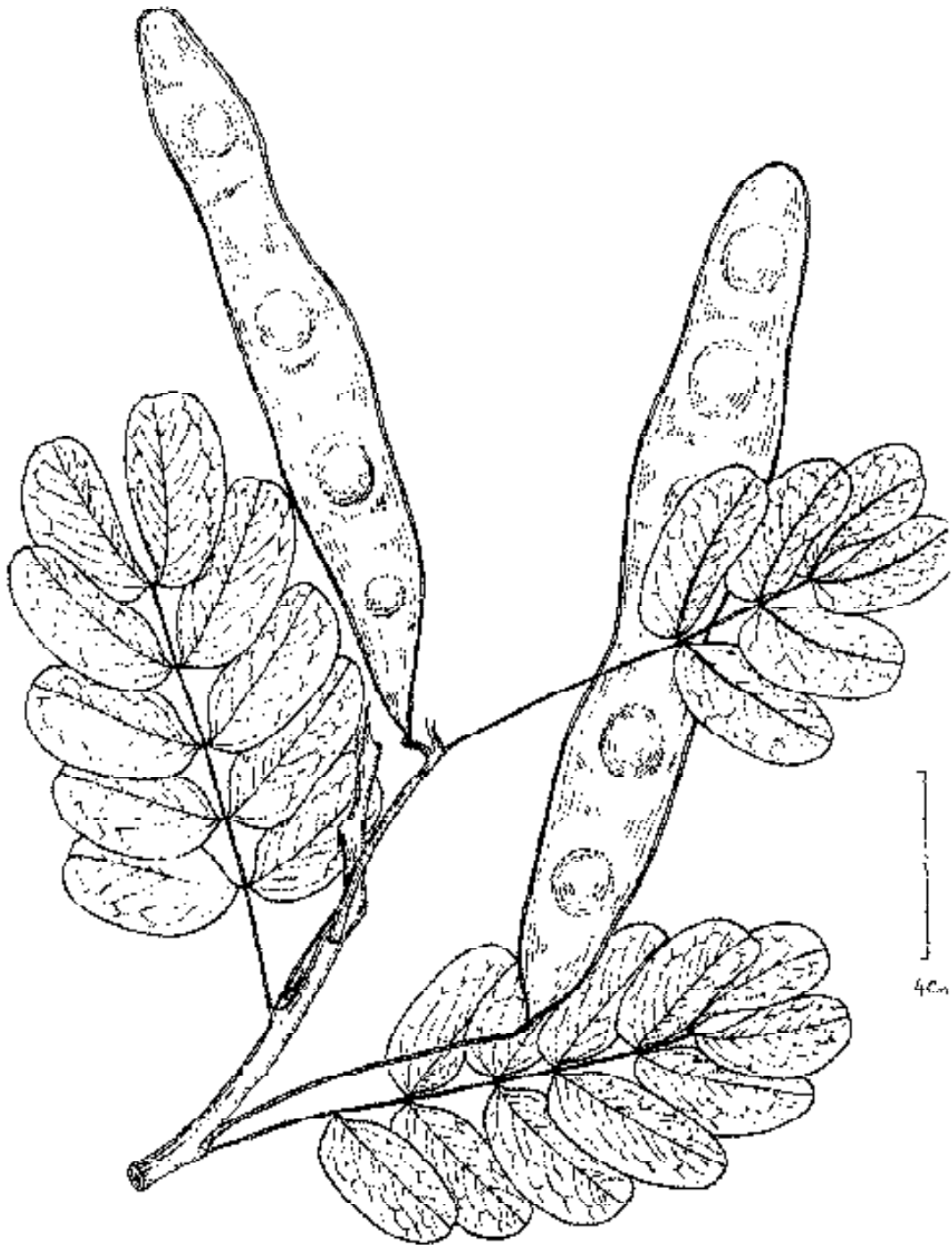


Fig. 45 : A fruiting twig of *Albizia labbeck* (L.) Benth.

shaped gland at the base; pinnac usually 1 - pair, basal smaller, terminal pair usually largest, oblong - lanceolate, glabrous, oblique at base, acuminate or acute, midrib often reddish. Flowers dull white or pale yellow about 2.5 cm across in sub-umbellate corymbose panicles. Pods 15 - 25 × 2.5 - 3 cm, deep brown, shining, attenuated at both ends. 4 - 8 seeded.

*Fl. & Fr.* : April - February.

*Specimens examined* : Neechingard, Meehold 5331 (CAL).

Boles are used as poles and supports, also used as fire wood.

4. *Albizia mollis* Boivin. in *Encycl.* 19 : Siecl. 2 : 33. 1839; Haridasan & Rao. *For. Fl. Meghalaya* 1 : 335. 1985. *A. julibrissin* Durazz. var. *mollis* Benth. ex Baker in Hook. f., *Fl. Brit. India* 2 : 300. 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 168. 1938.

Moderate size trees up to 20 m tall; crown irregular; lenticellate, irregularly fissured; rachis 7 - 28 cm long; tomentose; pinnac 8 - 24, 3 - 10 cm long; leaflets 10 - 20 pairs, 0.6 - 1.5 × 3.0 - 0.5 cm, oblong, truncate at base, cuspidate, mucronate, hairy. Flowers red or pinkish-red in 5 - 7 cm long racemose heads; corolla 0.5 - 0.8 cm long, greenish-yellow, tomentose; stamens pink or rose coloured. Pods 5-10 × 1- 1.5 cm, yellowish brown, pubescent when young. 2 - 6 seeded.

*Fl. & Fr.* : March - October.

*Specimens examined* : Khongoi valley. G. Watt 6767 (CAL).

5. *Albizia myriophylla* Benth., *London J. Bot.* 3 : 90. 1844; Baker in Hook. f., *Fl. Brit. India* 2 : 300. 1878; Nielsen in *Adansonia* 19 (2) : 227. 1979. *A. myriophylla* Benth. var. *foliolosa* Baker in Hook. f., *l.c.* 2 : 310. 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 169. 1938.

Large woody climber or straggling shrubs; young parts brown, tomentose. Rachis 10 - 20 cm long, with a large cup shaped gland near the base; pinnac 12 - 20 pairs, 2.6 - 5.1 cm long; leaflets 25 - 50 pairs, ca 0.5 cm long, linear, slightly falcate, oblique at base, midrib or leaf central or nearly so. Flowers sessile; calyx and corolla pubescent outside. Pods 10 - 15 cm long, tapering at both the ends, glossy brown, 6 - 10 seeded.

*Fl. & Fr.* : March - January.

*Specimens examined* : North Manipur, Mukerjee s.n. (CAL).

6. *Albizia odoratissima* (L. f.) Benth. in Hook., *London J. Bot.* 3: 88. 1844; Baker in Hook. f., *Fl. Brit., India* 2: 299. 1878; Kanjilal *et al.*, *Fl. Assam* 2: 164. 1938; Haridasan & Rao, *For. Fl. Meghalaya* 1: 336. 1985. *Mimosa odoratissima* L. f., *Suppl.* 437. 1781.

*Mani.*: *Un.*

Moderate sized trees, 15 - 25 m tall; crown spreading, young parts pubescent; branches with linear lenticels. Leaflets 10 - 15 pairs, 1.1 - 2.5 × 0.4 - 1.0 cm, oblong, obovate or obliquely oblong, apex obtuse, with micro. glabrous above, hairy beneath. Flowers white or yellowish- white, in heads up to 3 cm across; calyx and

corolla hairy. Pods 10 - 20 × 2 - 3 cm, oblong, tapering at both ends, flat, reddish or dark brown, 8 - 12 seeded.

Fl. & fr. : March - January.

*Specimens examined* : North Manipur, Mukerjee, *s.n.* (CAL).

7. *Ahizia procera* (Roxb.) Benth. in Hook., London J. Bot. 3: 89, 1844; Baker in Hook. f., Fl. Brit. India 2 : 299, 1878; Kanjilal *et al.*, Fl. Assam 2 : 163, 1938; Deb in Bull. Bot. Surv. India 3 : 263, 1961, & Fl. Tripura 1 : 131, 1981, *Afinosa procera* Roxb., Pl. Corom. 2 : 12, t. 121, 1798.

Mani.: *Khal*.

Tall semi-deciduous trees up to 25 m high; crown spreading; bark grey or yellowish brown. Leaves bipinnate; rachis up to 40 cm long with a large gland at base; pinnae 2 - 6 pairs, 12 - 24 cm; leaflets oblong, oval or rhomboid-oblong, rounded, mucronate, obtuse, base oblique, cuncate. Flowers sessile, yellowish white in solitary or fascicled heads in a large terminal panicles. Pods 8 - 20 × 1.5 - 2.5 cm, reddish - brown, glabrous, 6 - 12 seeded.

Fl. & Fr. : May - February.

*Specimens examined* : Mambar forest, Meebold 5330; G. Watt 6040; Deb 2419 (CAL).

Wood hard, durable and is used for posts, pillars, agricultural implements, also source of firewood.

### 3. *Archidendron* F. V. Muell.

*Archidendron clypearia* (Jack.) Nicolson in Adansonia 19 (1) : 15, 1979. *Inga clypearia* Jack. Malayam Misc. 2 (7) : 78, 1822. *Pithecellobium clypearia* (Jack.) Benth. in London J. Bot. 3 : 209, 1844; Baker in Hook. f., Fl. Brit. India 2 : 305, 1878; Deb in Bull. Bot. Surv. India 3 : 264, 1961. Fig. 46

Mani.: *Ardahpui*

Middle sized trees up to 15 m high, with prominent angulate branchlets. Leaves bipinnate, with 2 - 6 pairs of pinnae; rachis 6 - 20 cm, with a gland at base; leaflets 5 - 16 pairs, ovate, rhomboid, obtuse or acute, 0.5 - 4.5 × 0.3 - 1.5 cm. Flowers stalked, white or yellowish white in umbellate cymes; ovary densely sericeous or puberulous; calyx ca 3 mm, pubescent; corolla ca 8 mm; stamens numerous, ca 1.5 cm long. Pods 16 - 20 × 1.0 - 1.5 cm, circinate, sinuate along ventral suture; seeds 8 - 10, purplish or bluish-black.

Fl. & Fr. : March - December.

*Specimens examined* : Moreh, Deb 687; Langool, Deb 2094; Piphima, Meebold 5153 (CAL).

### 4. *Calliandra* Benth., *nouveau genre*.

*Calliandra haematocephala* Hassk., Retzia. 216, 1848; Deb in Bull. Bot. Surv. India 3 : 263, 1961.

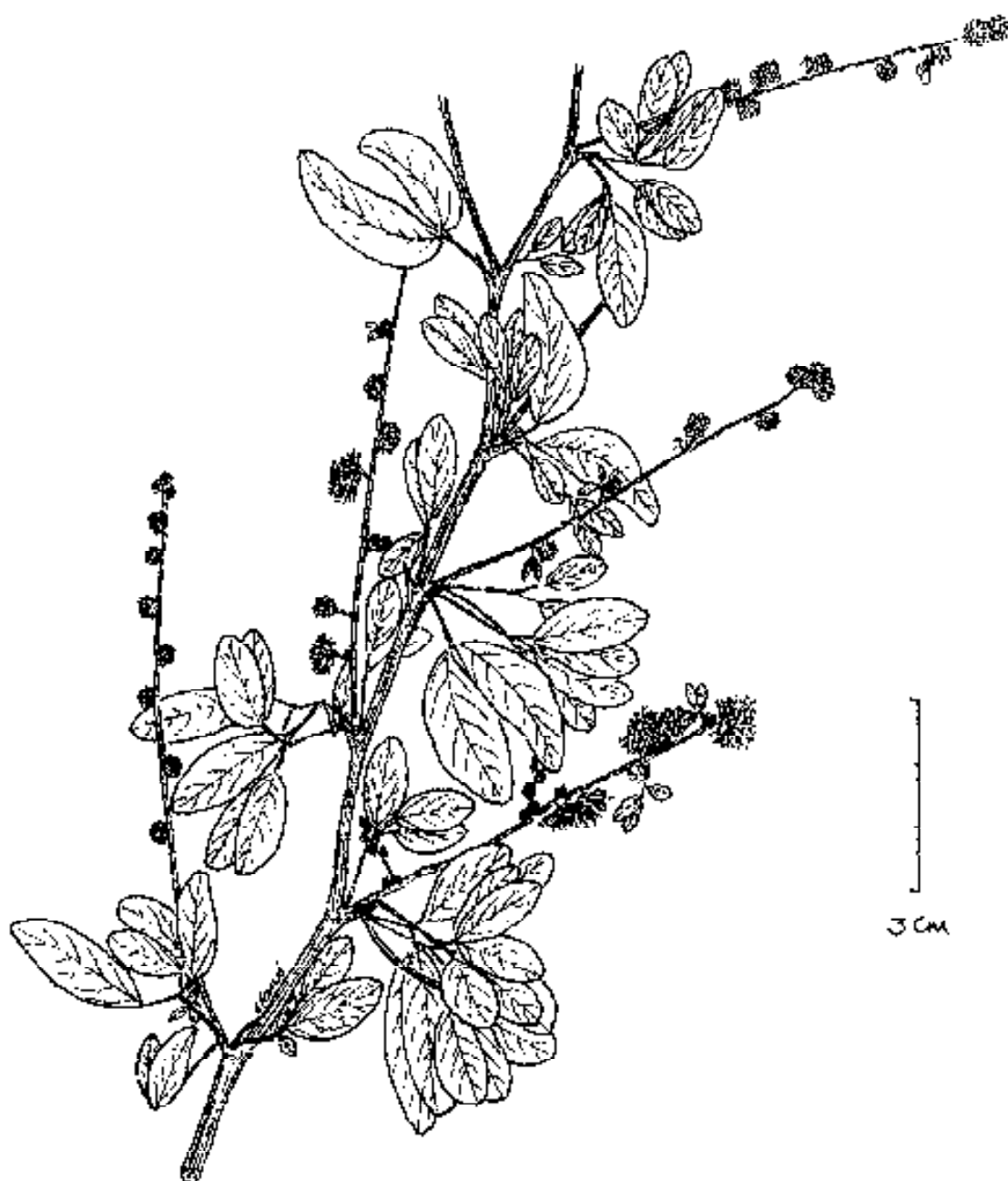


Fig. 46 : A flowering branch of *Archidendron clypearia* (Jack.) Nielson

Shrubs or small trees, up to 4 m high. Leaves bipinnate; pinnac 5 - 7 cm; petioles 1 - 1.5 cm; leaflets 4 - 5 pairs, 2.5 × 1 - 3 cm, obovate or ovate, rounded or sub-cordate at base, obtuse or sub-acute, mucronate, glabrous above pubescent beneath; stipules ca 1 cm, ovate - lanceolate, persistent. Flowers white or pinkish; in heads; calyx 0.5 cm, striate; corolla tube ca 1 cm, teeth 0.3 cm, white; stamens ca 40, white. Pods 10 - 12 × 1 - 1.5 cm, oblong - elliptic, unseptate within, 6 - 8 seeded.

*Fl. & Fr.* : February - May.

*Specimens examined* : Kakching, Deb 1252 (CAL).

Under cultivation.

### 5. *Entada* Adans.

*Entada rheedei* Spreng., Syst. Veg. 2 : 325, 1825; Britto in Mathew, Fl. Tamilnadu Carnatic 3 (1) : 542 - 543, 1983; Panigr. in Taxon 34 : 714, 1985. *E. pursaetha* DC., Prodr. 2 : 425, 1825; Deb in Bull. Bot. Surv. India 3 : 263, 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 338, 1985. *E. scandens auct non Benth.*, 1841; Baker & Hook. f., Fl. Brit. India 2 : 287, 1878; Kanjilal *et al.*, Fl. Assam 2 : 149, 1938.

Mani. : *Kangthro*.

Gigantic liana with greyish-brown or blackish bark. Leaves bipinnate, rachis up to 17 cm, ending in a long bifid tendril; pinnac 2 pairs, 5 - 10 cm long; leaflets 2 - 5 pairs, 2.5 - 7.5 × 1.5 - 3.5 cm, oblong - obovate, obtuse or acute at base, emarginate, coriaceous. Flowers 0.5 - 0.6 cm, pale-yellow, scented, in spike, 12 - 30 cm long; calyx campanulate, pubescent; corolla 5-lobed, stamens 4, free, anther tipped with deciduous glands. Pods woody, 30 - 50 × 7 - 10 cm, oblong, indented between seeds, breaking up into one seeded parts.

*Fl. & Fr.* : March - November.

*Specimens examined* : *s. loc.*, Deb 1411, 1506 (CAL); Nungba, Malick 1239 (BSIS).

### 6. *Leucaena* Benth.

*Leucaena leucocephala* (Lam.) de Wit, in Taxon 10 : 54, 1961 & *l.c.*, 24 : 349, 1975. *Mimosa leucocephala* Lam., Encycl. 1 : 12, 1785. *Leucaena glauca* Benth. in Hook., London J. Bot. 4 : 416, 1842; Baker in Hook. f., Fl. Brit. India 2 : 290, 1878; Deb in Bull. Bot. Surv. India 3 : 263, 1961.

Mani. : *Chigonglei Angouba*.

Large shrubs or small trees, 3 - 5 m tall, branches unarmed, young parts appressed hairy. Leaves bipinnate; pinnac 8 - 16 pairs. Leaflets 10 - 20 (more) pairs, 0.9 - 1.5 × 0.1 - 0.15 cm, linear - oblong, glabrous above, sparsely hairy beneath, oblique at base, apex acute, ciliate, membranous. Flowers in 1.4 - 1.6 cm across heads white. Pods 12 - 15 × 1 - 2 cm, linear - oblong, glabrous, brown.

*Fl. & Fr.* : May - October.

*Specimens examined* : Imphal, Deb 97, 365, 398 (CAL).

7. *Mimosa* L.

- 1a. Straggling shrubs, pods small *ca*  
1.5 cm long, not falcate..... 1. *M. pudica*
- b. Bushy shrubs; pods long up to 15 cm, falcate ..... 2. *M. rubicaulis*  
subsp. *himalayana*

1. *Mimosa pudica* L., Sp. Pl. 518. 1753; Baker in Hook. f., Fl. Brit. India 2 : 291. 1878; Kanjilal *et al.*, Fl. Assam 2:152. 1938; Deb in Bull. Bot. Surv. India 3 : 263. 1961.

Mani.: *Kangphal ikaithahi*.

Decumbent straggling shrub, densely prickly and bristly all over. Leaves bipinnate, sensitive; pinnae 4, digitate, 2.5 - 10 cm long, stipules linear - lanceolate; leaflets 12 - 20 pairs, 0.5 × 0.05 cm, oblong, elliptic, glabrous above, hairy beneath. Flowers pink, 0.6 - 1 cm across, globose, axillary head, covered with spreading bristles; stamens 4, exserted. Pod 1.5 cm long, linear - oblong, flat, indented, between seeds, bristly hairs on sutures.

*Fl. & Fr.* : July - December.

*Specimens examined* : Imphal, Deb 1028, 2467; s. l., C. B. Clarke 42096 (CAL); Uchathol, Malik 604; Nunga to Omamlong, Malik 1287 (BSIS).

Plants having medicinal value.

2. *Mimosa rubicaulis* Lam. subsp. *himalayana* (Gamble) Ohashi in Hara & Williams, Enum. Fl. Pl. Nepal 2 : 126. 1979. *M. himalayana* Gamble in Kew Bull. 1920; Kanjilal *et al.*, Fl. Assam 2 : 151. 1938; Haridasan & Rao, For. Fl. Meghalaya 1 : 339. 1985. *M. rubicaulis* *auct. non* Lam., 1783 ; Baker in Hook. f., Fl. Brit. India 2 : 291. 1878, *p.p.*

Bushy shrubs up to 4 m high; stems prickly obscurely ribbed. Leaves bipinnate, 10 - 18 cm long, pinnae 8 - 20, 3 - 6 cm long; leaflets 12 - 24, 0.4 - 0.7 × 0.12 - 0.3 cm, obliquely - oblong, truncate at base, mucronate, sparsely hairy. Flowers pink or pinkish - white, in 1 - 1.5 cm across heads. Pods 9 - 16 × 1.2 - 1.5 cm, falcate, oblong, undulate at margins, blackish-brown, 8 - 12 seeded.

*Fl. & Fr.* : July - December.

*Specimens examined* : Chingmairang, Deb 767 (CAL).

8. *Neptunia* Lour.

*Neptunia prostrata* (Lam.) Baillon, Bull. Soc. Linn. Par. 1 : 356. 1883; Deb in Bull. Bot. Surv. India 3 : 263. 1961 & Fl. Tripura 1 : 134. 1981. *Mimosa prostrata* Lam., Dict. 1; 10. 1783. *Neptunia oleracea* Lour., Fl. Cochinch. 654. 1790; Baker in Hook. f., Fl. Brit. India 2 : 285. 1878.

An aquatic herb with stout widely creeping or floating stems, rooting at the nodes. Leaves bipinnate, pinnae 4 - 6; leaflets sensitive, 5 - 15 pairs, about 0.8 - 1.5 cm long, oblong - obtuse, glabrous. Flowers minute in dense heads; bracts small ovate. Pods 1.3 - 2.5 cm, oblique - oblong, beaked, dehiscing early by the upper suture, 6 - 8 seeded.



*Fl. & Fr.* : July - October.

*Specimens examined* : Singamai, *Deb* 33 (CAL).

Used as a vegetable.

9. *Parkia* R. Br.

*Parkia timoriana* (A. DC.) Merr. in Philip. J. Sci. Bot. 5 : 33. 1910; Nielson in *Adansonia* 19 (2) : 340. 1980. *Inga timoriana* A. DC., Prodr. 2 : 422. 1825. *Parkia roxburghii* G. Don, Gen. Hist. 2 : 397. 1832; Baker in Hook. f., Fl. Brit. India 2 : 289. 1878; Kanjilal *et al.*, Fl. Assam 2 : 151. 1938. *P. javanica auct. non* Merr. 1913; Deb in Bull. Bot. Surv. India 3 : 263. 1961 & Fl. Tripura 1 : 134. 1981.

Mani : *Yanchak & Youngchak*.

Large trees, up to 25 m high; branches spreading; bark greyish - brown. Leaves bipinnate up to 60 cm long; rachis with a gland below the lower pair of pinnae and a few between the upper pinnae; pinnae 4- 12 cm long; leaflets 40 - 80 pairs, 0.4 - 0.6 × 0.1 - 0.3 cm, oblique - oblong, acute, base obliquely truncate, glabrous, tomentose along rachis. Flowers yellow or dull white, 1 - 1.5 cm long, narrow tubular, in dense clavate, long peduncled head. Pods 25 - 50 × 3.4 - 4 cm, flat, dark brown, dropping from the peduncle.

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

*Specimens examined* : Imphal, *Deb* 2466; Kangpokpi, *Deb* 993 (CAL); Pachao, *Malick* 742 (BSIS).

Young fruits are eaten as vegetables.

66. ROSACEAE

A. L. de Juss. Gen. Pl. 334. 1989.

(*K. P. Singh*)

1a.	Fruits follicular, dehiscent .....	2
b.	Fruits otherwise, indehiscent .....	3
2a.	Stipules absent; flowers in umbels or fascicles; follicles 5 or more .....	14. <i>Spiraea</i>
b.	Stipules present; flowers in racemes, usually paniced; follicle 1 or rarely 2 .....	6. <i>Neillia</i>
3a.	Ovary superior, carpels and fruits exposed .....	4
b.	Ovary inferior, carpels and fruits enclosed in the fleshy hypanthium .....	9
4a.	Shrubs or unarmed trees; carpel with 2 ovules in each .....	5
b.	Herbs or small shrubs; carpel with single ovule only .....	6

- 5a. Carpel only one; calyx deciduous ..... 9. *Prunus*  
 b. Carpels more than one, free; calyx persistent ..... 12. *Rubus*  
 6a. Leaves pari or impari pinnate ..... 7  
 b. Leaves digitate or digitately lobed .....  
 7a. Leaves paripinnate; styles  
 not hooked in fruits ..... 8. *Potentilla*  
 b. Leaves imparipinnate; styles hooked  
 in fruits ..... 1. *Agrimonia*  
 8a. Epicalyx segments toothed at apex;  
 flowers yellow ..... 3. *Duchesnea*  
 b. Epicalyx segments not toothed at apex;  
 flowers white ..... 4. *Fragaria*  
 9a. Armed (usually) shrubs or climbers;  
 carpels many, fruits small dry and  
 free within enlarged fleshy receptacles ..... 11. *Rosa*  
 b. Unarmed trees; carpels 1-5, fruits fleshy  
 and fused with the enlarged calyx ..... 10  
 10a. Fruits drupaceous, hard; ovary  
 2-3 celled ..... 7. *Photinia*  
 b. Fruits pomaceous ..... 11  
 11a. Ovary 5-celled, cells 3- many seeded ..... 2. *Docynia*  
 b. Ovary 2-5-celled, cells 1-2 seeded ..... 12  
 12a. Leaves pinnately compound ..... 13. *Sorbus*  
 (*S. insignis*, *S. kurzii*)  
 b. Leaves simple ..... 13  
 13a. Mature leaves white or brownish tomentose  
 beneath; calyx lobes persistent ..... 13. *Sorbus*  
 b. Mature leaves glabrous beneath;  
 calyx lobes usually deciduous ..... 14  
 14a. Ovary 3-4-celled, fruit umbonate ..... 5. *Micromelos*  
 b. Ovary 5-celled, fruit pyriform ..... 10. *Pyrus*

### 1. *Agrimonia* L.

*Agrimonia pilosa* Ledeb. var. *nepalensis* (D. Don) Nakai, Bot. Mag. Tokyo 47 : 247, 1933; Hara & Ohashi, Fl. E. Himal. 1 : 118, 1966. *A. nepalensis* D. Don, Prodr. Fl. Nep. 229, 1825; Balakr., Fl. Jowai 1 : 37, 1981. *A. eupatorium sensu* Hook. f., Fl. Brit. India 2 : 361, 1878, *p.p.*; Deb in Bull. Bot. Surv. India 3 : 258, 1961.

Perennial, hairy herbs, up to 1 m high, rootstock woody. Leaves imparipinnate, 5-16 cm long, cauline, 5-10 foliolate with many smaller leaflets in between larger ones; leaflets sessile, alternate, hairy on both surfaces, elliptic to obovate, serrate

or crenulate. 1 - 5 × 1 - 2 cm; stipules large entire or toothed. Flowers 4 - 6 mm across, yellow, in terminal spike like racemes; pedicels 1 - 3 mm; bracts slender, 3-lobed. Achenes 1 - 2 enclosed in bristly hypanthium.

*Fl. & Fr.* : April - September.

*Specimens examined* : *s. loc.* Deb 36 & 487 (CAL).

## 2. *Docynia* Decne.

*Docynia indica* (Wallich) Decne., *Nouv. Arch. Mus. Paris* 10 : 131, t. 14, 1874; Hook. f., *Fl. Brit. India* 2 : 369, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 210, 1938; Deb in *Bull. Bot. Surv. India* 3 : 258, 1961. *Pyrus indica* Wallich, *Pl. Asiat. Rar.* 2 : 56, t. 173, 1831.

Deciduous moderate sized trees, up to 15 m high. Leaves 4 - 8 × 2 - 5 cm, ovate or oblong-lanceolate, apex acuminate, coriaceous when mature, serrate or entire, upper side glabrous, lower side densely woolly; lateral nerves 5 - 10 pairs; petioles slender, 10 - 20 mm; stipules reddish, subulate, ca 0.4 mm. Flowers ca 2 mm across, white, 2 - 3 in fascicles or sometimes solitary; pedicels 6 - 8 mm; calyx elongated, pyriform ca 4 mm. Fruits a pome, spherical, pyriform, rugose when young, smooth with age, yellowish-green with orange spots, ca 2 - 3 × 2 cm, ca 15-seeded.

*Fl. & Fr.* : February - June.

*Specimens examined* : Kongpokpi, Deb 954 (CAL).

Fruits are edible both raw and cooked.

## 3. *Duchesnea* Smith

*Duchesnea indica* (Andrew.) Focke in Engl. & Prantl, *Pflanzenfam.*, III (3) : 33, 1888; Hara & Ohashi, *Fl. E. Himal.* 120, 1966; Balakr., *Fl. Jowai* 1 : 187, 1981. *Fragaria indica* Andrew., *Bot. Rep.* 7 : t. 479, 1807; Hook. f., *Fl. Brit. India* 2 : 343, 1878; Deb in *Bull. Bot. Surv. India* 3 : 258, 1961; Kanjilal *et al.*, *Fl. Assam* 2 : 203, 1938.

Mani.: *Kakyenkhujin laba*.

Silky hairy herbs; rootstock slender with prostrate runners. Leaves digitately 3-foliolate; leaflets 2 - 3.5 × 0.7 - 1.5 cm, obovate, serrate, base cuneate entire; petioles 5 - 10 cm; petiole or sessile, stipules leaf like, adnate, dentate. Flowers 1 - 2.5 cm across, yellow, solitary on axillary peduncles; calyx lanceolate; petals obovate. Achenes small, black, oblong, resting on silky red receptacles.

*Fl. & Fr.* : Throughout the year

*Specimens examined* : *s. loc.* Deb 146, 960, 1426 (CAL).

## 4. *Fragaria* L.

*Fragaria nilgerrensis* Schlecht. ex J. Gay in *Ann. sci. Nat. Bot.* ser. 4, 8 : 206, 1857; Hook. f., *Fl. Brit. India* 2 : 344, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 203, 1938; Deb in *Bull. Bot. Surv. India* 3 : 258, 1961.

Stout herbs; rootstock perennial with slender runners covered with long spreading hairs. Leaves digitately 3-foliolate; petioles 10–13 cm long, with sheathing base; leaflets 3–5 × 2–3 cm, obovate; margins pilose toothed, under surface pubescent; stipules adnate to the base. Flowers up to 3 cm across, white with pinkish tinge, in cymes; pedicels 2–3 cm long, bracts persistent, lanceolate, often cleft at apex. Fruits white with pinkish tinge; achenes minute, reddish-brown, embedded in fleshy receptacle.

*Fl. & Fr.* : May–June.

*Specimens examined* : Imphal, Deb 74 (CAL).

Fruits are edible.

### 5. *Micromelos* L.

*Micromelos meghalayensis* Panigr. in Bull. Bot. Surv. India 24 : 239. 1982 (1983). *Pyrus khasiana* Decne. Mem. Fam. Pom. 169. 1874, p.p.; Hook. f., Fl. Brit. India 2 : 378. 1878; Kanjilal *et al.*, Fl. Assam 2 : 218. 1938. Deb in Bull. Bot. Surv. India 3 : 259. 1961.

Small trees, young parts cottony. Leaves 7–15 × 2.5–8 cm; lanceolate to elliptic-ovate, abruptly acuminate, serrate, cuneate at base; petioles 1.5–2 cm long. Flowers in branched corymbs in the axils of leaves, white, up to 1 cm across; calyx lobes at first tomentose, deciduous, broadly triangular; styles 3–4, glabrous. Fruits up to 1 cm across; globose, 3–4 angled, spotted, wrinkled, with raised specks, 3–4 celled, cells one-seeded.

*Fl. & Fr.* : August–February.

*Specimens examined* : Koupru, Meebold 6575; Ukhrul, Mukerjee 2889 (CAL).

### 6. *Neillia* D. Don

*Neillia thyrsoflora* D. Don, Prodr. Fl. Nep. 228. 1825; Hook. f., Fl. Brit. India 2 (addenda) : 1. 1879; Kanjilal *et al.*, Fl. Assam 2 : 206. 1938; Deb in Bull. Bot. Surv. India 3 : 258. 1961; Purohit & Panigr. in J. Econ. Tax. Bot. 4 : 954. 1983.

Bushy erect shrubs with drooping shoots, up to 6 m high; branchlets slender. Leaves 5–11 × 2.5–7 cm, ovate, cordate, truncate or rounded at base often 1–3 lobed, acuminate, thinly pubescent along the nerves below, biserrate, lateral nerves 4–5, basal 3–5 pairs; petioles 12–18 mm, channelled, thinly pubescent; stipules coarsely serrate, ovate. Panicles hairy, up to 12 cm long, terminal or upper axillary. Flowers 4–6 mm across, white, bracts oblanceolate; calyx 5–6 mm, campanulate, hairy or glandular. Fruits a follicle, enclosed by calyx tube, dehiscent on ventral sutures; seeds brown, polished.

*Fl. & Fr.* : May–October.

*Specimens examined* : Ukhrul, Deb 650, 2334; Ukhrul, Mukerjee 3122 (CAL).

**7. Photinia Lindley**

- 1a. Leaves entire ..... 2. *P. integrifolia*
- b. Leaves serrate ..... 1. *P. arguta*

**1. Photinia arguta** Lindley in Edgw. Bot. Reg. 23, t. 1956, 1837; Balakr., Fl. Jowai 1 : 191, 1981. *Pourthiaea arguta* (Lindley) Decne in Nouv. Arch. Mus. Bar. ser. 1, 10 : 147, 1974; Hook. f., Fl. Brit. India 2 : 382, 1878; Kanjilal *et al.*, Fl. Assam 2 : 223, 1938; Deb in Bull. Bot. Surv. India 3 : 259, 1961.

Large shrubs or middle sized trees, up to 12 m high, branches spreading. Leaves 5 - 12 × 2 - 5 cm, oblong to elliptic, lanceolate, base cuneate, abruptly acuminate, serrate or serrulate, young ones hairy. Corymbs terminal, deciduously woolly. Flowers 5 - 8 mm; across, white, faintly fragrant; calyx ovate triangular; petals oblong-obovate. Fruits obovoid, drupe, 6 - 8 mm across, ripe ones yellowish; seeds ellipsoid, plano-convex.

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

*Specimens examined* : North Manipur, C. B. Clarke.

**2. Photinia integrifolia** Lindley in Trans. Linn. Soc. 13 : 103, 1821; Hook. f., Fl. Brit. India 2 : 381, 1878; Kanjilal *et al.*, Fl. Assam 2 : 222, 1938; Deb in Bull. Bot. Surv. India 3 : 258, 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 351, 1985. *Pyrus integerrima* D. Don, Prodr. Fl. Nep. 237, 1825. *Photinia integerrima* (D. Don); Balakr., Fl. Jowai 1 : 191, 1981.

Trees, 16 - 20 m high, all parts glabrous; bark brown or greyish-brown. Leaves 6 - 12 × 4 - 8 cm, oblanceolate or obovate, bluntly acuminate, undulate at margins, thinly coriaceous, lateral nerves 10 - 15 pairs; base narrowed, tapering towards petioles; petioles erect, 10 - 25 mm, channelled, base swollen; stipules subulate. Panicles corymbose, terminal; bracts tricuspidate, woolly. Flowers 5 - 8 mm across, yellowish white; calyx lobes triangular, ovate; petals orbicular. Fruits drupes, up to 1 cm, globose, yellow, turning purplish-brown when ripe.

*Fl. & Fr.* : February - November.

*Specimens examined* : Ukhrul, Mukerjee 2828 (CAL).

**8. Potentilla L.**

- 1a. Leaves digitate 3 - 5 foliolate, achenes wrinkled ..... 3. *P. sundaica*
- b. Leaves pinnate, achenes usually smooth ..... 2
- 2a. Leaves underside silvery white, hairy ..... 2. *P. fulgens*
- b. Leaves underside not white, glabrous ..... 1. *P. fragarioides*

**1. Potentilla fragarioides** L., Sp. Pl. 496, 1753; Deb in Bull. Bot. Surv. India 3 : 258, 1961.

Small erect or prostrate herbs, rootstock perennial, whitish pilose throughout.

Leaves 3-5 foliolate, 15-30 × 10-25 mm, obovate-elliptic, lobate, but not pinnatisect, rounded at base, serrate crenate. Flowers in loose cymes, yellow; calyx lobes ovate, ca 4 mm; petals ca 4-6 mm. Achenes ca 1-2 mm; glabrous.

*Fl. & Fr.* : February - March.

*Specimens examined* : Ukhrul, Mukerjee 2546 (CAL).

2. *Potentilla fulgens* Wallich ex Hook. in Bot. Mag. 53: t. 2700. 1826; Hook. f., Fl. Brit. India 2 : 349. 1878. *P. splendens* Wallich ex D. Don, Prodr. Fl. Nep. 230. 1825; Hook. in Bot. Mag. 53 : t. 2700. 1826; Kanjlal *et al.*, Fl. Assam 2 : 204. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961. *P. fulgens* var. *intermedia* Hook. f., Fl. Brit. India 2: 350. 1878.

Small prostrate, erect herbs, up to 2 m high, hairy; rootstock perennial, hairy. Leaves interruptedly pinnate, 5-15 cm long; leaflets 1-4 cm long, elliptic-oblong, serrate, membranous. Flowers 0.5-1 cm across, yellow, in terminal panicles; calyx shiny white. Achenes small, smooth, on elevated villous receptacles.

*Fl. & Fr.* : May - October.

*Specimens examined* : Ukhrul 1800 m, Mukerjee 3142 (CAL).

3. *Potentilla sundaica* (Blume) Kuntze, Rev. Gen. Pl. 1 : 219. 1891. *Fragaria sundaica* Blume, Bijdr. 17 : 1106. 1826. *Potentilla kleiniana* Wight & Arn. in Wight Illus. Ind. Bot. 1 : t. 85. 1831; C. B. Clarke in J. Linn. Soc. 25 : 20. 1889; Hook. f., Fl. Brit. India 2 : 359. 1878; Deb in Bull. Bot. Surv. India 3 : 259. 1961.

Annuals, up to 70 cm high; stems hairy, prostrate, slender. Leaves digitately 3-6-foliate; leaflets 2-5 cm long, narrowly obovate, obtusely serrate, coriaceous, base cuneate, underside glabrous or pubescent on nerves; petioles 3-10 cm long; stipules lanceolate, entire or serrate. Flowers 1-2 cm in terminal cymose panicles, yellow. Achenes globose, small, wrinkled.

*Fl. & Fr.* : April - August.

*Specimens examined* : *s. loc.*, Deb 1859. 1926 (CAL).

### 9. *Prunus* L.

- 1a. Flowers solitary, fascicled or umbelled; drupes bony. .... 2.
- b. Flowers in racemes; drupes soft. .... 4
- 2a. Leaves linear-lanceolate; drupes velutinous;  
seeds irregularly furrowed and pitted ..... *P. persica*
- b. Leaves usually ovate-lanceolate;  
drupes glabrous; seeds smooth or rough. .... 3
- 3a. Flowers greenish - white, stipules linear ciliate;  
drupes sulcate, acuminate at both ends ..... 2. *P. domestica*  
..... subsp. *domestica*
- b. Flowers pink, stipules pinnately divided into

- narrow linear segments, deciduous; drupes smooth.  
 sub-rotund to cordiform, strongly pitted ..... 1. *P. cerasoides*
- 4a. Racemes leafy at base; leaves deciduous;  
 drupes globose; leaves glabrous beneath.  
 serrate; petioles eglandular ..... 4. *P. nepaulensis*
- b. Racemes leafless at base; leaves evergreen,  
 persistent; drupes ellipsoid or bilobed ..... 5
- 5a. Leaves entire, margins undulate, ovary hairy;  
 drupes acute at apex ..... 6. *P. undulata*
- b. Leaves serrate, crenate or dentate;  
 drupes ellipsoid or ovoid ..... 3. *P. jenkinsii*

1. *Prunus cerasoides* D. Don, Prodr. Fl. Nep. 239. 1825; Kanjilal *et al.*, Fl. Assam 2 : 180. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961; Hara in Hara *et al.*, Enum. Fl. Pl. Nep. 2 : 141. 1979. *P. pudicum* Roxb. ex Brandis, For. Fl. Brit. India 194. 1874; Hook. f., Fl. Brit. India 2 : 314. 1878. Fig 47

Mani.: *Chumbdei*

Large deciduous trees, up to 20 m high. Leaves 5-12 × 3-4 cm, ovate-lanceolate, base round or truncate, with 3-4 glands, serrate, apex acuminate, glabrous on both surfaces; petioles 10-12 mm long; stipules linear. Flowers 1-3, 2.5-3.5 cm across, in corymbs or fascicles, surrounded by 2-3 leafy bract, pink, fading to white; calyx greenish. Drupes 4-6 × 5-8 mm, ellipsoid, yellow, often tinged with red.

*Fl. & Fr.* : October - June.

*Specimens examined* : Litan. Chauhan 94612 (ASSAM); Mao, Deb 1916 & 94612 (CAL).

2. *Prunus domestica* L. subsp. *domestica* Ghora & Panigr., Fasc. Fl. India 18: 6. 1984. *P. communis* Hudson, Fl. Anglica ed. 2. 1 : 212. 1778; Deb in Bull. Bot. Surv. India 3 : 259. 1961. *P. communis* Hudson var. *domestica* (L.) Hudson; Hook. f., Fl. Brit. India 2 : 315. 1878. *P. communis* subsp. *domestica* (L.) Brandis, For. Fl. N. W. Centr. India 192. 1874.

Mani.: *Phum*.

Trees up to 15 m high. Leaves 4-10 × 2-5 cm, ovate-lanceolate, serrate, apex acuminate, base cuneate, pubescent on under sides on lateral veins only, midrib glabrous. Flowers in pairs, greenish-white in umbelate fascicles from lateral buds, ca 2 cm across; sepals pubescent innerside. Drupes oblong, erect, sweet, fleshy, smooth.

*Fl. & Fr.* : February - July.

*Specimens examined* : Ukhrul, Mukerjee s.n; Maram. Deb 1920 (CAL).

Fruits edible.

3. *Prunus jenkinsii* Hook. f., & Thomson in Hook. f., Fl. Brit. India 2 : 317.

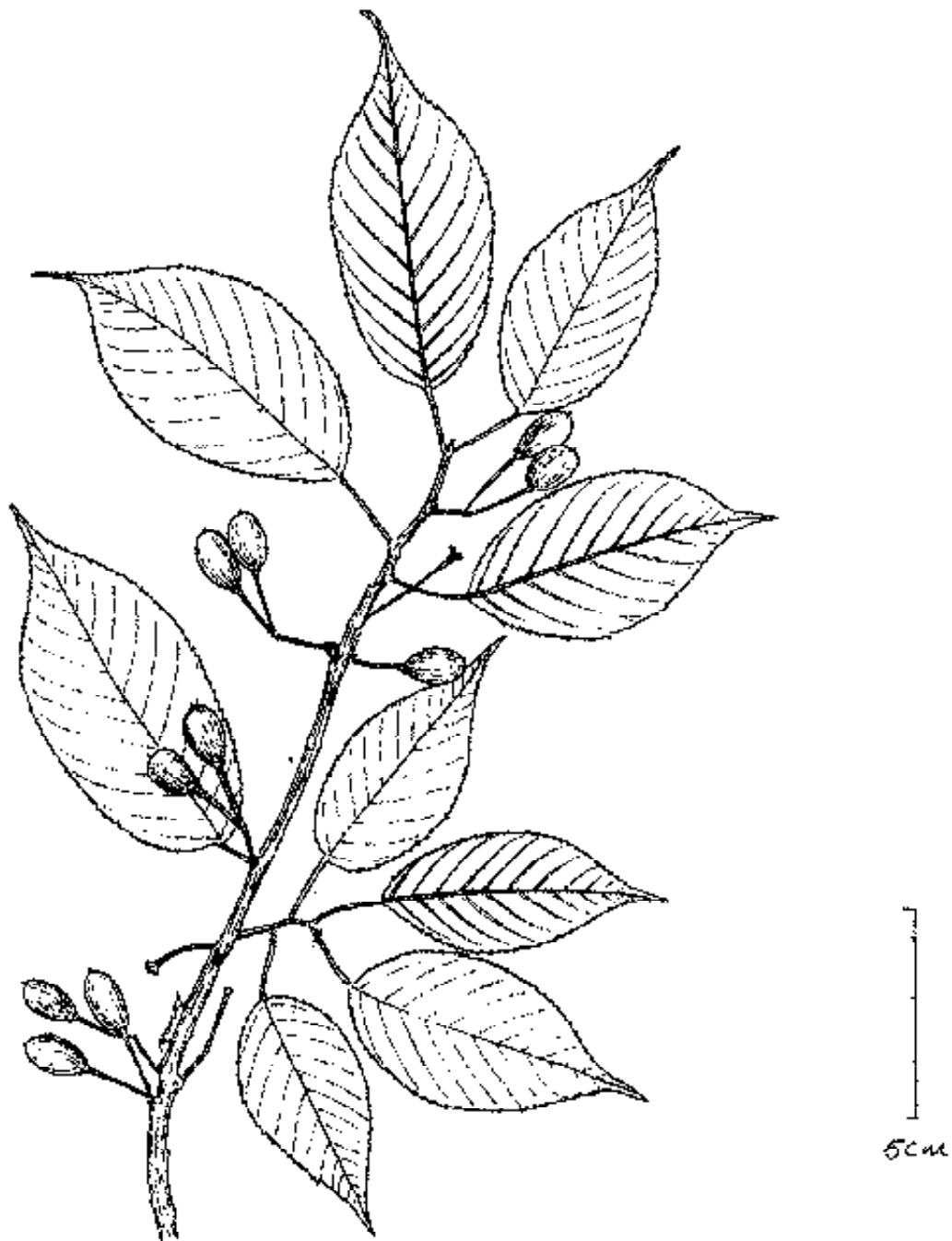


Fig. 47 : A fruiting twig of *Prunus cerasioides* D. Don



1878; Kanjilal *et al.*, Fl. Assam 2 : 181. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961; Ghora & Panigr., Fasc. Fl. India 18 : 33. 1984.

Trees up to 15 m high; bark dark grey. Leaves 8-16 × 3-6 cm, narrowly lanceolate or oblong lanceolate, base cuneate, caudate acuminate, sharply serrate, basal glands two; petioles 3-8 mm. Racemes axillary, solitary, 5-8 cm long. Flowers white, 0.5-0.7 cm across; pedicels pubescent; calyx ciliate. Drupes 2.3 cm long, ellipsoid, yellow, tinged with red, acid to taste.

Fl. & Fr. : March - October.

Specimens examined : West Manipur, 825 m, C. B. Clarke, s. n.

4. *Prunus nepaulensis* (Seringe) Stuedel, Nom. Bot. ed 2, 3 : 403. 1841 (nepaulensis); Hook. f., Fl. Brit. India 2 : 316. 1878, p.p. (nepalensis); Kanjilal *et al.*, Fl. Assam 2 : 178. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961. *Cerasus nepaulensis* Seringe in DC., Prodr. 2 : 540. 1825.

Medium sized trees, 8-18 m high. Leaves 7-13 × 3-5 cm, lanceolate to oblong-lanceolate, glabrous on both surfaces, apex caudate, base rounded to cuneate, crenate to serrate; stipules linear-lanceolate, caducous; petioles 1-2 cm long, eglandular, pubescent. Racemes 7-15 cm long. Flowers 7-8 mm across, white;

Fl. & Fr. : April - May.

Specimens examined : Sirohee, Kingdon Ward.

5. *Prunus persica* (L.) Batsch, Betyr. Entw. Pragm. Gesch. Natur. Reich. 1 : 30. 1801; Hook. f., Fl. Brit. India 2 : 313. 1878; Kanjilal *et al.*, Fl. Assam 2:182. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961; Ghora & Panigr., Fasc. Fl. India 18 : 12. 1984.

Mani : Chumbrei

Shrubs or medium sized trees, up to 8 m high. Leaves 8-15 × 3-5 cm, linear-lanceolate to broadly oblanceolate, sharply acuminate, serrate to serrulate, glabrous at length, puberulous on midrib below; petioles 4-8 mm long, glandular at upper portions; stipules fimbriate, subulate. Flowers 2-2.5 cm across, pink to white, axillary, solitary or fascicled; calyx silky tomentose outside. Drupes 3-5 cm long, elliptic ovoid, succulent, velutinous with a red tinged, edible. pyrenes elliptic, rugose, irregularly furrowed and pitted.

Fl. & Fr. : January - June.

Specimens examined : Kakching, Deb 1294; Mao, Deb 1869 (CAL).

6. *Prunus undulata* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 239. 1825; Ghora & Panigr., Fasc. Fl. India 18 : 36. 1984. *Prunus acuminata* (Wallich) D. Dietr., Syn. 3 : 42. 1842; Hook. f., Fl. Brit. India 2 : 317. 1878; Kanjilal *et al.*, Fl. Assam 2 : 181. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961. *Prunus wallichii* Stuedel, Nom. Bot. ed. 2, 2 : 404. 1841.

Large shrubs or trees, 5-14 m high; Leaves 10-12 × 4-5 cm, lanceolate oblong, acute to rounded at base, acuminate at apex; petioles 0.5-8 mm long, glabrous. Racemes axillary, solitary. Flowers white, fragrant; ovary villous at base.

Drupes ellipsoid, 10 - 20 × 6 - 10 mm, glabrous, purplish - black.

*Fl. & Fr.* : September - March.

*Specimens examined* : Sirohec, Kingdon Ward s.n. (CAL).

#### 10. *Pyrus* L.

- 1a. Leaves 5 - 8 × 2 - 4 cm; stipules  
subulate; fruits 2 - 3 cm across ..... *P. pashia*
- b. Leaves 6 - 15 × 4 - 9 cm; stipules linear;  
fruits 7 - 10 cm across, usually cultivated ..... *P. sinensis*

*Pyrus pashia* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 236. 1825; Hook. f., Fl. Brit. India 2 : 374. 1878; Kanjilal *et al.*, Fl. Assam 2 : 216. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961; Balakr., Fl. Jowai 1 : 196. 1981. Fig. 48

Mani.: *Naspati*.

Medium sized trees, 1 - 15 m high; young parts woolly. Leaves ovate - elliptic, 5 - 8 × 2 - 4 cm, lanceolate, acuminate or caudate, base rounded or truncate, margin serrulate, glabrous beneath when mature; stipules adnate to petiole in lower half, subulate. Flowers in axillary and terminal umbels, short, 1.5 - 2 cm across; calyx ovate, brownish tomentose within, deciduous in fruit; petals white. Fruits a pome, ellipsoid, glabrous, depressed at tip, 2 - 3 cm long, white specked, dark brown when ripe.

*Fl. & Fr.* : March - January.

*Specimens examined* : Chingmairang Deb (CAL); Chandei, Chauhan 94951; Ukhrul, Chauhan 94887 (ASSAM).

2. *Pyrus sinensis* Lindley in Trans. Hort. Soc. 6 : 396. 1826; Kanjilal *et al.*, Fl. Assam 2 : 217. 1938; Deb in Bull. Bot. Surv. India 3 : 259. 1961.

Medium size trees. Leaves 6 - 15 × 4 - 9 cm, broadly ovate to elliptic-lanceolate, apex acuminate, margins serrate, glabrous above; lateral nerves 7 - 10 pairs; stipules small, linear. Flowers corymbose on short branches, white, 2 - 3 cm across; calyx urceolate, deciduous; styles free not woolly. Fruits 7 - 10 cm across, globose to pyriform, depressed at top, yellowish green when ripe, edible.

*Fl. & Fr.* : March - October.

Cultivated for fruits in the valley.

#### 11. *Rosa* L.

- 1a. Erect shrubs ..... 2
- b. Climbers ..... 4
- 2a. Sepals and petals 4; flowers creamy  
white or yellow ..... 6. *R. sericea*
- b. Sepals and petals 5 or more; flowers white, pinkish - Rees ..... 3



Fig. 48 : A fruiting twig of *Pyrus pashia* Buch.-Ham. ex D. Don

- 3a. Young parts densely tomentose;  
stipules lacerate and tomentose;  
flowers white ..... 2. *R. clinophylla*
- b. Young parts glabrous; stipules adnate,  
tomentose; flowers rose-red. .... 4. *R. indica*
- 4a. Styles united into a column. .... 5
- b. Styles distinct, free plants up to 30 m high;  
flowers ivory white ..... 3. *R. gigantea*
- 5a. Stipules deeply fringed or pectinate;  
inflorescence eglandular; flowers  
pink to deep red ..... 5. *R. multiflora*
- b. Stipules entire, adnate, subulate at apex;  
inflorescence glandular; flowers white ..... 1. *R. brunonii*

1. *Rosa brunonii* Lindley, Monogr. Rosa. 120, t. 14. 1820; Hara in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 142. 1979. *Rosa mosehata* auct. non Herrm. 1762; Hook. f., Fl. Brit. India 2 : 367. 1878; Haridasan & Rao, For. Fl. Meghalaya 1 : 362. 1985. *R. longicuspis* Bertol., Misc. Bot. 21, 15, t. 3. 1865; Hook. *l.c.*, 1878; Kanjilal *et al.* Fl. Assam 2 : 208. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Evergreen climbing shrubs, prickles recurved. Leaves 10 - 14 cm long, imparipinnate; leaflets 3 - 9, 2 - 7 × 1 - 3 cm, ovate to oblong-lanceolate, short acuminate, base rounded, margins serrate, glabrous above, pubescent specially beneath and glandular; stipules adnate to petioles, glandular, subulate at apex. Flowers scenty, in large, simple or compound corymbs, creamy white, 3.5 - 5 cm across; calyx lobes pubescent. Fruits obovoid, brownish-red when ripe, 1 - 1.5 cm long.

*Fl. & Fr.* : April - June.

*Specimens examined* : Sirohcc, Kingdon-Ward

2. *Rosa clinophylla* Thory in Redoute Roses 1 : 43. 1817; Haridasan & Rao, For. Fl. Meghalaya 1 : 362. 1965. *R. involucrata* Roxb. ex Lindley, Monogr. Rosa. 8. 1820; D. Don, Prodr. Fl. Nep. 235. 1825; Hook. f., Fl. Brit. India 2 : 365. 1878; Kanjilal *et al.*, Fl. Assam 2 : 208. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Bushy shrubs, bark blackish, young parts brownish pubescent; prickles in pairs, straight, pointing downwards below each leaf. Leaves up to 10 cm long; leaflets 7 - 9, shortly stalked, 1 - 2 × 0.4 - 1 cm, elliptic-lanceolate, acute, base cuneate; margins finely serrate, midrib pubescent beneath; stipules lacerate and glandular at apex. Flowers white, solitary or in terminal corymbs; 3.5 - 5 cm across; calyx tube tomentose and glandular. Fruits tomentose, globose, 1 - 1.8 cm long.

*Fl. & Fr.* : February - July.

*Specimens examined* : Imphal valley, Deb 1568 (CAL).

3. *Rosa gigantea* Collett ex Crop. in Bull. Soc. Roy. Bot. Belgique 27 (2) : 148. 1888; Deb in Bull. Bot. Surv. India 3 : 259. 1961.

Large scrambling climbers up to 30 m high, armed with strong flat prickles. Leaves reddish, soft. Flowers fragrant, solitary, ivory white; stamens orange capped. Fruits yellowish red when ripe; nuts hard.

*Fl. & Fr.* : March - June.

*Specimens examined* : Ukhrul, Kingdon -Ward.

4. *Rosa indica* L., Sp. Pl. 1 : 492, 1753; Kurz, For. Fl. Brit. Burma 1 : 440, 1877. Hook. f., Fl. Brit. India 2 : 364, 1878; Kanjilal *et al.*, Fl. Assam 2 : 210, 1938; Deb in Bull. Bot. Surv. India 3 : 259, 1961.

Prickly evergreen shrubs, glabrous, prickles equal. Leaves imparipinnate: leaflets 2 - 4 × 1 - 3 cm, serrate, elliptic to broad ovate or oblong - ovate, acute or short acuminate, shining above, light coloured and glabrous beneath; stipules adnate near the apex, glandular, ciliate. Flowers large, double to simple, rose purple, sometimes white, on long pedicels; calyx tube ovoid, persistent, segments reflexed; petals in many series; carpels many at the base of calyx tube.

*Fl. & Fr.* : January - July.

*Specimens examined* : Imphal, Deb 1 (CAL).

5. *Rosa multiflora* Thunb., Fl. Jap. 214, 1784; Hook. f., Fl. Brit. India 2 : 364, 1878; Kanjilal *et al.*, Fl. Assam 2:210, 1938; Deb in Bull. Bot. Surv. India 3 : 260, 1961.

Mani.: *Natou-chahi*.

Climbing shrubs, prickles uniform; petioles and inflorescence softly pubescent, eglandular; stipules and bracts pectinate. Flowers in dense massive corymbs, pink to red; calyx broad, ovate, tube pubescent; styles united in a column.

*Fl. & Fr.* June - July.

*Specimens examined* : s. loc., Deb 1568 (CAL).

6. *Rosa sericea* Lindley, Monogr. Rosa 105, t. 12, 1820; Hook. f., Fl. Brit. India 2 : 367, 1878; Deb in Bull. Bot. Surv. India 3 : 260, 1961; Banerjee in Rec. Bot. Surv. India 19 (2) : 41, 1966. Fig. 49

Erect shrubs, up to 4 m high, branched, unarmed or bearing more or less straight paired scattered prickles. Leaves 2 - 8 cm; leaflets 7 - 9, 0.5 - 3 × 0.3 - 1 cm, oblong, base cuneate, acute at apex, margins toothed near apex otherwise entire, glabrous or pubescent above, sericeous beneath; stipules apiculate. Flowers creamy white or yellow, solitary, ebracteate, 5 - 6 cm in diam; calyx tube bristly, glandular; petals 4. Fruits subglobose, pyriform, silky or glabrous.

*Fl. & Fr.* : May - October.

*Specimens examined* : Imphal, Deb 2009 (CAL).

Flowers used in medicine; fruits edible.

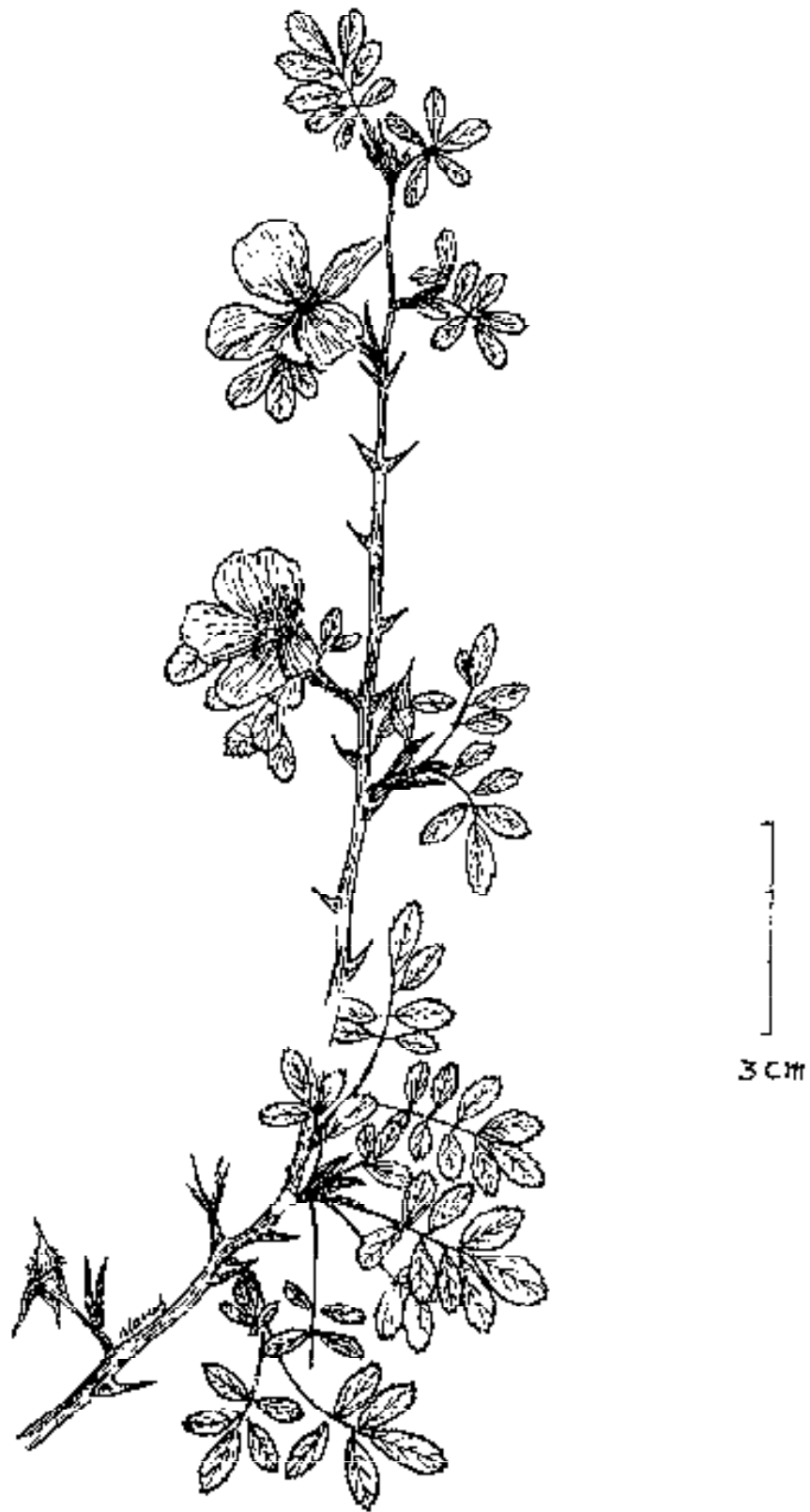


Fig. 49 : A flowering twig of *Rosa sericea* Lindley

**12. Rubus L.**

- 1a. Creeping herbs or prostrate shrubs. .... 2
- b. Erect branched, scrambling or climbing shrubs. .... 3
- 2a. Stems and petioles hirsute with slender prickles ..... 6. *R. calycinus* †
- b. Stems and petioles finally pubescent and bristly ..... 12. *R. nepalensis*
- 3a. Leaves simple, usually lobed or not lobed. .... 4
- b. Leaves palmately, pedately or pinnately compound ..... 11
- 4a. Leaves lobed. .... 5
- b. Leaves not lobed, almost entire. .... 9
- 5a. Leaf usually acute. .... 6
- b. Leaf lobes usually rounded or subacute. .... 8
- 6a. Under surface tomentose only along the nerves; leaves broadly ovate, shallowly 3-5-lobed ..... 4. *R. burkillii*
- b. Under surface velvety, white or pale brownish tomentose. .... 7
- 7a. Leaves palmately 5-lobed, under side pale brownish tomentose. .... 3. *R. birmanicus*
- b. Leaves 5-7 lobed, sub-orbicular, underside densely white tomentose, prickles few, straight, weakly hooked ..... 9. *R. kumaonensis*
- 8a. Leaf rough to touch, under side velvety tomentose with many sharply hooked prickles on veins; stipules lanceolate, deeply lacinate, 10-15 mm ..... 17. *R. rugosus*  
..... var. *rugosus*
- b. Leaf soft to touch, under side white tomentose with few straight weakly hooked prickles on veins; stipules caducous, ca 10 mm ..... 9. *R. kumaonensis*
- 9a. Petals absent; leaves white pubescent beneath ..... 1. *R. assamensis*
- b. Petals present. .... 10.
- 10a. Flowers white; leaves white, 7-10 pairs of lateral veins; stipules subulate, deciduous ..... 2. *R. betulinus*
- b. Flowers deep red; leaves with 20-25 pairs of lateral veins; stipules linear entire ..... 5. *R. calophyllus*
- 11a. Leaves usually 3 or rarely 5 foliolate ..... 12

- b. Leaves more than 3 foliolate ..... 15
- 12a. Leaves pedately 3 or 5 foliolate,  
petiolules subequal, elliptic-oblanccolate,  
densely serrate, stems unarmed or with few  
short prickles ..... 10. *R. lineatus*
- b. Leaves pinnately 3 - foliolate, terminal petiolule  
longer than lateral ones ..... 13
- 13a. Branches densely bristly and prickly;  
leaflets broadly elliptic or obovate  
rounded or obtuse at tips ..... 7. *R. ellipticus*
- b. Branches not bristly hairy, glabrous or  
prickly; leaflets acuminate or acute at tips ..... 14
- 14a. Underside white, dense tomentose;  
stipules filiform, entire ..... 8. *R. hypargyrus*  
..... var. *niveus*
- b. Under side glabrous except puberulous  
nerves; stipules linear ..... 11. *R. lucens*
- 15a. Leaves 3 -5 foliolate ..... 16
- b. Leaves 5 -11 foliolate ..... 17
- 16a. Leaves palmately foliolate, branches glabrous;  
stipules glandular hairy ..... 15. *R. pentagonus*
- b. Leaves pinnately foliolate; branches softly  
tomentose often with gland tipped hairs ..... 14. *R. opulifolius*
- 17a. Leaves 5 - 9 foliolate; stem glandular hairy;  
petals white; fruit orange-yellow ..... 16. *R. rosifolius*
- b. Leaves 5 - 11 foliolate; stem eglandular,  
petals pink. fruit black ..... 13. *R. niveus*

1. *Rubus assamensis* Focke in Bremen Abh. Nat. ver. 4 : 197. 1874; Hook. f., Fl. Brit. India 2 : 328. 1878; Kanjilal *et al.*, Fl. Assam 2 : 192. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Large bushy straggling or scandent shrubs, prickles small, recurved, young parts hairy. Leaves simple, ovate-oblong or oblong, 5 - 15 × 3 - 5 cm, acuminate, base sub-cordate, margins unequally toothed, glabrescent above, white pubescent beneath; nerves covered with hairs. Flowers in conical, terminal panicles, up to 25 cm long, white, 0.5 - 1.3 cm across; calyx ovate with silky white hairs outside; petals absent; carpels many with long hairs. Fruits globose, drupes few.

*Fl. & Fr.* : May - August.

*Specimens examined* : Ukhrul Mukerjee 3128 (CAL).

2. *Rubus betulinus* D. Don. Prodr. Fl. Nep. 233. 1825; Haridasan & Rao. For. Fl. Meghalaya 1 : 365. 1985. *R. acuminatus* Smith in Rees, Cyclop. 30. no. 43. 1815;



Hook. f., Fl. Brit. India 2 : 327. 1878; Kanjilal *et al.*, Fl. Assam 2 : 190. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Climbing shrubs with arching simple, glabrous branches. Leaves ovate or ovate-lanceolate, 8-16 × 2-7 cm, truncate at base, caudate acuminate, serrate, glabrous at maturity, pubescent only on veins beneath; stipules subulate; petioles slender. Flowers in terminal corymbs, white, 0.5-1 cm across, paniculate; bracts subulate. Fruits scarlet-red, stones rugose.

*Fl. & Fr.* : August-December.

*Specimens examined* : Mao, Deb 1816 (CAL).

**3. *Rubus birmanicus*** Hook. f., Fl. Brit. India 2 : 331. 1878; Kanjilal *et al.*, Fl. Assam 2 : 196. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Straggling shrubs eglandular, with hairy stem, prickles hooked. Leaves palmately 5-lobed, 7-11 cm in diam., base deeply cordate, 5-nerved, acute, hairy or glabrous above, pale brownish tomentose beneath; stipules and bracts cut into capillary lobes. Flowers in large panicles, white; calyx sub-acute, tomentose; petals orbicular, clawed, equal to calyx lobes; stamens many; carpels many, glabrous, receptacles villous.

*Fl. & Fr.* : July-August.

*Specimens examined* : Mao, Deb 1743 (CAL).

**4. *Rubus burkillii*** Rolfe in Kew Bull. 1920 : 109. 1920; Kanjilal *et al.*, Fl. Assam 2 : 202. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Straggling shrubs, branches with sharp hooked prickles. Leaves simple, or 3-5 lobed, 5-10 cm long, broadly ovate, lobes acute, with crenate margins, pubescent along nerves on both surfaces; stipules lacinate. Flowers in short terminal or axillary racemes, 3-7 together, white; calyx lobes acute, slightly pubescent on outer side; petals obovate. Drupes bright red.

*Fl. & Fr.* December-May.

*Specimens examined* : Mao, Deb 1743 (CAL).

**5. *Rubus calophyllus*** C. B. Clarke in J. Linn. Soc. 25 : 19. 1889; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Suberect shrubs, up to 3 m high, prickles recurved; branchlets pubescent. Leaves simple ovate, 12-15 × 5-7 cm, acuminate rounded at base, margins serrate, white sericeous below, veins 20-25 pairs; stipules linear, entire. Flowers in 2-6 flowered axillary panicles; calyx lobes triangular, caudate, acuminate obovate; petals deep red; stamens red; carpels many.

*Fl. & Fr.* June-November.

*Specimens examined* : Japov, C. B. Clarke s. n. (CAL).

**6. *Rubus calycinus*** Wallich ex D. Don, Prodr. Fl. Nep. 235. 1825; Hook. f., Fl. Brit. India 2 : 327. 1878; Kanjilal *et al.*, Fl. Assam 2 : 189. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Perennial herbs with creeping stems, softly hirsute and with slender prickles. Leaves orbicular-reniform, simple, 3 - 5 lobed, 3 - 6 cm across, apex rounded, base cordate margins toothed, thinly hirsute especially on veins, prickles scattered, slender, present on veins beneath; petioles hirsute and prickly, 4 - 8 cm long; stipules serrulate, broadly ovate. Flowers on suberect small branches, bearing 1 - 4 leaves and 1 - 2 flowers, 2.5 cm across; sepals green, ovate; petals white, obovate. Fruits globose, red.

Fl. & Fr. : April - June.

*Specimens examined* : *s. loc.*, Deb 1474, 1516 & 174 (CAL).

Fruits edible & plants grow in shady moist places.

7. *Rubus ellipticus* Smith in Rees, Cyclop. 30 : no. 16. 1819; Hook. f., Fl. Brit. India 2 : 336. 1878; Kanjilal *et al.*, Fl. Assam 2 : 196. 1938; Deb in Bull. Bot. Surv. India 3 : 260. 1961.

Fig. 50

*Mani* : Heijampet.

Robust straggling shrubs, 2 - 3 m high; stems angled, covered with long stiff reddish eglandular bristles and scattered deflexed prickles. Leaves pinnately trifoliolate; leaflets ovate orbicular to suborbicular, 3 - 10 × 2 - 5 cm, obtuse, base rounded, margins serrate, pale and puberulous beneath, midrib prickly; terminal leaflets larger; stipules linear, caducous. Flowers crowded in terminal leafy panicles, white, 5 - 7 mm across; calyx cup bristly, softly pale pubescent; petals obovate. Fruits orange yellow, succulent.

Fl. & Fr. : January - June.

*Specimens examined* : *s. loc.*, Deb 248, 1393 (CAL); Kangpokpi, Malick 1393 BSIS.

Fruits are eaten and sold in the market.

8. *Rubus hypargyryus* Edgew. var. *niveus* (Wallich ex G. Don) Hara in J. Jap. Bot. 53 : 137. 1978. *Rubus niveus* Wallich ex G. Don, Gen. Syst. 2 : 530. 1832; Hook. f., Fl. Brit. India 2 : 335. 1878, *non* Thunb. 1813; Deb in Bull. Bot. Surv. India 3 : 261. 1961.

*Mani* : Heijampat.

Scrambling shrubs, 2 - 3 m high, leafy branches with scattered to dense weak prickles, pubescent, eglandular. Leaves 2 - 3 foliolate; leaflets ovate lanceolate, 3 - 15 × 3 - 5 cm, acuminate, base cuneate, margins sharply and deeply toothed, glabrous above, densely white, tomentose beneath; stipules filiform, entire. Flowers solitary or 10 - 12 in axillary or terminal tomentose corymbs. pink or red; calyx lobes lanceolate, tomentose; petals obovate 5 - 6 mm. Fruits red or orange, ca 1 cm long, drupelets many pubescent.

Fl. & Fr. : June - August.

*Specimens examined* : Nongmaiching, Deb 2145 (CAL).

9. *Rubus kumaonensis* Balakr. in J. Bombay Nat. Hist. Soc. 67 : 58. 1970. *Rubus*

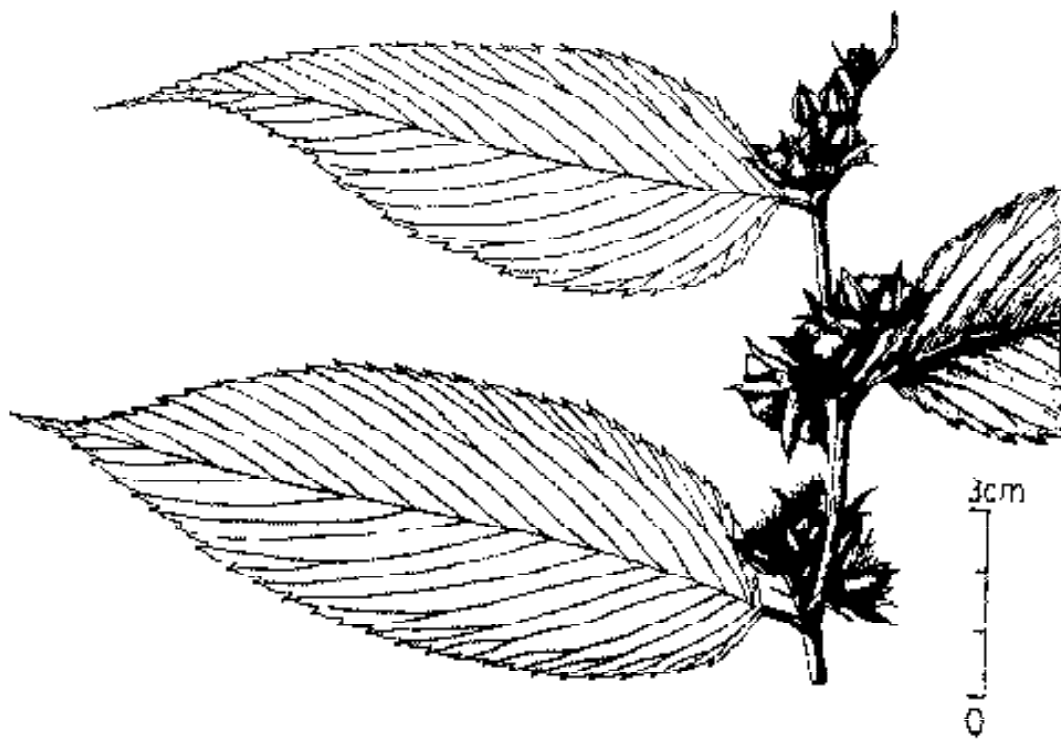


Fig. 50 : A twig of *Rubus ellipticus* Smith

*reticulatus* Wallich ex Hook. f., in Hook. f., Fl. Brit. India 2 : 331, 1878; Deb in Bull. Bot. Surv. India 3 : 261, 1961.

Large scrambling shrubs, eglandular, branches pubescent with white tomentum and few short (1-2 mm) straight or weakly curved prickles. Leaves deeply 5-7-lobed, suborbicular; lobes subacute; upper surface rugose, reticulate; lower surface rugose, reticulate; densely white tomentose; stipules deeply lacinate, lanceolate. Flowers in axillary and terminal racemes; calyx densely tomentose; petals white. Fruits globose, larger than calyx.

*Fl. & Fr.* July - October.

*Specimens examined* : Srapramenia, Deb 1123 (CAL).

10. ***Rubus lineatus*** Reinw. in Blume, Bijdr. 1108, 1827; Hook. f., Fl. Brit. India 2 : 333, 1878; Deb in Bull. Bot. Surv. India 3 : 260, 1961.

Scrambling shrubs up to 3 m high, eglandular, prickles absent or sometimes few, small, scattered; branches whitish, pubescent. Leaves pedately 3 or 5-foliolate; leaflets elliptic to oblanceolate, acuminate, cuneate at base, margins doubly serrate, 9-13 × 2-6 cm, upperside glabrous, lower side dense white silky tomentose with 20-30 pairs of nerves. Flowers few in short axillary heads or cymes, 1.5-2.5 cm across; calyx lobes triangular, ovate, acuminate, silky; petals obovate, greenish white. Fruits many, red.

*Fl. & Fr.* : March - June.

*Specimens examined* : Japvo, C. B. Clarke s.n. (CAL).

Dried roots used in treatment of food poisoning and stems in making fences.

11. ***Rubus lucens*** Focke in Bremen. Abh. Nt. Ver. 4 : 199, 1874; Hook. f., Fl. Brit. India 2 : 338, 1878; Kanjilal *et al.*, Fl. Assam 2 : 197, 1938; Deb in Bull. Bot. Surv. India 3 : 260, 1961.

Large scandent shrubs or climbing tall trees, eglandular, prickles minute, short hooked, branches angled, grooved. Leaves pinnately 3-foliolate, up to 35 cm long; leaflets 10-18 × 5.5-10 cm, elliptic, ovate or lanceolate, acuminate, base rounded, margins serrate, glabrous, except puberulous nerves beneath, stipules linear. Flowers in axillary or long terminal racemes or panicles, up to 30 cm long, bracts subulate, ca 1 cm long; calyx tube short; petals slightly larger, reddish, clawed. Fruits enclosed in the calyx, red; drupes sweet.

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

*Specimens examined* : West Manipur, C.B. Clarke s.n. (CAL); Nungba, Mallick 1129 (BSIS).

12. ***Rubus nepalensis*** (Hook. f.) Kuntze, Meth. Sp. Rubus. 125, 1879; Hara in J. Jap. Bot. 47 : 112, 1972. *Rubus nutans* Wallich ex G. Don. Gen. Syst. 2 : 538, 1832; Hook. f., Fl. Brit. India 2 : 334, 1878, cum var. *nepalensis* Hook. f.; Focke in Bibl. Bot. 1.7 (Ht. 72) : 39, 1910; non Vahl, 1824; Deb in Bull. Bot. Surv. India 3 : 261, 1961.

Creeping herbs, eglandular; stems and petioles finely pubescent and thinly

bristly. Leaves pinnately 3-foliolate: leaflets orbicular or sub-rhomboidal, 3-6 × 1-3 cm, apex rounded, base cuneate, margins double toothed, glabrous above, pubescent along the nerves below; stipules large, ovate. Flowers solitary, axillary, 7-5 mm across; calyx lip densely bristly, villous; lobes triangular, toothed at apex; petals obovate, whitish. Drupes scarlet.; stone smooth.

*Fl. & Fr.* : May - November.

*Specimens examined* : Japvo, C.B. Clarke s. n. (CAL).

**13. *Rubus niveus* Thunb.**, Diss. Bot. Med de. Rubo 78, 9. f. 3; 1813; Haridasan & Rao, For. Fl. Meghalaya 1 : 367, 1985. *R. lasiocarpus* Smith in Rees. Cyclop. 30 : *Rubus* no. 6, 1815; Hook. f., Fl. Brit. India 2 : 339, 1878; Kanjilal et al., Fl. Assam 2 : 200, 1938; Deb in Bull. Bot. Surv. India 3 : 260, 1961. *R. lasiocarpus* Smith var. *pauciflorus* (Wallich) Hook. f., l. c. 2 : 339, 1878; Deb in Bull. Bot. Surv. India 3 : 260, 1961. Fig. 51

Mani. - Hejampot.

Bushy shrubs with reddish branchlets, white bloom and scattered hooked prickles, glandular. Leaves 5-11 foliolate, 8-25 cm long; leaflets 3-8 × 1.5-4 cm, ovate, elliptic, sometimes lanceolate, acute, base narrow, rounded, sub-sessile or sessile, margins sharply dentate, sub-glabrous above, white tomentose beneath; petioles 2-4 cm, prickly; stipules linear lanceolate. Flowers purplish pink in axillary and terminal tomentose corymbs, 0.5-8 cm across; calyx ovate, white tomentose, petals shorter or equal to sepals. Fruits red, becoming blackish when ripe.

*Fl. & Fr.* : March - October.

*Specimens examined* : Mao, Deb 1739; Ukhrul, Mukerjee 2245, 2754; Nongmei - Ching, Deb 2145 (CAL).

**14. *Rubus opulifolius* Bertol**, Misc. Bot. 22 : 16, t. 4, 1862; Hook. f., Fl. Brit. India 2 : 340, 1878; Kanjilal et al., Fl., Assam 2 : 199, 1938; Deb in Bull. Bot. Surv. India 3 : 261, 1961.

Straggling shrubs; branches, petioles and inflorescence softly white tomentose, glandular, prickles few, hooked. Leaves 3-5, pinnately foliolate, terminal leaflet largest, 3-7 × 2-4 cm, irregularly lobed, ovate, acuminate; margins serrate; lateral leaflets elliptic lanceolate, 2-5 × 1-3 cm; underside densely white tomentose. Flowers in terminal or axillary racemes, red, ca 1.5 cm across; calyx with glandular bristles; petals broadly ovate, clawed; carpels clothed with hairs. Fruits globose; drupelets orange-yellow, succulent.

*Fl. & Fr.* : June - September.

*Specimens examined* : Imphal, Deb 2333 (CAL).

**15. *Rubus pentagonus* Wallich ex Focke** in Bibl. B. 17 (Int. 72) : 145, 1911; Long in Grierson & Long, Fl. Blunan 1 (3), 556, 1987; Hara & Ohashi in Hara, Fl. E. Himal. 131, 1966. *Rubus alpestris* auct. non Blume; Hook. f., Fl. Brit. India 2 : 332, 1878, p.p; Deb in Bull. Bot. Surv. India 3 : 260, 1961.



Fig. 51 : A flowering twig of *Rubus niveus* Thunb.

Scrambling erect shrubs, shoots almost glabrous. Leaves palmately 3 - 5 foliolate; leaflets sessile, elliptic, terminal one the largest, 5 - 10 × 3 - 4 cm, caudate acuminate, attenuate at base, margins serrate, faintly hairy below; petioles with few prickles and scattered gland-tipped bristles; stipules linear lanceolate, glandular hairy. Flowers scented, 1 - 3, terminal peduncles; calyx subulate, spiny and glandular-hairy; petals white, orbicular; stamens 1-seriate; carpels many, glabrous. Fruits globose, red or yellow; drupes 2 - 3 cm in diam., glabrous; stones rugose.

*Fl. & Fr.* : May - July.

*Specimens examined* : Japvo, *C.B. Clarke s.n.* (CAL).

16. *Rubus rosifolius* Smith, *Fl. Ic. Ined* 3 : t. 60, 1791, '*rosifolius*'; Roxb., *Fl. Ind.*, ed. 2 : 2 : 518, 1832; Hook. f., *Fl. Brit. India* 2 : 341, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 200, 1938; Deb in *Bull. Bot. Surv. India* 3 : 261, 1961.

Straggling or scandent shrubs, 1 - 2 m high, covered with spreading stiff purple gland-tipped hairs in younger parts; prickles scattered, straight. Leaves pinnately 5 - 9 foliolate; leaflets 6 × 1 - 3 cm, ovate-lanceolate, acuminate, margins doubly serrate, base rounded or cuneate, both surfaces with sessile glistening glands; lateral nerves 10 - 12 on each side; stipules linear, 3 - 4 cm. Flowers large, white, ca 2.5 cm across, solitary or 1 - 5 flowered, paniced; calyx deeply 5-lobed, caudate acuminate, pubescent, glandular. Fruits oblong to sub-globose, scarlet or orange-yellow on ripening.

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

*Specimens examined* : Ukhrul, *Mukerjee* 2418; Kangehup, *Deb* 2328 (CAL). Nungba to Bishenpur, *Maitik* 1237 (BSIS).

17. *Rubus rugosus* Smith in Rees, *Cyclop.* 30 : *Rubus* n. 34, 1819, var. *rugosus* Gamble, *Fl. Pres. Madras* 1 : 312, 1957 (repr. ed.); Balakr., *Fl. Jowai* 1 : 186, 1981, *R. moluccanus sensu* Hook. f., *Fl. Brit. India* 2 : 330, 1878, *non* L., 1753; Kanjilal *et al.*, *Fl. Assam* 2 : 194, 1938, *p.p.*; Deb in *Bull. Bot. Surv. India* 3 : 261, 1961.

Large scrambling shrubs, stems eglandular with scattered short recurved prickles, young parts tomentose, brownish. Leaves suborbicular, 4 - 10 × 3 - 8 cm, ovate, 3 - 7 lobed; lobes rounded, cordate at base, margins crenate-serrate, rugose above, grey velvety tomentose beneath; petioles 4 - 6 cm long; stipules small, caducous. Flower clusters terminal and axillary, creamy yellow or yellowish-white, ca 1 cm across; calyx villous; petals smaller than sepals. Fruits globose, ca 1 cm across, red, stones rugose.

*Fl. & Fr.* : June - October.

*Specimens examined* : Imphal, *Deb* 535; Kakching, *Deb* 1204 (CAL).

### 13. *Sorbus* L.

- la. Leaves simple; ventral side densely white tomentose; veins prominent ..... 1. *S. cuspidata*
- b. Leaves pinnate. .... 2

- 2a. Leaflets 4.5 - 6 × 1.5 - 2.5 cm, margins obscurely crenulate; fruits 10 - 15 mm ..... 2. *S. insignis*
- b. Leaflets 1.8 - 3 × 0.7 - 1 cm, margins serrate in upper half; fruits 5 - 6 mm ..... 3. *S. kurzii*

1. *Sorbus cuspidata* (Spach.) Hedlund in Kongl. Svenska Vet-akad. Handl. 35: 89. 1901; Ohashi in Hara, Enum. Fl. Pl. Nepal 2 : 147. 1979. *Crataegus cuspidata* Spach, Hist. Nat. Veg. 2 : 106. 1834. *Pyrus vestita* Wallich ex Hook. f., Fl. Brit. India 2 : 375. 1878; Deb in Bull. Bot. Surv. India 3 : 259. 1961.

Medium sized trees, 4 - 10 m, young parts greyish woolly or ferruginous. Leaves 6 - 12 × 3 - 7 cm, lanceolate or oblanceolate, acuminate or acute, base cuneate, serrate, entire towards base, upper surface glabrous, densely white tomentose beneath, lateral veins prominent beneath, 6 - 11 pairs; stipules linear, deciduous. Flowers in corymbose cymes, terminal and subterminal, 5 - 7 mm across, fragrant; calyx lobes persistent in fruits; petals woolly within; styles 3 - 5. Fruits globose, 10 - 15 mm across.

*Fl. & Fr.* : April - September.

*Specimens examined* : Sirohee, Kingdon-Ward. s.n.

2. *Sorbus insignis* (Hook. f.) Hedlund in Kongl. Svenska Vet-akad. Handl. 35 : 89. 1901; Ohashi in Hara *et al.*, Enum. Fl. Pl. Nepal. 2 : 148. 1979. *Pyrus insignis* Hook. f., Fl. Brit. India 2 : 377. 1878; Deb in Bull. Bot. Surv. India 3 : 259. 1961.

Trees up to 8 - 10 m; young shoots brownish tomentose. Leaves pinnate, 15 - 22 cm long; leaflets 4 - 6 pairs, oblong, 4.5 - 6 × 1.5 - 2.5 cm, apex acute, margins obscurely crenulate, base unequal sided, brownish tomentose beneath when young, becoming glabrous; petioles silky. Flowers up to 1.5 cm across, occurring in much branched woolly corymbs, white; calyx toothed, triangular, obconic. Fruits globose, up to 10 - 15 mm across, red, 3-celled.

*Fl. & Fr.* : March - May.

*Specimens examined* : Sirohee Furar, G.Watt 565 (CAL).

3. *Sorbus kurzii* (G. Watt. ex Prain) Schneid., Bull. Herb. Boiss. ser. 2, 6 : 315. 1906. *Pyrus kurzii* G. Watt ex Prain in J. Asiat. Soc. Bengal 73 : 203. 1904. *P. wattii* (Koehne) Bennett in Ind. J. For. 4 : 68. 1981. *Sorbus wattii* Koehne in Fedd. Repert. 10 : 515. 1921; Deb in Bull. Bot. Surv. India 3 : 261. 1961.

Trees, up to 8 m high, subglabrous. Leaves pinnately compound, 7 - 10 cm; leaflets 4 - 5 pairs, 1.8 - 3 × 7 - 1 cm, elliptic or somewhat obovate, base obliquely rounded, apiculate, margins serrate in upper half. Flowers in corymbs, 2 - 3 cm across, white; styles 3 - 4. Fruits 5 - 6 mm across red.

*Fl. & Fr.* : May - October.

*Specimens examined* : Manipur ex Koehne l.c.



**14. Spiraea L.**

- 1a. Leaves glaucous beneath; corymbs simple ..... 2. *S. cantoniensis*  
 b. Leaves pubescent beneath:  
 corymbs paniculate ..... 1. *S. callosa*

1. *Spiraea callosa* Thunb., Fl. Jap. 209, 1784; Hook. f., Fl. Brit. India 2 : 324, 1878; Kanjilal *et al.*, Fl. Assam 2 : 205, 1933; Deb in Bull. Bot. Surv. India 3 : 261, 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 369, 1985.

Erect or straggling shrubs with slender branches; branchlets pubescent. Leaves at the end of branches, alternate, 2 - 7 × 1 - 3 cm, ovate, oblong to oblong-lanceolate, incise serrate, acute, base cuneate, pale and puberulous beneath. Flowers corymbose, 4-5 mm across, white or pinkish - white; calyx lobes 5, pubescent, reflexed in fruits. Fruits of 5 follicles, recurved at tip.

Fl. & Fr. : June - November.

*Specimens examined* : Sirohee, Mukerjee 3177 (CAL).

2. *Spiraea cantoniensis* Lour., Fl. Cochinch. 322, 1790; Hook. f., Fl. Brit. India 2 : 326, 1878; Kanjilal *et al.*, Fl. Assam 2 : 206, 1938; Deb in Bull. Bot. Surv. India 3 : 261, 1961.

Straggling shrubs. Leaves ovate to oblong to rhomboid, 2 - 3.5 × 0.3 - 1.2 cm, base cuneate, sub acute to acute at apex, incise-serrate at margins, glabrous above, glaucous beneath. Flowers axillary and terminal umbellate corymbs, white, 0.7 - 1 cm, across; calyx turbinate; petals ovate-orbicular. Follicles free, oblong, dehiscent along ventral sutures.

Fl. & Fr. : March - November.

*Specimens examined* : Ukhrul, Mukerjee 2592 (CAL).

Cultivated as hedge plant.

**67. SAXIFRAGACEAE**

A. L. Jussieu, Gen. Pl. 308, 1789

("Saxifragae").

(A. S. Chauhan)

**1. Astilbe Buch. Ham. ex D. Don**

*Astilbe rivularis* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 211, 1825; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 389, 1878; Kanjilal *et al.*, Fl. Assam 2 : 233, 1938; Deb in Bull. Bot. Surv. India 3 : 327, 1961.

Erect, fulvous hairy, perennial herbs, up to 2 m high. Leaves alternate, 20 - 50 cm, irregularly 2-pinnate; leaflets 2.5 - 10.5 cm, ovate or elliptic, sometimes lobed, sharply, unequally toothed, long pointed, bristly on midrib beneath. Flowers *ca* 2

mm across, creamy-white or greenish-yellow, unisexual, in long terminal panicles; calyx cup shaped, deeply 5-lobed; petals absent; stamens 5, exserted, opposite the sepals. Capsules 2-4 mm long, 2-beaked; seeds minute.

*Fl. & Fr.* : July - October.

*Specimens examined* : Ukhrul, Mukerjee 3337 (CAL).

## 68. GROSSULARIACEAE

A.P. de Candolle in Lamarck et A. P. de Candolle, *Fl. Franc.*  
ed. 3, 4 (2) : 405. 1805 ('Grossulariae').

(B. M. Wadhwa)

### 1. Ribes L.

*Ribes glaciale* Wallich in Roxb., *Fl. Ind.* 2 : 513. 1824, *p.p.*; Hook. f., & Thomson in *J. Linn. Soc.* 2 : 88. 1857; C.B. Clarke in Hook. f., *Fl. Brit. India* 2 : 410. 1878, *p.p.*; Deb in *Bull. Bot. Surv. India* 3 : 327. 1961; Hara in *Fl. E. Himal.* 1 : 166. 1966.

Diocious shrubs up to 5 m high. Leaves broadly ovate, 2-3.5 cm long and broad, 3-lobed, mid lobe sub-acuminate, acutely serrate, sparsely glandular pubescent on upper surface, glabrous beneath; petioles 1-2.5 cm, finely pubescent and glandular. Racemes erect, 2-3.5 cm puberulous; bracts linear-lanceolate, 2-4 × 1 mm, glabrous. Flowers purplish crimson, ca 5 mm in diam., minutely pubescent, pedicels 1-4 mm. Berries globose, ca 7 mm in diam., red.

*Fl. & Fr.* : April - June.

*Specimens examined* : Lcimakhong, G. Watt 6587 (CAL).

## 69. ESCALLONIACEAE

Dumortier, *Anal. Fam. Pl.* 35, 37, 1829.

(B. M. Wadhwa)

### 1. Polyosma Blume

*Polyosma integrifolia* Blume, *Bijdr.* 629. 1826; Hook. f. & Thomson in *J. Linn. Soc.* 2 : 77. 1857; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 409. 1878. *P. wallichii* Kurz, *For. Fl. Brit. Burma* 1 : 444. 1877.

Medium sized evergreen trees; young shoots tawny pubescent. Leaves lanceolate or oblanceolate, 7-20 cm long, acuminate, entire to distantly serrate, cuncate at base, more or less pubescent along nerves, more so beneath; petioles 1-2 cm long, pubescent. Flowers in terminal pubescent racemes, greenish-white, tetramerous, bracts 3, subulate; calyx lobes deltoid, persistent, calyx tube adnate to ovary; petals valvate, linear, hairy within; stamens 4, epigynous, filaments thick, hairy; ovary inferior, 1-celled. Fruits sub-baccate, 7-12 mm long, smooth, 1-seeded.

*Fl. & Fr.* : May - July.

*Specimens examined* : Mao, Deb 1778 (CAL).

## 70. ITEACEAE

J. G. Agardh, *Theoria Syst. Pl.* 151. 1858.

(A. S. Chauhan)

1. *Itea* L.

- 1a. Leaves 5-11 × 1.5-5.5 cm; petals  
persistent; ovary pillose ..... 1. *I. chinensis*
- b. Leaves 10-20 × 3-10 cm; petals  
caducous; ovary glabrous ..... 2. *I. macrophylla*

1. *Itea chinensis* Hook. & Arn., *Bot. Beech. Voy.* 3 : 89. 1882. & 4 : t. 39. 1833; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 408. 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 231. 1938; Deb in *Bull. Bot. Surv. India* 3 : 327. 1961.

Shrubby trees up to 10 m high. Leaves alternate, elliptic-oblong, obovate or oblanceolate, acute at base, caudate acuminate, glandular-serrulate; lateral nerves 5-8 pairs; petioles ca 1.5 cm, slender. Flowers ca 3 mm across, yellowish-white, in 3-5 cm long racemes; pedicels ca 2.5 mm long; petals erect, persistent. Fruit a capsule, ca 8 mm, divergent at upper half; seeds caudate-acuminate at both ends.

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

*Specimens examined* : Sirohee 1950 m, Deb 2787 (CAL).

2. *Itea macrophylla* Wallich in Roxb., *Fl. Ind.* 2 : 419. 1824; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 408. 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 230. 1938; Deb in *Bull. Bot. Surv. India* 3 : 327. 1961.

Small trees or shrubs up to 5 m high. Leaves alternate, elliptic-oblong or broad ovate, sub-acute or rounded at base, acuminate, glandular-serrate; lateral nerves 7-10 pairs; petioles stout, ca 2.5 cm. Flowers ca 5 mm across, white with pale-pink tinge, in 3-15 cm long simple racemes; pedicels 1.5-3 cm long, petals recurved, caducous. Capsules ca 5 mm, divergent in upper half; seeds caudate at both ends.

*Fl. & Fr.* : May - February.

*Specimens examined* : Nungba - Bishenpur, Malik 1216 (BSIS).

## 71. HYDRANGEACEAE

Dumortier, *Anal. Fam. Pl.* 36, 38. 1829.

(B. M. Wadhwa)

- 1a. Calyx smaller than corolla, not corolline;  
all flowers fertile; fruits baccate ..... 1. *Dichroa*
- b. Calyx larger than corolla, corolline;  
outer flowers sterile; fruits capsular ..... 2. *Hydrangea*

**1. Dichroa Lour.**

*Dichroa febrifuga* Lour., Fl. Cochinch. 1 : 301. 1790; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 406. 1878; Deb in Bull. Bot. Surv. India 3 : 327. 1961; Hara in Fl. E. Himal. 114. 1966; Balakr., Fl. Jowai 1 : 193. 1981.

Shrubs 1 - 3 m high; young shoots and inflorescence pubescent with short curled hairs. Leaves elliptic-oblanccolate, 12 - 15 × 3.5 - 7 cm, acuminate, base cuneate or attenuate, margins serrate, sparsely pubescent on both surfaces; petioles 1 - 3.5 cm, channeled, dilated at base. Flowers in terminal cymes, 7 - 8 mm, adnate to the ovary, thinly hairy; petals elliptic, 5 - 6 × 1.5 - 2 mm, pale blue, becoming reflexed; stamens 5 - 6 mm long, purplish; anthers clavate; styles 3 - 5, ca 3 mm, thickened at apex. Berries sub-globose, 6 - 8 mm in diam, metallic-blue, crowded with persistent calyx lobes.

*Fl. & Fr.* : June - December.

*Specimens examined* : Tosen, Mukerjee 2773; Sirohee, Mukerjee 3575 (CAL).

**2. Hydrangea L.**

*Hydrangea robusta* Hook. f. & Thomson in J. Linn. Soc. 2 : 76. 1858; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 404. 1878; Kanjilal *et al.*, Fl. Assam 2 : 227. 1938; Deb in Bull. Bot. Surv. India 3 : 271. 1961.

Large shrubs, 2 - 4 m high, young parts pubescent. Leaves sub-opposite, 12 - 20 × 7 - 13 cm ovate to elliptic, acuminate, serrate, tapering at base, hairy above, brown hirsute on nerves on ventral side; lateral nerves 7 - 8 pairs; petioles 3 - 5 cm long, channeled. Inflorescence terminal, corymbose. Flowers 5 - 6 mm across, outer ones sterile, blue. Capsules sub-hemispheric, 3 - 4 mm in diam., ribbed, many seeded.

*Fl. & Fr.* : November - March.

*Specimens examined* : Imphal, Deb 323 (CAL).

**72. CRASSULACEAE**

A. P. de Candolle in Lamarck et A. P. De. Candolle,  
Fl. Franc. ed. 3. 4(1) : 382. 1805.

(A. S. Chauhan)

**1. Kalanchoe Adans.**

- 1a. Detached leaves producing young plants  
from margins; leaves simple or 3 - 7  
foliolate; styles longer than ovaries ..... 1. *K. pinnata*
- b. Detached leaves not producing plants  
from margins; leaves simple; styles  
equalling the ovaries ..... 2. *K. rosea*

1. *Kalanchoe pinnata* (Lam.) Pers., Syn. Pl. 1 : 446, 1805; Backer, Fl. Males, ser. 1, 4 : 199, 1951; Baba, Herb. Fl. Dehradun, 182, 1977. *Cotyledon pinnata* Lam., Dict. Bot. 2 : 141, 1786. *Bryophyllum calycinum* Salisb., Parad. Land. t. 3, 1805; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 413, 1878.

Mani. : *Manahidak*.

Erect or ascending herbs, glabrous; stem 4 -angular, purplish blotched. Leaves simple, pseudo - ternate or pinnately 3 - 7 foliolate, ovate - lanceolate or oblong, obtuse, crenate. Flowers in lax, paniced cymes pendulous; calyx segments ovate, acute, purplish; petals greenish at base, red in the upper, glands hairy; styles longer than the ovaries.

Fl. & Fr. : March - June.

Under cultivation.

2. *Kalanchoe rosea* C. B. Clarke in J. Linn. Soc. 25 : 21, 1889; Deb in Bull. Bot. Surv. India 3 : 327, 1961. Fig. 52

Mani. : *Manahidakmanbi*.

Erect herbs, branched, glabrous. Leaves opposite, petiolate, elliptic or spatulate, crenate - serrate, attenuate at base, obtuse at apex; lateral nerves 5 - 7. Flowers many, dense, red, in paniced cymes; sepals unequal, segments linear or linear - lanceolate; petals reddish or pinkish.

Fl. & Fr. : March - May.

Specimens examined : Mao, Deb 1887 (CAL).

The plant is used as an antidote for snake bite.

### 73. DROSERACEAE

R. A. Salisbury, Parad. Lond. Sub. t. 95, 1808 ('Droserace').

(A. S. Chauhan)

- 1a. Aquatic free floating rootless herbs; stems articulate; leaves contorted bladder ..... 1. *Aldrovandra*
- b. Herbs terrestrial, stems not articulate; leaves peltate circular ..... 2. *Drosera*

#### 1. *Aldrovandra* L.

*Aldrovandra vesiculosa* L., Sp. Pl. 281, 1753; DC., Prodr. 1 : 319, 1825; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 425, 1878; Deb in Bull. Bot. Surv. India 3 : 327, 1961. *A. verticellata* Roxb., Fl. Ind. 2 : 112, 1832.

An insectivorous small aquatic free floating rootless herbs; stem articulate with whorls of spatulate-orbicular leaves at the nodes. Leaves 3 - 6 mm, contorted bladders. Flowers peduncled, axillary, solitary; calyx 5-partite; petals 5, hypogynous, connivent in cap; stamens 5; ovary unilocular; style and stigma 5, ovules numerous. Capsules globose, 5 -valved; seeds numerous, broad, oblong with black shining testa.

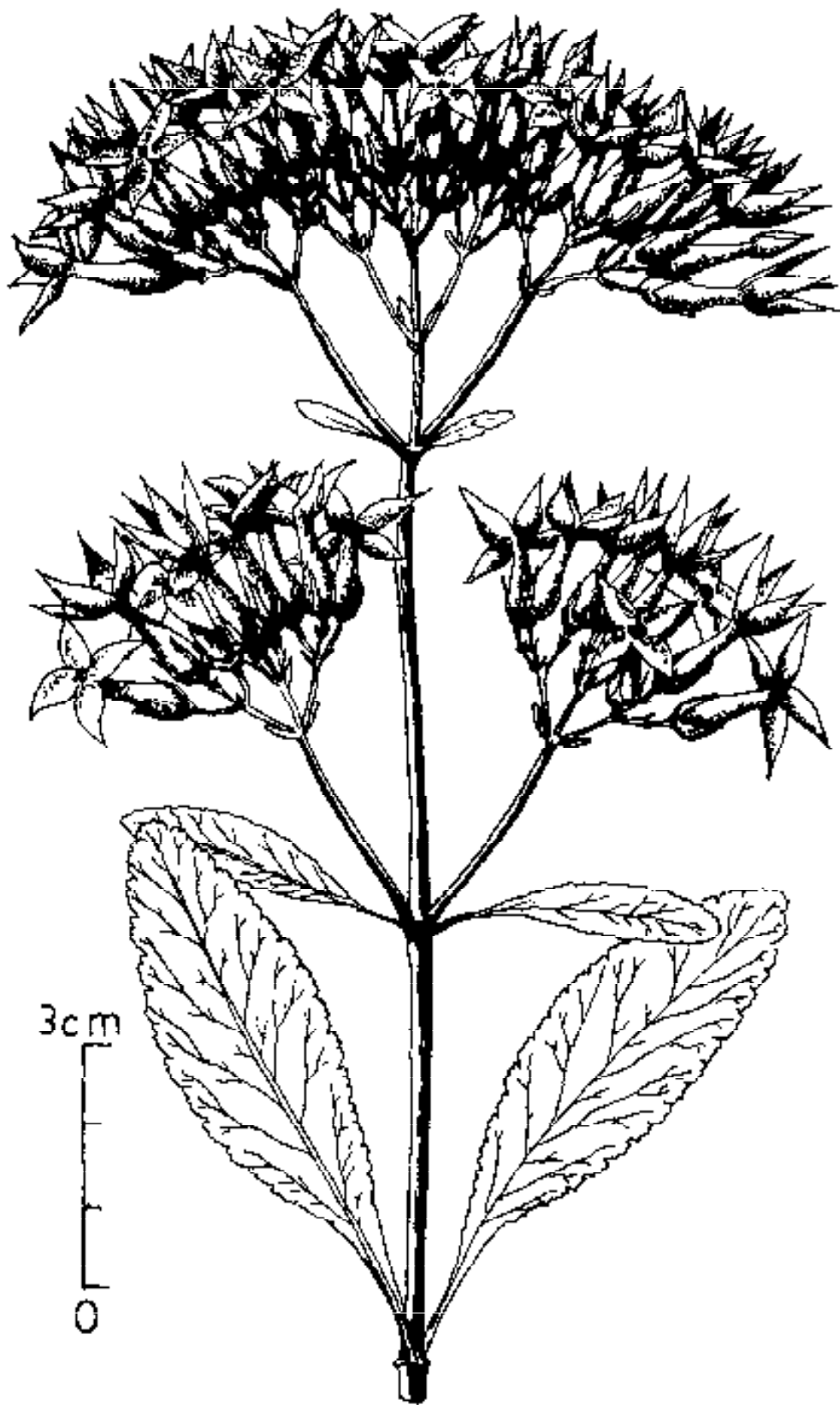


Fig. 52 : A flowering twig of *Kalanchoe rosea* C. B. Clarke

*Fl. & Fr.* : August - September.

*Specimens examined* : Imphal, Deb. s. n.

## 2. *Drosera* L.

*Drosera peltata* Smith in Willd., Sp. Pl. 1 : 1546. 1797; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 424. 1878; Kanjilal *et al.*, Fl. Assam 2 : 235. 1938; Deb in Bull. Bot. Surv. India 3 : 327. 1961; Long in Grierson & Long, Fl. Bhutan 1 (2) : 379. 1984.

Small erect herbs; stems, 7 - 19 cm, simple or with a few short branches, arising from underground tuber; basal leaves usually absent; stem-leaves numerous, alternate, lamina peltate, semicircular with attenuate tails at basal angles, ca 4 mm across, margins with spreading gland tipped cilia 1 - 3 mm, upper surface with short stalked glands; petioles 4 - 11 mm. Racemes subterminal, 1.5 - 2.5 cm, 4 - 6 flowered; pedicels slender, 2 - 9 mm; sepals ovate ca 2 × 1.3 mm; styles 3, each deeply divided into filiform segments. Capsules ca 2 mm in diam., subglobose, enclosed by persistent sepals and petals.

*Fl. & Fr.* : June - September.

*Specimens examined* : Khangklui, Mukerjee 3101 (CAL).

## 74. HAMAMELIDACEAE

R. Br. in Abel. Narr. J. China 374. 1818.

(A. S. Chauhan)

- 1a. Leaves palmately 5 - 7 nerved from base; ovate caudate, acuminate; flowers in heads ..... 2. *Exbucklandia*
- b. Leaves pinnately 9 - 12 nerved on each side; broadly ovate to suborbicular, acute to short-acuminate; flowers in spikes, appearing before leaves ..... 1. *Corylopsis*

### 1. *Corylopsis* Sieb. & Zucc.

*Corylopsis himalayana* Griffith. in J. Asiat. Soc. Bengal 23 : 642. 1854; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 427. 1878; Balakr., Fl. Jowai 1 : 195. 1981. *C. manipurensis* G. Watt ex Hemsley in Hook. Ic. Fl. Sub. tt. 2819, 2820, 1906; Kanjilal *et al.*, Fl. Assam 2 : 238. 1938; Deb in Bull. Bot. Surv. India 3 : 274. 1961.

Deciduous shrubs or small trees up to 6 m high; bark greyish or pale grey, smooth; branchlets slender. Leaves plicate in buds, broadly ovate to suborbicular, obliquely rounded or cordate at base, acute to short acuminate, serrate, 4 - 12 × 3 - 8 cm; lateral nerves 9 - 12 pairs; thinly tomentose beneath, glabrous above; petiole 1.0 - 2.5 cm. Flowers in 4 - 8 cm long, spike ca 0.8 cm across, pale-yellow, flowers appearing before leaves. Capsule ca 0.8 cm across, dehiscent at tip.

*Fl. & Fr.* : April - October.

*Specimens examined* : West Manipur, G. Watt s. n. (CAL).

## 2. *Exbucklandia* R. W. Brown

*Exbucklandia populnea* (R. Br. ex Griffith) R. W. Brown in J. Wash. Acad. Sc. 36 : 348. 1946; Balakr., Fl. Jowai 1 : 195. 1981. *Bucklandia populnea* R. Br. ex Griffith in Asiat. Res. 19 (1) : 94, t. 13 - 14. 1936; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 429. 1878; Kanjilal *et al.*, Fl. Assam 2 : 240. 1938. *Symingtonia populnea* (R. Br. ex Griffith) van Steenis in Acta Bot. Neerl. 1 : 444. 1952; Deb in Bull. Bot. Surv. India 3 : 274. 1961.

Trees up to 35 m high with narrow elongated crowns; bark blackish or dark brown. Leaves 6 - 15 × 4 - 15 cm, broadly ovate, caudate - acuminate, rounded obtuse or subcordate at base; basal nerves 5 - 7; lateral nerves 3 - 4 pairs; 1.5 - 3 cm long, obovate, obtuse, oblong, rounded at tip, heads 10 - 20 - flowered, 2 - 4 cm across. Flowers sessile; petals in bisexual flowers spatulate; in female flowers rudimentary. Capsules woody, sub-globose, 0.6 - 1 cm long.

*Fl. & Fr.* : October - February.

*Specimens examined* : Sirohee, Kingdon Ward 94 & 98 (CAL).

## 75. HALORAGACEAE

R. Br. in Flinders, Voy. Terra Austr. 2 : 549. 1814

("Haloragaceae").

(A. S. Chauhan)

### 1. *Myriophyllum* L.

*Myriophyllum tuberculatum* Roxb., Fl. Ind. 1 : 451. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 432. 1878; Deb in Bull. Bot. Surv. India 3 : 326. 1961; Meijden in Bernes 17 : 308. 1969. *M. indicum* Griffith, Not. 687. 1854.

Herbs, aquatic with stems floating and rooting at lower nodes. Leaves sessile, whorled, linear - lanceolate, toothed, submerged ones pectinately pinnatifid. Flowers upper ones alternate, solitary, small, monoecious, bracteate, upper whorls male, lower female; male flowers: sub-sessile, minute; calyx 2 - 4 lobed; petals 2 - 4; stamens 4; female flowers: calyx and corolla as in male flowers; ovary inferior, 4 loculed, each locule with one pendulous ovule; stigma fimbriate; styles 4. Fruits furrowed, tubercled at the back.

*Fl. Fr.* : March - May.

*Specimens examined* : Imphal, Deb 558 (CAL).

## 76. RHIZOPHORACEAE

R. Br. in Flinders Voy. Terra Austr. 2 : 549. 1814

("Rhizophoraceae").

(A. S. Chauhan)

### 1. *Carallia* Roxb.

*Carallia brachiata* (Lour.) Merr. in Phillip. J. Sci. 15 : 249. 1919; Deb in Bull. Bot. Surv. India 3 : 295. 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 376. 1985. *Diatoma*



*brachiata* Lour., Fl. Cochinch. 296. 1790. *Carallia lucida* Roxb., Pl. Corom. 3 : 8. 1811. *C. integerrima* DC., Prodr. 3 : 33. 1828; Henslow in Hook. f., Fl. Brit. India 2 : 439. 1878. *C. lanceaeifolia* Roxb. ex DC., Prodr. 3 : 3. 1828; Henslow in Hook. f., l.c. 2 : 439. 1878.

Fig. 53

Trees up to 15 m high; crowns compact, dense, oval; bark dark brown or reddish - brown when young. Leaves 6 - 18 × 3 - 7 cm, broadly elliptic, oblong obovate, abruptly acuminate, often obtuse or rounded, base narrowed cuneate, entire or sub entire at the tip, glossy; lateral nerves 8 - 14 pairs; petioles 0.5 - 1.2 cm; stipules 1 - 2 cm, lanceolate. Flowers sessile or sub - sessile, 0.4 - 0.6 cm across, greenish-yellow. Berries 0.8 - 1.2 cm across, globose, pink or red.

*Fl. & Fr.* : November - March.

*Specimens examined* : Ukhrul, Mukerjee 3079 (CAL).

## 77. COMBRETACEAE

R. Br., Prodr. 351. 1810.

(A. S. Chauhan)

- 1a. Trees; petals absent ..... 3. *Terminalia*
- b. Scandent or straggling shrubs;  
petals present ..... 2
- 2a. Calyx - tube distinct ..... 2. *Quisqualis*
- b. Calyx - tube not distinct ..... 1. *Combretum*

### 1. *Combretum* Loeffl., nom. cons.

- 1a. Flowers 5 - merous; fruits usually  
5 - winged ..... 4. *C. pilosum*
- b. Flowers 4 - merous; fruits 4 winged or ridged ..... 2
- 2a. Fruits fibrillar scaly; petals  
much longer than the calyx tubes ..... 2. *C. flagrocarpum*
- 2b. Fruits not fibrillar scaly; petals equalling or  
slightly longer than the calyx lobes ..... 3
- 3a. Shrubs glabrous; flowers greenish - white;  
calyx tube campanulate ..... 3. *C. ovalifolium*
- b. Shrubs covered with rusty tomentose  
or peltate scales; flowers yellow or  
greenish - yellow; calyx tube infundibuliform ..... 4
- 4a. Leaves cordate at base; young parts  
villous; panicles much shorter than  
the leaves; fruits stipitate ..... 1. *C. dasystachyum*
- b. Leaves cuneate at base; young parts covered  
with coloured peltate scales; panicles equalling  
the leaves; fruits not stipitate ..... 5. *C. punctatum*

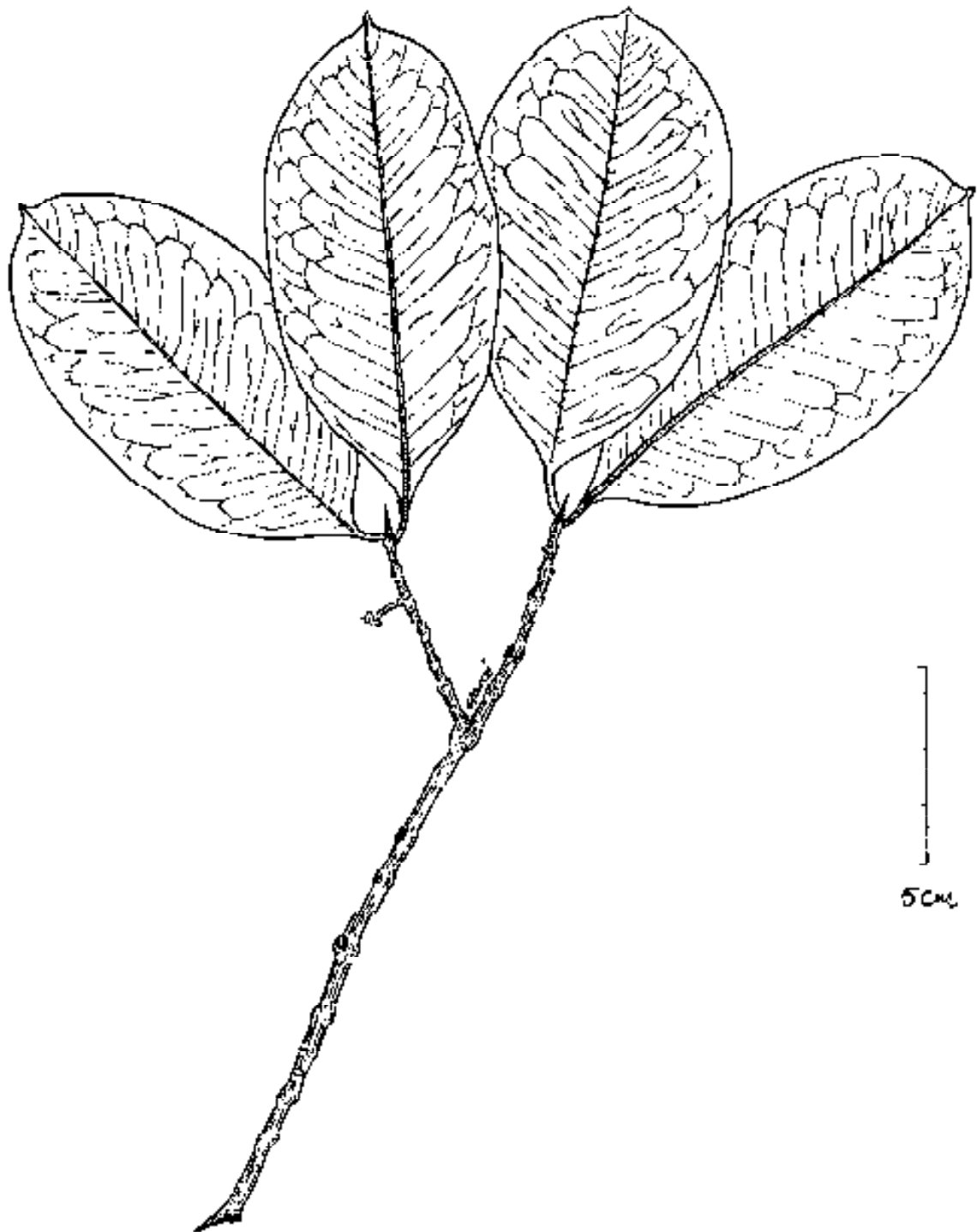


Fig. 53 : A twig of *Carollia brachiata* (Lour.) Merr.

1. *Combretum dasystachyum* Kurz in *Asiat. Soc. Bengal* 43 (2) : 187, 1874; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 547, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 255, 1938; Deb in *Bull. Bot. Surv. India* 3 : 296, 1961.

Woody climbers; young parts and inflorescence rusty hirsute or villous. Leaves 6 - 20 × 4 - 10 cm, oblong - lanceolate or oblanceolate or obovate, obtuse, acuminate, cordate at the base, glabrous above, pubescent beneath; petioles short, stout. Panicles terminal or axillary, much shorter than the leaves. Flowers bisexual, yellow or greenish-yellow, ca 0.4 cm across, tetramerous. Fruits stipitate, broadly 4 winged, clothed with scales, otherwise glabrous.

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

*Specimens examined* : Jirighat, Meebold 5366 (CAL).

2. *Combretum flagrocarpum* C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 455, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 253, 1938; Deb in *Bull. Bot. Surv. India* 3 : 296, 1961.

Large straggling or scandent shrubs; young parts brown tomentose or villous mixed with peltate scales. Leaves 7 - 18 × 4 - 10 cm, elliptic - oblong, broadly orbicular or ovate to obovate - lanceolate, acuminate, thinly coriaceous, pubescent along nerves or glabrescent with age. Panicles 8 - 15 cm, terminal or axillary, simple or branched. Flowers tetramerous, 0.3 - 0.5 cm across, yellow. Fruits 4 - winged, 2.2 - 4 cm long, orbicular, dotted with resinous glands, covered with linear - lanceolate scales.

*Fl. & Fr.* : April - November.

*Specimens examined* : Imphal valley, Meebold 5367 & 5938; Ukhrul, Mukerjee 3350 (CAL); Litan, Chauhan 94655 & 94771 (ASSAM).

3. *Combretum ovalifolium* Roxb., *Fl. Ind.* 2 : 226, 1832; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 458, 1878; Deb in *Bull. Bot. Surv. India* 3 : 296, 1961.

Scandent shrubs, young parts glabrous. Leaves 4 - 10 × 3.5 - 5.2 cm, elliptic, elliptic - ovate or ovate, acute or obtuse at apex, pale beneath, glabrous on both the surfaces; petiole ca 1.2 cm long. Flowers in paniced spikes, sub-sessile, tetramerous, 0.3 - 0.4 cm across, greenish - white; calyx teeth triangular, glabrous outside, covered with yellow scales; petals oblong. Fruits ca 2.5 cm, ovoid, 4 - winged.

*Fl. & Fr.* : February - June.

*Specimens examined* : Jirighat, Meebold 5699 (CAL).

4. *Combretum pilosum* Roxb., *Fl. Ind.* 2 : 231, 1832; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 453, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 251, 1938; Deb in *Bull. Bot. Surv. India* 3 : 296, 1961.

Scandent shrubs, young parts rusty or blackish-brown, spreading hairy. Leaves 8 - 20 × 4 - 10 cm, oblong - elliptic, oblong - oblanceolate, acuminate, base cordate or retuse, glabrescent or pubescent along nerves beneath. Flowers in paniced spikes, pentamerous, densely blackish or rusty villous, pink, 1.4 - 2.3 cm long; petals exceeding the length of sepals; ovary pilose. Fruits 2.4 - 4.3 cm long, elliptic or ovate - oblong in outline, 5 - winged.

*Fl. & Fr.* : January - October.

*Specimens examined* : Imphal, Deb 324 (CAL).

5. *Combretum punctatum* Blume, Bijdr. 640, 1825, subsp. *squamosum* (Roxb. ex D. Don) Exell, in van Steenis, Fl. Males. 4 : 539, 1954; Haridasan & Rao, For. Fl. Meghalaya 1 : 382, 1985. *C. squamosum* Roxb. ex D. Don in Trans. Linn. Soc. 15 : 419, 1827; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 456, 1878; Kanjilal *et al.*, Fl. Assam 2 : 253, 1938; Deb in Bull. Bot. Surv. India 3 : 296, 1961. *C. punctatum* Blume var. *squamosum* (Roxb. ex G. Don) Gang. & T. Chakrab. in J. Econ. Tax. Bot. 17 (3) : 680, 1993.

Large woody climbers; bark greyish - brown; young parts covered with peltate scales. Leaves 8 - 20 × 4 - 10 cm, oblong - elliptic or orbicular ovate, shortly acuminate at the apex, base rounded or cuneate; petioles long, stout, channelled. Flowers tetramerous, in terminal or axillary panicles; spikes, up to 12 cm long, 0.2 - 0.4 cm across, yellowish-white. Fruits 2 - 3.5 cm long, ovoid, 4- winged, covered with rounded scales.

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

*Specimens examined* : Imong, Meebold 5888 (CAL).

## 2. *Quisqualis* L.

*Quisqualis indica* L., Sp. Pl. ed. 2, 1 : 556, 1762; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 459, 1878; Kanjilal *et al.*, Fl. Assam 2 : 256, 1938; Deb in Bull. Bot. Surv. India 3 : 296, 1961.

Large woody climbers. Leaves 4 - 10 × 4 - 5 cm, elliptic - oblong, acuminate, softly pubescent; petioles 0.8 - 1 cm long, often transformed into recurved spines after the leaf fall. Flowers 5 - merous, showy, fragrant in terminal racemes, at first white then turning red; calyx limb slender, up to 5 cm long. Fruits very short, angled, glabrous, black.

*Fl. & Fr.* : June - October.

*Specimens examined* : Imphal, Deb 2496 (CAL).

Cultivated as an ornamental plant.

## 3. *Terminalia* L.

- |     |   |  |
|-----|---|--|
| 1a. | Drupes winged .....   | 2  |
| b.  | Drupes not winged .....   | 3  |
| 2a. | Petioles with 1 or 2 club shaped glands<br>at the base; drupes<br>with 5- winged .....      | 1. <i>T. alata</i> var. <i>tomentosa</i> |
| b.  | Petioles with 1 or 2 elongated glands<br>at the apex; drupes<br>with 2- winged .....        | 5. <i>T. myriocarpa</i>                  |
| 3a. | Leaves clustered at the apices of branched;<br>drupes globose, tomentose .....              | 2. <i>T. bellirica</i>                   |
| b.  | Leaves clustered at apices of<br>branches; drupes elongated or<br>ellipsoid, glabrous ..... | 4  |

- 4a. Leaf petiole 2.5 - 6 cm long, with obscure glands; panicles very tomentose; drupes ellipsoid ..... 3. *T. chebula*
- b. Leaf - petiole 0.5 - 2.1 cm long, with prominent glands; panicles pubescent; drupes oblanceolate ..... 4. *T. citrina*

**1. Terminalia alata** Heyne ex Roth var. **tomentosa** (Roxb.) Parkinson in Ind. For. Rec. 11. Bot. 1 (1) : 16. 1936; Deb, Fl. Tripura 1 : 383. 1981. *Pentaptera tomentosa* Roxb. Fl. Ind. 2 : 440. 1832. *Terminalia tomentosa* (Roxb.) Wight & Arn., Prodr. 1 : 314. 1834. non Mirbel; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 447. 1878, p.p.; Kanjilal *et al.*, Fl. Assam 2 : 246. 1938; Deb in Bull. Bot. Surv. India 3 : 296. 1961.

Large deciduous tree, with a clean bole and a full crown; bark brown to grey with deep longitudinal fissures and transverse cracks. Leaves sub-opposite, 13 - 30 × 6 - 10 cm, clustered at the ends of branches, oblong - elliptic to oblong lanceolate, entire or serrulate, rounded at base, villous, glabrescent with age; lateral nerves 13 - 30 pairs; petioles ca 1 cm long with club shaped glands, at the base. Spikes slender, 6 - 10.5 cm long, arranged in terminal panicles, thinly tomentose. Flowers ca 3 mm across, dull yellow. Drupes 4 - 5 cm long, with 5 coriaceous wings, glabrous, marked with close horizontal parallel striations. Fig. 54

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

*Specimens examined* : Nungba, G. Watt 6620; Nungba, Meebold 5977 (CAL).

**2. Terminalia bellirica** (Gaertn.) Roxb., Pl. Corom. 2 : 54, t. 198. 1805 'bellerica'; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 445. 1878; Kanjilal *et al.*, Fl. Assam 2 : 243. 1938; Exell in van Steenis, Fl. Males. 4 : 445. 1954. Deb in Bull. Bot. Surv. India 3 : 296. 1961. *Myrobalanus bellirica* Gaertn., Fruct. 2 : 90, t. f. a - d. 1791. Fig. 55

Mani.: *Bahera*.

Large deciduous trees, ca 30 m high, sometimes buttressed at base; bark grey, pale - greyish brown; young parts rusty tomentose. Leaves 5 - 16 × 3 - 12 cm, obovate to broadly elliptic, often whorled, abruptly acute, sometimes rounded or truncate, base cuneate, glabrous on maturity; margins with a pellucid rib; lateral nerves 5 - 8 on each side; petioles 2 - 8 cm long. Flowers 0.8 - 2.5 cm across, greenish yellow, with obnoxious smell, in slender drooping spikes, in the axils of leaves of new shoots, shorter than the leaves. Fruits 2 - 2.5 cm in diam., globose, grey velvety, pubescent.

*Fl. & Fr.* : March - November.

*Specimens examined* : Imphal, Deb 2484 (CAL).

**3. Terminalia chebula** Retz., Obs. Bot. 5 : 31. 1789; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 446. 1878; Kanjilal *et al.*, Fl. Assam 2 : 244. 1938; Deb in Bull. Bot. Surv. India 3 : 296. 1961. *Myrobalanus chebula* Gaertn., Fruct. 2 : 91, t. 97. 1791.

Mani. *Haritok*.

Deciduous tree, up to 25 m high; bark grey or ash coloured, rough and furrowed

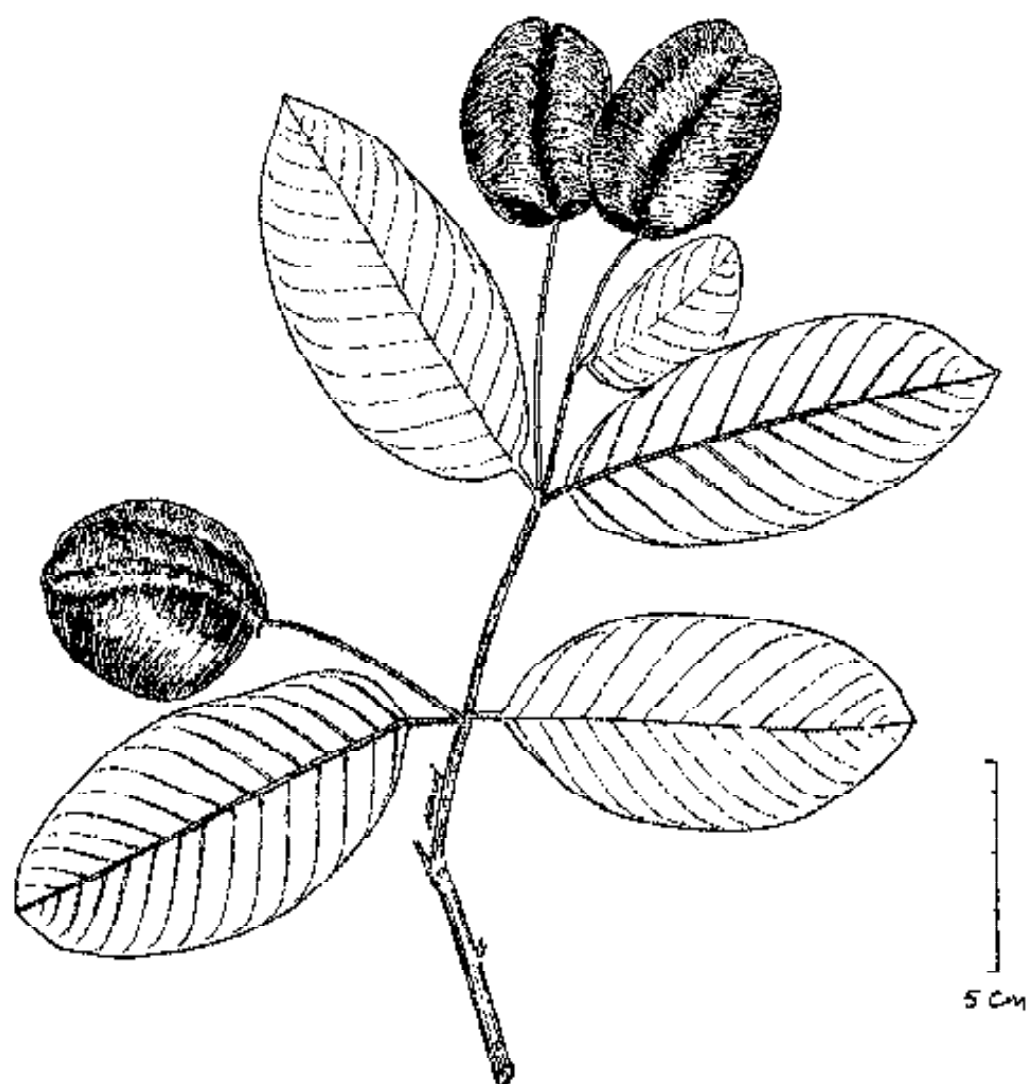


Fig. 54 : A twig of *Terminalia alata* Heyne ex Roth

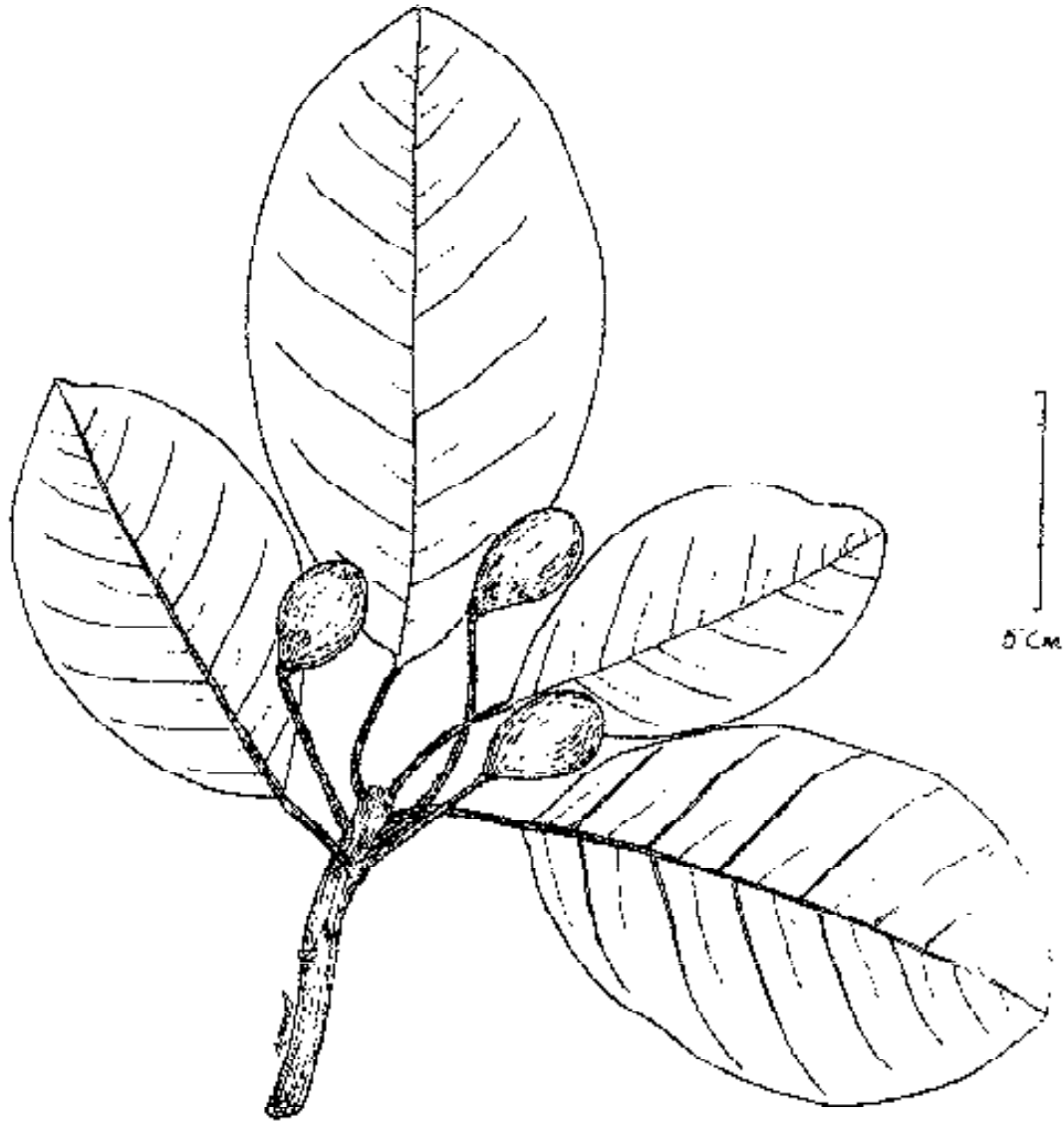


Fig. 55 : A fruiting twig of *Terminalia bellirica* (Gaertn.) Roxb.

- obtuse; young - parts rusty pubescent. Leaves 8 - 20 × 3 - 8 cm, elliptic or ovate - oblong, oblong - oblanceolate, alternate or sub - opposite, sub - coriaceous, glabrous, abruptly acuminate to acute, rounded to acute, rounded or cordate at the base; lateral nerves 6 - 12 on each side; petioles 2.5 - 6 cm, with glands at the side near the tips. Spikes terminal or from upper axils of new shoots, paniced or fascicled. Flowers 4 - 8 mm across, yellow, rusty pubescent when young, with obnoxious smell. Drupes 2.5 - 5 cm long, ellipsoid or obovoid, smooth, yellowish green when ripe. stones 5 - angled.

*Fl. & Fr.* : May - March.

*Specimens examined* : Imphal, Deb 2483, (CAL).

**4. Terminalia citrina** (Gaertn.) Roxb. ex Fleming in *Asiat. Res.* 1 : 183, 1810; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 446, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 245, 1938; Deb in *Bull. Bot. Surv. India* 3 : 296, 1961; Haridasan & Rao, *For. Fl. Meghalaya* 1 : 385, 1985. *Myrobalanus citrina* Gaertn., *Fruct.* 2 : 91, t. 97, 1791.

*Mani.* : *Manahi* & *Manachi*.

Deciduous trees up to 30 m high; stem buttressed at base; bark grey or brown. Leaves 6 - 20 × 4 - 10 cm, lanceolate or oblong - lanceolate or elliptic to oblong, rounded or broadly cuneate at base, acuminate; lateral nerves 8 - 12 pairs, finely reticulate; petiole 0.5 - 2, 1 cm, with two prominent glands near apex. Raceme paniced, 6 - 15 cm long. Flowers ca 4 mm across, yellow, fragrant. Fruits 3 - 5 × 2 - 2.5 cm, oblong-lanceolate, obtusely 5-angled.

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

*Specimens examined* : Singjanci, Deb 2482 (CAL).

**5. Terminalia myriocarpa** Van. Heurck. & Muell. -Arg. in Van Heurck., *Obs. Bot.* 215, 1871. C.B. Clarke in Hook. f., *Fl. Brit. India* 2 : 448, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 247, 1938; Deb in *Bull. Bot. Surv. India* 3 : 296, 1961. *Myrobalanus myriocarpa* O. Kuntze, *Rev. Gen. Pl.* 237, 1891.

*Mani.* : *Mazak*, *Thalana* & *Tolhao*.

Large trees, up to 35 m high with an ovoid crown and pendulous branches; bark grey or brown, young parts rusty pubescent. Leaves 10 - 28 × 3.5 - 8 cm, oblong lanceolate or oblong - elliptic, sometimes falcate, acute to acuminate, at base truncate or sub - cordate, entire or denticulate, glabrous or with few hairs along the nerves; lateral nerves numerous; petioles with 1 - 2 elongated glands at the apex. Panicles terminal or axillary, up to 30 cm long, spreading. Flowers ca 4 mm across, yellowish - pink. Drupes ca 5 mm long with 2 -lateral wings, yellow, 3- cornered.

*Fl. & Fr.* : September - March.

*Specimens examined* : West Manipur, Meebold 6559; Imphal valley, Deb 112 (CAL); Mt. KWab, Malick 1479 (BSIS).



**78. MYRTACEAE**

A. L. Juss., Gen. Pl. 322, 1789.

(A. S. Chauhan)

- 1a. Fruits capsular, dehiscing loculicidally: ..... 2
- b. Fruits baccate berries : ..... 3
- 2a. Flowers 1 - 3 in leaf axils; capsules  
more than 1 cm long ..... 3. *Eucalyptus*
- b. Flowers in spikes: capsules less  
than 1 cm long ..... 1. *Callistemon*
- 3a. Flowers in corymbose or sub-corymbose cymes;  
calyx not adnate to the ovary : ..... 4
- b. Flowers in clusters, not in corymbose cymes;  
calyx partly adnate to the ovary ..... 4. *Psidium*
- 4a. Panicles with trichotomous spreading branches;  
anther cells with deciduous apical glands ..... 2. *Cleistanthus*
- b. Panicles without trichotomous spreading branches;  
anther cells eglandular or with  
persistent glands ..... 5. *Syzygium*

**1. Callistemon R. Br.**

- 1a. Evergreen aromatic trees; leaves closely  
gland dotted; anthers not blackish ..... 2. *C. linearis*
- b. Shrubs or small trees; leaves not gland  
dotted; anthers blackish ..... 1. *C. citrinus*

1. *Callistemon citrinus* (Curtis) Skeels in U. S. Dept. Agr. Bur. Pl. Industr. Bull. 282. 49. 1913; Haridasan & Rao, For. Fl. Meghalaya 1 : 388. 1985, *Metrosideros citrina* Curtis in Bot. Mag. 8 : t. 260. 1724, *Callistemon lanceolatus* DC., Prodr. 3 : 223. 1828; Kanjital *et al.*, Fl. Assam 2 : 286. 1938; Deb in Bull. Bot. Surv. India 3 : 295. 1961.

Shrubs or small trees, branches arcuate, drooping; young parts covered with spreading hairs. Leaves linear - lanceolate, sharp pointed, 2.3 - 8 x 0.2 - 0.8 cm, base narrowed or cuneate, silky when young, glabrous when mature. Flowers in spikes, ca 10 cm long, 2 - 3.3 cm long, crimson red; calyx densely hairy, campanulate; anthers blackish. Capsule 0.4 - 0.8 cm long, truncate.

Fl. & Fr. : Throughout the year.

Specimens examined : Imphal, Deb 157 (CAL).

2. *Callistemon linearis* DC., Prodr. 3 : 223. 1828; Kanjital *et al.*, Fl. Assam 2 : 287. 1938; Deb in Bull. Bot. Surv. India 3 : 295. 1961.

Small, evergreen aromatic trees, with drooping branches; bark rough, fissured. young parts covered with soft spreading hairs. Leaves 4 - 8 x 0.2 - 0.5 cm, linear -

lanceolate, sharply pointed, narrowed at base, coriaceous, glabrous, closely gland dotted, with conspicuous intramarginal veins; petiole very short. Flowers in proliferous spikes, sessile, crimson; calyx campanulate, hairy; stamens long, brightly coloured, free, exserted. Capsules *ca* 0.5 cm long, woody, with a truncate apex.

*Fl. & Fr.* : March - December.

*Specimens examined* : Imphal, Deb 15 (CAL).

## 2. *Cleistocalyx* Blume

*Cleistocalyx operculatus* (Roxb.) Merr. & Perry in J. Arn. Arb. 18 : 337, t. 215, f. 41 - 48. 1937; Deb in Bull. Bot. Surv. India 3 : 295. 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 388. 1985, *Eugonia operculata* Roxb., Fl. Ind. 2 : 486. 1832; Duthie in Hook. f., Fl. Brit. India 2 : 498. 1878; Kanjilal *et al.*, Fl. Assam 2 : 277. 1938.

Medium - sized, glabrous evergreen trees; bark pale brown or greyish - white, rough and rectangular cracked. Leaves 6 - 20 × 4 - 10 cm, elliptic or obovate, oblanceolate or ovate, acuminate, base cuneate; lateral nerves 8 - 12 on each side; petioles short. Panicles 5 - 13 cm long, with corymbose cymes on trichotomous branches. Flowers 0.6 - 0.9 cm across, white; connective of anthers apically glandular. Berries globose, 0.6 - 1 cm, ovoid, tips truncate.

*Fl. & Fr.* : April - August.

*Specimens examined* : Imphal, Deb s.n. (CAL).

## 3. *Eucalyptus* L. Herit.

- 1a. Flowers 1 - 3 together in leaf axils;  
operculum covered with whitish powdery bloom;  
capsules more than 1 cm long, angular ..... 1. *E. globulus*
- b. Flowers in umbels; operculum not covered  
with whitish powdery bloom; capsules less  
than 1 cm long, globoid : ..... 2. *E. maculata*

1. *Eucalyptus globulus* Labill., Ral. Voy. Recher. Per. 1 : 153, t. 13. 1799; Kanjilal *et al.*, Fl. Assam 2 : 286. 1938; Deb in Bull. Bot. Surv. India 3 : 295. 1961.

Lofty trees up to 40 m high, aromatic, with spreading lax crowns; bark ashy-grey, smooth, peeling off in long strips. Leaves 13 - 27 × 1.2 - 4 cm, linear to narrow lanceolate, falcate, abruptly narrowed to the base, acuminate, bluish, glaucous. Flowers large, 1 - 3 together in leaf axils, *ca* 3 cm long; calyx tube much longer than the operculum with whitish powdery bloom. Capsules *ca* 3 cm long, angular and rugose.

*Fl. & Fr.* : August - March.

*Specimens examined* : Kangpokpi, Deb 941 (CAL).

2. *Eucalyptus maculata* Hook., Ic. Pl. t. 619. 1844; Kanjilal *et al.*, Fl. Assam 2 : 286. 1938; Deb in Bull. Bot. Surv. India 3 : 295. 1961.

Tall trees, with column like trunk; bark whitish or greyish, deciduous in patches. Leaves alternate, 10 - 17 × 1.3 - 3.5 cm, lanceolate or linear - lanceolate, falcate. Flowers in clusters of three, umbels or in panicles; calyx tube adnate to the ovary at the base; petals united with the calyx lobes to form a hemispherical lid much shorter than calyx. Fruits *ca* 1 cm long, ovoid, globoid-drum shaped.

- 1a. Leaves without lemon - scented glands ..... var. *maculata*  
 b. Leaves with lemon scented glands ..... var. *citriodora*

**Var. maculata**

*Fl. & Fr.* : October - March.

*Specimens examined* : Kangpokpi, Deb 1853 (CAL).

**var. citriodora** (Hook.) Bailey, *Encycl.* 1152, 1942; Deb, *Fl. Tripura* 1 : 367, 1981. *E. citriodora* Hook. in *Mitch. J. Trop. Austral.* 235, 1838; Kanjilal *et al.*, *Fl. Assam* 2 : 286, 1938; Deb in *Bull. Bot. Surv. India* 3 : 295, 1961.

*Mani.* : *Nasik.*

Tall trees, with column like trunks, bark whitish or greyish, cracked in pieces. Leaves alternate, gland dotted, strongly lemon scented, 10 - 17 × 1.3 - 3.5 cm, lanceolate or linear - lanceolate, falcate. Flowers in clusters of three, umbels or in panicles; calyx tube adnate to the ovary at the base; petals united with the calyx lobes to form a hemispherical lid much shorter than calyx tube. Fruits *ca* 1 cm long, ovoid, globose, urn - shaped.

*Fl. & Fr.* : October - February.

*Specimens examined* : Kangpokpi, Deb 1553 (CAL).

Cultivated as an avenue tree.

#### 4. *Psidium* L.

***Psidium guajava* L.**, *Sp. Pl.* 470, 1753; Duthie in Hook. f., *Fl. Brit. India* 2 : 468, 1878; Kanjilal *et al.*, *Fl. Assam* 2 : 287, 1938; Deb in *Bull. Bot. Surv. India* 3 : 295, 1961.

*Mani.* : *Pungdol.*

Large shrubs or small trees, up to 8 m high; bark pinkish - brown, exfoliating in thin flakes. Leaves opposite, 5 - 10 × 3 - 7 cm, oblong, elliptic - oblong, acute or obtuse or oblong, base cordate, entire, glabrous above, pubescent beneath; lateral nerves much prominent. Flowers 1 - few clustered together in axillary peduncles, greenish - white or yellowish, 2 - 3.2 cm across; calyx partly adnate to the ovary below, urceolate. Berry globose or pyriform, varying in size and shape, yellowish - white, seeds immersed in sweet pulp, yellowish or pink; seeds are very less in parthenocarpic fruits, edible.

*Fl. & Fr.* : April - February.

*Specimens examined* : Imphal, Deb 2338 (CAL).

5. *Syzygium* Gaertn.

- 1a. Tall trees, leaves with long petioles; lateral nerves 20-30 pairs; flowers ca 1cm across greenish white in axillary or lateral cymes, usually on fallen leaf axils ..... 1. *S. cumini*
- b. Medium sized trees; leaves with short petiole; lateral nerves 15-20; flowers ca 5 cm across, white, pink, yellowish - pink in terminal few flowered cymes ..... 2. *S. jambos*

1. *Syzygium cumini* (L.) Skeels in U. S. Dept. Ag. Bur. Pl. Industr. Bull. 248 : 25. 1912; Deb in Bull. Bot. Surv. India 3 : 295. 1961; Hara in Hara *et al.*, Enum. Fl. Pl. Nepal. 2 : 169. 1979; Balakr., Fl. Jowai 1 : 199. 1981. *Myrtus cumini* L., Sp. Pl. 471. 1753. *Eugenia jambolana* Lam., Encycl. 3 : 198. 1789; Kanjilal *et al.*, Fl. Assam 2 : 278. 1938.

Mani.: Jamun & Gulamchat.

Large evergreen trees, up to 20 m high; crown umbrella shaped. bark thick greyish or whitish - brown. Leaves 7-18 × 3-8 cm, elliptic - oblong, oblanceolate elliptic, ovate to obovate elliptic, abruptly acuminate, narrowed at the base, glabrous, pale beneath; lateral nerves 20-30 pairs; petioles 10-25 cm, channeled. Cymes sub-corymbose terminal or axillary, ca 12 cm long. Flowers 0.6-0.8 cm, greenish - white, 3-8 together, sessile or shortly pedicelled; calyx cupular; corolla calyptrate. Berries 1-2.5 cm across, ellipsoid, reddish black at maturity.

Fl. & Fr. : March - July

Specimens examined : Imphal, Deb s.n. (CAL).

2. *Syzygium jambos* (L.) Alston in Trimen, Handb. Fl. Ceylon 6 : 115. 1931; Deb in Bull. Bot. Surv. India 3 : 295. 1961. *Eugenia jambos* L., Sp. Pl. 470. 1753; Duthie in Hook. f., Fl. Brit. India 2 : 474. 1878; Kanjilal *et al.*, Fl. Assam 2 : 266. 1938.

Mani.: Nongnangkori & Gutabjam

Medium sized evergreen trees up to 15 m high. Leaves 10-20 × 2.5-5 cm, oblong lanceolate, lanceolate or ovate lanceolate, acuminate at apex, base cuneate; lateral nerves raised beneath. Flowers 4-5 cm across, white or dull-white, in panicles; calyx ca 1.5 cm across, obconic, reflexed; petals obovate, rounded. Berries ca 3 cm across, yellowish to pink tinged.

Fl. & Fr. : April - September.

Specimens examined: Imphal Deb 1972 (CAL).

**79. MELASTOMATACEAE**

A. L. Juss., Gen. Pl. 328. 1789 ("Melastomac").

(A. S. Chauhan)

- 1a. Ovary inferior ..... 2
- b. Ovary superior ..... 4
- 2a. Leaves palmately veined; fruits ribbed,  
many seeded ..... 3
- b. Leaves pinnately veined; fruits not ribbed,  
usually 1-seeded ..... 4. *Memecylon*
- 3a. Stamens 4, similar; fruits 4-ribbed ..... 2. *Blastus*
- b. Stamens 8, dissimilar; fruits 8-ribbed ..... 6. *Oxyspiru*
- 4a. Flowers 3-merous; anther  
connectives not produced ..... 8. *Sonerila*
- b. Flowers 4-5-merous; anther  
connectives produced ..... 5
- 5a. Flowers less than 4 cm across; stamens equal  
in length; fruits dehiscent by apical pore ..... 6
- b. Flowers more than 5 cm across;  
stamens unequal in length; fruits  
dehiscent irregularly ..... 7
- 6a. Stamens dorsally appendaged; fruits  
quadrangular; seeds straight, ovoid ..... 7. *Sarcopyramis*
- b. Stamens not appendaged; fruits terete;  
seeds curved falcate ..... 5. *Osbeckia*
- 7a. Tall shrubs or trees; anthers bluish;  
capsule dry ..... 9. *Tibouchina*
- b. Herbs or small shrubs; anthers not  
bluish; capsules fleshy ..... 8
- 8a. Stamens 4; ovary 4-celled with  
vertical ridges ..... 1. *Anplectrum*
- b. Stamens 10-12; ovary 5-6 celled  
without vertical ridges ..... 3. *Melastoma*

**1. Anplectrum A. Gray**

*Anplectrum assamicum* C. B. Clarke in J. Linn. Soc. 25 : 23. 1889; Kanjilal *et al.*, Fl. Assam 2 : 303. 1938; Deb in Bull. Bot. Surv. India 3 : 296. 1961.

Fig. 56

Shrubs, ca 3 m tall; young parts with spreading bristly hairs. Leaves opposite, 10-20 × 3.5-7.5 cm. oblong-lanceolate or ovate-oblong to elliptic-lanceolate,

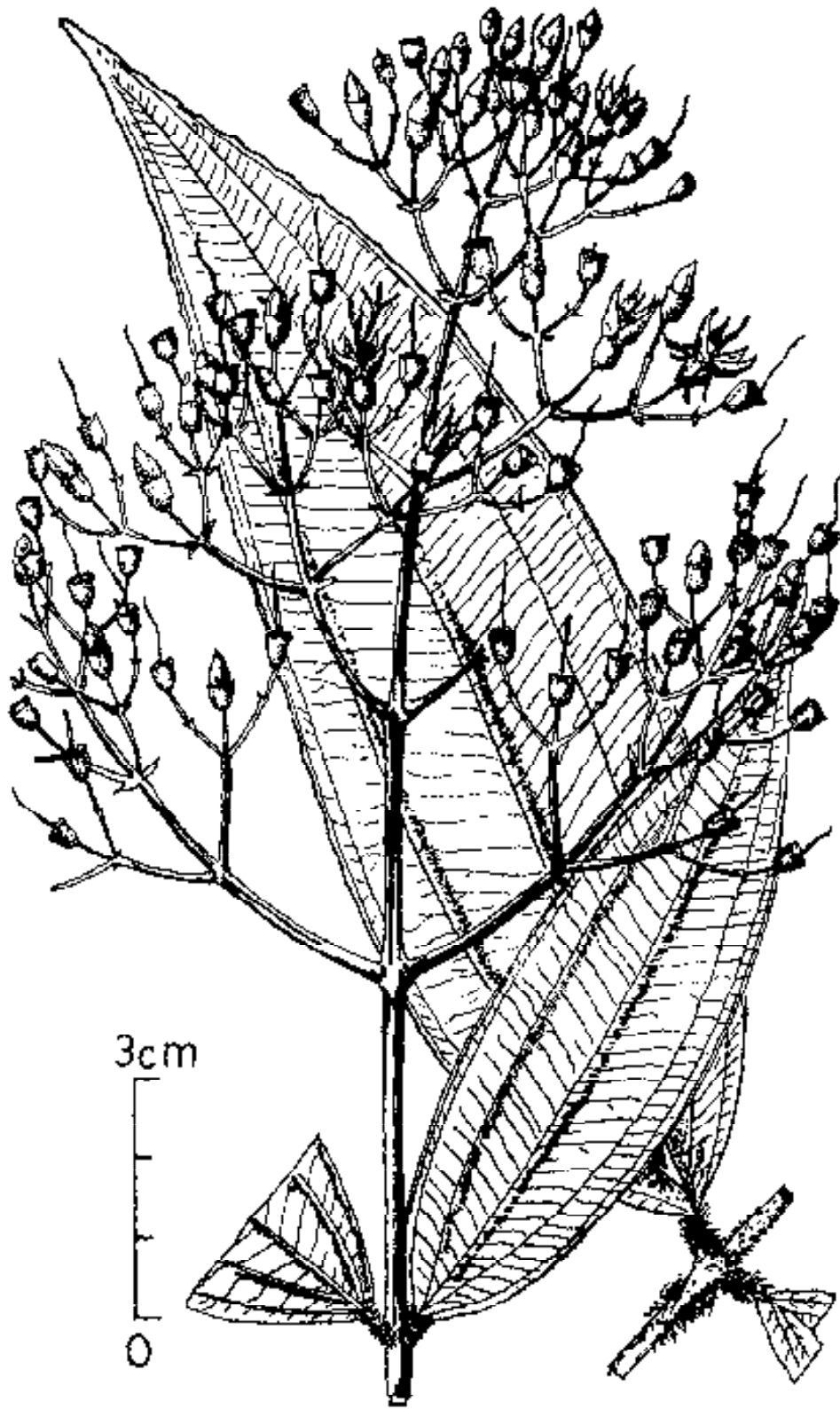


Fig. 56 : A branch of *Anplectrum assamicum* C. B. Clarke

acuminate, narrowed or rounded at base; basal nerves 3-5, sub-cordate; petioles ca 3 mm. Flowers tetramerous in terminal pyramidal panicles; bracteoles ca 4 mm long, lanceolate to ovate, ciliate; petals 4, whitish with bristly tipped apex; stamens 8, inserted at the base of the limb; 4 filaments with longer anthers and other 4 with shorter anthers; anthers with 2-lateral lobes. Fruits ca 3 mm long, ovoid, baccate; seeds small, dark-brown.

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

*Specimens examined* : Morkoo, C. B. Clarke 42323 (CAL).

### 2. *Blastus* Lour.

*Blastus cochinchinensis* Lour., Pl. Cochinch. 527, 1790; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 528, 1879; Kanjilal *et al.*, Fl. Assam 2 : 304, 1938; Deb in Bull. Bot. Surv. India 3 : 296, 1961.

Mani.: *Bobuchuntnei*.

Shrubs, ca 4 m high with terete branches; young parts densely covered with reddish-brown or yellowish-white scales. Leaves 7.5-14.5 x 2.5-4.5 cm, elliptic lanceolate to oblong, acuminate, cuneate at base, membranous, 3-5 nerved at base; petioles ca 1.2 cm long. Flowers in panicles in the axils of fallen leaves, tetramerous, small; petals equal; much exceeding the calyx teeth; stamens 4, equal, anthers with 2 lobes at the base. Fruits ca 4 mm long capsules, dehiscence by 4 slits; seeds minute, brownish.

*Fl. & Fr.* : January - May.

*Specimens examined* : Imphal valley, Deb 79 (CAL).

### 3. *Melastoma* L.

- 1a. Young parts coarsely bristly; bract large, lanceolate, enclosing buds; calyx lobes glabrous inside ..... 1. *M. malabathricum*
- b. Young parts silky; bracts ovate, not enclosing buds; calyx lobes densely silky inside. .... 2. *M. nepalensis*

1. *Melastoma malabathricum* L., Sp. Pl. 390, 1753, 'malabathrica'; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 523, 1879; Kanjilal *et al.*, Fl. Assam 2 : 297, 1938; Deb in Bull. Bot. Surv. India 3 : 296, 1961; Balakr., Fl. Jowai 1 : 202, 1981.

Bushy shrubs, up to 4 m high; stems strigose with long subulate scales. Leaves 5-12 x 2-5 cm, oblong-lanceolate to elliptic, rounded to acute at base, acuminate, scabrous above, appressed hairy above, strigose on main nerves beneath; basal nerves 3-5; petioles strigose, ca 1 cm. Flowers 4-6 cm across; mauve-purple, in clusters at the ends of branchlets, bracts 1.5-2 cm, lanceolate, enclosing the buds; calyx lobes lanceolate, densely covered with scales. Fruits ca 0.6 cm across, truncate, purple.

*Fl. & Fr.* August - January.

*Specimens examined* : Sirohee, *Meebold* 5600A; Imphal, *Deb* 1320 (CAL); Uchathol, *Malick* 627; Imphal, *Malick* 1356 (BSIS).

2. *Melastoma nepalensis* Lodd., Bot. Cab. t. 707. 1823; Balakr., Fl. Jowai 1 : 202. 1981, *M. normale* D. Don, Prodr. Fl. Nep. 220. 1825; C., B. Clarke in Hook. f., Fl. Brit. India 2 : 534. 1879; Kanjilal *et al.*, Fl. Assam 2 : 298. 1938; Deb in Bull. Bot. Surv. India 3 : 296. 1961.

Large shrubs, up to 6 m high; stems reddish, densely hairy. Leaves 6 - 14 × 2 - 4 cm, oblong lanceolate or elliptic to ovate lanceolate, base rounded, acute to shortly acuminate, adpressed hairy above pubescent or villous beneath; basal nerves 3 - 5. Flowers 5 - 6 cm across, pink - purple, in fascicles of 5 - 10 at the branch tips; bracts ca 1 cm, ovate, not enclosing buds; calyx leaves ovate lanceolate, densely hairy. Fruits ca 0.7 cm across, truncate, pulpy.

*Fl. & Fr.* : July - December.

*Specimens examined* : Piphima, *Meebold* 5600B; Ukhrul *Mukerjee* 2864; Koupru, *Deb* 2244 (CAL).

#### 4. *Memecylon* L.

*Memecylon cerasiforme* Kurz, For. Fl. Brit. Burma 1 : 516. 1877; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 557. 1879; Kanjilal *et al.*, Fl. Assam 2 : 305. 1938; Joseph, Fl. Nongpoh 120. 1982.

Small trees up to 15 m tall, with a straight bole and compact crown. Leaves 7 - 12 × 3 - 6 cm, broadly elliptic lanceolate or elliptic oblong, cuneate at base, acuminate, glabrous; lateral nerves looping near the margins; petioles channelled. Flowers ca 0.5 cm across, bluish - white, in pedunculate, simple or compound cymes, sub sessile; calyx 4 - lobed, campanulate, truncate; ovary inferior. Berries ca 1.5 cm in diam. globose, black; 1 - 2 seeded.

*Fl. & Fr.* : March - December.

*Specimens examined* : Monpui, *Deb* 27172 (CAL).

#### 5. *Osbeckia* L.

- |     |   |                         |
|-----|---|-------------------------|
| 1a. | Flowers 5 merous; stamens 10 .....  | 2                       |
| b.  | Flowers 4 merous; stamens 8 .....   | 3                       |
| 2a. | Leaves 0.4 - 1.2 cm with 3 basal nerves;<br>flowers pink; calyx with few bristles at base .....         | 4. <i>O. nutans</i>     |
| b.  | Leaves 1.5 - 2 cm, with 5 basal nerves;<br>flowers white; calyx tube with stellate hairs .....          | 3. <i>O. nepalensis</i> |
| 3a. | Leaves with 3 - 5 basal nerves; flowers<br>capitate; anthers beaked .....                               | 4                       |
| b.  | Leaves with 5 - 7 basal nerves; flowers in<br>paniculate or corymbose cymes;<br>anthers attenuate ..... | 5                       |



- 4a. Erect herbs; bracts glabrous; calyx tube  
glabrous, covered with scales ..... 2. *O. chinensis*
- b. Diffuse herbs; bracts pubescent;  
calyx tube hairy, without scales ..... 1. *O. capitata*
- 5a. Stems terete, covered with bulbous based  
hairs; flowers in corymbose cymes;  
bracts triangular; calyx linear - subulate ..... 6
- b. Stems quadrangular, not covered with bulbous hairs;  
flowers in paniculate cymes; bracts ovate; calyx  
triangular - elongate ..... 7
- 6a. Stems reddish; flowers always 4-merous,  
pink; calyx lobes densely hairy;  
capsules more than 1 cm long ..... 8. *O. stellata*
- b. Stems green; flowers 4 or 5-merous,  
white; calyx lobes sparsely hairy,  
capsules less than 1 cm long ..... 7. *O. sikkimensis*
- 7a. Leaves with 5 basal nerves; calyx lobes  
glabrous or sparsely hairy;  
fruits ca 2 cm, cylindric ..... 5. *O. rostrata*
- b. Leaves with 7 basal nerves; calyx lobes  
covered with long setose and short white  
hairs; fruits ca 1 cm, ovoid ..... 6. *O. septaminervis*

1. *Osbeckia capitata* Walp., Nov. Act. Acad. Caesp. Leop. Carol. Nat. Cur. 19, Suppl. 1 : 331, 1843; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 516, 1879; Kanjilal *et al.*, Fl. Assam 2 : 295, 1938; Deb in Bull. Bot. Surv. India 3 : 297, 1961.

Mani.: *Buakbum*.

Diffuse herbs, up to 50 cm; branches from near the base, quadrangular, strigose with adpressed bristly hairs. Leaves 1-3.5 × 0.5-1 cm, ovate to elliptic-ovate, sessile, rounded at base, acute, pubescent at both surfaces; basal nerves 3-6. Flowers ca 2 cm across, pinkish-purple, capitate, terminal; pedicels 2-3 mm; bracts ca 1 cm long, ovate, acute, pubescent, ciliate; calyx lobes ca 4 mm, ciliate. Capsules ovoid, ca 0.8 cm, glabrous, short-necked.

Fl. & Fr. : June - November.

*Specimens examined* : Chingmoirong, Deb 603; Kaliching, Deb 1200; Ukhrul, Mukerjee 2703 (CAL).

2. *Osbeckia chinensis* L., Sp. Pl. 345, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 515, 1879; Kanjilal *et al.*, Fl. Assam 2 : 294, 1938; Deb in Bull. Bot. Surv. India 3 : 297, 1961 & Fl. Tripura 1 : 390, 1981, *O. angustifolia* D. Don, Prodr. Fl. Nep. 221, 1825.

Mani.: *Huilukham*.

Erect weak undershrubs, up to 80 cm; branches pubescent with adpressed hairs. Leaves 2 - 4 × 0.5 - 1 cm, oblong to linear-lanceolate, rounded to subobtruse at base, acute at apex, adpressed pubescent, 3 - 5 nerved at the base, subsessile; petioles ca 0.2 cm. Flowers capitate at the ends of the branches purple or mauve, tetramerous, ca 2 cm across; pedicels short, ca 0.2 cm; bracts glabrous outside; calyx tube glabrous, 4-lobed, triangular, ciliate; stamens 8, anthers with beaks. Capsules small, 0.6 - 0.8 cm, ovoid, subglabrous, with a short neck formed of the persistent calyx.

var. *chinensis*

Fl. & Fr. : May - November.

*Specimens examined* : Shugnu, *Deb* 2676; Khuduk, *Deb* 233; Uyongkhong, *G. Watt* 7281; Koupru, *Meebold* 5907 (CAL); Chandel, *Chauhan* 94939 (ASSAM).

**3. *Osbeckia nepalensis*** Hook., *Exot. Fl.* 1 : t. 31. 1822; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 521. 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 295. 1938; Deb in *Bull. Bot. Surv. India* 3 : 297. 1961.

Mani. : *Namulai*

Small erect, slender shrubs, up to 1.5 m; stems obscurely quadrangular, scabrous. Leaves 5 - 12 × 1.5 - 5 cm; broadly ovate-lanceolate or oblong-lanceolate to elliptic-lanceolate, cordate to rounded at base, acute or subacute, subsessile, pilose, adpressed hairy along nerves; petioles very short, ca 2.5 mm. Flowers ca 3 cm across, white to purple, pentamerous in terminal or upper axillary corymbose cymes; pedicels ca 0.3 cm; bracts equalling the calyx-lobes; calyx-lobes lanceolate, glabrous, ciliate at the margins. Capsules, ca 1.2 cm, campanulate, truncate, densely scaly.

Fl. & Fr. : August - February.

*Specimens examined* : Laimakhong, *Deb* 594; Imphal, *Deb* 331; Jirighat, *Meebold* 6007; Jakhamac, *Meebold* 5604 (CAL); Kongpokpi, *Malick* 1391 (BSIS).

**4. *Osbeckia nutans*** Triana in *Trans. Linn. Soc.* 28 : 54. 1871; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 521. 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 296. 1938; Deb in *Bull. Bot. Surv. India* 3 : 297. 1961; Balakr., *Fl. Jowai* 1 : 205. 1981.

Shrubs or undershrubs, up to 1 m high; branches numerous. Leaves 2 - 7 × 0.4 - 1.2 cm, linear-lanceolate or linear-oblong, subacute to rounded at base, acuminate, gradually tapering to the tip; glabrous above, pale and strigose beneath along midrib. Flowers ca 3 cm across, pink, pinkish-purple, 1 - 3 together on short terminal peduncles ca 8 mm; bracts linear-lanceolate; calyx lobes lanceolate, ca 1 cm long, adpressed scaly; petals obovate. Capsules, ca 0.8 cm, campanulate.

Fl. & Fr. : October - January.

*Specimens examined* : Chatrik, *Deb* 1364. Palled, *Mukerjee* 3688 (CAL)

5. *Osbeckia rostrata* D. Don var. *pulchella* Triana in Trans. Linn. Soc. 28 : 54. 1871; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 518. 1879; Kanjilal *et al.*, Fl. Assam 2 : 294. 1938; Deb, Fl. Tripura 1 : 391. 1981.

Small shrubs, differing from the preceding species in having quadrangular stems, more glabrescent leaves; petioles longer, glabrous; scales between the calyx lobes obscure or absent. Fruits large ca 2.5 cm, cylindrical; seeds buff - coloured.

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

*Specimens examined* : North Manipur, G. Watt 7278; Jirighat, Meebold 5724; Bishenput, Meebold 6004 (CAL).

6. *Osbeckia septaminervis* Ham, ex Craib in Notes R. Bot. Gard. Edinb. 10 : 55. 1917; Kanjilal *et al.*, Fl. Assam 2 : 293. 1938; Deb in Bull. Bot. Surv. India 3 : 297. 1961.

Small shrubs, ca 2 m high, stems quadrangular, hirsute with spreading hairs. Leaves 7 - 12 × 2 - 3 cm, lanceolate to oblong - lanceolate, acute, attenuate at the base, hirsute above, strigose beneath along midrib; basal nerves 7; petioles ca 1.2 cm, densely hairy. Flowers ca 3.5 - 4 cm across, in axillary or terminal paniced cymes, densely covered with harsh hairs; bracts ca 0.6 cm long, sub rotundate to ovate; calyx lobes 4, ca 1.5 cm long, linear lanceolate, sparsely hairy with long setose and whitish short hairs; stamens up to 4 cm long, anthers longer than filaments. Capsules ca 1 cm, ovoid, narrowed into a neck.

*Fl. & Fr.* : August - November.

*Specimens examined* : Pallel, Deb 205 (CAL).

7. *Osbeckia nikkimensis* Craib in Notes R. Bot. Gard. Edinb. 10 : 56. 1917; Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 170. 1979. *O. crinita* auct. non Benth. ; C.B. Clarke in Hook. f., Fl. Brit. India 2: 517. 1879, *p.p.*; Deb in Bull. Bot. Surv. India 3 : 297. 1961.

Mani.: *Builu-kham*.

Shrubs, 1 - 2 m high, branches covered with spreading bulbous, fuscous hairs. Leaves 3 - 10 × 2 - 4 cm, ovate to oblong - lanceolate, acute to acuminate, cuneate to rounded at base, basal nerves 5 - 7; petioles 1 - 2 cm. Flowers ca 2.5 cm across, in terminal and upper axillary corymbose cymes, white or purplish; calyx lobes ca 5.5 mm, linear subulate. Capsules ca 1 cm across, ovoid, tapering into a neck.

*Fl. & Fr.* : July - April.

*Specimens examined* : Uyong Khong, G. Watt 7157; Piphima Meebold 5605; Ukhrul, Mukerjee 3528; Ching Mairang, Deb 546 (CAL); Nungba, Malick 1146 (BSIS).

8. *Osbeckia stellata* Buch. - Ham. ex D. Don in Bot., Reg. 8 : t. 674. 1822; Deb in Bull. Bot. Surv. India 3 : 297. 1961; Baiakt., Fl. Jowai 1 : 206. 1981. *O. crinita* Naud. in Ann. Sci. Nat. Bot. ser 3. 14. 72. 1850; C. B. Clarke in Hook. f., Fl. Brit. India

2 : 517, 1879, *p.p.*; Kanjilal *et al.*, Fl. Assam 2 : 293, 1938.

Shrubs, up to 2.5 m high; stems reddish, covered with spreading bulbous based hairs. Leaves 2-10 × 1-4 cm, ovate-lanceolate, cuneate to rounded at the base, acute to acuminate, scabrous, hairy on both surfaces; basal nerves 5-7; petioles 0.5-2 cm. Flowers *ca* 2.5 cm across, white to purple, in terminal or upper axillary corymbose cymes; pedicels *ca* 0.8 cm; calyx lobes *ca* 0.6 cm long. Capsules *ca* 1.2 cm, ovoid, narrowed into a neck.

*Fl. & Fr.* : August-March.

*Specimens examined* : Lamatak, G. Watt 7175; Ukhrul, Mukerjee 3245 (CAL); Kaibul Lamjao National Park, Chauhan 95120 (ASSAM).

### 6. *Oxyspora* DC.

- 1a. Plants glabrous; rachis quadrangular at base; calyx lobes reddish; capsules not ribbed ..... 1. *O. cernua*
- b. Plants hairy or scaly; rachis not quadrangular; calyx lobes greenish; capsules ribbed ..... 2.
- 2a. Leaves 3-5 cm broad, bristly along the nerves beneath; petioles with tuft of bristly hairs at the tip ..... 2. *O. paniculata*
- b. Leaves 4-11 cm broad, sparsely hairy along the nerves beneath; petioles without tuft of hairs at the tip ..... 3. *O. vagans*

1. *Oxyspora cernua* (Roxb.) Hook. f. & Thomson ex Triana in Trans, Linn. Soc. 28 (1) : 73, t. 6, f. 62 b. 1872; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 526, 1879; Kanjilal *et al.*, Fl. Assam 2 : 301, 1938; Deb in Bull. Bot. Surv. India 3 : 297, 1961. *Melastoma cernua* Roxb., Fl. Ind. 2 : 404, 1832.

Straggling shrubs, up to 2 m high with long drooping branches. Leaves 8-30 × 2.5-5 cm, ovate to elliptic-lanceolate, base rounded or cordate, acuminate, green, shining above, pale or reddish beneath; petioles 2-5 cm. Flowers in lax panicles, *ca* 50 cm long, rose-pink, *ca* 1.5 cm across, rachis quadrangular at base; calyx ovate, acute, *ca* 1 cm, reddish. Capsules *ca* 1 cm long, obovoid to ellipsoid, reddish.

*Fl. & Fr.* : August-December.

*Specimens examined* : Mao, 1737 (CAL); Mt. Karoh, Malick 1468 (BSIS).

2. *Oxyspora paniculata* (D. Don) DC., Prodr. 3 : 123, 1828; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 525, 1879; Kanjilal *et al.*, Fl. Assam 2 : 300, 1938; Deb in Bull. Bot. Surv. India 3 : 297, 1961. *Arthrostemma paniculatum* D. Don in Mem. Wern. Nat. Hist. Soc. 4 : 299, 1822.

Shrubs, up to 2 m high, young shoots and petioles dense hairy. Leaves 12 × 3 - 5 cm, elliptic to ovate-lanceolate or broadly lanceolate, rounded or subcordate at base, acuminate, bristly along nerves beneath, obscurely serrate; petioles 3 - 5 cm. Flowers in terminal lax panicles, ca 20 cm long, 1 - 1.5 cm across, pinkish-purple; calyx tube campanulate, 0.4 - 0.6 cm. Capsule 8 ribbed, ellipsoid, ca 1 cm long, crowned by accrescent calyx limbs.

*Fl. & Fr.* : July - December.

*Specimens examined* : Ukhrul, Mukerjee 3487; Bishanpur, Meebold 5598 (CAL); Litan, Chauhan 94604 (ASSAM).

3. *Oxyspora vagans* (Roxb.) Wallich, *Pl. Asiat. Rar.* 1 : 78. 1830; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 526. 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 300. 1938; Deb in *Bull. Bot. Surv. India* 3 : 297. 1961. *Melastoma vagans* Roxb., *Fl. Ind.* 2 : 404. 1824.

Shrubs, up to 2 m high. Leaves 8 - 20 × 0.4 - 1 cm, elliptic to ovate-lanceolate or ovate-elliptic to orbicular, base rounded or subcordate, acuminate, glabrous above except the nerves, sparsely hairy beneath, crenate, petioles 1 - 4 cm. Flowers in 15 - 30 cm long panicles, purplish-red, ca 2 cm long; calyx lobes ca 0.5 cm long, stellate pubescent. Capsules ca 0.9 cm long, ellipsoid, 8-ribbed.

*Fl. & Fr.* : September - March.

*Specimens examined* : Koupru, Meebold 10826; Chingmairong, Deb 1158; Nungba, Meebold 6012 (CAL); Nungba, Malick 1146 & 1158; Ainadhar, Malick 963 (BSIS).

### 7. *Sarcopyramis* Wallich

*Sarcopyramis nepalensis* Wallich, *Tent. Fl. Nep.* 32, t. 23. 1824; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 541. 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 308. 1938; Deb in *Bull. Bot. Surv. India* 3 : 297. 1961.

Erect or ascending glabrous herbs, up to 30 cm high; stems succulent, quadrangular. Leaves 5 - 8 × 1 - 3.5 cm., ovate to lanceolate, subequal at base, long acuminate, serrulate at margins, membranous; basal nerves 3 - 5; petioles 2 - 3 cm long. Flowers ca 1 cm across, pinkish-purple, terminal or axillary, solitary or 2 - 3 fascioled; pedicels ca 0.6 cm; calyx lobes 4, ca 0.2 cm. Capsules ca 0.8 cm, ovoid, quadrangular, crowned by four large scales; seeds numerous.

*Fl. & Fr.* : October - February.

*Specimens examined* : Ukhrul, Mukerjee 3489, Deb 1512; Koupru, Deb 1867 (CAL).

### 8. *Sonerila* Roxb., *nom. cons.*

- 1a. Leaves 3 - 10 cm long, broadly ovate to lanceolate; anthers long attenuate or acuminate..... 1. *S. maculata*

- b. Leaves 0.5 - 2.5 cm long, elliptic or lanceolate; anthers short truncate or acute ..... 2. *S. stricta*

1. *Sonerila maculata* Roxb., Fl. Ind. 1 : 180, 1820; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 537, 1879; Kanjilal et al., Fl. Assam 2 : 304, 1938; Deb in Bull. Bot. Surv. India 3 : 297, 1961 & Fl. Tripura 1 : 392, 1981.

Herbs with spreading hairs, ca 30 cm high. Leaves opposite, 3 - 10 × 2.5 - 5.5 cm, broadly ovate to lanceolate, ciliate, serrulate, spotted above, unequal at base, acuminate; lateral nerves 4 - 5 pairs; petioles 1 - 4 cm. Flowers 1 cm across, mauve, in condensed scorpioid axillary cymes; peduncles 3 - 5 cm; calyx tube campanulate, obconical; stamens 3, attenuate. Capsules erect, 5 - 7 × 2 - 5 mm, glabrous, obpyramidal - angular, obscurely ribbed; seeds numerous with a whitish ridge.

*Fl. & Fr.* : August - January.

*Specimens examined* : Barak, Meebold 5598; Ukhrul, Mukerjee 3365 (CAL).

2. *Sonerila stricta* Hook. in Bot. Mag. 74, t. 4398; 48, 1848; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 530, 1879; Deb in Bull. Bot. Surv. India 3 : 297, 1961.

Small erect branched herbs; branches puberulo - pubescent with few spreading hairs. Leaves 0.5 - 2.5 cm, elliptic or lanceolate, narrowed at both the ends, membranous. Flowers in dense axillary, scorpioid cymes, rose - purple; calyx tube puberulous; petals 3, ca 2 mm long, obovate, rose - purple; stamens 3, anthers ovate, narrowed at the apex. Capsules ca 5 mm long, trigonous, elongated funnel shaped, obscurely ribbed; seeds minute, numerous.

*Fl. & Fr.* : July - December.

*Specimens examined* : Ukhrul, Mukerjee 3341; Imphal, Deb 1170 (CAL); Langan Hills, S. N. Bal 481 (BSIS); Churachandpur, Chauhan 94974 (ASSAM).

### 9. *Tibouchina* Aublet

*Tibouchina semidecandra* Cong. in Mart., Fl. Bras. 14(3) : 365, 1817 - 1820; Kanjilal et al., Fl. Assam 2 : 208, 1938; Haridasan & Rao, For. Fl. Meghalaya 1 : 413, 1985.

Tall shrubs or small trees, up to 6 m tall. Leaves 5 - 10 × 2.5 - 4.5 cm, elliptic lanceolate or elliptic - oblanceolate, cordate at base, acute or shortly acuminate, silky hairy on both the surfaces. Flowers ca 8 cm across, bluish - purple; calyx tube ca 1.5 cm, oblanceolate; petals 5, obovate; stamens 10, unequal. Capsules 1.5 - 2 cm long, 5 - valved, enclosed in the calyx tube.

*Fl. & Fr.* : July - November.

*Specimens examined* : Koupru, Deb 1592 (CAL).

80. LYTHRACEAE

Jaume St. Hilarie, Expos. Fam. 2 : 175, 1805 ("Lythriac").

(A. S. Chauhan)

- 1a. Annual herbs, aquatic, flowers small;  
stamens definite ..... 2.
- b. Perennial shrubs or trees; flowers large;  
stamens indefinite ..... 2. *Lagerstroemia*
- 2a. Capsules dehiscent septically ..... 3. *Rotala*
- b. Capsules indehiscent, opening  
irregularly ..... 1. *Ammannia*

1. *Ammannia* L.

*Ammannia baccifera* L., Sp. Pl. 120, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 569, 1879; Kanjilal *et al.*, Fl. Assam 2 : 316, 1938. *Rotala baccifera* Koehne in Bot. Jahrb. 1 : 175, 1880; Deb in Bull. Bot. Surv. India 3 : 325, 1961.

Mani.: *Kundo, Ishing & Loubuk-leiri.*

Erect herbs up to 30 cm tall; stems tetragonous. Leaves 3.5 - 5.5 × 0.3 - 1.5 cm, linear-oblong, elliptic-lanceolate or lanceolate, sessile or sub-sessile, narrow at base, apex obtuse. Flowers ca 0.15 cm long, reddish, in axillary, sub-sessile cymes, forming whorls; calyx ca 0.8 cm long, triangular, without appendages. Capsules ca 0.3 cm long, depressed globose, red, in clusters.

subsp. *baccifera*

*Fl. & Fr.* : November - March.

*Specimens examined* : *s. loc.* G. Watt 14; Imphal valley, Deb 519 (CAL).

2. *Lagerstroemia* L.

- 1a. Flowers white; fruits less than 1.5 cm long ..... 2.
- b. Flowers pink rarely white; fruits more than  
1.5 cm long ..... 3
- 2a. Leaves petiolate; calyx tube without a  
ring inside ..... 2. *L. microcarpa*
- b. Leaves sub-sessile; calyx tube with a  
ring inside ..... 3. *L. parviflora*
- 3a. Flowers more than 4 cm across; calyx  
tube ridged ..... 4. *L. speciosa*
- b. Flowers less than 3 cm across; calyx  
tube not ridged. .... 1. *L. indica*

1. *Lagerstroemia indica* L., Syst. Nat. ed. 10. 1766, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 575. 1879; Kanjilal *et al.*, Fl. Assam 2 : 312. 1938; Deb in Bull. Bot. Surv. India 3 : 325. 1961.

Mani.: Jarol.

Small trees up to 10 m high, usually branching from the base; bark white or ashy, peeling off in thin pieces; branchlets sharply quadrangular. Leaves 2.5 - 7 × 2 - 4 cm, elliptic, obovate or obovate-orbicular, rounded, sub-obtuse, or often notched, entire. Flowers ca 3 cm across, pink or white, in 10 - 20 cm long corymbose panicles; outer whorl of 5 - 7 stamens larger than the others. Capsule ca 1 cm across, obconic.

Fl. & Fr. : May - August.

Specimens examined : Imphal, Deb 125 (CAL).

2. *Lagerstroemia microcarpa* Wight, Icon. t. 109. 1839; Furtado & Srisuko in Gard. Bull. Singapore 24 : 192, t. 2 b. 1969. *L. lanceolata* Wallich ex C.B. Clarke in Hook. f., Fl. Brit. India 2 : 576. 1879; Deb in Bull. Bot. Surv. India 3 : 325. 1961.

Large trees up to 25 m tall, bark grey coloured. Leaves 5.5 - 9.5 × 3.5 - 6.5 cm, elliptic-inodorous lanceolate or elliptic, acute or shortly acuminate, glabrous above, hoary tomentose beneath. Flowers ca 0.6 cm long, inodorous, in axillary or terminal panicles; calyx campanulate; petals ca 0.5 cm long. Capsules ca 1.5 cm long, ellipsoid, glabrous, brownish red.

Fl. & Fr. : November - June.

Specimens examined : West Manipur, Kaith s.n. (CAL).

3. *Lagerstroemia parviflora* Roxb., Pl. Cor. 1 : 47, t. 66. 1759; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 575. 1879; Kanjilal *et al.*, Fl. Assam 2 : 310. 1938; Deb in Bull. Bot. Surv. India 3 : 325. 1961.

Tall trees, deciduous up to 20 m high with a straight bole, buttressed or fluted at base; bark grey or brown, peeling off in thin strips; young parts pubescent. Leaves 4 - 10 × 2 - 4 cm, ovate-lanceolate, ovate-elliptic or ovate, acute or acuminate, base rounded, glabrous above, puberulous beneath along the nerves, lateral nerves 5 - 7; petioles very short. Flowers ca 1 cm across, white or whitish-pink, in lax axillary or terminal panicles; bracts leafy; calyx tube cupular, woody in fruits; petals 0.4 cm long; Capsules ca 3 cm long, ellipsoid or ovoid, purple, supported at the base by the calyx; seeds with terminal wings.

Fl. & Fr. : March - December.

Specimens examined : West Manipur, Kaith s.n. (CAL).

4. *Lagerstroemia speciosa* (L.) Pers., Syn. 2 : 72. 1806; Deb in Bull. Bot. Surv. India 3 : 325. 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 415. 1985. *Munchausia speciosa* L. in Muench. Hausv. 1 : 357, t. 2. 1770. *Lagerstroemia flosreginae* Retz., Obs. 5 : 25. 1788. *p.p.*; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 577. 1879; Kanjilal



*et al.*, Fl. Assam 2 : 311, 1938.

Mani.: *Jarol*

Trees up to 20 m high; bark peeling off in irregular flakes. Leaves 10 - 21 × 4 - 7 cm, elliptic, oblong-elliptic or oblong-lanceolate, often falcate, acuminate, base truncate, glabrous on both surfaces; petioles *ca* 1 cm long. Flowers *ca* 6 cm across, showy, mauve purple, in *ca* 30 cm long panicles; calyx greyish-brown tomentose. Capsules *ca* 3.5 cm across, oblong, ovoid to sub-globose minutely apiculate, glabrous; seeds winged.

Fl. & Fr. : April - October.

*Specimens examined* : Imphal, Deb 274 (CAL)

### 3. *Rotala* L.

*Rotala rotundifolia* (Buch. - Ham. ex Roxb.) Koehne in Engler. Bot. Jahrb. 1 : 175, 1880; Deb in Bull. Bot. Surv. India 3 : 325, 1961; Balakr., Fl. Jowai 1 : 207, 1981. *Annamia rotundifolia* Buch. - Ham. ex Roxb., Fl. Ind. 1 : 446, 1820; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 566, 1879; Kanjilal *et al.*, Fl. Assam 2 : 316, 1938.

Mani.: *Kundo, Ishing & Laubuck-feiri*.

Perennial, aquatic herbs, 10 - 25 cm; rhizomes creeping. Leaves opposite, sessile, 2.1 - 2.5 × 1.2 - 2.2 cm, orbicular or broadly obovate, narrowed at base, rounded at apex, green above, reddish-green beneath. Flowers minute, *ca* 0.3 cm long, purplish-pink, in axillary, erect 3 - 6 cm long terminal simple or branched racemes; calyx campanulate; petals 0.15 cm long. Capsules *ca* 0.18 cm across, ellipsoid-oblong, 4-valved; seeds ellipsoid, minute, peltate.

Fl. & Fr. : April - November.

*Specimens examined* : Imphal valley, Meebold 5506; Deb 1602 (CAL).

## 81. SONNERATIACEAE

Engl. in Engl. & Prantl. Nat. Pflanzenfam. Nachtr. 261, 1897.

(A. S. Chauhan)

### 1. *Duabanga* Buch.-Ham.

*Duabanga grandiflora* (Roxb. ex DC.) Walp., Rep. 2 : 114, 1834; Deb in Bull. Bot. Surv. India 3 : 295, 1961; Haridasan & Rao, For. Fl. Meghalaya 1 : 416, 1985. *Lagerstroemia grandiflora* Roxb. ex DC., Mem. Soc. Hist. Nat. Genev. 32 : 84, 1824. *Duabanga sonneratioides* Buch.-Ham. in Trans. Linn. Soc. 17 : 177, 1837; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 579, 1879.

Mani. : *Romdala*

Tall evergreen trees; *ca* 30 m high; branches drooping; bark rough, grey with vertical fissures. Leaves 15 - 23 × 6 - 10 cm, oblong, ovate-oblong, shortly acuminate, base cordate, entire or obscurely crenulate, glaucous beneath; lateral nerves 20 - 23 on each side; petioles stout, very short. Flowers large *ca* 6 - 10 cm

across, in several flowers sub-corymbose, pale-creamy or white; stamens numerous, filaments exserted. Capsules 6 - 7 cm across; 4 - 8 valved, dirty brown; seeds minute, tailed.

*Fl. & Fr.* : February - October.

*Specimens examined* : Moreh, Deb 598 (CAL); Nungba to Bishenpur, Mallick 1202 (BSIS).

## 82. PUNICACEAE

Horaninow, Prim. Linn. Syst. Nat. 81. 1834.

(A. S. Chauhan)

### 1. Punica L.

*Punica granatum* L., Sp. Pl. 472. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 581. 1879; Kanjilal *et al.*, Fl. Assam 2 : 315. 1938; Backer in van Steenis, Fl. Males. 4 (3) : 226. 1951; Deb in Bull. Bot. Surv. India 3 : 296. 1961.

Mani.: *Kaphoi*.

Tall shrubs or small trees, up to 6 m high. Leaves opposite, 2.5 - 5.5 cm, oblong or ovate-lanceolate, obtuse, glabrous, dark green, shining above, short petioled. Flowers ca 2.5 cm across, orange-red; 1 - 5 together in axillary cymes; calyx thick, campanulate or tubular, persistent; petals 5 - 7, wrinkled. Fruits 5 - 8 cm across, brownish - yellow to red, crowned by persistent calyx; seeds numerous, surrounded by pink pulp.

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

*Specimens examined* : Imphal, Deb 363 (CAL).

Under cultivation.

## 83. ONAGRACEAE

A. L. Jussieu, Gen. Pl. 317. 1789 ("Onagreae").

(A. S. Chauhan)

- |     |   |                     |
|-----|---|---------------------|
| 1a. | Calyx with 5-segments; ovary 1-locular;<br>stigma infundibuliform .....   | 3. <i>Oenothera</i> |
| b.  | Calyx with 3 - 5 segments; ovary 3 - 5-locular;<br>stigma otherwise ..... | 2                   |
| 2a. | Stamens 8; seeds comose .....   | 1. <i>Epilobium</i> |
| b.  | Stamens equal to the number of calyx<br>segments; seeds not comose .....  | 2. <i>Ludwigia</i>  |

### 1. Epilobium L.

*Epilobium brevifolium* D. Don, Prodr. Fl. Nep. 22. 1825; Balakr., Fl. Jowai 1 : 208.

1981. *E. hookeri* C. B. Clarke in Hook. f. Fl. Brit. India 2 : 585. 1879; Kanjilal *et al.*, Fl. Assam 2 : 317. 1838; Deb in Bull. Bot. Surv. India 3 : 325. 1961. *E. khasianum* C. B. Clarke in Hook. f. Fl. Brit. India 2 : 858. 1879; Kanjilal *et al.*, Fl. Assam 2 : 318. 1938.

Perennial erect herbs or undershrubs, up to 1 m tall. Leaves 1.5–4.5 × 0.6–1.5 cm, elliptic, elliptic-ovate or oblong-lanceolate; petioles ca 2 mm long. Flowers ca 1 cm in diam., purple, solitary or in sub paniculate terminal racemes; sepal-lobes ca 5 mm long, oblong-lanceolate, villous; petals ca 6 mm long, obovate. Capsules ca 6 cm, linear; seeds many, oblong, brown.

*Fl. & Fr.* : September - December.

*Specimens examined* : Laimatak, Meebold 5969; Koupru, Meebold 6499 (CAL).

## 2. Ludwigia L.

- 1a. Stamens as many as petals ..... 4. *L. perennis*
- b. Stamens twice as many as petals ..... 2
- 2a. Flowers white; seeds uniseriate ..... 3
- b. Flowers yellow; seeds multiseriate;  
rarely uniserrate ..... 4
- 3a. Herbs with pneumatophores;  
capsules terete ..... 1. *L. adscendens*
- b. Herbs without pneumatophores;  
capsules 4 -angled ..... 5. *L. prostrata*
- 4a. Capsules sub-terete, not ribbed;  
seeds dimorphic ..... 2. *L. hyssopifolia*
- b. Capsules 6–8-ribbed, seeds not  
dimorphic ..... 3. *L. octovalvis*  
..... subsp. *sessiliflora*

1. *Ludwigia adscendens* (L.) Hara in J. Jap. Bot. 28 : 292. 1953; Deb, Fl. Tripura 2 : 177. 1981. *Jussiaea adscendens* L., Mant. 1: 69. 1767. *J. repens* L., Sp. Pl. 388. 1753; C. B. Clarke in Hook. f. Fl. Brit. India 2 : 587. 1879. *Ludwigia clavelliana* Maza & Molinet in Dicc. Bot. Nom. Vulg. Cub. & Puerto Riquenos 38, 1889; Deb in Bull. Bot. Surv. India 3 : 325. 1961.

Mani.: Tebo.

Aquatic herbs; stems profusely branched, floating on water surface with the help of pneumatophores. Leaves ovate or oblanceolate, attenuated to the petiole, obtuse. Flowers white; sepals 5–6; petals 5–6, obovate, white; stamens 10–12. Capsules ca 2.5 cm long, linear, cylindrical, seeds uniseriate.

*Fl. & Fr.* : January–October.

*Specimens examined* : Imphal, Deb 1956 (CAL).

2. *Ludwigia hyssopifolia* (G. Don) Exell in Garcia de Orta 5 : 471 & 474, t. 2, 1957; Raven in Reinwardtia 6 : 385, 1963; Malick & Safui in J. Econ. Tax. Bot. 19 : 4, 1987. *Jussiaea hyssopifolia* G. Don, Gen. Syst. 2 : 693, 1832.

Erect herbs up to 30 cm tall. Leaves  $5 \times 1.3$  cm, lanceolate, tapering at base, acute, sub-glabrous. Flowers ca 1 cm long, yellow. Capsules ca 2 cm long, terete, tapering towards base, crowned by disc and calyx lobes.

Fl. & Fr. : July - November.

Specimens examined : Uchetnoi, Malick s.n. (BSIS).

3. *Ludwigia octovalvis* (Jacq.) Raven subsp. *sessiliflora* (Mich.) Raven in Kew Bull. 15 : 476, 1962; Deb in Bull. Bot. Surv. India 3 : 325, 1961. *Oenothera octovalvis* Jacq., Enum. Syst. Pl. 19, 1760. *Jussiaea octonervia* var. *sessiliflora* Mich., in Mart., Fl. Bras. 13 (2) : 180, 1875. *J. suffruticosa* L., Sp. Pl. 338, 1753; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 587, 1879.

Mani.: Tebo.

Robust herbs or undershrubs, perennial, 0.5 - 1.5 m tall; stems pubescent with raised decurrent lines. Leaves  $3.5 - 6.5 \times 0.5 - 2.5$  cm, elliptic - lanceolate to ovate lanceolate, tapering at base, acute, sub-glabrous, sessile. Flowers ca 2 cm long, yellow, shortly pedicellate; solitary, axillary; sepals ca 4 mm long, ovate, hairy, petals 5 - 15 mm long, yellow. Capsules ca 4 cm long, sub-quadrangular, truncate, tapering towards base, pubescent; seeds many, brown.

Fl. & Fr. : November - June.

Specimens examined : Imphal, Deb 255 (CAL).

4. *Ludwigia perennis* L., Sp. Pl. 119, 1753; Deb in Bull. Bot. Surv. India 3 : 325, 1961; Raven in Reinwardtia 6 : 367, 1963. *L. parviflora* Roxb., Fl. Ind. 1 : 440, 1820; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 588, 1879.

Annual erect herbs, 20 - 50 cm tall, glabrous. Leaves  $0.5 - 5 \times 0.4 - 2$  cm, linear lanceolate or elliptic oblong, tapering at base into a short petiole, acute at apex, glabrous. Flowers yellow, sessile or sub-sessile, solitary, axillary; sepals 0.2 cm long; petals equalling the sepals, elliptic oblong. Capsules 0.5 - 1.5 cm long, linear - oblong, glabrous; seeds multiseriate.

Fl. & Fr. : August - October.

Specimens examined : Imphal valley, Deb 1279 (CAL).

5. *Ludwigia prostrata* Roxb., Fl. Ind. 1 : 441, 1820; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 588, 1879; Deb, Fl. Tripura 2 : 178, 1983; Malick & Safui in J. Econ. Tax. Bot. 10 : 4, 1987.

Prostrate or decumbent herbs; stem reddish. Leaves  $2.5 - 3 \times 1 - 1.5$  cm, lanceolate, membranous, glabrous, narrowed into a slender petiole. Flowers sessile, white; sepals 4, lanceolate; petals 4, yellow or white. Capsule ca 2 cm, slender, 4 angled, glabrous; seeds minute, uniseriate, pink.

*Fl. & Fr.* : June - October.

*Specimens examined* : Borabaktra, *Malick* 684 (BSIS).

### 3. *Oenothera* L.

*Oenothera rosea* Soland in Aiton, Hort. Kew, ed. 1.2 : 3. 1789; Kanjilal *et al.*, Fl. Assam 2 : 320. 1938; Deb in Bull. Bot. Surv. India 3 : 325. 1961.

Erect, small herbs, up to 60 cm tall, with ascending branches from the base. Leaves opposite, lanceolate to ovate-lanceolate, acute at apex. Flowers small, purple, in terminal, solitary cymes; calyx 5-fid. ovate, obtuse. petals 5, obovate, sub-rotund, pink; stamens 5; ovary inferior, 1-locular; stigma infundibuliform. Berries oblong, cylindrical.

*Fl. & Fr.* : April - October.

*Specimens examined* : Lcinakhong, *Deb* 547 (CAL).

## 84. TRAPACEAE

Dumortier, Anal. Fam. Pl. 36, 39. 1829.

(A. S. Chauhan)

### 1. *Trapa* L.

- 1a. Fruits with 2 lateral sharp spines ..... 1. *T. bispinosa*  
 b. Fruits with 4 sharp spines ..... 2. *T. quadrispinosa*

1. *Trapa bispinosa* Roxb. Corom. Pl. 234. 1815; C.B. Clarke in Hook. f., Fl. Brit. India 2 : 590. 1879; Deb in Bull. Bot. Surv. India 3 : 325. 1961. *Trapa natans* var. *bispinosa* (Roxb.) Makino in Linuma, Somoku- Dzusetzu ed. 3. 1 : 137. 1907; Deb, Fl. Tripura 2 : 180. 1983.

An aquatic floating herbs, with long stoloniferous stems. Leaves dimorphic rhomboid rosette, with swollen petioles on surface of water: floating leaves broader than long, denticulate, serrate, reddish, densely pubescent or villous beneath. Stems bear two type of adventitious roots, one fixed the plants with substratum, others are free floating. Flowers white, after pollination. Nut with two lateral sharp spines, 1-seeded.

*Fl. & Fr.* : October - February.

*Specimens examine* : Imphal, *Deb* 2495 (CAL).

2. *Trapa quadrispinosa* Roxb., Fl. Ind. 1 : 451. 1820; Hara, Enum. Fl. Pl. Nepal 2 : 176. 1979. *T. natans* *aut non* L. ; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 590. 1879; Deb in Bull. Bot. Surv. India 3 : 325. 1961. *T. natans* L. var. *quadrispinosa* (Roxb.) Makino in Linuma, Somoku Dzusetzu ed. 3 : 139. 1907.

Aquatic herbs with lax rosettes of triangular coarsely toothed leaves, floating on the surface, submerged leaf-stalks with inflated, air-bladders; leafblades 2 - 4

× 3-5 cm, 3 lobed, dark green above, reddish-purple and pubescent beneath. Flowers white; calyx fused with the ovary, hairy; petals 4, ca 8 mm long. Drupes ca 3 cm long, top-shaped, 4 angled, glabrous, with 4-sharp spines.

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

*Specimens examined*: Logtak. Deb 556 (CAL).

## 85. PASSIFLORACEAE

A. L. Juss. ex Kunth, in Humboldt, Bonpland et Kunth, Nov. Gen. Sp. 2 ed., Fol. 100; ed. qu. 1817 ("Passifloreae").

(A. S. Chauhan)

- 1a. Flowers bisexual; corona conspicuous ..... 2. *Passiflora*  
 b. Flowers unisexual; corona absent  
 or inconspicuous ..... 1. *Adenia*

### 1. *Adenia* Forsskal

- 1a. Leaves ovate-cordate, entire;  
 anthers linear, bilobed; gynophore long ..... 1. *A. cardiophylla*  
 b. Leaves ovate-cordate, broadly and  
 deeply 3-5 lobed; anthers linear-  
 obtuse; gynophore short ..... 2. *A. trilobata*

1. *Adenia cardiophylla* (Masters) Engl. in Bot. Jahrb. 14 : 375. 1891; Chakrav. in Bull. Bot. Soc. Bengal 3 : 66. 1949; Deb in Bull. Bot. Surv. India 3 : 282. 1961. *Modecca cardiophylla* Masters in Hook. f., Fl. Brit. India 2 : 602. 1879, non Blume; Kanjilal *et al.*, Fl. Assam 2 : 324. 1928.

Large climbers, branches terete, glabrous. Leaves long petioled, entire or sometimes palmately 3-lobed; basal lobe 8-22 × 8-18 cm, cordate-ovate, 2-glandular at the apex, towards the base of lamina. Flowers ca 0.8 cm, bell-shaped, white, in many flowered cymes; bracteoles ca 1 mm, linear; calyx tube spotted, ca 6 mm; petals equal to the sepals. Fruits on long gynophore, ovoid; seeds reniform.

*Fl. & Fr.*: July-September.

*Specimens examined*: Imphal valley. Deb 1127 (CAL).

2. *Adenia trilobata* (Roxb.) Engl. in Bot. Jahrb. 14 : 376. 1891; Chakrav. in Bull. Bot. Soc. Bengal 3 : 68. 1949; Deb in Bull. Bot. Surv. India 3 : 282. 1961; Haridasn & Rao, For. Fl. Meghalaya 1 : 418. 1985. *Modecca trilobata* Roxb., Fl. Ind. 3 : 133. 1832; Masters in Hook. f., Fl. Brit. India 2 : 603. 1879; Kanjilal *et al.*, Fl. Assam 2 : 323. 1938.

Large climbers with woody base; branchlets sulcate, green. Leaves palmately 3-5 lobed, 6-15 × 6-14 cm, broadly obovate, sub-truncate or cordate at base, 5-7 nerved, 2-glands on the upper surface at base; lobes acuminate, glaucous

beneath; lateral nerves 2 - 5 pairs; petioles 5 - 12 cm. Flowers unisexual, in axillary cymes, white, ca 0.6 cm across; peduncles 10 - 15 cm long, terminating in a tendril. Fruits oblong, ellipsoid, 5 - 7 cm long, scarlet when ripe, narrowing at both ends; seeds with reticulate testa.

*Fl. & Fr.* : June - September.

*Specimens examined* : Kawpam, Meebold 5906 (CAL).

## 2. *Passiflora* L.

- 1a. Leaves truncate ..... 6. *P. perpera*
- b. Leaves not truncate ..... 2
- 2a. Leaf blades lobed ..... 3
- b. Leaf blades not lobed ..... 5. *P. napalensis*
- 3a. Leaf blades palmately 5-lobed ..... 1. *P. caerulea*
- b. Leaf blades 3-lobed ..... 4
- 4a. Herbs with foetid smell; petioles eglandular ..... 3. *P. foetida*
- b. Herbs without foetid smell; petioles glandular ..... 5
- 5a. Stipules foliaceous; petioles with  
   2- 4 glands ..... 7. *P. subpeltata*
- b. Stipules linear-ovate; petioles with  
   2 -glands at the apex ..... 6
- 6a. Flowers 2 - 3 cm in diam.;  
   coronal filaments 1-seriate ..... 4. *P. morifolia*
- b. Flowers 5 - 6 cm in diam.,  
   coronal filaments 4 - 5 seriate ..... 2. *P. edulis*

1. *Passiflora caerulea* L., Sp. Pl. 959. 1753; Chakrav. in Bull. Bot. Soc., Bengal 3 : 63. 1949; Deb in Bull. Bot. Surv. India 3 : 282, 1961, *Grandaitia caerulea* Medic., Malvaceae, 97, 1787.

Climbers; stem sub-angular, striate, grooved, glabrous. Leaves palmately 5-lobed, cordate, membranous; petioles 1.5 - 3 cm long; stipules ca 1 cm long, ovate aristate. Flowers 8 - 10 cm in diam., purplish; calyx tube cupuliform; petals ca 2 cm, purple, broadly obtuse. Fruits ca 6 cm long, ovoid, orange or yellow; seeds obcordate, reticulate.

*Fl. & Fr.* : August - November.

*Specimens examined* : Imphal valley, Deb 142 (CAL).

2. *Passiflora edulis* Sims, Mag. t. 1949. 1818; Kanjilal *et al.*, Fl. Assam 2 : 323. 1938; Chakrav. in Bull. Bot. Soc. Bengal 3 : 61, 1949; Deb in Bull. Bot. Surv. India 3 : 282, 1961, *P. incarnata* Ker- Gawler in Bot. Reg. t. 332. 1918.

Profusely branching, glabrous, climbers. Leaves subcoriaceous, 3-lobed, 5 - 11 × 4 - 10 cm, serrate, sub-coriaceous; stipules linear, subulate; petioles 1 - 4 cm long, biglandular at the apex. Flowers ca 6 cm in diam., white; bracts ovate, serrate; sepals

ca 3.5 cm, oblong, corniculate; petals ca 3 cm long, oblong, white, corona 4 - 5 seriate, filamentous. Fruits 4 - 5 cm, globose; seeds oval, reticulate.

*Fl. & Fr.* : June - October.

Under cultivation.

**3. *Passiflora foetida* L.**, Sp. Pl. 959. 1753; Hook. f., Fl. Brit. India 2 : 599. 1879; Prain, Bengal Pl. 512. 1903; Chakrav. in Bull. Bot. Soc. Bengal 3 : 57. 1949; Deb in Bull. Bot. Surv. India 3 : 282. 1961.

Trailing or climbing herbs with foetid smell. Leaves 3-lobed, cordate at the base; petioles eglandular; stipules semi-auriculate, pinnatisect with gland tips; bracts involucrate, pinnatisect, gland tipped. Flowers 2.5 cm in diam., white pink or lilac; calyx campanulate; sepals ovate-oblong; petals 5, oblong-lanceolate; corona in many series. Fruits 2 - 3 cm in diam., globose, yellow or red; seeds ovate cuneiform.

*Fl. & Fr.* : November - March.

*Specimens examined* : Imphal, Deb 457 (CAL); Nutanlalpani, Mallick 883 (BSIS).

Cultivated for its beautiful flowers. The fruits and leaves are medicinal.

**4. *Passiflora morifolia* Masters** in Fl. Bras. 13 : 555, t. 1. 1872; Chakrav. in Bull. Bot. Soc. Bengal 3 : 62. 1949; Deb in Bull. Bot. Surv. India 3 : 282. 1961.

Climbers, with quadrangular glabrous stems; young parts hispid. Leaves 4 - 12 × 5 - 15 cm, 3 lobed, middle lobe ovate, lateral divergent, deeply cordate at base, serrate, petioles 2 - 6 cm long, 2 -glandular towards the apex; stipules 5 - 6 mm, ovate, acuminate, peduncles densely hispid, divaricate. Flowers 2 - 3 cm, white; sepals 1 - 1.2 cm, linear-oblong, densely pubescent; petals 5 - 7 mm, linear-lanceolate, white. Fruits 2 cm in diam., globose, hispid; seeds compressed, reticulate.

*Fl. & Fr.* : September - December.

*Specimens examined* : Imphal, Deb 457 (CAL).

**5. *Passiflora napalensis* Wallich** Tent. Fl. Nep. 20, t. 11. 1824; Masters in Hook. f., Fl. Brit. India 2 : 600. 1879; Kanjilal *et al.*, Fl. Assam 2 : 322. 1938; Chakrav. in Bull. Bot. Soc. Bengal 3 : 52. 1949; Deb in Bull. Bot. Surv. India 3 : 282. 1961.

Climbers; stems angular, glabrescent. Leaves 4 - 10 × 1.5 - 6.5 cm, ovate lanceolate, tip acute, mucronate, base rounded to cordate, with 2 - 6 black conspicuous glands close to the nerves on the lower surface; petioles 2 - 5.5 cm with 2-glands above the middle; pedicels 10 - 15 mm. Flowers 7 - 8 mm, whitish; calyx cylindrical; petals narrow, membranous; coronal filaments many seriate. Fruits globose, 10 - 15 seeded.



*Fl. & Fr.* : July - October.

*Specimens examined* : Keithenmanbi, *G. Watt* 7309; Kangchup, *Deb* 1495 (CAL).

6. *Passiflora perpera* Masters in Hook. f., *lc. Pl.* 18. t. 1768, 1888; De Wilde in *Blumea* 20 : 235, 1972. *P. assamica* Chakrav. in *Bull. Bot. Soc. Bengal* 3 : 48, 1949; *Deb* in *Bull. Bot. Surv. India* 3 : 282, 1961.

Glabrous climbing herbs. Leaves alternate, truncate 3 lobed, 3 - 5 × 6 - 12 cm, mid-lobe smaller; petiole 2 - 3.5 cm long, 2- glandular towards the base; stipules filiform, deciduous. Flowers *ca* 2 cm, in few-flowered fascicles; sepals *ca* 1 cm long, oblong; petals equal to sepals, oblong, coronal filaments 4-seriate. Fruits 2.5 - 3 cm, globose.

*Fl. & Fr.* : October - January.

*Specimens examined* : Ukhrul, *Mukerjee* 2475; Khongli, *G. Watt* 7310 (CAL).

7. *Passiflora subpeltata* Ortega, *Nov. Rar. Pl. Hort. Matrit.* 6 : 78, 1789; Chakrav. in *Bull. Bot. Soc. Bengal* 3 : 59, 1949; *Deb* in *Bull. Bot. Surv. India* 3 : 282, 1961; Green in *Kew Bull.* 26 : 557, 1972. *P. calcarata* Masters in *Trans. Linn. Soc. London* 27 : 638, 1871; Gamble, *Fl. Pres. Madras* 1 : 524, 1919.

Climbers with terete stems, glabrous. Leaves 3 lobed mid-lobe 4 - 9 × 4 - 10 cm, sub-peltate at base, glabrous on both surfaces; petioles 4 - 6 cm long with 2 - 4 glands; stipules 1 - 4 cm long, foliaceous; peduncles 4 - 5 cm long; sepals *ca* 2 cm long, oblong, green outside, whitish within; petals linear-oblong. Fruits 2 - 4 cm in diam., sub-globose; seeds ovate, flat, finely reticulate.

*Fl. & Fr.* : September - November.

*Specimens examined* : Imphal, *Deb* 518 (CAL).

## 86. CARICACEAE

Dumortier, *Anal. Fam. Pl.* 37, 42, 1829.

(A. S. Chauhan)

### I. Carica L.

*Carica papaya* L., *Sp. Pl.* 1036, 1753; Masters in Hook. f., *Fl. Brit. India* 2 : 599, 1879; Fischer in *Rec. Bot. Surv. India* 12 (2) : 97, 1938; *Deb* in *Bull. Bot. Surv. India* 3 : 285, 1961.

Herbaceous trees, 2 - 3 m tall, with milky latex. Leaves alternate, usually forming a crown at apex, long, petioled, palmately lobed. Flowers polygamodioecious, rarely bisexual, greenish-white; in male flowers, pistil rudimentary; corolla gamopetalous. Fruits large, 1-celled berry, globose.

*Fl. & Fr.* : Throughout the year.

Commonly cultivated for the edible fruits.

**87. CUCURBITACEAE**

A. L. Juss., Gen. Pl. 393. 1789.

(A. S. Chauhan)

- 1a. Ovules more than 1, usually many ..... 2  
 b. Ovules solitary ..... 17. *Sechium*  
 2a. Stamens 5 ..... 3  
 b. Stamens 3, rarely 2-1 ..... 7  
 3a. Leaves divided into 3-7 leaflets ..... 4  
 b. Leaves not divided into leaflets ..... 6  
 4a. Fruits trigonous ..... 8. *Gomphogyne*  
 b. Fruits not trigonous ..... 5  
 5a. Tendrils simple; fruits pea like ..... 10 *Gynostemma*  
 b. Tendrils 2-fid; fruits elongate, clavate ..... 16. *Neolamsonia*  
 6a. Leaves serrate; stamens equal;  
 filaments straight; seeds 2-4 ..... 1. *Actinostemma*  
 b. Leaves dentate; stamens unequal;  
 filaments recurved; seeds many ..... 19. *Thladiantha*  
 7a. Anther cells straight or slightly curved ..... 8  
 b. Anther cells conduplicate, triplicate or contorted ..... 10  
 8a. Flowers sub-umbellate; pedicels  
 2.5 - 8 cm long, ..... 18. *Solena*  
 b. Flowers fascicled; pedicels short up  
 to 2 cm long ..... 9  
 9a. Tendrils simple; fruits up to 6-12 mm in diam ..... 15. *Mukia*  
 b. Tendrils bifid; fruits 20-25 mm diam ..... 7. *Diplocyclus*  
 10a. Petals fimbriate ..... 11  
 b. Petals not fimbriate ..... 12  
 11a. Calyx tube more than 7 cm long; petals  
 fringes ca 15 cm long ..... 11. *Hodgsonia*  
 b. Calyx tube less than 7 cm long;  
 petals fringes very short ..... 20. *Trichosanthes*  
 12a. Male flowers with elongate calyx tubes ..... 13  
 b. Male flowers without elongated calyx tubes ..... 14  
 13a. Petioles biglandular at laminar base;  
 flowers white ..... 12. *Lagenaria*  
 b. Petioles not biglandular; flowers yellow ..... 9. *Gymnopetalum*  
 14a. Corolla rotate or if campanulate  
 5-partite ..... 15  
 b. Corolla campanulate, divided not more than half way down ..... 19

- 15a Stamens inserted at the mouth of calyx tube; anthers free ..... 16
- b. Stamens inserted below the mouth of calyx tube; anthers cohering ..... 17
- 16a. Fruits dry, endocarp fibrous, dehiscent ..... 13. *Luffa*
- b. Fruits soft, endocarp fleshy indehiscent ..... 2. *Benincasa*
- 17a. Calyx with 2 - 3 scales; male flowers bracteate ..... 14. *Momordica*
- b. Calyx without scales; male flowers ebracteate ..... 18
- 18a. Tendrils simple; connectives produced beyond the anther loculi ..... 5. *Cucumis*
- b. Tendrils 2 - 3 fid; connectives not produced ..... 3. *Citrullus*
- 19a. Styler disc present; connectives produced ..... 21. *Zehneria*
- b. Styler disc absent; connectives not produced ..... 20
- 20a. Tendrils simple; flowers white ..... 4. *Coccinia*
- b. Tendrils divided; flowers yellow ..... 6. *Cucurbita*

**1. Actinostemma Griffith**

*Actinostemma tenerum* Griffith. Fl. Cantor 25, t. 3. 1841; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 633. 1879; Deb in Bull. Bot. Surv. India 3 : 283. 1961; Chakrav. in Fasc. Fl. India 11 : 7. 1982.

Scandent herbs with slender branches. Leaves cordate-hastate; petiole filiform, puberulous, 0.1 - 0.3 cm long; lamina 4 - 8 × 2 - 4 cm, narrowly ovate, sagittately trilobed, minutely denticulate, emarginate, acuminate, upper surface indistinctly punctate scabrid; tendrils filiform; male flowers 7 - 15 cm long, many; sepals subulate, 1-nerved; female flowers solitary or fasciculate, ca 2 cm long. Fruits 1.8 - 2 cm long, 1.2 - 1.3 cm thick; seeds broadly ovate, thick, reticulate.

*Fl. & Fr.* : May - October.

*Specimens examined* : Imphal valley, Mukerjee 3388; s. loc, Deb 495, 532 (CAL).

**2. Benincasa Savi**

*Benincasa hispida* (Thunb.) Cogn. in DC. Monogr. Phan. 3 : 513. 1881; Deb in Bull. Bot. Surv. India 3 : 283. 1961; Balakr., Fl. Jowai 1 : 214. 1981. *Cucurbita hispida* Thunb., Fl. Jap. 322. 1872. *Benincasa cerifera* Savi, Bibl. Ital. 9 : 158. 1818; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 616. 1879.

*Maui.* : Torobot.

Annual slender climbers; stems rigid, diffuse. Leaves ovate to reniform, deeply cordate, acute, 5 - 11 angular, 10 - 26 × 10 - 25 cm, upper surface scabrous, lower shortly hispid, margins sinuate, dentate; tendrils slender, 2 - 3 fid; petioles 4 - 18 cm. Flowers monoecious, solitary, 7 - 11 cm across, yellow; pedicels 5 - 10 cm; calyx tube 4 - 6 cm, densely villose, lobes lanceolate; corolla connate at the base; densely

pilose. Fruits ellipsoid, fleshy, hairy when young; seeds compressed, ovoid, yellowish-white, ca 2 mm thick.

*Fl. & Fr.* : June - September.

*Specimens examined* : Imphal valley, Deb 845 (CAL).

### 3. *Citrullus* Schrader ex Ecklon & Zeyher *nom. cons.*

*Citrullus lanatus* (Thunb.) Mastsumura & Nakai in Cat. Som. Spro. Hort. Bot. Univ. Imp. Tokyo 1916 : 30, 1916; Bhandari, Fl. Ind. Des. 163, 1978; Deb, Fl. Tripura 1 : 254, 1981. *Momordica lanata* Thunb., Prodr. Pl. Cap. 13, 1800. *Citrullus vulgaris* (Schrader) Schrader in Ecklon & Zeyher, Enum. Fl. Afr. Austr. 279, 1836; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 621, 1879. *Colocynthis citrullus* (L.) O. Kuntze, Rev. Gen. Pl. 1 : 256, 1891; Deb in Bull. Bot. Surv. India 3 : 283, 1961.

Prostrate annuals, stem angular, villose; petioles 6 - 12 cm long. Leaves variable in shape, size and lobation, 8 - 20 × 5 - 15 cm, usually ovate, cordate, more or less scabrid, deeply trifid, segments pinnatifid, with lobulate or undulate lobes, densely hirsute on both the surfaces; tendrils trifid. Male flowers in 1 - 3 cm long peduncles, villous, greenish; female flowers in 2 - 6 cm long peduncles. Fruits large, variable in shape, size and colour, sub-globose or ellipsoid, pulp sweet, red or yellow, sometimes greenish also; seeds red or black or of different shades.

*Fl. & Fr.* : April - July.

Under cultivation.

### 4. *Coccinia* Wight & Arn.

*Coccinia grandis* (L.) Voigt, Hort. Suburb. Calc. 59, 1854; Bhandari, Fl. Ind. Des. 163, 1978; Deb, Fl. Tripura 1 : 254, 1981. *Bryonia grandis* L., Mant. Pl. 1 : 126, 1767. *Coccinia indica* Wight & Arn. Prodr. 347, 1834. *C. cordifolia* auct. Pl. (non *Bryonia cordifolia* L.), *Cephalandra indica* Naudin, Ann. Sci. Nat. ser. 5, 16, 1859; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 621, 1879.

Mani.: *Tarbuz*

Climbing herbs with angular, glabrous stems; petioles 2 - 5 cm, slender. Leaves 5 - 10 cm long, entire to palmately lobed or angled, with a few glistening glands on the midrib towards the base, minutely denticulate. Male flowers in 2 - 6 cm long, subfiliform peduncles, striate, white; female flowers in 1 - 3 cm long peduncles, solitary. Fruits ovoid or elliptic, 2.5 - 5 cm long, round at both ends, pulp red, juicy; seeds oblong, yellowish, compressed.

*Fl. & Fr.* : June - February

*Specimens examined* : Imphal valley, Deb s.n. (CAL).

### 5. *Cucumis* L.

1a. Ovary softly hairy; young fruits not tuberculate ..... 1. *C. melo*

- ..... var. *melo*  
 b. Ovary hispidulous; young fruits tuberculate ..... 2. *C. sativus*

1. *Cucumis melo* L., Sp. Pl. 1010, 1753; Chakrav. in Fasc. Fl. India II : 32, 1982. *C. melo* L. var. *cultra* Kurz in J. Asiat. Soc. Bengal 46 (2) : 102, 1877; Deb in Bull. Bot. Surv. India 3 : 283, 1961 & Fl. Tripura 1 : 255, 1981.

Robust annual herbs; stems prostrate, hirsute, elongate, angular, ultimately somewhat terete and glabrous. Leaves 8 - 15 cm long, and as much broad, 5 angular, obtuse, suborbicular, denticulate, base cordate, villous or subhirsute; petioles slender, hispid, equal or longer than lamina. Male flowers fasciculate, peduncles slender, 0.5 - 3 cm long; female flowers with peduncles 1 - 2 cm long; ovary softly hirsute. Fruits edible, not tuberculate, polymorphous; seeds 10 - 12, ca 5 × 7 mm, white, oblong, obtuse at apex, base subacute.

var. : **melo**

Fl. & Fr. : May - October.

Under cultivation.

2. *Cucumis sativus* L., Sp. Pl. 1012, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 630, 1879; Kanjilal *et al.*, Fl. Assam 2 : 332, 1938; Deb in Bull. Bot. Surv. India 3 : 283, 1961; Chakrav. in Fasc. Fl. India II : 36, 1982.

Mani. : *Jhabi*.

Annual herbs, stems prostrate, hirsute. Leaves 12 - 18 cm long and broad, broadly cordate-ovate, villous hispid, 5 - 7 nerved, palmately 3 - 5 lobed, lobes triangular, dentate, acute; petiole 8 - 20 cm long, robust, hispid. Male flowers fasciculate; peduncles slender, 0.5 - 20 cm long; corolla 2 - 3 cm long, lobes acute; female flowers solitary or fasciculate, peduncles robust, 1 - 2 cm long, ovary often fusiform, muricate, aculeate; hairs rigid, pungent. Fruits oblong, tuberculate, yellowish-green, glabrous; seeds 8 - 15 × 3 - 5 mm, whitish, oblong, both ends sub-acute.

Fl. & Fr. : May - October.

Under cultivation.

#### 6. *Cucurbita* L.

- la. Leaves soft; petioles 8 - 19 cm long;  
 calyx foliaceous ..... 1. *C. moschata*  
 b. Leaves cartaceous; petioles 6 - 9 cm long;  
 calyx not foliaceous ..... 2. *C. pepo*

1. *Cucurbita moschata* (Duch. ex Lam.) Duch. ex Poiret, Dict. Sci. Nat. 8 : 234, 1818; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 622, 1879; Deb in Bull. Bot. Surv. India 3 : 283, 1961; Chakrav. in Fasc. Fl. India II : 41, 1982. *C. pepo* L. var. *moschata* Duch. ex Lam., Encycl. 2 : 152, 1786.

Annual prostrate herbs; stems 2 - 3 cm long, internode 10 cm long. Leaves 16

× 24 cm, soft, 5 - 6 -lobed, lobes acute or rarely obtuse, often with whitish blotches on the upper surface; petioles 8 - 19 cm long with pungent hairs; tendrils many-fid. Male flowers solitary; calyx tube 0.5 - 0.6 cm long, lobes 3, linear; corolla 8 × 6 cm, campanulate, pale-yellow; female flowers solitary, large; fruiting peduncles stout, 5 - 7 cm long, 5 - 6 angled. Fruits various, usually oblong and constricted at the middle; seeds *ca* 1.2 cm, distinctly marginate, yellow.

*Fl. & Fr.* : March - December.

Under cultivation.

**2. *Cucurbita pepo* L.**, Sp. Pl. 1010, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 622, 1879; Kanjilal *et al.*, Fl. Assam 2 : 332, 1938; Deb in Bull. Bot. Surv. India 3 : 289, 1961; Chakrav. in Fasc. Fl. Ind. 11 : 43, 1982.

Annual herbs; stems long prostrate, angular, sulcate. Leaves 8 - 10 × 9 - 10 cm, 5-lobed; lobes obtuse or acute; sinus obtuse, *ca* 7 cm broad and *ca* 2 cm deep, margin dentate, base cordate, upper surface scabrous, lower with glandular, club-shaped hairs; petioles 6 - 9 cm long, rigid, pungent hairs below, tendrils branched. Flowers solitary; male flowers *ca* 6 cm long; peduncles 3 - 6 cm long, 5 angular, yellow; calyx tube obscurely 5 angled; corolla 5 × 3 cm, campanulate, yellow. Fruits variable with fibrous pulp; seeds 7 - 25 mm long, whitish-yellow; marginate.

*Fl. & Fr.* : June - December.

Under cultivation.

### 7. *Diplocyclos* (Endl.) Post & Kuntze

***Diplocyclos palmata* (L.) Jeffrey** in Kew Bull. 15 : 382, 1962; Balakr., Fl. Jowai 1 : 211, 1981. *Bryonia palmata* L., Sp. Pl. 1012, 1753. *B. laciniosa auct. non* L.; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 622, 1879. *Bryonopsis laciniosa auct. non* L., Naudin 1859; Deb in Bull. Bot. Surv. India 3 : 283, 1961.

Mani.: *Karot akhabi*.

Annual herbs with slender elongated stems. Leaves broadly ovate, 8 - 12 cm long, deeply palmately 5-lobed, upper scabrous, lower smooth, margin denticulate or undulate or sub-crenulate; petioles 2 - 8 cm, tendrils bifurcate. Flowers greenish-yellow, peduncles 0.5 - 1.5 cm long; corolla shortly papillose; female flowers fasciculate; ovary globose. Fruits 1.0 - 1.5 cm in diam., spherical, yellowish-green; seeds grey, *ca* 5 mm long, attenuate with raised projection.

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

*Specimens examined* : Imphal valley, Deb 134 (CAL).

### 8. *Gomphogyne* Griffith

***Gomphogyne macrocarpa* Cogn.** in Engl., Pflanzenr. 4 : 40, 1916; Deb in Bull. Bot. Surv. India 3 : 283, 1961; Chakrav. in Fasc. Fl. India 11 : 52, 1982.

Herbs with slender branches. Leaves palmately divided into 5-7 leaflets, membranous, more or less glabrous, acute crenate-dentate, middle leaflets 4-6 × 1-1.8 cm, lateral leaflets shorter; petioles 3-6 cm long; petiolules 3-5 mm long; tendrils filiform. Male racemes ca 30 cm long, simple; flowers ca 8-10 mm across; calyx rotate, 5 partite; female flowers fasciculate. Fruits sub-cylindric, 4-5 × 2-2.5 cm, many seeded, yellow; seeds 9-11 × 7-8 mm, irregularly obovate, base acute, apex rounded.

*Fl. & Fr.* : July-September.

*Specimens examined* : Laimatak, Chakravarty, s.n. (CAL).

### 9. *Gymnopetalum* Arn.

*Gymnopetalum cochinchinense* (Lour.) Kurz in J. Asiat. Soc. Bengal 40: 57, 1871; C. B. Clarke in Hook. f., Fl. Brit. India 2: 611, 1879; Deb in Bull. Bot. Surv. India 3: 283, 1961; Balakr., Fl. Jowai 1: 214, 1981. *Bryonia cochinchinense* Lour., Fl. Cochinch. 595, 1790.

Climbing herb, stem 1.5-2.0 m long, scandent. Leaves ovate, palmately 3-5 angular, lobed or partite, 4-15 × 3-15 cm, villose hirsute, minutely denticulate; tendril filiform, usually simple. Male flowers solitary or in 3-8 flowered racemes; peduncles 0.3-1.5 cm long; female flowers solitary or in pairs; peduncles 1-4 cm long; calyx tube sub-cylindric, spreading; corolla lobes white, 2.5-3.0 × 10-12 mm. Fruits ovoid, acuminate, 10 ribbed, 4-7 × 2.3 cm, pubescent, red with green pulp; seeds compressed, oblong, brown, distinctly marginate.

*Fl. & Fr.* : August-November.

*Specimens examined* : Imphal valley, Deb 89 (CAL).

### 10. *Gynostemma* Blume

*Gynostemma pentaphylla* (Thunb.) Makino in Bot. Mag. Tokyo 16: 179, 1902; Jeffrey in Kew Bull. 34: 800, 1980. *Vitis pentaphylla* Thunb., Fl. Jap. 105, 1784. *Gynostemma pedatum* Blume, Bijdr. 23, 1825; C. B. Clarke in Hook. f., Fl. Brit. India 2: 633, 1879; Kanjilal *et al.*, Fl. Assam 2: 331, 1938.

Slender scandent herbs. Leaves 3-7 foliolate, 4-14 × 2-5 cm, ovate-oblong or lanceolate, pedate, crenulate, acute, lateral leaflets shorter, outermost leaflet very short; petioles 3-7 cm; petiolules 1-4 mm. Flowers white, in lax axillary panicles; rachis 10-30 cm long; pedicels 1-4 mm long; calyx lobes 0.5 mm long, triangular, acute; corolla lobes 2-2.5 × 0.5 mm, lanceolate. Fruits globose, 7-9 mm, olive-green; seeds compressed, ellipsoid, sub-triangular, yellowish.

*Fl. & Fr.* : July-October.

*Specimens examined* : Ukhrul, Mukerjee 2607; Maram, Deb 1918 (CAL).

### 11. *Hodgsonia* Hook. f. & Thomson

*Hodgsonia macrocarpa* (Blume) Cogn. in DC., Monogr. Phan. 3: 349, 1881; Deb

in Bull. Bot. Surv. India 3 : 283. 1961; Balakr., Fl. Jowai 1 : 212. 1981. *Trichosanthes macrocarpa* Blume, Bijdr. 935. 1826. *T. heteroclita* Roxb., Fl. Ind. 3 : 705. 1832; *Hodgsonia heteroclita* (Roxb.) Hook. f. & Thomson in Proc. Linn. Soc. 2 : 257. 1853; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 606. 1879.

Large climbers up to 25 m. Leaves palmately 3 or rarely 5-lobed, 15–20 cm across and as broad, lobes more or less deep, acuminate, both surfaces glabrous, truncate or emarginate at base, nerves robust; petioles 5–8 cm; tendrils 2–3 fid. Flowers brown tomentose; male flowers in 15–30 cm long, pedunculate racemes; female flowers solitary; bracts fleshy, oblong-lanceolate, 0.5–1 cm; corolla yellow outside, white inside, limbriate; fringes up to 15 cm long. Fruits depressed globose, longitudinally 12-grooved, 7–12 × 10–16 cm, reddish-brown, tomentose; seeds ca 3.7 × 3 cm, flat, in 3–6 pairs.

*Fl. & Fr* : February–August.

*Specimens examined* : Koupuru, Deb 2271 (CAL).

## 12. *Lagenaria* Seringe

*Lagenaria siceraria* (Molina) Standley in Publ. Field Mus. Nat. Hist. Chicago, Bot. ser. 3, 3 : 435. 1930; Jeffrey in Kew Bull. 34 : 79. 1980. *Cucurbita siceraria* Molina, Sagg. Storia. Nat. Chile 133. 1782. *Lagenaria vulgaris* Seringe in Mem. Soc. Phys. Hist. Nat. Geneve 3 (1) : 25. 1825; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 613. 1879. *L. leucantha* (Duch.) Rusby in Mem. Torr. Bot. Club 6 (1) : 43. 1896; Deb in Bull. Bot. Surv. India 3 : 283. 1961.

Climbing or trailing, softly pubescent herbs. Leaves 10–40 cm long, sub-orbicular, cordate, denticulate, acute or shortly acuminate; basal nerves 5–7; petioles 5–30 cm, thick, erect, biglandular at apex. Flowers monoecious, white, solitary, in male flowers peduncles as long as the petioles; calyx tube campanulate, lobes 5, triangular; petals 5, free, tomentose; in female flowers calyx tube cup-shaped. Fruits bottle-shaped; greenish-yellow; seeds white, obovate-oblong, triangular, rarely round.

*Fl. & Fr* : July–December.

Under cultivation for its fruits.

## 13. *Luffa* Mill.

- 1a. Flowers pale-yellow, fruits angular,  
seeds not winged, ..... 1. *L. acutangula*
- b. Flowers bright-yellow, fruits not  
angular; seeds winged, ..... 2. *L. cylindrica*

1. *Luffa acutangula* (L.) Roxb., Fl. Ind. 3 : 713. 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 615. 1879; Deb in Bull. Bot. Surv. India 3 : 283. 1961; Chakrav. in Fasc. Fl. India 11 : 67. 1982. *Cucumis acutangula* L., Sp. Pl. 1011. 1753.

Mani.: *Mayang-shebot*.



Climbers. Leaves 15 - 20 cm long and as broad, palmately 5 - 7 angled or subulate; petioles 5 - 10 cm long; tendrils trifid, sub-hispid. Flowers on 10 - 15 cm long peduncles, pale-yellow, 17 - 20 flowered at the apex; pedicels 1 - 4 cm long; calyx tube campanulate, pentagonous. Fruits 15 - 30 × 6 - 10 cm, angular, clavate-oblong, acutely 10 - angled, apex obtuse or slightly acute; seeds 10 - 12 × 6 - 8 mm, ovate, compressed, black.

*Fl. & Fr.* : June - October.

Under cultivation.

2. *Luffa cylindrica* (L.) M. Roemer, Fam. 2 : 63. 1846; Deb in Bull. Bot. Surv. India 3 : 283. 1961; Chakrav. in Fasc. Fl. India 11 : 70. 1982. *Momordica cylindrica* L., Sp. Pl. 1009. 1753. *Luffa aegyptiaca* Mill., Dict. ed. 4 : 500. 1785; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 614. 1879.

Mani.: *Shehot*.

Climbers, stems glabrous. Leaves 15 - 25 cm long and as broad, palmately 5 lobed; petioles 10 - 12 cm long, tendrils bifid. Flowers on 10 - 15 cm long peduncles, 15 - 20 flowered. Flowers bright yellow; pedicels 1 - 2 cm long; calyx tube short, broadly campanulate, apex round. Fruit 12 - 50 × 8 - 12 cm, not angular, fusiform, obtuse, strongly fibrous inside; seeds ca 1.2 × 0.1 - 0.9 cm, ovate, smooth, black, margins slightly winged.

*Fl. & Fr.* : June - December.

*Specimens examined* : s. loc., : Meebold 6334, 6335; s. loc., : Deb 184 (CAL).

#### 14. *Momordica* L.

- 1a. Plants monoecious; berries tuberculate ..... 1. *M. charantia*
- b. Plants dioecious; berries not tuberculate ..... 2
- 2a. Flowers whitish-yellow; fruits 10 - 15 cm long, not beaked; seeds ashy-grey ..... 2. *M. cochinchinensis*
- b. Flowers yellow; fruits 3 - 5 cm long; beaked at base; seeds pale yellow ..... 3. *M. dioica*

1. *Momordica charantia* L., Sp. Pl. 1009. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 616. 1879; Kanjilal *et al.*, Fl. Assam 2 : 330. 1938; Chakrav. in Fasc. Fl. India 11 : 89. 1982.

Mani.: *Karela*.

Climbers with branched puberulous stems, 1 - 2 m long. Leaves 5 - 12 cm long and as broad, reniform or suborbicular, both surfaces glabrous, prominently nerved, 5 - 7 lobed, lobes ovate-oblong, base constricted, mucronate-dentate; petiole subglabrous; tendrils simple, pubescent; plant monoecious. Flowers solitary, yellow; bracts foliaceous, 0.5 - 1.5 cm long, reniform, entire, shortly pubescent. Fruits 6 - 20 cm long, large, muricate-tuberculate, oblong, trivalved, dehiscent at apex; seeds 1 - 1.5 × 0.6 - 0.8 cm, compressed, sculptured on the surface.

*Fl. & Fr.* : June - October.

Under cultivation.

**2. *Momordica cochinchinensis* (Lour.) Spreng., Syst. Veg. 3 : 14, 1826; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 618, 1879; Kanjilal *et al.*, Fl. Assam 2 : 330, 1938; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Chakrav. in Fasc. Fl. India 11 : 92, 1982. *Muricia cochinchinensis* Lour., Fl. Cochinch. 2 : 596, 1790.**

Mani.: Karol.

Robust perennial climbers; roots tuberous; stems angular, smooth. Leaves 10-20 cm long, sub-orbicular, divided into 3-5 lobes; base emarginate, lobes ovate or oblong, lanceolate, entire, rarely denticulate; tendrils simple robust; plants dioecious. Flowers solitary, whitish-yellow; calyx lobes 12-16 × 6-8 mm, narrow, acute, almost scabrous. Fruits 10-15 cm long, red, fleshy, ovoid, acute; seeds 2.5 × 2.8 × 1.8-2.5 cm, numerous, ashy grey, ovate, sculptured.

*Fl. & Fr.* : August - November.

*Specimens examined* : Imphal, Deb 593, 612 (CAL).

**3. *Momordica dioica* Roxb. ex Willd., Sp. Pl. 4 : 605, 1805; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 617, 1879; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Balakr., Fl. Jowai 1 : 214, 1981; Chakrav. in Fasc. Fl. India 11 : 94, 1982.**

Mani.: Karol.

Perennial climbers; roots tuberous. Leaves 4-10 × 3-8 cm, ovate-orbicular, cordate at base, acute to obtuse-mucronate, entire or denticulate at margins; pedicels 1-3 cm, plants dioecious. Flowers ca 3 cm across; male flowers solitary, pale-brownish yellow; the female fasciated, yellow; peduncles 4-12 cm, bracts sessile, cucullate. Berries 3-5 × 2-3.4 cm, ovoid, beaked at base; seeds ovoid, pale yellow, emarginate, seed coat very brittle.

*Fl. & Fr.* : June - October.

Under cultivation.

#### 15. *Mukia* Arn.

- 1a. Fruiting peduncles 2-6 mm long;  
seeds ovoid, smooth ..... 1. *M. leiosperma*
- b. Fruiting peduncles almost absent;  
seeds ovoid-oblong, apiculate ..... 2. *M. maderaspatana*

**1. *Mukia leiosperma* (Wight & Arn.) Wight in Ann. Mag. Nat. Hist. 8 : 208, 1842; Jeffrey in Kew Bull. 34 : 794, 1980. *M. leiosperma* Wight & Arn. in An. Mag. Nat. Hist. 8 : 268, 1842; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 623, 1879. *Melathria leiosperma* (Wight & Arn.) Cogn. in DC., Monogr. Phan. 3 : 622, 1881; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Chakrav. in Fasc. Fl. India 11 : 81, 1982. *Bryonia leiosperma* Wight & Arn., Prodr. 1 : 345, 1834.**

Robust herbs, stems angular-sulcate, villous. Leaves 6-9 × 3-6 cm, subcoriaceous, ovate-cordate, entire, angular or shortly lobed, acute, margins denticulate, densely villose; petioles 1-5 cm long, densely villose to sub-hirsute; tendrils more or less robust. Flowers fasciculate; pedicels very short, calyx tube ca 2 mm long, erect, spreading. Fruits 1-1.2 cm, globose, glabrous, smooth; seeds ca 6 mm, ovoid, base slightly attenuate, turgid.

*Fl. & Fr.* : July-September.

*Specimens examined* : s. loc., Meebold 5781 & 5164 (CAL).

2. *Mukia maderaspatana* (L.) M. Roemer, *Fam. Syn. Monogr.* 2 : 247, 1846; Jeffrey in *Kew Bull.* 34 : 794, 1980; Balakr., *Fl. Jowai* 1 : 211, 1981. *Cucumis maderaspatanus* L., *Sp. Pl.* 1012, 1753. *Bryonia scabrella* L. f., *Suppl.* 424, 1781. *Mukia scabrella* (L. f.) Arn. in *Hook., J. Bot.* 3 : 276, 1841; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 623, 1879. *Melothria maderaspatana* (L.) Cogn. in *DC., Monogr. Phan.* 3 : 623, 1881; Deb in *Bull. Bot. Surv. India* 3 : 284, 1961; Chakrav. in *Fasc. Fl. India* 11 : 83, 1982.

Annual herbs, stems scandent, sulcate. Leaves 4-15 × 4-12 cm, membranous, ovate, entire, angular or 3-5 lobed, acute, minutely denticulate; petioles 1-6 cm long; tendrils slender, elongate. Flowers solitary or fascicled, yellow; calyx tube ca 2 mm, villose-hirsute, erect, subulate. Fruits 6-12 mm thick, brownish yellow, globose, juicy; seeds ca 2 mm, grey, turgid, ovoid-oblong, indistinctly marginate, base apiculate.

*Fl. & Fr.* : July-December.

*Specimens examined* : Imphal valley, Deb 133, 1136, 1265 & 2708 (CAL).

#### 16. *Neosalsmitra* Hutch.

*Neosalsmitra clavigera* (Wallich) Hutch. in *Ann. Bot.* 6 : 100, 1942; Deb in *Bull. Bot. Surv. India* 3 : 284, 1961; Chakrav. in *Fasc. Fl. India* 11 : 98, 1982. *Zanonia clavigera* Wallich, *Pl. Asiat. Rar.* 2 : 28, 1831. *Alsomitra clavigera* M. Roemer, *Syn. Fam.* 2 : 118, 1846; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 634, 1879.

Climbers with slender branches. Leaves 5-10 × 1.5-4 cm, 3-foliolate, oblong lanceolate, entire, acuminate, lateral leaflets asymmetrical, uniglandular at base; middle leaflet 6-12 × 2-5 cm, acute, petioles 1.5-2 cm long; tendril bifid, glabrous. Male flowers on 12-30 cm long peduncles, many flowered; female flowers with clavate ovary. Berries 6-7 × 1-3 cm, yellow, subcylindric, clavate, apex truncate, base subrotund; seeds thick, dark grey, star shaped, deeply toothed, oblique winged, brownish-white.

*Fl. & Fr.* : October-March.

*Specimens examined* : Loungja, Mukerjee 3710 (CAL).

#### 17. *Sechium* P. Brown, *nom. cons.*

*Sechium edule* (Jacq.) Sw., *Fl. Ind. Occ.* 2 : 1150, 1800; Kanjilal *et al.*, *Fl. Assam* 2 : 332, 1938; Deb in *Bull. Bot. Surv. India* 3 : 284, 1961; Chakrav. in *Fasc. Fl. India*

11 : 100, 1982. *Sicyos edulis* Jacq., Enum. Pl. Carib. 32, 1760.

Mani.: *Dashkush*.

Perennial climbers; roots tuberous. Leaves 8 - 24 cm and as much broad 3 - 5 angular, basal sinus deeply emarginate; 4 - 12 cm long, smooth; tendrils sulcate, 3 - 5 fid, glabrous. Flowers 10 - 30 in fascicles; pedicels 1.6 cm long, ovary obovoid, unilocular, 5-sulcate, hairy. Fruits ca 8 × 7 cm, green, deeply 5-sulcate, obovoid, sparsely spinulose, one seeded, seeds viviparous.

Fl. & Fr. : July - January.

Under cultivation.

### 18. *Solena* Lour.

*Solena amplexicaulis* (Lam.) Gandhi in Sald. & Nicols., Fl. Hassan Dist. 179, 1976; Jeffrey in Kew Bull. 34 : 793, 1980. *Bryonia amplexicaulis* Lam., Encycl. 1 : 496, 1785. *Solena heterophylla* Lour., Fl. Cochinch. 514, 1799; Balakr., Fl. Jowai 1 : 211, 1981. *Zehneria umbellata* Thwaites, Enum. Pl. Zeyl. 125, 1859; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 625, 1879, p.p. *Melothria heterophylla* (Lour.) Cogn. in DC., Monogr. Phan. 3 : 618, 1881; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Chakrav. in Fasc. Fl. Ind. 11 : 80, 1982.

Mani.: *Lamgi*.

Scandant herbs. Leaves 6 - 20 cm long, coriaceous often with a few minute glands at the base, ovate, sub-orbicular, oblong or narrowly lanceolate, acute or acuminate, base emarginate, margin sparsely denticulate, upper surface punctate, lower glabrous; petioles 0.5 - 1.2 cm, scabrous; tendrils glabrous. Flowers on 0.2 - 5.5 cm long, peduncles, few to many flowered; pedicels 2 - 6 cm long, spreading, filiform; calyx tube campanulate, glabrous. Fruits 4 - 5 × 2 - 2.7 cm, oblong, brown, many seeded; seeds 5 - 7 × 4 - 6 mm, grey, sub-spherical, turgid, base blunt.

Fl. & Fr. : March - November.

Specimens examined : s. loc., G. Watt 6323; Imphal, Deb 215 (CAL).

### 19. *Thladiantha* Bunge.

- 1a. Leaves simple; male flowers with prominent bracts ..... 1. *T. cordifolia*  
 b. Leaves simple but divided or compound; male flowers without bracts ..... 2. *T. hookeri*

1. *Thladiantha cordifolia* (Blume) Cogn. in DC., Monogr. Phan. 3 : 424, 1881; Jeffrey & Kashyapa in Kew Bull. 14 : 461, 1960; Chakrav. in Fasc. Fl. India 11 : 102, 1982. *Luffa cordifolia* Blume, Bijdr. 929, 1826. *Thladiantha calcarata* C. B. Clarke in J. Linn. Soc. 15 : 126, 1876; Kanjilal et al., Fl. Assam 2 : 329, 1938; Deb in Bull. Bot. Surv. India 3 : 284, 1961. *T. dubia* auct. non Bunge; Hook. f. in Bot. Mag. t. 5469, 1864; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 631, 1879.

Large climbers; petioles 3 - 8 cm long, slender, villous. Leaves 6 - 14 × 5 - 10 cm, simple, deeply cordate, ovate, undivided, denticulate, densely villous; pedicels 3 - 8 mm long, crowded; bracts 2 - 2.5 cm long, broadly ovate, imbricate. Male flowers racemose or cymose, rarely solitary, yellow; calyx tube shortly campanulate; female flowers solitary. Fruits oblong, baccate, indehiscent, many seeded; seeds longitudinally 12 - 15 nerved, 4.5 - 5 × 3 - 3.5 mm, ca 2 mm thick, ovoid, base saccate, both surfaces rugose.

*Fl. & Fr.* : July - October.

*Specimens examined* : *s. loc.*, G. Watt 6740; Mukerjee 2820; Deb 2265, 2569 (CAL).

**2. *Thladiantha hookeri*** C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 631. 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 33. 1938; Deb in *Bull. Bot. Surv. India* 3 : 284. 1961; Chakrav. in *Fasc. Fl. India* 11 : 103. 1982.

Large climbers with angular saccate stems; petioles 3 - 6 cm long, slender. Leaves 10 - 12 × 6 - 8 cm, simple or divided, membranous, remotely denticulate, upper surface punctate, lower glabrous, 3 - 5 foliolate, acuminate; leaflets 8 - 3 × 3 - 4.5 cm, lateral ones shorter, auriculate; tendrils filiform. Male flowers in racemes; peduncles 2 - 3 cm long, slender puberulous, 4 - 7 flowered; female flowers solitary or in few flowered racemes. Fruits 3.0 - 3.5 cm long, oblong, both side round; seeds 6.5 × 5 mm, ash-coloured, smooth, attenuate at base.

- 1a. Leaves simple or divided ..... 1. var. *hookeri*
- b. Leaves palmately compound ..... 2. var. *irregularis*

1. var : *hookeri*

*Fl. & Fr.* : May - July.

2. var. *irregularis* Chakrav. in *Fasc. Fl. India* 11 : 104. 1982. *T. hookeri* C. B. Clarke var. *palmatifolia*; emend. Chakrav. in *Notes R. Bot. Gard. Edinb.* 21 (48) : 121-123. 1948; Deb in *Bull. Bot. Surv. India* 3 : 284. 1961.

*Fl. & Fr.* : May - September.

*Specimens examined* : Mapoong, G. Watt 7190 (CAL).

**20. *Trichosanthes* L.**

- 1a. Pedicels of male flowers shorter than other flowers;  
bracts minute; fruits twisted ..... 1. *T. cucumerina*  
..... var. *anguina*
- b. Pedicels of male flowers longer than other flowers;  
bracts large; fruits not twisted ..... 2
- 2a. Calyx segments dentate or laciniate ..... 3. *T. iricuspidata*
- b. Calyx segments entire ..... 3
- 3a. Leaves entire, ovate- triangular;  
bracts entire; flowers yellow ..... 1. *T. cordata*

## b. Leaves lobed, suborbicular:

bracts crenate; flowers white .....4. *T. wallichiana*

1. *Trichosanthes cordata* Roxb., Fl. Ind. 3 : 703, 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 608, 1879; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Balakr., Fl. Jowai 1 : 213, 1981.

Robust climbers with tuberous roots. Leaves 12 - 20 × 9 - 12 cm, ovate, subangulate or sublobate, cordate at base, membranous, 3 - 5 nerved entire, acute to short acuminate; petioles 5 - 10 cm long, tendrils robust, sulcate, puberulous. Male flowers in 12 - 20 cm long, peduncles 4 - 8 flowered, yellow; female flowers solitary or fascicled, subsessile. Berries 5 - 7 cm, globose, red, smooth; seeds 1.0 - 1.2 × 0.4-0.5 cm, transversely broad, belated at the middle, belt with raised margins.

Fl. & Fr. : June - December.

Specimens examined : Kangpokpi, Deb 950 (CAL).

2. *Trichosanthes cucumerina* L., Sp. Pl. 1: 1008, 1753; C.B. Clarke in Hook. f., Fl. Brit. India 2: 609, 1879; Grierson in Grierson & Long, Fl. Bhutan 2(1): 264, 1991. *Trichosanthes anguina* L., Sp. Pl., 1008, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 610, 1879; Kanjilal *et al.*, Fl. Assam 2 : 329, 1938; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Chakrav. in Fasc. Fl. India 11 : 108, 1982. *Cucumis anguina* L., Syst. ed. 10, 1279, 1759.

Mani.: *Shebot*.

Annual herbs with slender puberulous stems; petioles 10 - 15 cm long, stout, striate, villose. Leaves 10 - 15 × 12 - 18 cm, orbicular-reniform, distantly denticulate, deeply 5-lobed; tendrils 2 - 3 fid; plants monoecious. Male flowers in 10 - 25 cm long peduncles, 8 - 15 flowered; pedicels 0.5 - 2 cm long, slender, minutely bracteate; female flowers solitary 0.5 - 5 cm long, peduncles. Fruits ca 1.5 m long, often twisted, surface smooth, white striped along the length; seeds ca 1.2 cm, oblong, finely rugulose, apex round, base attenuate.

var. *anguina* Haines

Fl. & Fr. : May - August.

Specimens examined : Imphal, Deb 2515 (CAL).

Cultivated for fruits.

3. *Trichosanthes tricuspidata* Lour., Fl. Cochinch. 2 : 589, 1790; Jeffrey in Kew Bull. 34 : 794, 1980. *T. bracteata* (Lam.) Voigt., Hort. Suburb. Calc. 58, 1845; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Chakrav. in Fasc. Fl. India 11 : 109, 1982. *Modecca bracteata* Lam., Encycl. Meth. Bot. 4 : 210, 1796. *Trichosanthes palmata* Roxb., Fl. Ind. 3 : 704, 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 606, 1879.

Extensive climbers, branches sulcate; petioles 3 - 10 cm long, striate; tendrils

3, rarely 2-fid. Leaves palmately 3-7 lobed, 5-25 × 6-17 cm, obovate to suborbicular, deeply cordate at base. Male flowers in 10-20 cm long, peduncles, sulcate, puberulous, 5-10 flowered, white, 4-5 cm across; bracts puberulous, 3-4 cm long; female flowers axillary, solitary. Berries, globose, 5-7 cm, red, with orange streaks; seeds many, ovate-oblong, whitish.

*Fl. & Fr.* : July-December.

*Specimens examined* : Keithernabi, G. Watt 5831; Sengmai Mukerjee 3169; Imphal, Deb 1092 (CAL).

4. *Trichosanthes wallichiana* (Seringe) Wight in Ann. & Mag. Nat. Hist. 8 : 270, 1842; Kanjilal *et al.*, Fl. Assam 2 : 327, 1938; Deb in Bull. Bot. Surv. India 3 : 284, 1961. *Involucrata wallichiana* Seringe in Mem. Soc. Phys. Hist. Nat. Geneve 3 (1) . 1, 5, 1825. *Trichosanthes multinoba* C. B. Clarke in Hook. f., Fl. Brit. India 2 : 607, 1879; Kanjilal *et al.*, Fl. Assam 2 : 328, 1938

Robust climbers: tendrils 2-3 fid. Leaves petiolate, 8-20 cm across, sub-orbicular, cordate or sub-truncate at base, palmately 3-9 lobed, lobes oblong-lanceolate, margin denticulate, coarsely pubescent above. Flowers ca 3 cm across, white; male peduncles 15-30 cm long, puberulous, 6-12 flowered; female peduncles 2-4 cm long; bracts ovate 2-3 cm. Fruits ca 5 cm long, ovoid, bright red with orange stripes; seeds many, margin more or less angular.

*Fl. & fr.* : July-November.

*Specimens examined* : Litau, Bor 18122 (CAL).

## 21. *Zehneria* Endl.

*Zehneria scabra* (L. f.) Sonder in Harv. & Sond., Fl. Cap. 2 : 486, 1862; Jeffrey in Kew Bull. 15 : 369, 1962. *Bryonia scabra* L., f. Suppl. 423, 1781. *Zehneria hookeriana* Arn. in Hook., J. Bot. 3 : 275, 1841; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 624, 1879 (excl. syn.). *Melothria perpusilla* (Blume) Cogn. in C. DC., Monogr. Phan. 3 : 607, 1881; Deb in Bull. Bot. Surv. India 3 : 284, 1961; Chakrav. in Fasc. Fl. India 11 : 85, 1982.

Mau., Lamthabi & Pabashari.

Herbs with slender sulcate branches. Leaves 5-10 × 4-8 cm, ovate-cordate, undivided or angular, rarely 3-5 lobed, acute, undulate-denticulate; glabrous, basal sinus ca 1.5 cm deep; petioles 2.5 cm long, glabrous; tendrils slender, elongate, glabrous. Flowers on long peduncle, monoecious, 6-20 flowered; pedicels 1-6 mm long; calyx tube campanulate, teeth recurved. Fruits 8-10 cm thick, globose, finely reticulate; seeds 3-4 × 2-3 mm, ovate, oblong, base attenuate, brown, compressed.

*Fl. & Fr.* : June-December.

*Specimens examined* : Imphal valley, Mukerjee 3388; Imphal Deb 88 (CAL).

## 88. BEGONIACEAE

C. A. Agardh, Aphor. Bot. 200. 1825.

(A.S. Chauhan)

1. *Begonia* L.

- 1a. Plants acaulescent or subacaulescent : ..... 2  
 b. Plants caulescent : ..... 3  
 2a. Capsules sub-quadrate, 1 winged ..... 3. *B. obversa*  
 b. Capsule narrow-oblong, 3-winged ..... 8. *B. wattii*  
 3a. Leaves elliptic-lanceolate; nerves red ..... 2. *B. hatacoa*  
 b. Leaves ovate-cordate or orbicular, nerves not red : ..... 4  
 4a. Capsule 2-loculed; ..... 5  
 b. Capsule 3-4 loculed : ..... 7  
 5a. Plant parts sub-glabrous;  
 leaves usually lobed ..... 4. *B. palmata*  
 b. Plant parts hairy; leaves entire ..... 6  
 6a. Capsules pubescent ..... 1. *B. barbata*  
 b. Capsules shaggy ..... 7. *B. thomsonii*  
 7a. Flowers pinkish-white; capsules 3-loculed,  
 with one wing, dehiscent ..... 5. *B. pieta*  
 b. Flowers white; capsules 4-loculed,  
 with 4 small horns, indehiscent ..... 6. *B. roxburghii*

1. *Begonia barbata* Wallich ex. A. DC. in DC., Prodr. 15 (1) : 384. 1864. *non* Kurz: C. B. Clarke in Hook. f., Fl. Brit. India 2 : 646. 1879; Deb in Bull. Bot. Surv. India 3 : 284. 1961 & Fl. Tripura 1 : 268. 1981.

Herbs with creeping root stocks; stem decumbent with spreading hairs. Leaves ovate, oblique, cordate at base, 5 - 12 cm. hispid; petioles with spreading hairs, 2.2 - 7.5 cm; stipules lanceolate subulate, ciliate; peduncles few flowered, up to 8 cm long. Flowers pinkish - white. Capsules 1.2 - 2.5 cm, recurved with a descending wing, hispid, 2-narrow wings on both the sides; seeds brown, ellipsoid.

Fl. & Fr. : July - March.

*Specimens examined* : West Manipur, C. B. Clarke s.n. (CAL); Sripurikhal, Malick 1086; Nutanlatpani, Malick 898 (BSIS).

2. *Begonia hatacoa* Buch. Ham. ex D. Don, Prodr. 223. 1823; Grierson in Grierson & Long, Fl. Bhutan 2(1) : 243. 1991. *Begonia rubrovenia* Hook. in Curtis. Bot. Mag. 7 9 : t. 4689. 1852, C. B. Clarke in Hook. f., Fl. Brit. India 2 : 645. 1879; Deb in Bull. Bot. Surv. India 3 : 285. 1961; Balakr., Fl. Jowai 1 : 215. 1981.

Herbs ca 30 cm high, succulent, with thick rootstock and puberulous stems. Leaves elliptic or lanceolate, 7 - 15 cm, sub-cordate at base, acute to acuminate, glabrous or shortly pubescent on the nerves beneath, entire; lateral nerves 5-7 pairs, reddish; petioles 3 - 10 cm, short; stipules lanceolate, 6 × 4 cm, glabrous; peduncles



axillary, 6 - 12 cm, few flowered. Flowers white or pinkish. Capsules 2-celled, recurved, winged, one wing larger than the rest, reddish-green; seeds ellipsoid.

*Fl. & Fr.* : July - October.

*Specimens examined* : Mao, Deb 1773 (CAL).

**3. *Begonia ohversa*** C. B. Clarke in J. Linn. Soc. 25 : 26, 1889; Deb in Bull. Bot. Surv. India 3 : 285, 1961. Fig. 57

Subcaulescent, red-tomentose herbs; rhizomes small, ligneous. Leaves cordate-ovate, 15 - 20 cm long, acute, margins minutely serrulate, nerves tomentose beneath; petiole up to 20 cm long, tomentose. Peduncles axillary, 20 - 30 cm long, sometimes bearing leaves. Capsule 1.2 × 1.8 cm, sub-quadrate 2-loculed, narrowly 1-winged; placentae 2 cleft.

*Fl. & Fr.* : July - November.

*Specimens examined* : Iapho, C. B. Clarke 41240, 41247 (CAL).

**4. *Begonia palmata*** D. Don, Prodr. Fl. Nep., 223, 1825; Balakr., Fl. Jowai 1 : 215, 1981. *B. laciniata* Roxb., Fl. Ind 3 : 649, 1832; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 645, 1879; Deb in Bull. Bot. Surv. India 3 : 285, 1961.

Mani.: *Banhang*.

Erect herbs with long creeping rootstocks, 12 - 60 cm. Leaves ovate, unequally cordate at base, acute to acuminate at apices of lobes, 8 - 15 × 4 - 12 cm, ciliate, serrulate-laciniate; main nerves 5 - 7; petioles 3 - 10 cm; stipules 10 - 12 × 6 - 10 mm. Peduncles axillary, 5 - 15 cm, solitary, 2 - 5 flowered; bracts 6 - 12 × 4 - 6 mm, oblong-lanceolate, brown pubescent. Capsule 10 - 13 × 12 - 18 mm, oblong, 3 recurved winged, reddish; seeds ellipsoid.

*Fl. & Fr.* : June - November.

*Specimens examined* : Mao, Deb 1772 (CAL).

**5. *Begonia picta*** Smith, Exot. Bot. 2 : 81, t. 101, 1805; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 638, 1879; Deb in Bull. Bot. Surv. India 3 : 285, 1961; Balakr., Fl. Jowai 1 : 217, 1981.

Mani.: *Banhang*.

Slender herbs, 12 - 35 cm. Leaves ovate-orbicular, 4 - 10 × 3 - 7 cm, unevenly rounded or cordate at base, acute to short-acuminate, coarsely serrulate at margins, pilose above, villous on the nerves beneath; main nerves 5 - 7; petioles 2 - 10 cm. Peduncles 2 - 6 cm, pubescent above, bracts subulate, ca 2 mm. Flowers pinkish-white, 1.2 - 1.5 cm across. Capsules triquetrous, much elongated, 1-winged; seeds shortly ellipsoid, light brown.

*Fl. & Fr.* : June - October.

*Specimens examined* : Homelong, 1200m, Mukerjee 3671 (CAL).

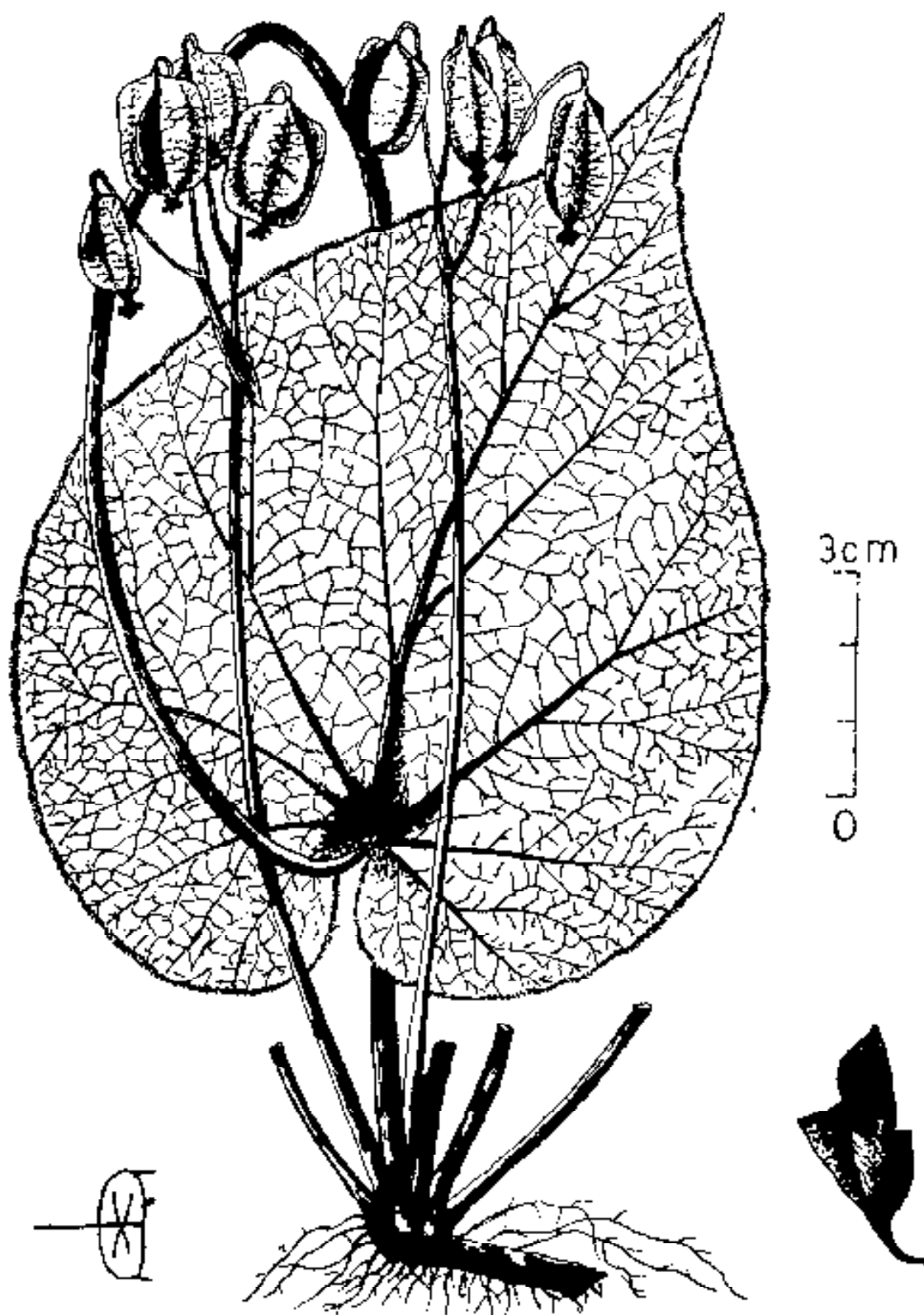


Fig. 57 : *Begonia obversa* C. B. Clarke in fruiting

6. *Begonia roxburghii* (Miq.) A. DC. in DC., Prodr. 15 (1) : 398, 1864; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 635, 1879; Deb in Bull. Bot. Surv. India 3 : 285, 1961; Balakr., Fl. Jowai 1 : 217, 1981. *Diploclinium roxburghii* Miq., Fl. Ind. Bot. 1 (1) : 692, 1856. *Begonia malabarica non* Lam.; Roxb., Fl. Ind. 3 : 648, 1832.

Mani.: Jaukibarui.

Herbs with fibrous roots, up to 1 m. Leaves large, broadly ovate, cordate at base, 13-25 × 12-26 cm, acute to acuminate, glabrescent; petioles short, 6-32 cm; stipules 1.3-2 cm, lanceolate, glabrous; peduncles axillary, dichotomous, bracteate, 4-8 cm; bracts linear-lanceolate, 4-6 mm. Flowers white. Capsules pendent, succulent, ending in 4 small horns upwards, red spotted with greenish yellow bases; seeds ellipsoid.

Fl. & Fr. : May - October.

Specimens examined : Koupru, Deb 2340 (CAL).

7. *Begonia thomsonii* DC., Prodr. 15 (1) : 349, 1864; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 647, 1879; Deb in Bull. Bot. Surv. India 3 : 285, 1961; Balakr., Fl. Jowai 1 : 215, 1981.

Erect or decumbent herbs, ca 35 cm high. Leaves ovate, cordate at base, acute to short-acuminate, ciliate at margins, denticulate, not lobed; petioles 4-35 cm, densely shaggy as in the stem; stipules lanceolate, ca 1 cm. Peduncles 3-10 cm; bracts lanceolate, 6-8 × 3-4 mm. Flowers white to pink. Capsules ca 2.3 cm, hairy, erect turgid; seeds ellipsoid.

Fl. & Fr. : July - October.

Specimens examined : Koupru, Deb 1523 (CAL).

8. *Begonia wattii* C. B. Clarke in J. Linn. Soc. 25 : 26, 1889; Deb in Bull. Bot. Surv. India 3 : 285, 1961. Fig. 58

Delicate, pubescent herbs, 10-30 cm high; rhizomes inconspicuous, with fibrous roots. Leaves long petioled, cordate-ovate, acute, margins double serrated; stipules ovate-subulate, ciliate. Peduncles axillary, dichotomously branched, often bearing leaves. Flowers numerous, small, rose-red; anthers barely apiculate. Capsules 3-winged; wings narrow, oblong, pubescent, ca 1.2 × 1.8 cm, 2-loculed; placentae 2-cleft.

Fl. & fr. : September - December.

Specimens examined : North Manipur, C. B. Clarke 41414, 42124. (CAL).

## 89. DATISCEAE

Lindley, Intr. Nat. Syst. Bot. 109, 1830 ('Datisceae').

(A. S. Chauhan)

### 1. Tetrameles R. Br.

*Tetrameles nudiflora* R. Br. in Benn., Pl. Jay. Rar. 79, t. 17, 1838; C. B. Clarke

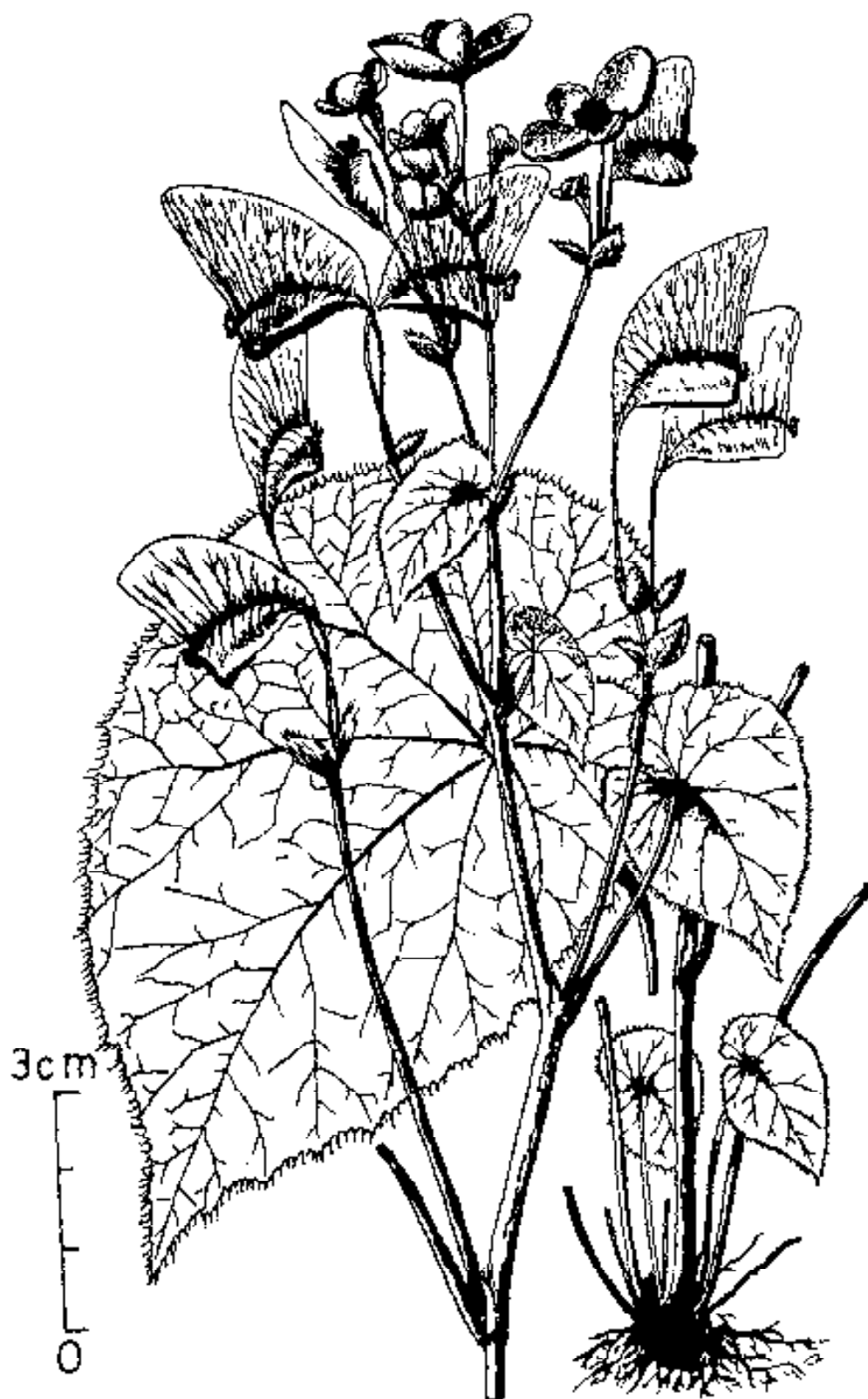


Fig. 58 : *Begonia wattii* C. B. Clarke in flowering

in Hook. f., Fl. Brit. India 2 : 657, 1879; van Steenis, Fl. Males. ser. 1, 4 : 385, 1953.  
Mani. : "Orag-phop"

Large tree, up to 30 m tall, stems buttressed. Leaves 6-15 x 6-12 cm, broadly ovate, shortly acuminate, serrate or nearly entire, pubescent on both surfaces when young, glabrous when old, nerves pubescent beneath. Flowers yellow in paniculate racemes, unisexual, dioecious, appearing before the leaves, clustered near the branch tips, pubescent; female flowers sessile in spicate racemes, ebracteate; calyx lobes 4, connate, one or two smaller, ovate, pubescent outside. Capsules ca 0.5 cm long, ovoid, glandular, 4-ribbed, membranous.

Fl. & Fr. : February - June.

Specimens examined : West Manipur, Deb s.n. (CAL).

## 90. CACTACEAE

A. L. Juss., Gen. Pl. 310, 1789 ("Cacti").

(A. S. Chauhan)

### 1. *Opuntia* P. Mill.

- 1a. Spine usually one, from an areole;  
petals golden yellow; berries obovoid ..... 2. *O. vulgaris*
- b. Spines several from an areole;  
petals white; berries pyriform ..... 1. *O. stricta*  
var. *dillenii*

1. *Opuntia stricta* (Haw.) Haw. var. *dillenii* (Ker-Gawler) Benson, Cact. & Succ. J. Amer. 41 : 126, 1969. *Cactus dillenii* Ker-Gawler in Edn. Bot. Reg. 3, t. 255, 1818. *Opuntia dillenii* Haw., Suppl. Pl. Succ. 79, 1819; Kanjilal *et al.*, Fl. Assam 2 : 337, 1938; Deb in Bull. Bot. Surv. India 3 : 285, 1961.

Mani. : *Meipoki*.

Straggling shrubs; branches with terete trunks; joints obovate to oblong; margins entire, lower joints often corky; spines several from an areole, yellow, brownish in age, usually terete and straight, sometimes stout spines and innumerable barbed bristles. Leaves subulate. Flowers ca 8 cm long, yellow or light orange; sepals and petals white; filaments greenish-yellow. Berries pyriform, depressed at the apex, bearing tufts of barbed bristles, deep purple at maturity.

Fl. & Fr. : June - September.

Specimens examined : Imphal valley, Deb 2415 (CAL).

Cultivated as hedge plant in the villages.

2. *Opuntia vulgaris* Mill., Gard. Dict. ed. 8, no. 1, 1768; Deb in Bull. Bot. Surv. India 3 : 285, 1961 & Fl. Tripura 1 : 272, 1981. *O. monacantha* Haw., Suppl. Pl. Succ. 81, 1819; Kanjilal *et al.*, Fl. Assam 2 : 336, 1938.

Large succulent shrubs, branching at the top, sometimes from near base; joints obovate or oblong, much compressed. Leaves very small, *ca* 0.4 cm, caducous, lanceolate, subulate spines usually one, persisting from an areole with dense pale brown shining bristly usually multicelled hairs. Flowers yellow or reddish, *ca* 8 cm across; sepals broad; each with a broad red stripe down the middle; petals spreading golden-yellow; stamens short, yellow or greenish; pistil longer than the filaments; style white with 6-stigmatic lobes. Berries obovoid, reddish-purple.

*Fl. & Fr.* : March - October.

*Specimens examined* : Litan, Deb 2414 (CAL).

Planted as a hedge in the villages up to 1800 m altitude.

## 91. AIZOACEAE

Rudalphi, Syst. Orb. Veg. 53. 1830 (Aizoidae).

(A. S. Chauhan)

- 1a. Flowers greenish, in fascicles; ovary 3-5 celled ..... 1. *Glinus*  
 b. Flowers white or pinkish, solitary;  
 ovary 1 - 2 celled ..... 2. *Trianthema*

### 1. *Glinus* L.

*Glinus lotoides* L., Sp. Pl. 463. 1753; Backer in van Steenis, Fl. Males. ser. 1. 4 (3) : 269. 1951; Deb, Fl. Tripura 2 : 189. 1983. *Mollugo hirta* Thunb.; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 662. 1879. *M. lotoides* Wight & Arn. ex C. B. Clarke in Hook. f., Fl. Brit. India 2 : 776. 1879; Deb in Bull. Bot. Surv. India 3 : 321. 1961.

Prostrate or diffuse herbs, much branched. Leaves opposite, broadly ovate or obovate, 1 - 2.5 × 0.5 - 2 cm, cuneate at base, obtuse or apiculate at apex, sometimes undulate at margins. Flowers in fascicles of 3 - 7, greenish; tepals *ca* 0.6 cm, ovate, acute, white hairy outside; stamens 5 - 6; styles 5 - 6. Capsules 5-valved; seeds granulate.

*Fl. & Fr.* : September - December.

*Specimens examined* : Imphal valley, Deb 1636 (CAL).

### 2. *Trianthema* L.

*Trianthema portulacastrum* L., Sp. Pl. 223. 1753; Backer in van Steenis, Fl. Males. 4 (3) : 274. 1951; Deb in Bull. Bot. Surv. India 3 : 321. 1961. *T. monogyna* L., Mant. Pl. 69. 1767; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 660. 1872.

Annual diffuse prostrate glabrous herbs, up to 45 cm long. Leaves 1 - 4 cm, obovate to sub-orbicular, opposite, unequal, entire; petioles *ca* 0.3 cm, base dilated, membranous; exstipulate. Flowers *ca* 0.3 cm long, white or pinkish, solitary, small, axillary, sessile, in clusters; calyx lobes obtuse, cuspidate; stamens 10 - 20, unequal. Capsules *ca* 0.5 cm, coriaceous, membranous, beaked; seeds 4 - 5, reniform.

*Fl. & Fr.* : April - June.

*Specimens examined* : Imphal river, *Deb* 1105 (CAL).

## 92. MOLLUGINACEAE

Hutchinson, *Fam. Fl. Pl.* 1 : 128. 1926.

(*A. S. Chauhan*)

### 1. *Mollugo* L.

*Mollugo pentaphylla* L., *Sp. Pl.* 89. 1753; Backer in van Steenis, *Fl. Males.* 4 : 268. 1951; Deb in *Bull. Bot. Surv. India* 3 : 321. 1961, *M. stricta* L., *Sp. Pl.* ed. 2 : 131. 1762; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 663. 1879.

Erect or prostrate, much branched herbs. Leaves in pseudo-whorls of 3-9, lanceolate or linear-lanceolate, obovate, acute or obtuse, 1-nerved. Flowers in much branched cymes, greenish white; tepals obovate-oblong, white margined; stamens 3; styles 3. Capsules 0.2 cm long, ellipsoid, trigonous; 12-15 seeded.

*Fl. & Fr.* : March - November.

*Specimens examined* : Imphal valley, *Deb* 229 & 2619 (CAL); Jiribam, *Malick* 648; Kangrendhar, *Malick* 1020 (BSIS).

## 93. APIACEAE

Lindley, *Nat. Syst. Bot.* ed. 2, 21. 1836

(*nom. alt.* "Umbelliferac").

(*D. K. Singh*)

- 1a. Leaves and umbels simple; vittae obscure.....2
- b. Leaves and umbels compound; vittae prominent.....4
- 2a. Plants highly aromatic; stem deeply striate;  
leaf margin toothed, spinous ..... *S. Eryngium*
- b. Plants non aromatic; stems terete;  
leaf margins serrate or crenulate. .... 3
- 3a. Leaves orbicular or cordate-reniform; petals obtuse,  
imbricate; secondary ridges as prominent  
as primary ..... 1. *Centella*
- b. Leaves suborbicular to rhomboid or palmatifid; petals  
acute, valvate; secondary ridges absent ..... 8. *Hydrocotyle*
- 4a. Plants hirsute, hispid or pubescent. .... 5
- b. Plants glabrous. .... 7
- 5a. Leaves pinnately decomposed; bracts and  
bracteoles linear; rays few; fruits laterally  
compressed ..... 12. *Trachyspermum*
- b. Leaves 1-4 pinnate; bracts foliaceous;

- rays numerous; fruits dorsally compressed. .... 6
- 6a. Plants hispid; bracts and bracteoles numerous;  
fruits elliptical, slightly dorsally compressed,  
all ridges prominent ..... 4. *Daucus*
- b. Plants hirsute; bracts few or absent; fruits  
orbicular-obovate, dorsally highly compressed,  
only lateral ridges prominent ..... 7. *Heracleum*
- 7a. Leaves decompond; fruits sub-globose ..... 2. *Coriandrum*
- b. Leaves 1 - 4 pinnate; fruits otherwise. .... 8
- 8a. Fruits dorsally compressed. .... 9
- b. Fruits either laterally compressed or not compressed. .... 10
- 9a. Bracteoles pinnatifid; fruits ovoid- subquadrate ..... 11. *Selinum*
- b. Bracteoles linear; fruits ellipsoid ..... 9. *Oenanthe*
- 10a. Bracts and bracteoles entirely absent;  
fruits not compressed ..... 6. *Foeniculum*
- b. Bracts and bracteoles usually present;  
fruits laterally compressed. .... 11
- 11a. Bracts and bracteoles a few only when  
present; fruits ovate-oblong ..... 10. *Pimpinella*
- b. Bracts and bracteoles always present,  
numerous; fruits cylindric. .... 3. *Cuminum*

### 1. *Centella* L.

*Centella asiatica* (L.) Urban in Mart., Fl. Bras. 1 (1) : 287, t. 78, f. 1. 1879; Deb in Bull. Bot. Surv. India 3 : 328. 1961; Cannon, in Hara *et al.* Enum. Fl. Pl. Nepal 2 : 185. 1979; Balakr., Fl. Jowai 1 : 218. 1981. *Hydrocotyle asiatica* L., Sp. Pl. 234. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 669. 1879; Kanjilal *et al.*, Fl. Assam 2 : 340. 1938. Fig. 59

Mani.: *Peruk*.

Perennial herbs; stems slender, long, creeping, rooting at nodes, glabrous. Leaves orbicular or cordate- reniform, uniformly crenate to crenulate. 1.5 - 6.5 cm diam., glabrous or slightly pubescent; petioles usually geminate, up to 15 cm in length, glabrous or pubescent; stipules broad, scarious. Umbels solitray or up to 5 at each node, each with 2 - 3, broad, sub-amplexicaul bracts; peduncles fascicled, 1 - 5 cm long, equal in same fascicle. Flowers up to 6 per umbel, sessile to subsessile, often monoecious; petals red, ovate. Fruits laterally compressed, with narrow commissures; mericarps broader than long, with secondary ridges more or less similar to that of primary ones.

Fl. & Fr. : October - June.

Specimens examined : Imphal, Malick 1320; Sripurikhal, Malick 1088; Caljang, Malick 1148 (BSIS).

Medicinal.



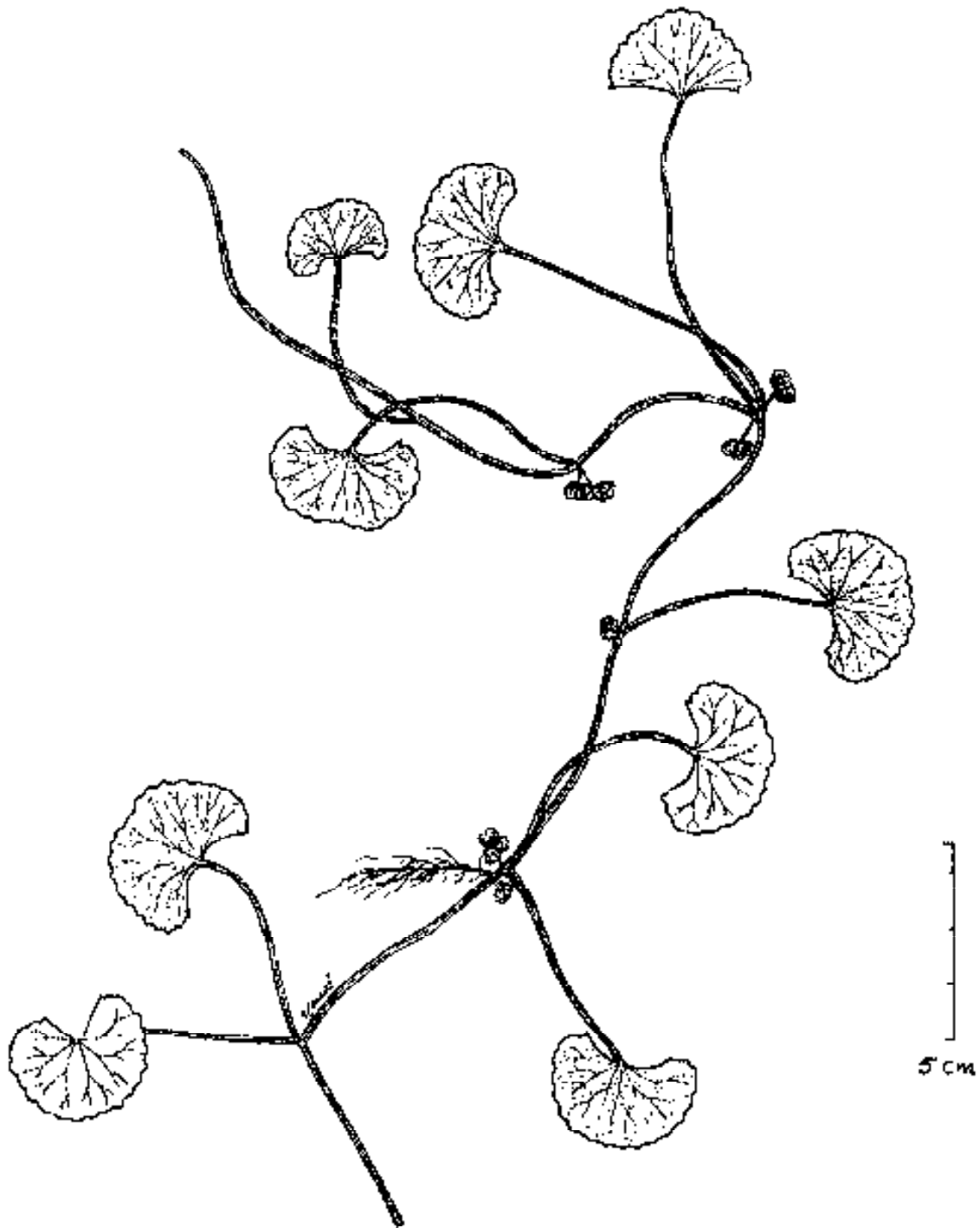


Fig. 59 : A twig of *Centella asiatica* (L.) Urban

## 2. *Coriandrum* L.

*Coriandrum sativum* L., Sp. Pl. 256, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 717, 1879; Deb in Bull. Bot. Surv. India 3 : 328, 1961; Cannon in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 185, 1979; Deb, Fl. Tripura 2 : 193, 1983.

Mani.: *Phodigon*.

Annual herbs, 15 - 50 cm; stems slender, branched, glabrous with a foetid smell. Leaves pinnately decomposed, lower leaf segments ovate-lanceolate, crenate. Flowers purplish-white, in compound umbels, cbracteate; bracteoles few, linear, calyx minutely dentate, dentitious, acute, unequal; petals obovate, rotundate, that of outer flowers often radiant. Fruits globose-subglobose, with 4 secondary and 5 primary subconspicuous to conspicuous ridges on each mericarp, vittae obscure.

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

*Specimens examined* : Imphal, Deb 2341 (CAL).

Widely cultivated for its leaves and fruits, used as condiment and spices.

## 3. *Cuminum* L.

*Cuminum cyminum* L., Sp. Pl. 1 : 254, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 718, 1879; Deb in Bull. Bot. Surv. India 3 : 328, 1961.

Annual herbs, 10 - 50 cm; stems slender, glabrous. Leaves bi- or tripinnate, with ciliate ultimate segments, 2 - 5 cm long. Flowers white, 3 - 5 in each partial umbel; pedicels stout; umbels compound, rays 1 - 5, somewhat stout; bracts 2 - 4, filiform or trifid, usually longer than rays; bracteoles usually 3, unequal; calyx subulate, unequal; petals obovate-oblong, emarginate. Fruits 4 - 5 mm, ovoid-oblong, setulose; primary ridges filiform, conspicuous, secondary ridges hispidulate; vittae large.

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

*Specimens examined* : Imphal, Deb 2341 (CAL).

Widely cultivated as a winter season crop for its fruits, used as condiments.

## 4. *Daucus* L.

*Daucus carota* L., Sp. Pl. 1 : 242, 1753; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 718, 1879; Deb in Bull. Bot. Surv. India 3 : 328, 1961 & Fl. Tripura 2 : 194, 1983.

Mani.: *Gajar*.

Annual or biennial herbs, variable in habit and branching; stems usually branched, 10 - 200 cm, setose, hispidous or glabrous. Leaves (1-) 2 - 3 pinnate, segments variable dentate, pinnatifid or pinnatisect, glabrous to pubescent, often fleshy; upper cauline leaves often bract-like. Flowers white or purplish-white; umbels compound, concave, flat or convex; rays (8-) 10 numerous, often inflexed in fruits; bracts and bracteoles numerous, bracts as long as the rays 1 or 2 pinnate, often deflexed; calyx teeth obscure; petals obovate, emarginate. Fruits 2 - 4 mm, elliptic, terete or somewhat dorsally compressed, spines on the secondary ridges divergent at base, shorter than the width of mericarp.

*Fl. & Fr.* : June - December.

Widely cultivated.

### 5. *Eryngium* L.

*Eryngium foetidum* L., Sp. Pl. 1 : 232, 1753; Kanjilal *et al.*, Fl. Assam 2 : 340, 1938; Deb in Bull. Bot. Surv. India 3 : 328, 1961; Cannon in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 186, 1979. Fig. 60

Diffused, perennial, highly aromatic herb, stems dichotomously branched, deeply striate. Leaves simple, oblanceolate, 5 - 10 × 0.5 - 2.5 cm, attenuate at base, spinous toothed; floral leaves palmatipartite, sessile. Flowers white, in oblong cylindrical heads; bracts spinulose, with stellate hairs; calyx teeth ridged. Fruits ellipsoid.

*Fl. & Fr.* May - October.

*Specimens examined* : Ukhrul, Mukerjee 3254; *s. loc.*, Deb (CAL).

The leaves are edible. Plant yields a volatile oil. The fruits are used as condiment.

### 6. *Foeniculum* Mill.

*Foeniculum vulgare* Mill., Gard. Dict. ed. 8, 1768; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 695, 1879; Cannon in Hara *et al.* Enum. Fl. Pl. Nepal 2 : 186, 1979; Deb in Bull. Bot. Surv. India 3 : 328, 1961. *Anethum foeniculum* L., Sp. Pl. 263, 1753.

Mani.: *Hop.*

Annual tall, glabrous herbs, aromatic. Leaves pinnately decomposed, ultimate segments linear. Flowers in compound umbels, involucre and involucels none; bracts absent; sepals absent; petals yellow, emarginate, with a short obtuse point. Disc with conical lobes; stamens much longer than petals. Fruits ca 6 mm long, oblong, glabrous with stony ridges.

*Fl. & Fr.*: November - March.

*Specimens examined* : Imphal valley, Deb 386 (CAL).

Cultivated for its fruits, which are used as spice and condiment.

### 7. *Heracleum* L.

*Heracleum wallichii* DC., Prodr. 4 : 195, 1830; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 712, 1879; Deb in Bull. Bot. Surv. India 3 : 328, 1961; Cannon in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 186, 1879. *H. sublineare* C. B. Clarke in Hook. f., l. c. 2 : 713, 1879.

Erect, perennial herbs; stems 0.5 - 1.5 m, covered with glaucous hairs below the nodes. Leaves pinnately compound, serrate, veins pilose on both side. Flowers white to pinkish-white, 1 - 2 in compound umbels; bracts usually deciduous; bracteoles 2 - 5, sometime absent; rays 5 - 10, glabrous; sepals prominent, linear. Fruits oblong-obovate, brown, glabrous, ridges inconspicuous; vittae half the length of mericarp.



Fig. 60 : *Eryngium foetidum* L. in flowering

*Fl. & fr.* : July - October.

*Specimens examined* : Ukhrul Mukerjee 3636 (CAL).

### 8. *Hydrocotyle* L.

- 1a. Leaves 2.5 - 8 cm in diam.; umbels multi-flowered; bracts minute; flowers sessile, yellowish-green to green ..... 1. *H. nepalensis*
- b. Leaves 0.5 - 2 cm in diam., umbels 3 - 8 flowered; bracts absent; flowers sub-sessile, pink to brown. .... 2. *H. sibthorpioides*

1. *Hydrocotyle nepalensis* Hook., *Exot. Fl.* 1 : t. 30, 1823; Cannon in Hara *et al.*, *Enum. Fl. Pl. Nepal* 2 : 186, 1979. *H. javanica* auct. non Thunb. : C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 667, 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 339, 1938; Deb in Bull. Bot. Surv. India 3 : 328, 1961; Balakr., *Fl. Jowai* 1 : 218, 1981. *H. himalaica* Mukerjee in Ind. For. 95 : 470, 1969. *H. javanica* var. *podantha* (Molkenb.) C. B. Clarke in Hook. f., *l.c.* : 668, 1879. Fig. 61

Mani.: *Awaperuk*.

Perennial herbs; stems prostrate, succulent, sarmentose, with erect, flexuous branches, glabrous, rooting at nodes. Leaves suborbicular to rhomboid, palmatifid, 5 - 8 lobed, with serrate margins, glabrous or laxly pubescent; petioles erect, 5 - 18 cm long, laxly pubescent; stipules broader than long, entire. Flowers solitary; peduncles shorter than petiole, leaf opposed; petals entire. Fruits orbicular, dorsiventral; mericarp with emarginate primary ridges; secondary ridges absent.

*Fl. & fr.* : May - October.

*Specimens examined* : Kangpokpi, Mukerjee 4309; Ukhrul Deb 946, 1825; Mao, Mukerjee 3130 (CAL) : Nungba, Malik 1278 (BSIS).

Plants used for medicinal purpose as a substitute for *Centella asiatica* (L.) Urb.

2. *Hydrocotyle sibthorpioides* Lam., *Encycl.* 3 : 153, 1789; Cannon in Hara *et al.*, *Enum. Fl. Pl. Nepal* 2 : 186, 1979; Deb in Bull. Bot. Surv. India 3 : 328, 1961 & *Fl. Tripura* 2 : 196, 1981. *H. rotundifolia* DC., *Prodr.* 4 : 64, 1830; C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 668, 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 340, 1938.

Perennial, delicate, slender herbs; stems creeping, with ascending branches. Leaves suborbicular-cordate, 3 - 5 lobed, crenate, glabrous and shiny, both the surface villous; stipules minute, fimbriate. Flowers sessile or with peduncles up to 0.5 cm, glabrous; petals small, lanceolate. Fruits orbicular, smooth to punctate, compressed, pentagonal, primary ridges very prominent.

*Fl. & Fr.* : March - May.

*Specimens examined* : s. loc., Deb 2738 (CAL).

Plants used for medicinal purpose, as a substitute for *Centella asiatica* (L.) Urb.

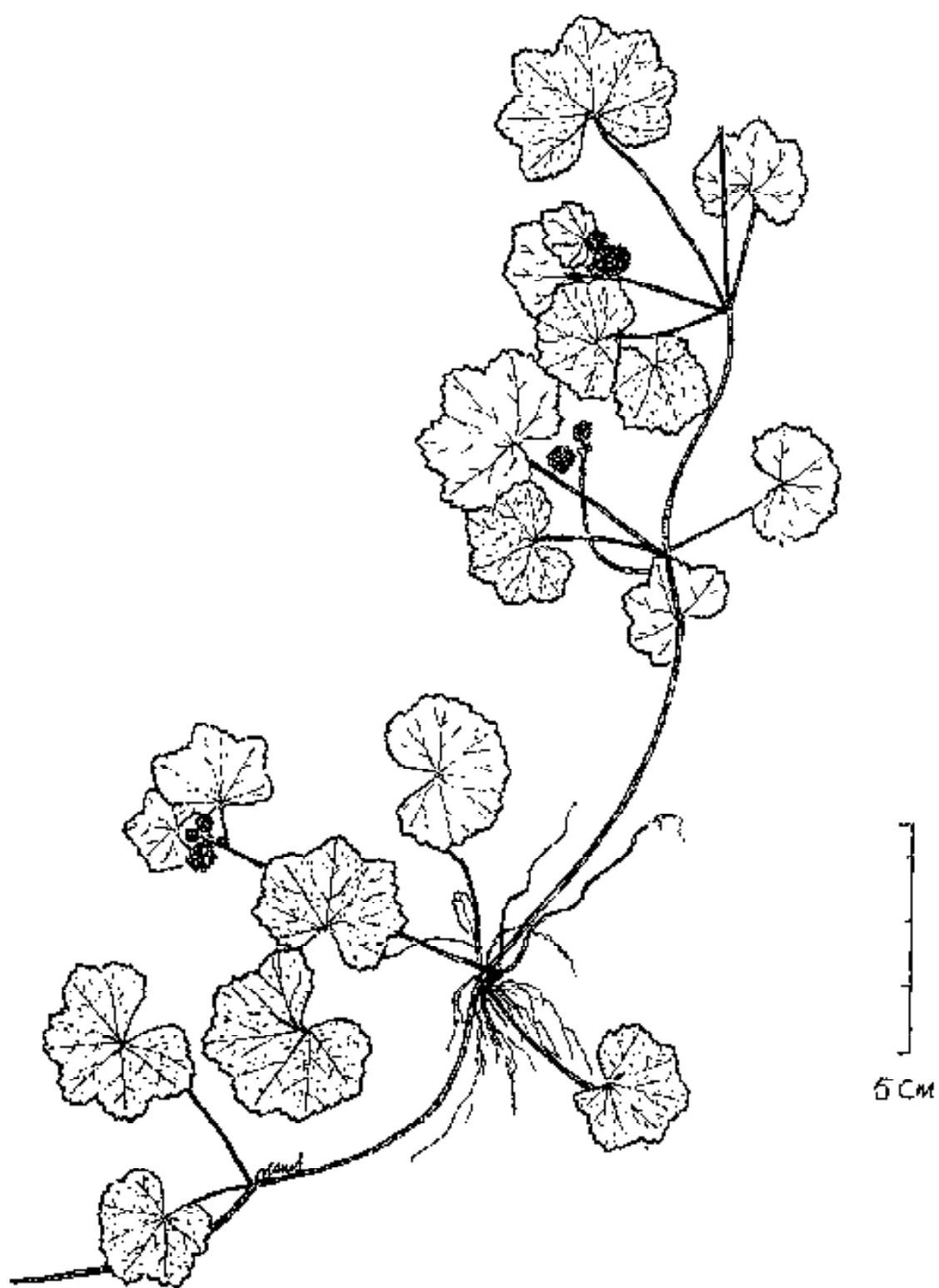


Fig. 61 : *Hydrocotyle nepalensis* Hook. in flowering

9. *Oenanthe* L.

*Oenanthe javanica* (Blume) DC., Prodr 4 : 138, 1830; Buwaida in van Steenis, Fl. Males 4 (2) : 136, 1949; Cannon in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 187, 1979; Deb in Bull. Bot. Surv. India 3 : 328, 1961; Balakr., Fl. Jowai 1 : 220, 1981. *Stum javanicum* Blume, Bijdr. 15 : 881, 1826. *Oenanthe stolonifera* DC., Prodr. 4 : 138, 1830; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 696, 1879; Kanjilal *et al.*, Fl. Assam 2 : 341, 1938. *O. linearis* DC., Prodr. 4 : 138, 1830; Deb in Bull. Bot. Surv. India 3 : 328, 1961. *O. javanica* subsp. *linearis* (Wallich ex DC.) Murata in Acta Phyt. Geobot. 25 : 103, t. 2, f. 4, 1973.

Fig. 62

Mani.: *Kamprek*.

Perennial, stoloniferous, glabrous herbs, growing in swamps; stems long, 0.5-1.5 m or more, prostrate with ascending tips, rooting from the under surface of nodes. Leaves uni or bipinnate; leaflets ovate-lanceolate or lanceolate-rhomboid, laxly serrate, rachis sheathing at base. Umbels compound, leaf opposed; peduncles elongated, up to 20 cm; rays 5-30, stout. Flowers white; petals entire or emarginate. Fruits more or less orbicular, compressed; mericarp ridges distinct, sub confluent.

Fl. & Fr. : April - September.

Specimens examined : Maohing, Deb 986; Ukhrul, Mukerjee 2735, 2925 (CAL).

10. *Pimpinella* L.

- 1a. Plants part villose, tomentose or laxly pubescent..... 2
- b. Plant parts glabrous ..... 5. *P. vulgare*
- 2a. Plants corymbose above; rays 3-15 ..... 3
- b. Plants non corymbose above; rays 3-4 ..... 2. *P. flaccida*
- 3a. Bracts and bracteoles absent; rays 5-8 ..... 3. *P. hastata*
- b. Bracts and bracteoles present or absent.  
rays 3-15 ..... 4
- 4a. Leaves entire to trifid; bracts 1-2;  
bracteoles 3-8 ..... 1. *P. diversifolia*
- b. Leaves 2 to 3 pinnate; bracts and  
bracteoles 0-2 ..... 4. *P. sikkimensis*

1. *Pimpinella diversifolia* DC., Prodr. 4 : 122, 1830; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 688, 1879; Deb in Bull. Bot. Surv. India 3 : 328, 1961; Cannon in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 188, 1979.

Villose, sub-tomentose or laxly pubescent herbs; stems 0.5-1.5 m, distally corymbose; lower leaves entire-trifid, rounded-ovate; upper cauline leaves with 3-5 leaflets; leaflets lacinate or sub-pinnate. Flowers white; umbels compound; bracts linear, 1-2, sometimes absent; bracteoles 3-8, sometimes absent; rays 3-15, occasionally villous; petals emarginate. Fruits laterally compressed; mericarp ridges obscure.

Fl. & Fr. : June - October.

Specimens examined : Nongmaijing, Deb 2175 (CAL).



Fig. 62 : A twig of *Oenanthe javanica* (Blume) DC. in fruiting



2. *Pimpinella flaccida* C. B. Clarke in J. Linn. Soc. 25 : 26. 1889; Deb in Bull. Bot. Surv. India 3 : 328. 1961.

Flaccid, erect branched, laxly foliaceous herbs; younger parts pilose. Leaves triangular-ovate, pinnately lobed; leaflets 3 - 7, broadly ovate-triangular or oblong ovate, acute. Umbels compound, axillary or terminal; bracts and bracteoles absent; rays 3 - 4, slender 0.5 - 2 cm long; calyx teeth obsolete. Fruits ovoid, small, up to 0.3 cm in diam.; mericarp ridges prominent.

*Fl. & Fr.* : August - November.

*Specimens examined* : Koupru, Deb 2342 (CAL).

3. *Pimpinella hastata* C. B. Clarke in Hook. f., Fl. Brit. India 2 : 687. 1879; Deb in Bull. Bot. Surv. India 3 : 328. 1961.

Perennial, laxly pubescent herbs; stems 0.6 - 1 m, erect, sparsely leafy corymbose distally. Leaves glabrous; lower leaves cordate or triangulate-lanceolate, margins serrate, villous on the underside; upper leaves tripartite; leaflets ovate. Umbels compound; bracts and bracteoles absent; rays 5 - 8, scabrous. Fruits dorsally subcompressed, inner face somewhat concave; mericarp ridges obscure.

*Fl. & Fr.* : July - August.

*Specimens examined* : Koupru, Deb 2250 (CAL).

4. *Pimpinella sikkimensis* C. B. Clarke in Hook. f., Fl. Brit. India 2 : 685. 1879; Deb in Bull. Bot. Surv. India 3 : 328. 1961; Banerjee in Rec. Bot. Surv. India 19 (2) : 49. 1966; Cannon in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 188. 1979.

Perennial, sparsely scetulose or glabrous herbs, stems 0.5 - 1.6 cm, erect, corymbose. Leaves large, ovate bi or laxly tripinnate, pinnae and pinnules opposite, segments oblong-lanceolate, serrate. Flowers greenish-white; umbels compound; bracts and bracteoles minute, 0 - 2; rays 4 - 15, divaricate, white; sepals lanceolate; petals emarginate. Fruits dorsally compressed, mericarp ridges subprominent.

*Fl. & Fr.* : June - August.

*Specimens examined* : Ukhrul, Mukerjee 2936; Koupru, Deb 1470 (CAL).

5. *Pimpinella vulgare* (Dunn) Hand. -Mazz., Symb. Sin. 7 : 719. 1933; Deb in J. Bombay Nat. Hist. Soc. 63 : 455. 1966. *Cryptotaeniopsis vulgare* Dunn in Hook. f., loc. 8, t. 2737, 1902. *Pimpinella clarkeana* G. Watt ex Banerjee in J. Bombay Nat. Hist. Soc. 50 : 88. 1951; Deb in Bull. Bot. Surv. India 3 : 328. 1961.

Slender, small, erect herbs; stems 15 - 30 cm long, unbranched, striate, hollow within. Leaves membranous, glabrous; radical leaves 3-foliolate; petioles slender, flattened, 5 - 15 cm long, winged at base; leaflets 1.5 - 4.5 × 1 - 3.5 cm, elliptic ovate, simple or up to 3-fid, base obtuse, cuneate, margins serrate, acute; cauline leaves smaller, 3-fid; petioles 1 - 2 cm long. Flowers white; umbels terminal, 3 - 5 cm in diam., primary rays 12 - 17 in numbers; bracts absent; bracteoles 1 - 3, lanceolate; petals glabrous, obovate, emarginate. Fruits up to 4 mm long, mericarp ridges distinct.

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

*Specimens examined* : Chingsow. G. Watt 6556 (CAL).

### 11. *Selinum* L., *nom. cons.*

*Selinum striatum* Wallich ex C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 699, 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 432, 1938; Deb in *Bull. Bot. Surv. India* 3 : 328, 1961; Balakr., *Fl. Jowai* 1 : 219, 1981.

Perennial herbs; stems erect, 0.3 - 1.5 m, glabrous, with withered fibres towards base. Leaves tri to tetrapinnate, oblong-ovate or lanceolate, segments 1 - 2 pinnatifid, narrow, linear lanceolate. Flowers white; umbels compound, axillary; bracts and bracteoles minute, linear-lanceolate, 4 - 8; rays glabrous or laxly pubescent, 8 - 15; sepals linear, oblong. Fruits dorsally compressed; mericarp ridges elevated, winged.

*Fl. & Fr.* : June - November.

*Specimens examined* : Ukhrul, Mukerjee 3517; Koupru, Deb 2295 (CAL).

### 12. *Trachyspermum* Link, *nom. cons.*

*Trachyspermum ammi* (L.) Sprague in *Kew Bull.* 1929 : 228, 1929; Deb in *Bull. Bot. Surv. India* 3 : 328, 1961; Balakr., *Fl. Jowai* 1 : 219, 1981. *Sison ammi* L., *Sp. Pl.* 1 : 252, 1753. *Ammi copticum* L., *Mant.* 56, 1767. *Carum copticum* (L.) C. B. Clarke in Hook. f., *Fl. Brit. India* 2 : 682, 1879. Fig. 63

Annual herbs; stem slender, erect, 0.5 - 1.5 m, glabrous or minutely pubescent; root fusiform. Leaves bi or tripinnate, pinnae narrow, linear-lanceolate, branched. Flowers white, polygamous; umbels compressed, axillary; bracts numerous, linear, entire or branched, sometimes absent; rays 4 - 15; bracteoles 2 - 5, small, filiform; petals obovate, emarginate. Fruits subquadrate or oblong-ovoid, muricate-subhispidate, mericarp ridges distinct.

*Fl. & Fr.* : June - October.

Under cultivation.

The fruit is used as spice and medicinally.

## 94. ARALIACEAE

A. L. de Juss. *Gen. Pl.* 217, 1789 (Araliae).

(D. K. Singh)

- |     |  |                     |
|-----|--|---------------------|
| 1a. | Herbs, perennial with tuberous rootstock .....             | 7. <i>Panax</i>     |
| b.  | Trees or large climbing-scandant shrubs .....              | 2                   |
| 2a. | Umbels sessile, borne on midrib of the leaf .....          | 5. <i>Helwingia</i> |
| b.  | Umbels pedunculate, in axillary or terminal panicles ..... | 3                   |
| 3a. | Leaves pinnate or pinnately decomound .....                | 1. <i>Aralia</i>    |
| b.  | Leaves simple, digitate or palmate .....                   | 4                   |



Fig. 63 : *Trachyspermum ammi* (L.) Sprague in fruiting

- 4a. Leaves digitately compound; umbels  
panicled or in compound racemes ..... 8. *Schefflera*
- b. Leaves simple, entire, or palmately lobed;  
panicles sparsely branched ..... 5
- 5a. Climbers; leaves simple or lobed;  
stipules absent ..... 4. *Hedera*
- b. Trees or large shrubs; leaves palmate  
or digitate; stipules present ..... 6
- 6a. Pedicels articulated ..... 6. *Macropanax*
- b. Pedicels not articulated ..... 7
- 7a. Umbels panicled or solitary; flowers  
polygamous or hermaphrodite; ovary  
2-4 celled; styles distinct ..... 3. *Eleutherococcus*
- b. Umbels in large compound panicles;  
flowers often polygamous; ovary 2-celled;  
styles connate ..... 2. *Brassaiopsis*

### 1. *Aralia* L.

- 1a. Plants glabrous at least in upper portion ..... 2
- b. Plants villose throughout ..... 3. *A. thomsonii*
- 2a. Panicles pubescent; bracts absent  
or caducous ..... 1. *A. armata*
- b. Panicles glabrous; bracts present, persistent ..... 2. *A. foliosa*

1. *Aralia armata* (G. Don) Seem. in J. Bot. 6 : 134. 1868; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 723. 1879; Kanjilal *et al.*, Fl. Assam 2 : 345. 1938; Deb in Bull. Bot. Surv. India 3 : 272. 1961. *Panax armatus* G. Don, Gen. Syst. 3 : 386. 1834.

Mani.: Naosek.-Manbi.

Prickly shrubs or small trees; upper part of stem and petioles glabrous. Leaves very-large 1 - 2 m, 3 - 4 pinnate; ultimate pinnales 5 - 9 foliolate; leaflets pilose, ovate-lanceolate, cordate at base, serrulate. Panicles terminal. Flowers small, white; calyx glabrous; sepals distinct; petals 5. Fruits pentangular.

Fl. & Fr. : November - February.

*Specimens examined* : Chingmairong, Meebold 6043; Malom, Deb 1175 (CAL); Nongba, Malick 1229 (BSIS).

2. *Aralia foliosa* Seem. in J. Bot. 6 : 143. 1868; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 723. 1879; Kanjilal *et al.*, Fl. Assam 2 : 346. 1938; Deb in Bull. Bot. Surv. India 3 : 272. 1961.

Large, sparsely prickly shrubs; prickles short, strong, all parts of plants villous and woolly. Leaves up to 1 m, 2 - 3 pinnate, with a pair of leaflets at each ramification; leaflets ovate, ovate-lanceolate, elliptical, sub-cordate at base, acute to

acuminate, laxly serrulate. Umbels paniced 30-60 cm; bracts linear lanceolate. Flowers white; sepals distinct; petals ovate. Fruits globose subglobose, plicate.

*Fl. & Fr.* : April-September.

*Specimens examined* : s. loc., Meebold 9214; Deb 2007 (CAL).

**3. *Aralia thomsonii*** Seem. in J. Bot. 6: 134. 1868; C. B. Clarke in Hook., f., Fl. Brit. India 2 : 723. 1879; Kanjilal *et al.*, Fl. Assam 2 : 345. 1938; Deb in Bull. Bot. Surv. India 3 : 272. 1961.

Large prickly shrubs; prickles short, strong. Leaves up to 1 m, 2-3 pinnate with a pair of leaflets, at each division of rachis; pinnules 5-9 foliolate; leaflets 5-15 × 2-5 cm, elliptic-ovate or lanceolate, subcordate at base, acute to acuminate, serrulate at margins; lateral nerves 6-10 pairs. Flowers ca 0.3 cm across, white, in 15-20 flowered umbellate panicles. Fruits ca 0.4 cm, globose, deeply 5-angled.

*Fl. & Fr.* : April-October.

*Specimens examined* : Kasom, Mukerjee, 3279 (CAL).

## 2. *Brassaiopsis* Decne. & Planch.

- 1a. Leaves digitately compound : ..... 2  
 b. Leaves palmately compound : ..... 3  
 2a. Plants profusely prickly; prickles sharp;  
 leaves 3-9 foliolate; leaflets sharply serrate ..... 1. *B. aculeata*  
 b. Plants sparsely prickly; prickles blunt;  
 leaves 5-7 foliolate; leaflets entire or  
 obscurely serrulate ..... 2. *B. glomerulata*  
 3a. Leaflets serrulate, under surface glabrous;  
 fruits globose, sub-didymous ..... 3. *B. hainla*  
 b. Leaflets entire, under surface furfuraceous;  
 fruits ellipsoid or turbinate ..... 4. *B. polyacantha*

**1. *Brassaiopsis aculeata*** (Buch-Ham. ex D. Don) Seem. in J. Bot. 2 : 293. 1864; C. B. Clarke in Hook., f., Fl. Brit. India 2 : 738. 1879; Kanjilal *et al.*, Fl. Assam 2 : 339. 1938; Deb in Bull. Bot. Surv. India 3 : 273. 1961. *Hedera aculeata* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 187. 1825. Fig. 64

Small prickly trees, armed with sharp, stout prickles; young branches rusty brown tomentose. Leaflets obovate-lanceolate, acuminate, attenuate at base, serrate; subsessile, profusely covered with bristles and stellate hairs. Umbels solitary or racemed, paniced. Flowers yellowish-green; bracteoles clustered, minute, hispidate.

*Fl. & Fr.* : January-June.

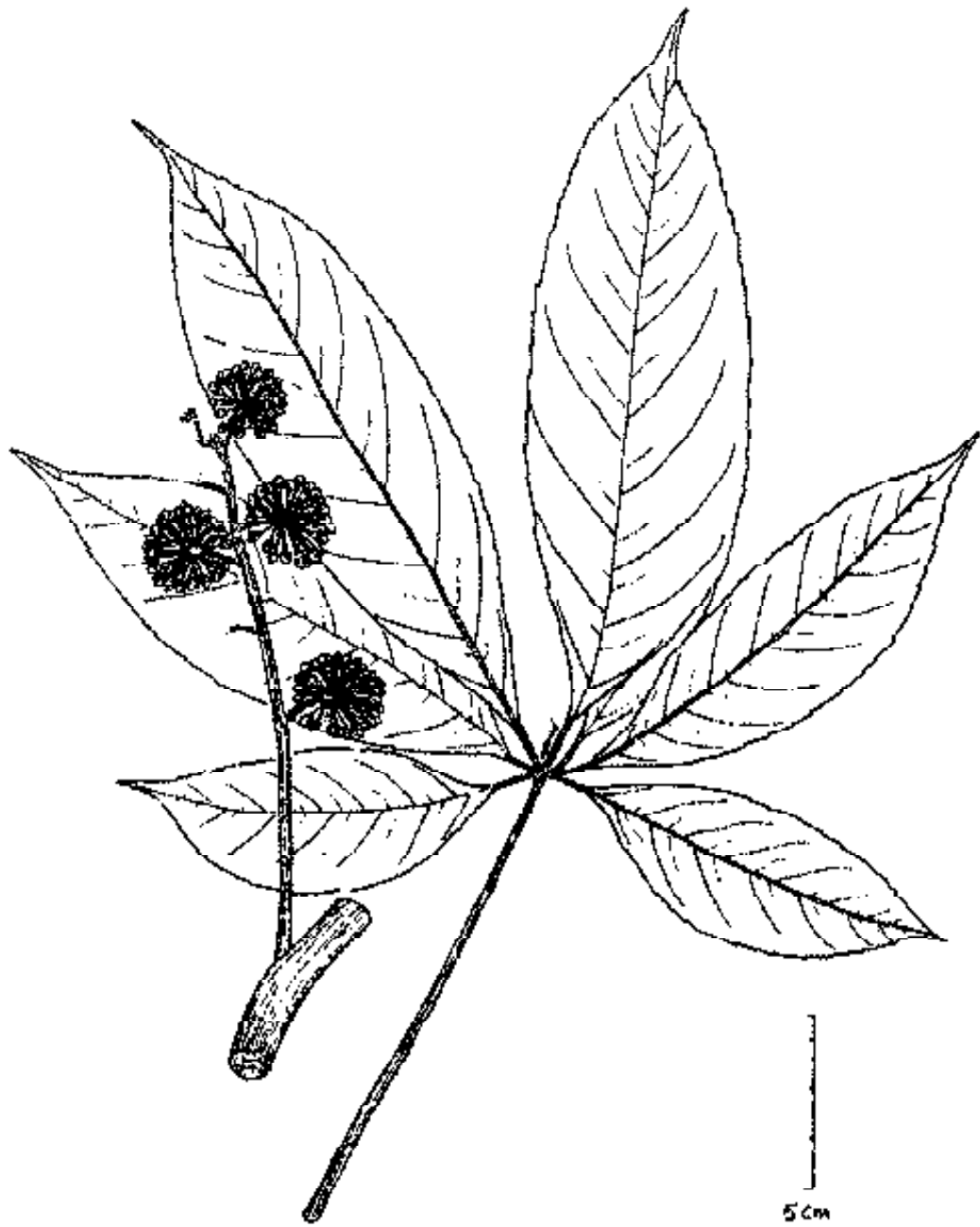


Fig. 64 : *Brassaiopsis aculeata* (Buch.-Ham. ex D. Don) Seem.  
a fruiting branch and leaf

*Specimens examined* : Mao, Deb 1868 (CAL).

**2. *Brassiopsis glomerulata* (Blume) Reql. Cartn. Fl. 12, 275, t. 411, 1863; Deb in Bull. Bot. Surv. India 3 : 273, 1961. *Aralia glomerulata* Blume, Bijdr. 872, 1826. *Brassiopsis speciosa* Decne & Planch., Rev. Hort. ser. 4, 3 : 106, 1854; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 737, 1879; Kanjilal *et al.*, Fl. Assam 2 : 358, 1938.**

Small trees, bole thin; upper parts of branches prickly; bark whitish or greenish brown grey. Leaflets elliptic-oblong, lanceolate, ovate, entire or laxly serrulate, with scattered, stellate hairs. Panicles large terminal, bracts oblong-lanceolate; umbels many flowered, racemed. Flowers white, small, tomentose. Fruits didymo globose.

*Fl. & Fr.* : February - December.

*Specimens examined* : West Manipur 1500 m, C. B. Clarke *l.c.*

**3. *Brassiopsis hainla* (Buch.-Ham. ex D. Don) Seem. in J. Bot. 2 : 292, 1864; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 735, 1879; Deb in Bull. Bot. Surv. India 3 : 271, 1961. *Hedera hainla* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 187, 1825.**

Small trees; branches distantly prickled, young parts stellate tomentose. Leaves truncate-cordate at base, palmately divided, subspinose, serrulate. Umbels in large, compound, panicles; bracts small, ovate, densely stellate tomentose, persistent.

*Fl. & Fr.* : February - October.

*Specimens examined* : Mao, Deb 1530; Koupru, Deb 1832 (CAL).

**4. *Brassiopsis polyacantha* (Wallich) R. N. Banerjee in Ind. For. 93 : 341, 1967; Philipson in van Steenis, Fl. Males. 9 (1) : 93, 1979. *Hedera polyacantha* Wallich, Fl. Asiat. Rat. 2 : 82, t. 190, 1831. *Brassiopsis palmata* (Roxb.) Kurz in J. Asiat. Soc. Bengal 39 (2) : 77, 1870; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 735, 1879; Kanjilal *et al.*, Fl. Assam 2 : 360, 1938; Deb in Bull. Bot. Surv. India 3 : 273, 1961. *Pseudobrassiopsis polyacantha* (Wallich) R. N. Banerjee in J. Bombay Nat. Hist. Soc. 72 : 72, 1975.**

Small, sparsely branched, prickly trees; young petioles, lower surface of leaves and inflorescence tomentose. Leaves palmatifid, segments elliptic-lanceolate, entire. Panicles large; bracts subulate, deciduous; umbels racemosely arranged, bracteoles pubescent; calyx tomentose.

*Fl. & Fr.* : September - April.

*Specimens examined* : Kangla, Deb 1414 (CAL).

### 3. *Eleutherococcus* Maxim.

***Eleutherococcus trifoliatus* (L.) Hu in J. Arn. Arb. 61 : 110, 1980. *Zanthoxylum trifoliatum* L., Sp. Pl. 270, 1753. *Acanthopanax trifoliatum* (L.) Merr. in Philipp. J. Sci. 1 : 217, 1906; Deb in Bull. Bot. Surv. India 3 : 272, 1961. *A. aculeatum* (Ait.) Seem :**

C. B. Clarke in Hook. f., Fl. Brit. India 2 : 726. 1879; Kanjilal *et al.*, Fl. Assam 2 : 357. 1938.

Mani.: Kosa.

Prickly, glabrous, straggling shrubs or small trees; branches angulate, spines short; broad based, often deflexed. Leaves digitate, 3 - 5 foliolate, leaflets oblanceolate or lanceolate-elliptic, denticulate, rarely with few stiff hairs on nerves beneath. Flowers in globose, usually solitary, axillary or terminal umbels, umbels panicled; bracts concave acute; bracteoles numerous; sepals and petals 5. Fruits compressed, styles persistent.

Fl. & Fr. : October - February.

Specimens examined : Meebold 6242; 6556; Mukerjee 3251 (CAL).

#### 4. *Hedera* L.

*Hedera nepalensis* K. Koch., H. Dendr. 284, t. 75. 1853; Kanjilal *et al.*, Fl. Assam 2 : 355. 1938; Deb in Bull. Bot. Surv. India 3 : 273. 1961. *Hedera helix* auct. non L. ; Roxb., Fl. Ind. 2 : 515. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 739. 1879. Fig. 65

Large scandent shrubs, up to 20 m high, climbing on trees or rocks with numerous aerial rootlets; bark more or less white-pale brown. Leaves simple, polymorphic, elliptic-lanceolate to ovate-ellipsoid, 5 - 12 cm long, highly variable in breadth, acute or caudate-acuminate, cuneate at base; stipules absent. Flowers in terminal pedunculate, globose umbels or in sub-corymbose panicles, 0.4 - 1.5 cm across, polygamous, pale-green; calyx more or less truncate or slightly dentate; petals valvate with a ridge in the centre. Fruits globose, 0.5 - 0.8 cm across, yellow, shining when ripe.

Fl. & Fr. : October - January.

Specimens examined : Koupru, Mukerjee 3622; Deb 1534; Sirohee, Deb 1811 (CAL).

#### 5. *Helwingia* Willd. *nom. cons.*

*Helwingia himalaica* Hook. f. & Thomson ex C. B. Clarke in Hook. f., Fl. Brit. India 2 : 726. 1879; Kanjilal *et al.*, Fl. Assam 2 : 372. 1938; Hara in Fl. E. Himal. 232, 645. t. 4a. 1966. *H. himalaica* var. *lanceolata* G. Watt ex Das ; Deb in Bull. Bot. Surv. India 3 : 273. 1961.

Glabrous undershrubs; stem branched, lignose. Leaves simple, lanceolate or ovate-lanceolate, 1.5 - 3 × 5 - 8 cm; phyllodes oblong-spathulate. Flowers minute, in sessile umbels on the midrib of phyllodes. Fruits sessile, 1 - 3 on same phyllode, 0.6 - 1 cm long, ellipsoid, red.

Fl. & Fr. : April - September.

Specimens examined : Sirohee furar, G. Watt 6465 (CAL).



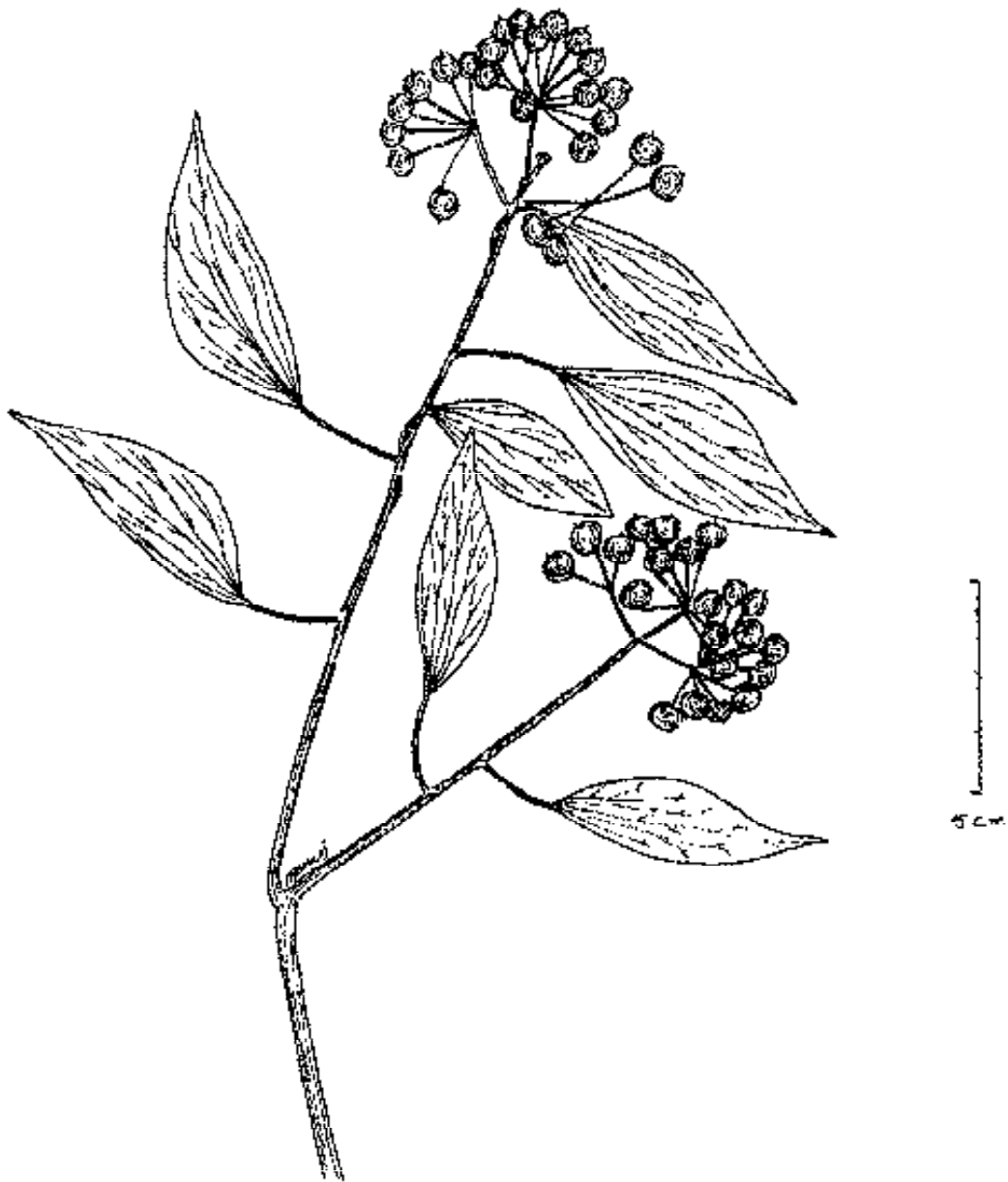


Fig. 65 : A fruiting twig of *Hedera nepalensis* K. Koch.

6. *Macropanax* Miq.

- 1a. Small trees or subscandent large shrubs; bark grey, warty; leaflets denticulate or serrulate; panicles rusty stellate tomentose; bracts deciduous; calyx tube campanulate ..... 1. *M. dispersum*
- b. Trees up to 15 m; bark pale white or greenish grey, smooth; leaflets entire or distantly finely dentate; panicles glabrous; bracts absent or caducous; calyx tube infundibulate ..... 2. *M. undulatus*

1. *Macropanax dispersum* (Blume) O. Kuntze, Rev. Gen. Pl 1 : 271. 1891; Balakr., Fl. Jowai 1 : 226. 1981. *Aralia dispersa* Blume, Bijdr. 872. 1826. *Macropanax areophilus* Miq., Fl. Ind. Bat. 1 : 764. 1855; C. B. Clarke in Hook. f. Fl. Brit. India 2 : 738. 1879; Kanjilal *et al.*, Fl. Assam 2 : 362. 1938; Deb in Bull. Bot. Surv. India 3 : 273. 1961.

Asm. : Pani Kesuri.

Small trees or large subscandent shrubs; blaze yellowish-brown, aromatic, branches with lenticellate projections. Leaves digitate, 3 - 5 foliolate; leaflets 7 - 15 × 2.5 - 8.0 cm, narrowly lanceolate or obovate to oblanceolate, base obtuse to acute, glabrous or glabrescent, denticulate or serrulate. Panicles rusty-stellate tomentose, terminal, 25 - 50 cm long; bracts deciduous, inconspicuous; bracteoles few deciduous. Flowers small, 0.3 - 0.5 cm across, yellowish-green. Fruits ovoid, ca 0.5 cm across.

Fl. & Fr. : August - March.

Specimens examined : Mao, Deb 1911 (CAL).

2. *Macropanax undulatus* (Wallich ex G. Don) Seem. in J. Bot. 2 : 294. 1864; C. B. Clarke in Hook. f. Fl. Brit. India 2 : 738. 1879; Kanjilal *et al.*, Fl. Assam 2 : 362. 1938; Deb in Bull. Bot. Surv. India 3 : 273. 1961, *Hedra undulata* Wallich ex G. Don., Syst. 3 : 394. 1834.

Asm. : Pani bonkeseru

Small to medium sized, evergreen trees, blaze creamy white, with pleasant mango like aroma. Leaves digitate, 3 - 5 foliolate; leaflets oblong, elliptic or oblong-lanceolate, 6 - 15 × 1.5 - 5 cm, base cuneate, sub-oblique, coriaceous, glabrous; margins entire or distantly finely dentate. Panicles glabrous, up to 30 cm; bracts caducous; bracteoles absent or caducous. Flowers minute, 0.5 - 0.6 cm across, yellowish-green. Fruits ovoid-ellipsoid, 0.5 - 1 cm across with persistent styler column.

Fl. & Fr. : June - February.

Specimens examined : West Manipur ex C. B. Clarke *s.n.*

7. *Panax* L.

- 1a. Leaflets minutely serrate with short teeth;  
styles free; fruit globose ..... 1. *P. assamica*
- b. Leaflets deeply serrate; styles united at  
the base; fruits laterally compressed ..... 2. *P. pseudo-ginseng*

1. *Panax assamica* R. N. Banerjee in Bull. Bot. Surv. India 10 : 23. 1968.

Tall, stout herbs, up to 1.5 m tall; tubers aromatic, unbranched, horizontal; stems stout, glabrous, straw coloured. Leaves whorled at the summit of the stems, exstipulate, digitate, 5-7 foliolate; leaflets broadly linear, 7-15 x 3.0 cm, base rounded, rarely attenuate, long acuminate, densely setose on veins on both surfaces, margins minutely serrate. Peduncles ca 36 cm long, glabrous, stout or whorled at the top of rachis. Umbels many flowered; flowers bisexual, greenish white. Fruits 5-lobed, globose, ca 5 mm in diam., red.

*Fl. & Fr.* : April - September.

*Specimens examined* : Ukhrul, Mukerjee 3183 (CAL).

2. *Panax pseudo-ginseng* Wallich in Trans. Med. Phys. S. Calc. 4 : 117. 1829; Deb in Bull. Bot. Surv. India 3 : 273. 1961. *Panax schinseng* var. *nepalensis* Nees, Ic. Pl. Med. 5 : t. 16, c. 1833. *Aralia pseudo-ginseng* (Wallich) Benth. ex C. B. Clarke in Hook. f., Fl. Brit. India 2 : 721. 1879; Kanjilal *et al.*, Fl. Assam 2 : 346. 1938.

Herbs or small shrubs, up to 0.7 m, with perennial, horizontal, tuberous to tuberiferous roots; stem smooth, erect, terminated in whorl of leaves. Leaves digitate, 3-5 (-9) foliate; leaflets lanceolate, 5-20 x 1-3 cm, with scattered bristles on the upper surface, acuminate or caudate, base obtuse or tapering, margins serrate or doubly serrate. Peduncles more or less glabrous, 1 (2-4), simple or with up to 5 umbellate heads. Flowers polygamo-monoecious. Fruits compressed, red or blackish red.

*Fl. & Fr.* : May - September.

*Specimens examined* : Sirohees, Mukerjee 3636 (CAL).

8. *Schefflera* J. R. & G. Forst. *nom. cons.*

- 1a. Small trees or shrubs ..... 2
- b. Medium sized, much branched tree ..... 3. *S. shweliensis*
- 2a. Trees or scandent shrubs; panicles small,  
glabrous or pubescent; bracts caducous;  
styles obscure ..... 1. *S. elliptica*
- b. Small trees; panicles large, stellate woolly;  
bracts persistent; stigmas connate into  
narrow cylindrical style ..... 2. *S. hypoleuca*

1. *Schefflera elliptica* (Blume) Harms in Engl. & Prantl., *Pflanzenfam.* 3 (8) : 39. 1894; Shang in *Candollea* 39 : 468. 1984. *Sciadophyllum ellipticum* Blume, *Bijdr.* 878. 1826. *Schefflera venulosa* (Wight & Arn.) Harms in Engl. & Prantl., l.c.; Deb in *Bull. Bot. Surv. India* 3 : 273. 1961. *Paratropia venulosa* Wight & Arn., *Prodr.* 377. 1834. *Heptapleurum venulosum* (Wight & Arn.) Seem. in *J. Bot.* 3 : 80. 1865; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 729. 1879. Fig. 66

*Asm.* : *Dhovalata & Utang.*

Large, climbing or scandent shrubs, often epiphytic; bark white or pale brown, prominently lenticellate. Leaves palmately 3 - 7- foliolate; leaflets elliptic- oblong or oblanceolate, 10 - 30 × 2.5 - 9 cm, glabrous, margins entire. Flowers yellowish green, polygamous; umbellules few flowered, arranged in much branched terminal panicles; 12 - 25 cm long; umbellules up to 2 cm long; calyx truncate; petals oblong-obovate, free or connate. Fruits globose, 0.3 - 0.8 cm across, 5- ribbed, yellow.

*Fl. & Fr.* : March - November.

*Specimens examined*: Ukhrul, *Mukerjee* 3032; Koupru, *Deb* 2250 (CAL).

2. *Schefflera hypoleuca* (Kurz) Harms in Engl. & Prantl. *Pflanzenfam.* 3 (8) : 38. 1894; Balakr., *Fl. Jowai* 1 : 223. 1981. *Hepatapleurum hypoleucum* Kurz, *For. Fl. Brit. Burma* 1 : 539. 1877; C. B. Clarke in *Hook. f., Fl. Brit. India* 2 : 728. 1879; Kanjilal *et al.*, *Fl. Assam* 2 : 350. 1938; Deb in *Bull. Bot. Surv. India* 3 : 273. 1961.

Small branched trees; bark more or less smooth, grey or brown; tender parts and inflorescence with stellate scurf. Leaves digitate, polymorphic near inflorescence, 5 - 7 foliate; leaflets with scattered stellate hairs, or glaucous beneath, oblong, or elliptic or oblong-ovate, 10 - 37 × 4 - 15 cm, acute to acuminate, margins entire or distantly serrulate, lobed or irregularly pinnatifid. Flowers whitish green, in terminal or racemed umbels, arranged in subcorymbose panicles, 25 - 60 cm long, acute, covered with stellate, glaucous hairs. Fruits globose, 5- ribbed.

*Fl. & Fr.* : October - April.

*Specimens examined* : Ukhrul, *Chauhan* 94893 (ASSAM).

3. *Schefflera shweliensis* W. W. Smith in *Kew Bull.* 1934 : 91. 1934; Kanjilal *et al.*, *Fl. Assam* 2 : 380. 1938; Deb in *Bull. Bot. Surv. India* 3 : 273. 1961.

Medium sized, much branched trees resembling clump of palms; stems 6 - 8 m high, bark dark brown, warty. Leaves digitate; leaflets oblong-elliptic or obovate, 7 - 16 × 1.5 - 5 cm; margins entire, acute to apiculate, base subacute obtuse, glaucous beneath. Flowers pale green; umbellules up to 0.6 cm in diam., arranged in branched, terminal or leaf opposed panicles, 15 - 30 cm long. Fruits globose, 0.5 - 0.6 cm in diam., 5 - 7 ribbed.

*Fl. & Fr.* : November - February.

*Specimens not seen.*

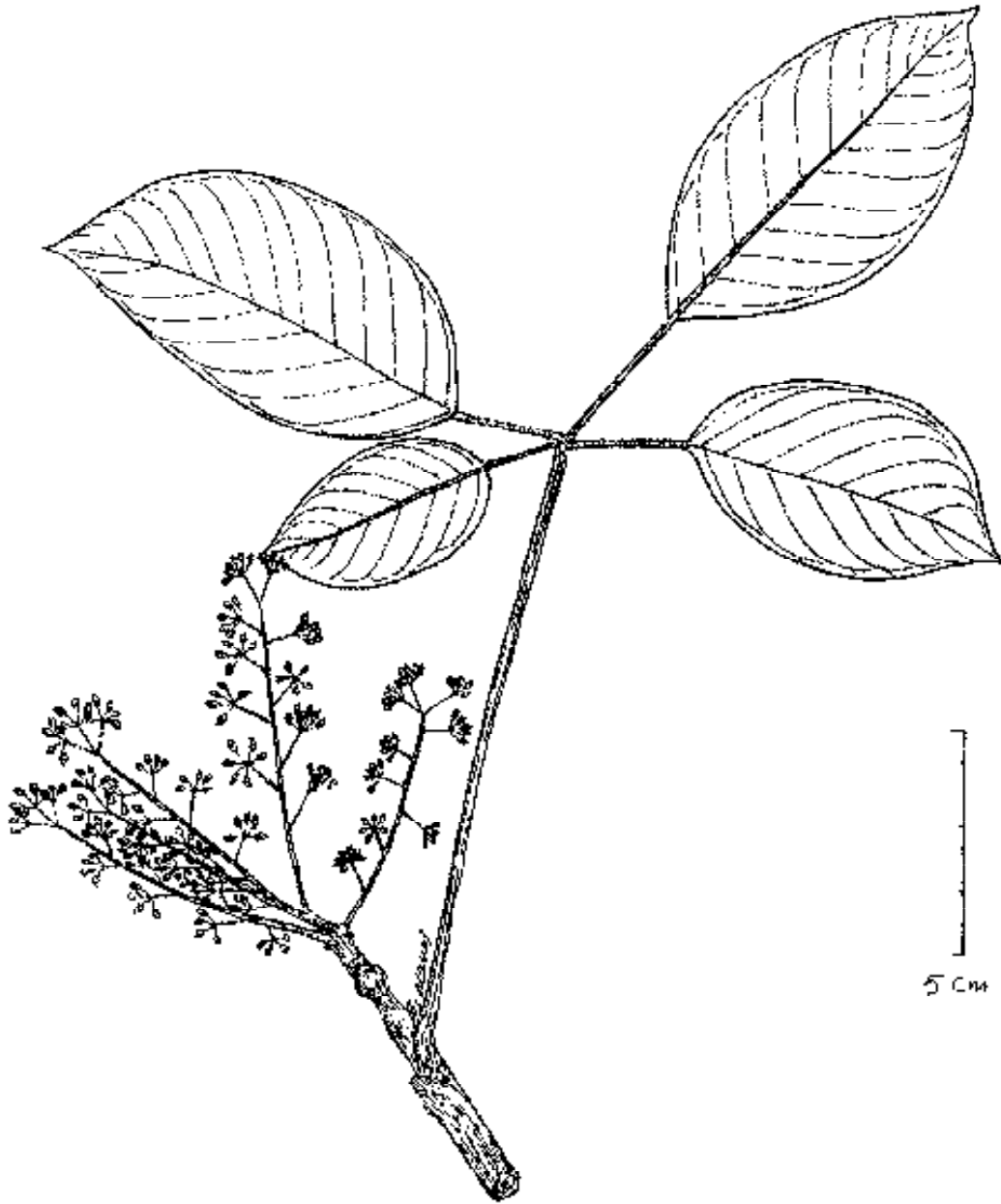


Fig. 66 : A flowering twig of *Schefflera elliptica* (Blume) Harms.

## 95. CORNACEAE

Dumortier, Anal. Fam. Pl. 33, 34, 1829 ("Cornaceae").

(A. S. Chauhan)

- 1a. Shrubs; flowers dull purple;  
ovary 1-locular; fruits berries ..... 1. *Aucuba*
- b. Trees; flowers white; ovary 2-locular;  
fruits drupes ..... 2. *Cornus*

1. *Aucuba* Thunb.

*Aucuba himalaica* Hook. f. & Thomson ex Hook. f., Ill. HIMAL. Pl. t. 12, 1855; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 747, 1879; Kanjilal *et al.*, Fl. Assam 2 : 370, 1938; Deb in Bull. Bot. Surv. India 3 : 272, 1961; Mathew in Fasc. Fl. India 19 : 21, 1988.

Shrubs up to 5 m high; branchlets dichotomous, spreading or scandent. Leaves 13-18 × 4-5 cm, lanceolate, obtuse at base, acuminate, margins dentate, glabrous above; petioles ca 2.8 cm. Panicles terminal on short lateral branches, densely pilose. Flowers dull purple, staminate; petals 4, coriaceous. Fruits berries, elliptic, 12 × 6 mm, crowned by calyx and disc, red when ripe.

*Fl. & Fr* : June - September.

*Specimens examined* : Sirohee, Chingsaw, Limatak, G. Watt 6357, 6542, 6586 respectively (CAL).

2. *Cornus* L.

- 1a. Leaves ovate to broadly ovate;  
involucral bracts 0; style apically swollen;  
fruits pubescent ..... 1. *C. macrophylla*
- b. Leaves elliptic-lanceolate;  
involucral bracts present; style linear;  
fruits glabrous ..... 2. *C. oblonga*

1. *Cornus macrophylla* Wallich in Roxb., Fl. Ind. 1 : 433, 1820; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 744, 1879; Kanjilal *et al.*, Fl. Assam 2 : 366, 1938; Deb in Bull. Bot. Surv. India 3 : 272, 1961; Mathew in Fasc. Fl. India 19 : 22, 1988. *C. controversa* Hemsley ex Prain in Bot. Mag. t. 8261 in text (June 1909); Deb in Bull. Bot. Surv. India 3 : 272, 1961. *Syda macrophylla* (Wallich) Sejak in Novit. Bot. & Del. Sem Hort. Bot. Univ. Carol. Prag. 10, 1960; Haridasan & Rao, For. Fl. Meghalaya 1 : 450, 1985.

Trees up to 14 m tall; leaf scars cushion shaped; broadly ovate, 10-14 × 4-8 cm glabrous above, glaucous below with minute appressed hairs, base often oblique, margin entire, apex long acuminate; petioles 2-2.5 cm. Panicles terminal, decussate, terminating in cymes, minutely hairy. Flowers white; calyx urceolate, white

hairy, 4 toothed; petals 4, oblong, 6 mm. pubescent outside, stamens 4; styles 4  
5 mm, apically swollen; ovary 2-locular, with 1 ovule in each locule. Drupes 2  
seeded, globose, 5-4 mm, crowned with calyx lobes and disc.

*Fl. & Fr.* : April - July.

*Specimens examined* : Khongoi valley, G. Watt. 6760; Mao, Deb 1831 (CAL).

2. *Cornus oblonga* Wallich in Roxb., Fl. Ind. 1 : 432. 1820; C. B. Clarke in Hook.  
f., Fl. Brit. India 2 : 744. 1879; Kanjilal *et al.*, Fl. Assam 2 : 366. 1938; Deb in Bull.  
Bot. Surv. India 3 : 272. 1961; Matthew in Fasc. Fl. India 19 : 23. 1988. *Swida oblonga*  
(Wallich) Sojak in Novit., Bot. Sem. Hort. Bot. Univ. Carol. Prag. 10. 1960; Haridasan  
& Rao, For. Fl. Meghalaya 1 : 450. 1985.

Trees up to 10 m tall; branchlets with reniform leaf scars. Leaves 10-12 × 3-4  
cm, elliptic-lanceolate, sub coriaceous, glabrous above, hirtellous below the  
prominent nerves; petioles 1-2 cm. Inflorescence of terminal branched cymes;  
peduncle 2-2.5 cm, striate; pedicels 3 mm; involucre bracts 2-3 mm, ovate-  
lanceolate; calyx tooth 4, minute, persistent; petals 4, 4 mm; stamens 4; filaments  
subulate, 4 mm; receptacles campanulate, hirtellous, 4 × 3 mm; style 3 mm. Drupes  
6 × 5 mm, elliptic, glabrous.

*Fl. & Fr.* : September - April.

*Specimens examined* : Sirohee, G. Watt 6141; Imphal valley. Deb 1832, 1933;  
Litan. Mukerjee 2452, 2554 (CAL).

## 96. ALANGIACEAE

A. P. de Candolle, Prodr. 3 : 203. 1828 ("Alangiac").

(A. S. Chauhan)

*Alangium* Lam., *nom. cons.*

- 1a. Branchlets hirsute with golden or brown hairs; fruits deeply grooved ..... 1. *A. barbatum*
- b. Branchlets glabrous without golden or brown hairs; fruits not grooved ..... 2. *A. chinense*

1. *Alangium barbatum* (R. Br.) Baill. ex O. Kuntze, Rev. Gen. Pl. 273. 1891;  
Kanjilal *et al.*, Fl. Assam 2 : 369. 1938; Deb in Bull. Bot. Surv. India 3 : 272. 1961;  
Matthew in Fasc. Fl. India 19 : 3. 1988. *Marlen barbata* R. Br. Names & Notes Ind.  
Pl. 1828-1849 & in R. Br., Misc. Bot. Works 3 : 534. 1867; C. B. Clarke in Hook.  
f., Fl. Brit. India 2 : 743. 1879.

Small trees up to 6 m tall, all parts shaggy with spreading long golden or  
brown hairs. Leaves ovate to obovate, oblique, 10-20 × 7-12 cm, angled or  
obscurely lobulate, membranous, acuminate, round or sub-cordate base, villous;  
lateral nerves 5-7 on either half; petioles 2.2-3 cm long. Flowers 3-15 or more  
in dichotomously branched cymes, shorter than the leaves, pedicels 2-10 mm; calyx

small, shaggy with golden hairs. Drupes 0.5 - 0.7 cm long, ovoid, one seeded, slightly striate, thinly pubescent.

*Fl. & Fr.* : June - March.

*Specimens examined* : Chingmairong, Deb 738 (CAL).

2. *Alangium chinense* (Lour.) Harms in Ber. Deutsch. Bot. Ges. 15 : 24. 1879; Deb in Bull. Bot. Surv. India 3 : 272. 1961; Mathew in Fasc. Fl. India 19 : 3. 1988; *Stylidium chinense* Lour., Fl. Cochinch. 220. 1790. *Marlea begoniaefolia* Roxb., Pl. Cor. 3 : 80, t. 203. 1819. *Alangium begoniaefolia* (Roxb.) Kanjilal *et al.*, Fl. Assam 2 : 368. 1938. Fig. 67

Small trees up to 20 m high; bark grey warty, branches horizontally spreading. Leaves 7 - 12 × 5 - 8 cm, alternate, ovate, ovate-orbicular, acuminate, base oblique, truncate, cuneate or cordate, angled or lobed, dark green above, pale beneath, 3 - 7 nerved from base, glabrous above, pubescent along nerves beneath; petioles grooved. Flowers white, 1.3 - 2.5 cm long, narrow, oblong in bud, in axillary dichotomously branched peduncled cymes; calyx minutely toothed, covered with long scattered hairs. Drupe 0.8 - 0.6 cm, ovoid, dark purple when ripe, slightly ribbed, 2-seeded.

*Fl. & Fr.* : July - October.

*Specimens examined* : Imphal, Deb 402; Ukhrul, Mukerjee 2923 (CAL).

## 97. NYSSACEAE

Dumortier, Anal. Fam., Pl. 13. 1839.

(A. S. Chauhan)

### 1. *Nyssa* Gronov. ex L.

*Nyssa javanica* (Blume) Wang. in Pflanzreich 41 : 15. 1909; Wasscher in Van Steenis, Fl. Males. 4 : 29. 1951; Deb in Bull. Bot. Surv. India 3 : 272. 1961; Mathew in Fasc. Fl. India 19 : 234. 1988; *Agathisanthes javanica* Blume, Bijdr. 644. 1825. *Nyssa sessiliflora* Hook. f. & Thomson, Gen. Pl. 1 : 952. 1867; C. B. Clarke in Hook. f., Fl. Brit. India 2 : 747. 1879.

Tall trees up to 40 m high. Leaves 9 - 17 × 3 - 8 cm, oblong lanceolate to ovate, acute at base, acuminate; petioles ca 5 cm, slightly sulcate. Flowers in axillary capitula; bracteoles 2 × 1 mm, connate half way, broadly ovate, ciliate; calyx 5-toothed; petals 5 × 1 mm, broadly ovate, reflexed; stamens 10, anthers elliptic. Drupes 1 × 0.5 cm, ellipsoid, greenish-yellow, later turns purple.

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

*Specimens examined* : West Manipur. Kaith l.c.



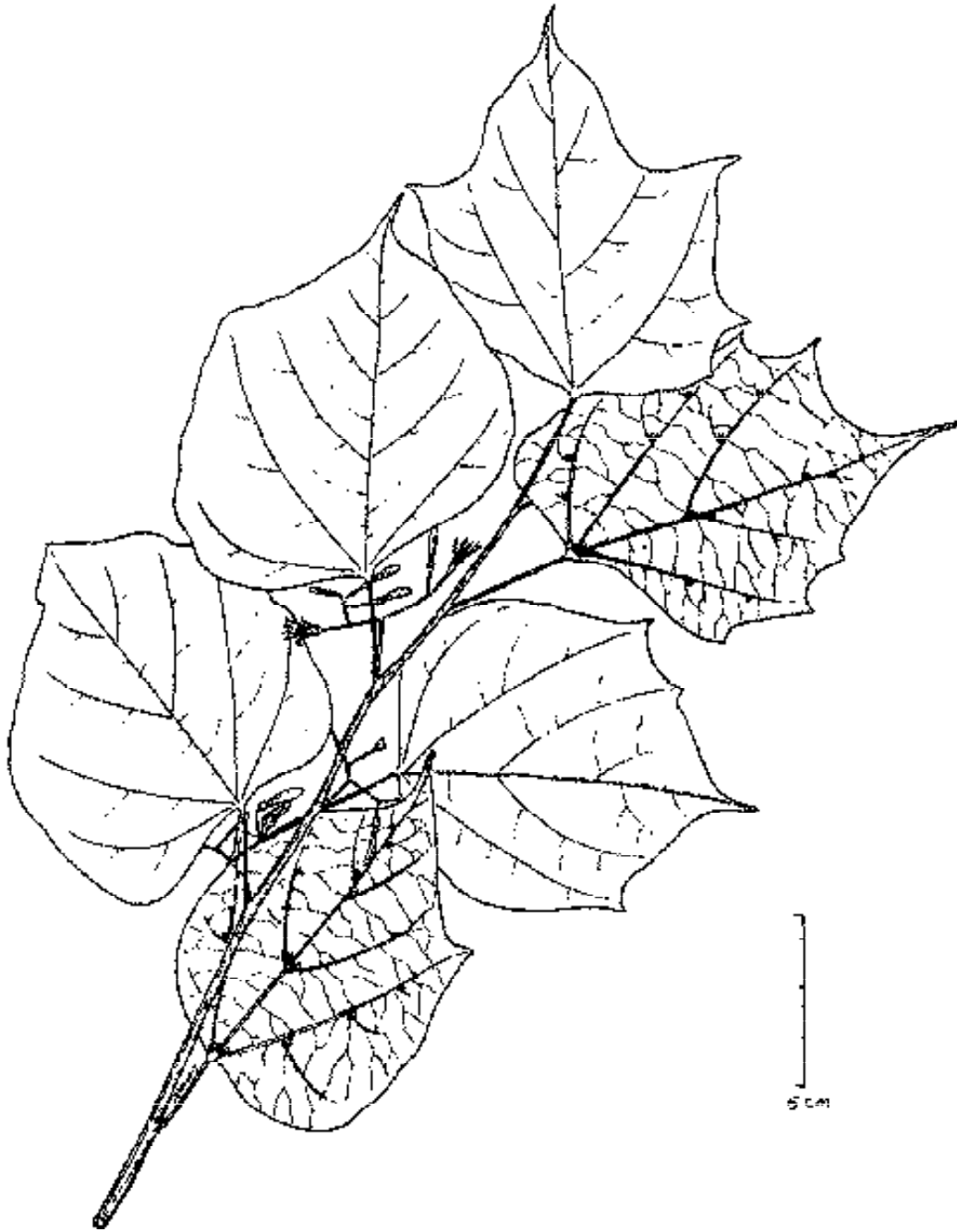


Fig. 67 : A flowering twig of *Alangium chinense* (Lour.) Harms

## 98. CAPRIFOLIACEAE

Adans. Fam. 2 : 133. 1763 ("Caprifolia").

(A. S. Chauhan)

- 1a. Leaves compound; ovary 3-5 celled ..... 2. *Sambucus*  
 b. Leaves simple; ovary 1-3 celled ..... 2  
 2a. Climbers or shrubs; flowers zygomorphic;  
 fruits many seeded ..... 1. *Lonicera*  
 b. Trees or shrubs; flowers  
 actinomorphic; fruits 1-seeded ..... 3. *Viburnum*

1. *Lonicera* L.

- 1a. Branches glabrous; corolla tube  
 ca 1.3 cm long, glabrous ..... 1. *L. glabrata*  
 b. Branches silky villous; corolla tube  
 ca 2 cm long, hirsute ..... 2. *L. macrantha*

*Lonicera glabrata* Wallich in Roxb., Fl. Ind. 2 : 175. 1824; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 10. 1880; Kanjilal *et al.*, Fl. Assam 3 : 8. 1939; Deb in Bull. Bot. Surv. India 3 : 273. 1961 & Fl. Tripura 1 : 199. 1981.

Scandent shrubs; branches glabrous. Leaves 7-8.5 × 2.5-3.5 cm, ovate, cordate, acute, coriaceous, glabrous above, villous on nerves beneath. Flowers in short spikes or panicles; calyx teeth ca 2 mm long, lanceolate; corolla tube 1.3 cm long, pubescent within; styles glabrous or sparsely hairy.

Fl. & Fr. : April-October.

Specimens examined : Imphal, Deb 214 (CAL).

2. *Lonicera macrantha* (D. Don) Spreng., Syst. Veg. 4 (2) : 82. 1827; Haridasan & Rao. For. Fl. Meghalaya 2 : 545. 1987, *Caprifolium macranthum* D. Don. Prodr., Fl. Nepal. 1 : 140. 1825. *Lonicera japonica* auct. non Thunb. 1784; Wallich in Roxb. Fl. Ind. 2 : 174. 1824; Deb in Bull. Bot. Surv. India 3 : 273. 1961. *L. macrantha* (D. Don) DC., Prodr. 4 : 333. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 10. 1880; Kanjilal *et al.*, Fl. Assam 3 : 8. 1939.

Climbing shrubs; young parts silky villose. Leaves 2-7 × 1-3 cm, ovate-oblong or ovate-elliptic, cordate or sub-cordate at base, shortly acuminate or apiculate, villous beneath. Flowers 4-6 cm long, pale-yellow, yellowish-white, fragrant, in corymbose cymes; calyx teeth hairy; corolla tube ca 2 cm long, hirsute; style purplish, narrow at tip.

Fl. & Fr. : May-October.

Specimens examined : Imphal, Deb 174 (CAL).

Planted as an ornamental shrub in the gardens.

## 2. *Sambucus* L.

*Sambucus javanica* Blume, Bijdr. 657. 1826; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 2. 1888; Kanjilal *et al.*, Fl. Assam 3 : 1. 1939; Deb in Bull. Bot. Surv. India 3 : 273. 1961.

Erect shrubs or small trees, up to 5 m tall. Leaves 1 - 6 foliolate, 5 - 20 cm long; leaflets 2 - 15 × 1 - 3.5 cm, lanceolate, oblong-lanceolate or obovate, sub-cordate at base, acuminate, serrate, glabrous. Flowers ca 0.5 cm across, yellowish-white or white, in 6 - 25 cm across much branched corymbs; stamens 5, spreading. Berries ca 4 mm, globose, black when ripe.

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

*Specimens examined* : Irong, G. Watt 6904; Khongoi, G. Watt 6769 (CAL) : Irong Bank road, Malick 6904 (BSIS).

## 3. *Viburnum* L.

- |     |   |                             |
|-----|---|-----------------------------|
| 1a. | Leaves 3- nerved at base .....  | 5. <i>V. foetidum</i>       |
| b.  | Leaves penninerved .....  | 2                           |
| 2a. | Leaves oblong, tapering at both ends;<br>branches angular, red .....                                  | 1. <i>V. atrocyaneum</i>    |
| b.  | Leaves lanceolate or elliptic- lanceolate;<br>branches terete .....                                   | 3                           |
| 3a. | Leaves coarsely dentate; branches<br>horizontal .....   | 2. <i>V. colebrookianum</i> |
| b.  | Leaves serrate or remotely dentate;<br>branches not horizontal .....                                  | 4                           |
| 4a. | Leaves ovate elliptic, acute; flowers in lax<br>drooping panicles; fruits red .....                   | 4. <i>V. erubescens</i>     |
| b.  | Leaves ovate lanceolate, long acuminate;<br>flowers in terminal corymbs;<br>fruits bluish black ..... | 3. <i>V. cylindricum</i>    |

1. *Viburnum atrocyaneum* C. B. Clarke in Hook. f., Fl. Brit. India 3 : 7. 1880; Deb in Bull. Bot. Surv. India 3 : 273. 1961.

Erect, evergreen shrubs; branches angular, red, glabrous. Leaves 6 - 8 × 1 - 3 cm, oblong, tapering at both ends, acute, obscurely dentate, glabrous. Flowers small, in terminal umbellate cymes. Drupes ca 0.5 cm, ellipsoid, compressed, glabrous, blue.

*Fl. & Fr.* : May - August.

*Specimens examined* : Sirohee, G. Watt 5978 & 6430 (CAL).

2. *Viburnum colebrookianum* Wallich ex DC., Prodr. 4 : 325. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 5. 1880; Kanjilal *et al.*, Fl. Assam 3 : 4. 1939; Deb in Bull. Bot. Surv. India 3 : 273. 1961; Haridasan & Rao, For. Fl. Meghalaya 2 : 456. 1987.

Large spreading shrubs or small trees, with horizontal branches; young shoots stellate pubescent. Leaves 8-20 × 3-6 cm, elliptic-oblong, oblong-lanceolate or broadly elliptic, narrowed or obtuse at base, acuminate. Flowers ca 3 mm across, greenish-white, in 3-5 cm across axillary umbels; petals oblong ovoid, spreading. Drupes ca 6 mm, ellipsoid, orbicular.

*Fl. & Fr.* : February - August.

*Specimens examined* : West Manipur, C. B. Clarke *l.c.*

**3. *Viburnum cylindricum*** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 142. 1825; Hara in Hara *et al.* Enum. Fl. Pl. Nepal 2 : 198. 1979. *V. coriaceum* Blume, Bijdr. 656. 1826; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 5. 1880; Kanjilal *et al.*, Fl. Assam 3 : 4. 1939; Deb in Bull. Bot. Surv. India 3 : 274. 1961.

Large shrubs or small trees, up to 12 m tall. Leaves 5-20 × 3-8 cm, ovate to lanceolate, acute or rounded at base, long acuminate, remotely dentate, glabrous above, pubescent on the nerves beneath. Flowers ca 0.8 cm across, creamy-white or pale-purplish, in 4-8 cm across, thinly pubescent terminal corymbs; corolla lobes erect, purplish-white. Drupes ca 0.5 cm long, ellipsoid, bluish-black when ripe.

*Fl. & Fr.* : July - December.

*Specimens examined* : Jiribam, Meebold 6690; Ukhrul, Mukerjee 3213 (CAL); Ukhrul, Chauhan 94896 & 94929; Churachandpur, Chauhan 94971 (ASSAM).

**4. *Viburnum erubescens*** Wallich ex DC., Prodr. 4 : 329. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 7. 1880; Deb in Bull. Bot. Surv. India 3 : 274. 1961.

Tall deciduous shrubs, up to 4 m high. Leaves 6-8 × 2.5-3 cm, ovate-elliptic or elliptic-oblong, obtuse at base, acute, sharply serrate, glabrous above, pilose on nerves beneath. Flowers white or creamy-white, in lax drooping panicles; corolla tube slender, 5 mm long, lobes short, spreading. Drupes ca 0.6 cm across, ellipsoid, globose, red.

*Fl. & Fr.* : May - August.

*Specimens examined* : Chingsaw, G. Watt 6560 (CAL).

**5. *Viburnum foetidum*** Wallich, Pl. Asiat. Rar. 1 : 49. t. 61. 1830; C. B. Clarke in Hook. f., Fl. Brit. India 3 : 4. 1880; Kanjilal *et al.*, Fl. Assam 3 : 3. 1939; Balakr., Fl. Jowai 1 : 28. 1981.

Shrubs, up to 3-5 m tall; young parts densely pubescent. Leaves 2-8 × 1-3 cm, rhomboid-ovate, elliptic-lanceolate, rounded or truncate at base, acute-mucronate, distantly denticulate, glabrous above, hairy on nerves beneath; lateral nerves 3-4 pairs. Flowers ca 0.2 cm across, white, in 3-7 cm across sub-corymbs; corolla rotate, white. Drupes ca 0.5 cm long, ellipsoid, dark-red; seeds 3 grooved.

*Fl. & Fr.* : May - November.

*Specimens examined* : Imphal, Deb 392 (CAL).

**99. RUBIACEAE**

A. L. Juss., Gen. Pl. 196. 1789.

(A. S. Chauthan, P. Chakraborty & D.K. Singh)

1a.	Inflorescence a dense, globose head; trees or large shrubs .....	2
b.	Inflorescence not heads; if heads then herbs or under shrubs up to 1 m high .....	3
2a.	Climbers with hooked peduncles; flowers ebracteolate; seeds winged .....	34. <i>Uncaria</i>
b.	Trees or erect shrubs, without hooks; flowers bracteolate; seeds not winged, if winged then trees .....	4
3a.	Flowers with one sepal enlarged, petaloid .....	15. <i>Mussaenda</i>
b.	Flowers all uniform; sepals not petaloid .....	8
4a.	Shrubs; flowers white, less than 20 in each head .....	14. <i>Morinda</i>
b.	Trees, flowers not white, more than 25 in each head .....	5
5a.	Corolla valvate in bud .....	6
b.	Corolla imbricate in bud .....	7
6a.	Calyx tube angular; corolla lobes distinct, throat glabrous; seeds winged .....	20. <i>Neonauclea</i>
b.	Calyx tube not angular; corolla lobes obscure or absent, throat hairy or villous, seeds not winged .....	13. <i>Mitragyna</i>
7a.	Ovules one in each cell, seeds winged .....	3. <i>Cephalanthus</i>
b.	Ovules more than two in each cell; seeds not winged .....	19. <i>Neolamarekia</i>
8a.	Twining or climbers .....	9
b.	Erect herbs or shrubs .....	10
9a.	Scabrid herbs or climbers .....	28. <i>Rubia</i>
b.	Twining shrubs .....	22. <i>Paederia</i>
10a.	Ovules one in each cell .....	11
b.	Ovules more than one in each cell .....	12
11a.	Plants strictly herbaceous .....	13
b.	Plants woody shrubs .....	15
12a.	Corolla lobes twisted in bud .....	22
b.	Corolla lobes valvate in bud .....	23
13a.	Fruits dehiscent .....	31. <i>Spermacoce</i>
b.	Fruits indehiscent .....	14
14a.	Leaves opposite; calyx with 4 teeth .....	10. <i>Knoxia</i>

- b. Leaves usually whorled; calyx teeth absent ..... 6. *Galium*
- 15a. Corolla tube twisted in bud ..... 16
- b. Corolla tube valvate in bud ..... 18
- 16a. Branches compressed; corolla lobes  
4- 7; anthers 4- 7, sessile ..... 4. *Coffea*
- b. Branches terete; corolla lobes 4;  
anthers 4, usually filamentous ..... 17
- 17a. Stipules coriaceous; ovules  
attached to septum ..... 9. *Ixora*
- b. Stipules membranous; ovules  
attached to prominent placenta ..... 23. *Pavetta*
- 18a. Erect foetid shrubs ..... 19
- b. Non-foetid liana small trees ..... 21
- 19a. Corolla throat glabrous; ovary  
5-celled; fruits a capsule ..... 12. *Leptodermis*
- b. Corolla throat villous; fruits  
a drupe ..... 20
- 20a. Calyx tube short, 3- 7 toothed; ovary  
4- 9 celled, fruits with 3- 9 pyrene ..... 11. *Lasianthus*
- b. Calyx tube obconic, 4- 6 lobed;  
ovary 2- celled; fruits with 1- 2 pyrens ..... 29. *Saprosma*
- 21a. Leaves always opposite ; inflorescence  
axillary fascicles or small cymes ..... 1. *Canthium*
- b. Leaves opposite or whorled; inflorescence  
terminal, corymbose or paniced ..... 26. *Psychotria*
- 22a. Fruits capsular, dehiscent ..... 35. *Wendlandia*
- b. Fruits berry, indehiscent ..... 24
- 23a. Fruits dry, capsular, dehiscent ..... 28
- b. Fruits fleshy, drupaceous or  
baccate indehiscent ..... 29
- 24a. Inflorescence terminal, styles hairy ..... 33. *Tarenna*
- b. Inflorescence axillary, styles usually glabrous,  
pubescent ..... 25
- 25a. Ovary 1 celled; ovules 2- 6 in each cell ..... 7. *Gardenia*
- b. Ovary 2 celled; ovules 2-many in each cell ..... 26
- 26a. Armed trees, flowers solitary or  
together; berries many seeded ..... 2. *Catunaregam*
- b. Unarmed trees; flowers many in spikes  
or panicles; berries 2 many seeded ..... 27
- 27a. Flowers small in axillary spikes; corolla funnel  
shaped; berries 2- 8 seeded ..... 24. *Petunga*

- b. Flowers in paniced cymes; corolla silver shaped; berries many seeded ..... 27. *Randia*
- 28a. Leaves crenate, serrate or undulate; stamens 2 only ..... 30. *Silvianthus*
- b. Leaves entire; stamens 4-5 ..... 30.
- 29a. Plants herbaceous weak ..... 5. *Dentella*
- b. Plants stout herbs, under-shrubs or shrubs ..... 32.
- 30a. Fruits didymously obovate, with 2 compressed, spreading lobes; dehiscing from top to base ..... 21. *Ophiorrhiza*
- b. Fruits oblong, subglobose or orbicular; loculicidally dehiscent ..... 31.
- 31a. Cells 1 few seeded; seeds plano-convex ..... 18. *Neanotis*
- b. Cells many seeded; seeds minute angled ..... 32. *Spiradiclis*
- 32a. Stipules free or combined in bristly sheath ..... 8. *Hedyotis*
- b. Stipules always free ..... 33.
- 33a. Stipules 3-fid ..... 25. *Polysolenia*
- b. Stipules entire ..... 34.
- 34a. Corolla throat villous; inflorescence condensed corymbose cymes ..... 17. *Myrianeuron*
- b. Corolla throat glabrous; inflorescence paniced, zig-zag branched, trichotomous cymes ..... 16. *Mycetia*.

**1. *Canthium* Lam.**

*Canthium angustifolium* Roxb., Fl. Ind. 2 : 169, 1824; Hook. f., Fl. Brit. India 3 : 135, 1880; Kanjilal *et al.*, Fl. Assam 3 : 66, 1940; Deb in Bull. Bot. Surv. India 3 : 310, 1961.

Scandent or straggling shrubs, sparsely spiny. Leaves 3-15 × 1-5 cm, ovate lanceolate or oblong-lanceolate, rounded or acute at base, acuminate; lateral nerves 4-6 on each side. Flowers 5-merous, yellow or dull-white, in axillary or supra axillary spikes; calyx turbinate; corolla spreading, twisted. Fruits ca 6 mm, orbicular, compressed; pyrenes wrinkled or tubercled.

*Fl. & Fr.* : March - October.

*Specimens examined* : s. loc Deb 1498 & 2143.

**2. *Catunaregam* Adans. ex Wolf.**

- 1a. Shrubs or trees; flowers solitary or 2-3 together, pale greenish yellow; corolla covered with silky hairs ..... 1. *C. spinosa*

- b. Shrubs with short spines; flowers  
solitary, white; corolla glabrous ..... 2. *C. uliginosa*

1. *Catunaregam spinosa* (Thunb.) Tirvengadam in Taxon 27 : 515. 1978; Verdc. in Kew Bull. 36 : 503. 1981. *Gardenia spinosa* Thunb., Diss. Gard. n. 7, t. 2, f. 4. 1780. *Randia dumetorum* (Retz.) Poiret in Lam. Encycl. Suppl. 2 : 829. 1812; Hook. f., Fl. Brit. India 3 : 110. 1880; Kanjilal *et al.*, Fl. Assam 3 : 59. 1939. *Xeromphis spinosa* (Thunb.) Keay in Bull. Jard. Bot. Brux. 28 : 37. 1958; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Large deciduous shrubs or small trees, up to 10 m high. Leaves 2-7 × 1-3 cm, elliptic, obovate to oblanceolate-obovate-spathulate, coriaceous, lateral nerves 5-7 on each side. Flowers ca 1.6 cm long, pale greenish-yellow, solitary or 2-3 together on short lateral branchlets, fragrant; calyx campanulate; corolla spreading, covered with silky hairs. Berries ca 3.2 cm across, globose or ovoid, glabrous; seeds compressed, embedded in pulp.

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

*Specimens examined* : Lango! Hill, Deb 2101 (CAL).

2. *Catunaregam uliginosa* (Retz.) Sivarajan, Fl. Calicut 132. 1982. *Gardenia uliginosa* Retz., Obs. 2 : 14. 1781. *Randia uliginosa* (Retz.) Poiret in Lam., Encycl. Suppl. 2 : 829. 1811; Hook. f., Fl. Brit. India 3 : 110. 1880. *Xeromphis uliginosa* (Retz.) Mahesh. in Bull. Bot. Surv. India 3 : 92. 1961.

Shrubs with short spines; branches quadrangular. Leaves 12 × 7 cm, elliptic or oblanceolate, obtuse, glabrous. Flowers solitary, 3-4 cm across, white; corolla lobes broadly orbicular, glabrous. Berries many seeded; seeds embedded in pulp.

*Fl. & Fr.* : March - October.

*Specimens examined* : Siroheo, G. Watt 6141; Imphal valley, Deb 1832, 1933; Litan, Mukerjee 2452, 2554 (CAL); Chandel, Chauhan 94934 (ASSAM).

### 3. *Cephalanthus* L.

*Cephalanthus tetrandra* (Roxb.) Ridsdale & Bakh. f. in Blumea 23 : 182. 1976. *Nauclea tetrandra* Roxb., Fl. Ind. 2 : 125. 1824. *Cephalanthus naucleoides* DC., Prodr. 539. 1830; Hook. f., Fl. Brit. India 3 : 24. 1880. *C. occidentalis* non L. 1753; Kanjilal *et al.*, Fl. Assam 3 : 17. 1939; Deb in Bull. Bot. Surv. India 3 : 310. 1961.

An evergreen shrubs or small trees, ca 5 m tall. Leaves 8-16 × 2.5-5 cm, ovate or ovate-lanceolate, rounded or narrowed at the base, Heads globose, receptacle pubescent. Flowers small, sessile, white, fragrant; calyx campanulate woolly inside; corolla lobes 4-5, with a black gland between each at the base; stamens 4, on the mouth of corolla; anthers bicuspidate. Fruits compressed; seeds winged arilate.

*Fl. & Fr.* : March - January.

*Specimens examined* : West & Central Manipur, Meebold 10819; *s. loc.* Deb 2166 (CAL).



4. *Coffea* L.

- 1a. Plants deciduous ..... 2. *C. benghalensis*  
 b. Plants evergreen ..... 2.  
 2a. Erect shrubs or small trees; calyx  
 teeth truncate; fruits oblong ..... 1. *C. arabica*  
 b. Straggling shrubs; calyx teeth acute;  
 fruits globose ..... 3. *C. khasiana*

1. *Coffea arabica* L., Sp. Pl. 172. 1753; Kanjilal *et al.*, Fl. Assam 3 : 74. 1939; Deb in Bull. Bot. Surv. India 3 : 310. 1961.

Mani: *Cofi*.

Large shrubs or small trees, 10-12 m tall. Leaves bifarious, 15-30 × 8-18 cm, broadly elliptic or oblanceolate, rounded or obtuse at base, acute or acuminate, shining; stipules broadly lanceolate, cuspidate. Fascicles ca 6 cm across at each node. Flowers ca 2.5 cm long, white, fragrant; calyx truncate; corolla fragrant; infundibulate. Drupes 1.3-2.2 cm long, oblong, purple when ripe, with 2 pyrenes.

*Fl. & Fr.* : March-December.

Introduced in the state recently for cultivation.

2. *Coffea benghalensis* Heyne ex M. Roemer & Schult., Syst. Veg. 5. 200. 1819; Malick & Safui in J. Econ. Tax. Bot. 10 : 5. 1987. *C. benghalensis* Roxb., Hort. Beng. 15. 1814; Hook. f., Fl. Brit. India 3 : 153. 1880; Kanjilal *et al.*, Fl. Assam 3 : 75. 1939.

Shrubs up to 5 m tall, subscaudent. Leaves 5-15 × 1.5-6 cm, elliptic or oblong-lanceolate, caudate, acuminate, membranous; lateral nerves 10-15 on each half; stipules subulate, spinescent. Flowers 1-3, white, 2-2.5 cm long, fragrant, proteranthous. Drupes subglobose, blackish when ripe; seeds grooved.

*Fl. & Fr.* : February-November.

*Specimens examined* : Chanderpur, Malick 774; Nutan Lalpari, Malick 875 (BSIS).

3. *Coffea khasiana* Hook. f., Fl. Brit. India 3 : 154. 1880; Kanjilal *et al.*, Fl. Assam 3 : 74. 1939; Deb in Bull. Bot. Surv. India 3 : 310. 1961.

Small shrubs or small trees, branches with adpressed hairs. Leaves 8-15 × 3-5 cm, simple, opposite, elliptic-lanceolate, caudate, acuminate; lateral nerves 6-8 on each leaf; stipules subulate. Flowers ca 6 mm, orange-red, in many flowered axillary dense cymes, ca 2 cm across; calyx teeth pilose, acute; throat villous. Drupes ca 6 mm in diam., globose, red; seeds black.

*Fl. & Fr.* : January-December.

*Specimens examined* : Koupru, 1200-2100m, G. Watt. 5778 & 6185 (CAL)

### 5. *Dentella* Forst.

*Dentella repens* (L.) J. R. & G. Forst., Char. Gen. 26, t. 13, 1776; Hook. f., Fl. Brit. India 3 : 42, 1880; Deb in Bull. Bot. Surv. India 3 : 310, 1961. *Oldenlandia repens* L., Mant. Pl. 1 : 40, 1767, non Burm. f. 1768. *Hedyotis repens* Lam., Encycl. Meth. Bot. 1: 171, 1791.

Straggling weed, the stem usually rooting at the joints. Leaves 5-8 × 2-3 mm, sub-sessile, obovate, spatulate or elliptic, 1-nerved, ciliate or glabrous; stipules truncate. Flowers solitary, axillary, white; corolla 5-lobed, each lobe 2-3 toothed. Fruits small, dry, globose, 2-celled, indehiscent, densely hairy outside, many seeded.

*Fl. & Fr.* : June - December.

*Specimens examined* : s. loc. Deb. M/37 (CAL).

### 6. *Galium* L.

- 1a. Leaves 4-6 at each nodes;  
1-nerved; fruits glabrous ..... 1. *G. asperifolium*
- b. Leaves 4 at each nodes; nerves 3  
at base; fruits covered with  
hooked hairs ..... 2. *G. elegans*

1. *Galium asperifolium* Wallich in Roxb., Fl. Ind. 1 : 381, 1820; Balakr., Fl. Jowai 1 : 252, 1981. *G. mollugo* non L. 1753, *sensu* Hook. f., Fl. Brit. India 3 : 207, 1881; Kanjilal *et al.*, Fl. Assam 3 : 95, 1939; Deb in Bull. Bot. Surv. India 3 : 310, 1961.

Much branched herbs, stem 4-angled, weak prostrate or pendulous and often rooting at the nodes. Leaves 1-3 × 0.3-0.4 cm, sessile, 4-6 in whorls; lanceolate or linear-obovate, cuspidate or acuminate, narrowed at base. Peduncles 3 flowered, arranged in axillary and terminal paniced leafy cymes. Flowers ca 1 mm across, yellowish-brown. Fruits granulate, glabrous, brownish black when ripe.

*Fl. & Fr.* : June - November.

*Specimens examined* : Imphal valley, Deb 1075 & 2080 (CAL).

2. *Galium elegans* Wallich ex Roxb., Fl. Ind. 1 : 382, 1824. *G. rotundifolium auct.* non L. 1753; Hook. f., Fl. Brit. India 3 : 204, 1881; Kanjilal *et al.*, Fl. Assam 3 : 94, 1939; Deb in Bull. Bot. Surv. India 3 : 310, 1961.

Diffuse herbs. Leaves 4 in whorls, 0.6-2.5 × 0.3-1 cm, sessile, ovate or elliptic, mucronate or obtuse, base rounded, hairy. Flowers ca 2 mm across, yellowish, in terminal cymes; corolla lobes spreading. Fruits densely clothed with hooked hairs, reddish when ripe.

*Fl. & Fr.* : June - November.

*Specimens examined* : Mao 1800 m, Deb 1853 (CAL).

7. *Gardenia* Ellis *nom. cons.*

*Gardenia campanulata* Roxb., Fl. Ind. 1 : 710. 1832; Hook. f., Fl. Brit. India 3 : 118. 1880; Kanjilal *et al.*, Fl. Assam 3 : 54. 1939; Malick & Safui in J. Econ. Tax. Bot. 10 : 5. 1987.

Shrubs 4-7 m tall, armed with spinescent abortive branches. Leaves 4-8 × 1.5-3.5 cm, elliptic-ovate or oblanceolate, acute to acuminate at base, stipules triangular, caducous, acute or acuminate, membranous. Flowers dimorphic, ca 1 cm long; male flowers in fascicles; female flowers solitary; calyx urn-shaped, truncate, dilated; corolla lobes obtuse, white. Fruits ellipsoid or sub-globose, 5-angled, seeds many.

Fl. & Fr.: March-October.

Specimens examined : Jirimukh, Malick 846 (BSIS).

8. *Hedyotis* L.

- 1a. Fruits hard, indehiscent ..... 2
- b. Fruits dehiscent loculicidally or septocidally ..... 3
- 2a. Flowers in sessile axillary clusters ..... 1. *H. auricularia*
- b. Flowers in axillary short paniculate cymes ..... 4
- 3a. Fruits dehiscent septocidally ..... 8. *H. scandens*
- b. Fruits dehiscent loculicidally ..... 5
- 4a. Flowers and fruits glabrous;  
petals white ..... 5. *H. glabra*
- b. Flowers and fruits pubescent;  
petals pink or purple ..... 10. *H. vestita*
- 5a. Capsules terete; seeds minute, angular ..... 6
- b. Capsules 4-angled; seeds hardly angular ..... 9
- 6a. Flowers in corymbs or heads;  
branches 4-angled ..... 7
- b. Flowers sessile, solitary or in clusters ..... 8
- 7a. Flowers in long pedicels 2-3 in corymbs;  
capsules didymous ..... 3. *H. corymbosa*
- b. Flowers sessile, many in heads;  
capsules not didymous ..... 7. *H. pinifolia*
- 8a. Flowers solitary; calyx teeth subulate;  
capsules smooth ..... 4. *H. diffusa*
- b. Flowers 2-6 in axillary clusters;  
calyx teeth triangular, capsules hispid ..... 9. *H. verticillata*
- 9a. Flowers in racemose panicles;  
calyx lobes short triangular ..... 2. *H. biflora*
- b. Flowers in dichotomously branched cymes;  
calyx minute ..... 6. *H. ovatifolia*

1. *Hedyotis auricularia* L., Sp. Pl. 101. 1753; Hook. f., Fl. Brit. India 3 : 58. 1880; Balakr., Fl. Jowai 1 : 246. 1981; Rao & Hamadri in Ind. For. 99 : 375. 1973. *Oldenlandia auricularia* (L.) K. Schum. in Engler & Prantl. Pflanzenfam. 4 (4) : 25. 1891.

subsp. *auricularia*

Mani: *Langban-Koukha*

Bushy herbs or undershrubs up to 10 m tall; branches glabrous or hirsute especially at the nodes. Leaves 3 - 8 × 1 - 4 cm, elliptic to oblong, acute to acuminate, cuneate at base; petioles 4 - 12 mm. Inflorescence axillary cymose, dense flowered; flowers sessile, white or greenish-yellow. Capsule globose, sparsely hairy; seeds many; angular, finely reticulate.

Fl. & Fr.: June - December.

*Specimens examined* : Litan, Chauhan 94649 (ASSAM), Sripuriphal, Malick 1067; Nungba, Malick 1215 (BSIS).

2. *Hedyotis biflora* (L.) Lam. Encycl. Meth. Bot. 1 : 272. 1792. *Oldenlandia biflora* L., Sp. Pl. 119. 1753. *O. paniculata* L., Sp. Pl. ed. 2 : 1667. 1763; Hook. f., Fl. Brit. India 3 : 69. 1880, *p.p.*; Deb in Bull. Bot. Surv. India 3 : 312. 1961. *Thecagonum biflorum* (L.) Babu in Bull. Bot. Surv. India 11 : 214. 1969.

Annual herbs; 15 - 30 cm, elliptic-oblong, nerves indistinct; stipules bristly. Flowers small, white, in 3 flowered terminal panicles. Capsules ca 4 mm in diam., didymous, 4 angled.

Fl. & Fr. : March - October.

*Specimens examined* : Morch, Deb 883 (CAL).

3. *Hedyotis corymbosa* (L.) Lam., Encycl. Meth. Bot. 1 : 272. 1792; Balakr., Fl. Jowai 1 : 245. 1981. *Oldenlandia corymbosa* L., Sp. Pl. 119. 1753; Hook. f., Fl. Brit. India 3 : 64. 1880.

Herbs, 6 - 45 cm tall; stems tetragonous, glabrous or with short bristles. Leaves 10 - 30 × 1 - 5 mm, linear-lanceolate, acute at both ends; petioles ca 2 mm long. Flowers ca 4 mm, white or pale-purple, in 2 - 3 flowered fascicles; peduncles 4 - 8 mm long. Capsules ca 2 mm across, subtended by persistent calyx.

Fl. & Fr. : September - February.

*Specimens examined* : Jirimukh, Malick 815 (BSIS).

4. *Hedyotis diffusa* Willd., Sp. Pl. 1 : 566. 1797; Hara & Gould in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 202. 1979. *Oldenlandia diffusa* (Willd.) Roxb., Fl. Ind. 1 : 423. 1820; Hook. f., Fl. Brit. India 3 : 65. 1880; Kanjilal *et al.*, Fl. Assam 3 : 39. 1939; Deb in Bull. Bot. Surv. India 3 : 312. 1961.

Fig. 68

Mani: *Linnorei*

Small diffuse herbs with perennial root-stock; branches slender. Leaves sub-

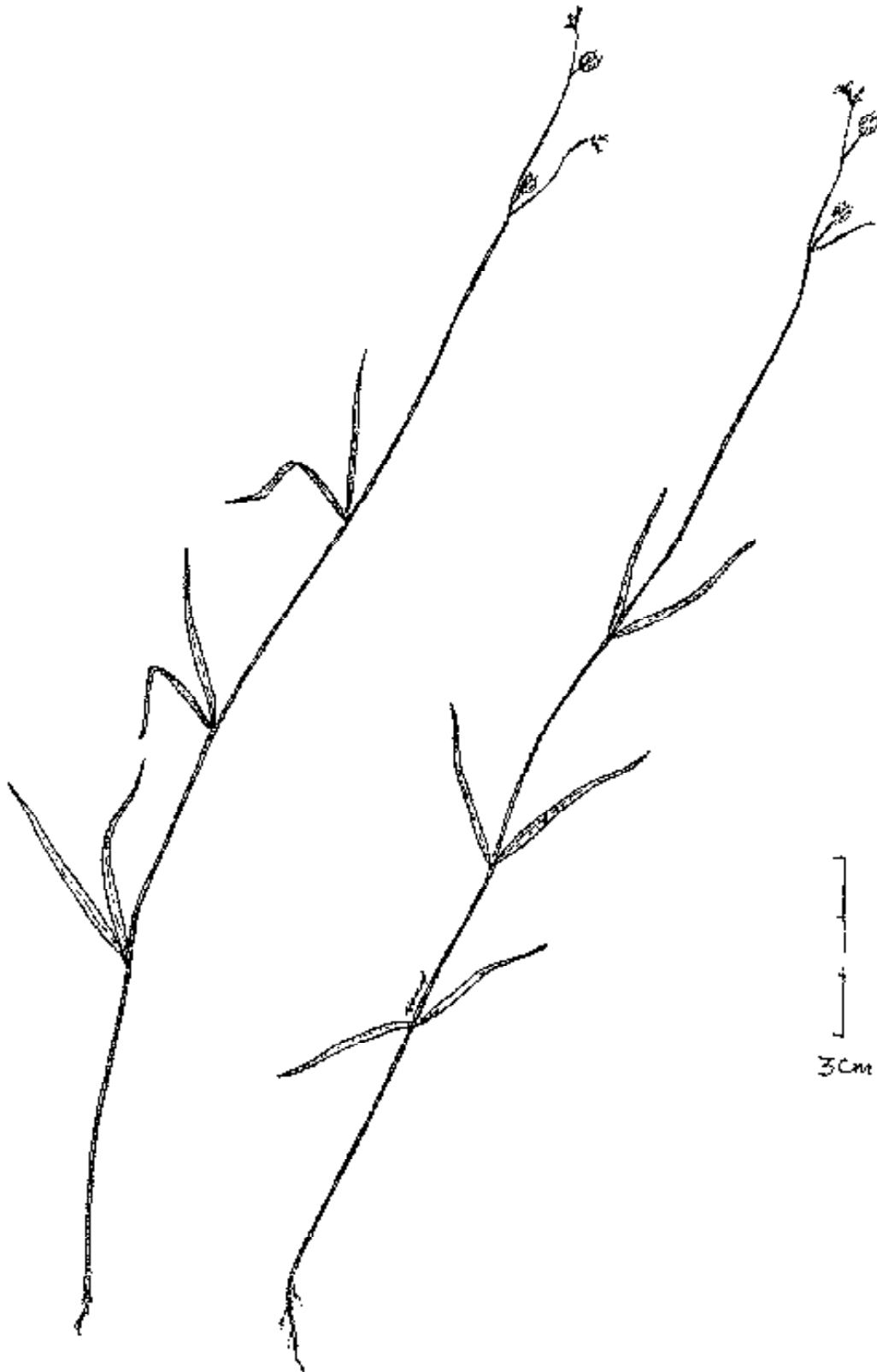


Fig. 68 : *Hedyotis diffusa* Willd. plants in fruits

sessile, linear lanceolate, margins recurved, nerveless. Flowers solitary, white; calyx finely ciliate. Capsules sub-globose, smooth; seeds angular.

*Fl. & Fr.* : June - August.

*Specimens examined* : Imphal valley, Deb 964 (CAL).

5. *Hedyotis glabra* (Roxb.) Miq., Fl. Ind. Bat 2 : 183. 1857; Hook. f., Fl. Brit. India 3 : 59, 1880; Malick & Safui in J. Econ. Tax. Bot. 10 : 5, 1987. *Spermacoce glabra* Roxb., Fl. Ind. 1 : 368, 1832.

Undershrubs, 50 - 100 cm tall; stem terete, fistular hispid on the grooves of furrows. Leaves 2 - 10 × 1.5 - 3.5 cm, ovate-lanceolate or linear-lanceolate, membranous at base, acuminate at apex; lateral nerves 5 - 7 on each side. Flowers small, white, in paniced cymes; calyx teeth 4, much shorter than the fruit; corolla tube densely hairy within, lobes 4. Capsules globose, indehiscent, seeds numerous.

*Fl. & Fr.* : August - November.

*Specimens examined* : Jirimukh, Malick 822 (BSIS).

6. *Hedyotis ovatifolia* Cav., Icon. 6 : 52, 1801; Balakr., Fl. Jowai 1 : 244, 1981. *Oldenlandia budicaulis* Roth., Nov. Pl. Sp. 95, 1921; Hook. f., Fl. Brit. India 3 : 70, 1880; Kanjilal *et al.*, Fl. Assam 3 : 39, 1939; Deb in Bull. Bot. Surv. India 3 : 312, 1961.

Herbs, 5 - 25 cm tall. Leaves 2 - 8 × 1 - 3 cm, ovate or oblong, ovate-elliptic, cuneate at base, obtuse at apex, flaccid. Flowers white or pale-purple, in corymbose panicles; calyx lobes 4, triangular, corolla lobes 4, villous at throat. Capsules ca 2 mm, laculicidally dehiscent at the top, seeds reticulate.

*Fl. & Fr.* : April - September.

*Specimens examined* : Litan, Mukerjee 3374; Seprameina, Deb 1141 (CAL).

7. *Hedyotis pinifolia* Wallich ex G. Don, Gen. Syst. 3 : 526, 1834; Hook. f., Fl. Brit. India 3 : 60, 1880; Deb in Bull. Bot. Surv. India 3 : 312, 1961.

Slender diffuse, much branched herbs, 10 - 20 cm tall, branches 4-angled. Leaves 2 - 4 cm, narrowly linear, acuminate, scabrous above, 1-nerved, margin revolute. Cymes axillary and terminal. Heads many flowered.

*Fl. & Fr.* : July - December.

*Specimens examined* : Koupru, Deb 2344 (CAL).

8. *Hedyotis scandens* Roxb. ex D. Don, Podr. Fl. Nep. 134, 1825; Hook. f., Fl. Brit. India 3 : 57, 1880; Kanjilal *et al.*, Fl. Assam 3 : 37, 1939; Deb in Bull. Bot. Surv. India 3 : 310, 1961.

Climbing or succulent undershrubs. Leaves 5 - 15 × 2 - 4 cm, elliptic or lanceolate, acute or cuneate at base; stipules truncate, purple dotted. Flowers white, in terminal trichotomous sub-corymbose panicles. Capsule globose or ovoid, 3 - 4 mm across, separating into two cocci; seeds many, reticulate, plano-convex.

- 1a. Flowers in terminal trichotomous  
sub-corymbose panicles ..... var. *scandens*
- b. Flowers in umbellate cymes ..... var. *sulcata*  
var. *scandens*

*Fl. & Fr.*: January - December.

*Specimens examined*: Chulen, 1000 m, G. Watt 5061; Imphal Malick 1352; Ainaibhat, Malick 958; Nungba, Malick 1140 (BSIS); Imphal, Chauhan 94618 (AS-SAM).

var. *sulcata* C. B. Clarke in J. Linn. Soc. 25 : 30, 1889; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

*Fl. & Fr.*: December - March.

*Specimens examined*: West Manipur 300 m. C. B. Clarke s.n.

9. *Hedyotis verticillata* (L.) Lam., Encycl. Meth. 1 : 271, 1791. *Oldenlandia verticillata* L., Mant. 1 : 40, 1767. *Hedyotis hispida* Retz. Obs. 4 : 23, 1786; Hook. f., Fl. Brit. India 3 : 60, 1880. *H. cradaegotum* Spreng., Pungill 2 : 35, 1825; Deb in Bull. Bot. Surv. India 3 : 310, 1961.

Diffuse herbs, 15 - 40 cm tall, stem terete, hispidulous with two raised stipular lines on each side. Leaves 2.5 - 7.5 × 0.6 - 1.5 cm, elliptic to linear-lanceolate, scabrid on both surfaces, recurved on the margin. Flowers 2 - 6, in axillary clusters; calyx teeth triangular, as long as capsule. Capsule ovoid, hispid.

*Fl. & Fr.*: April - September.

*Specimens examined*: Imphal Valley, Deb 220 (CAL); Imkurashar, Malick 945 (BSIS).

10. *Hedyotis vestita* G. Don, Gen. Syst. 3 : 526, 1834; Hook. f., Fl. Brit. India 3 : 58, 1880; Kanjilal *et al.*, Fl. Assam 3 : 38, 1939; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Much branched diffuse herbs; branches terete, villous. Leaves 3 - 12 × 1 - 2 cm, elliptic, lanceolate, acuminate, plaited; stipules membranous with long cilia. Flowers pink or purple in axillary paniculate cymes. Capsule small, globose, indehiscent, hairy.

*Fl. & Fr.*: June - February.

*Specimens examined*: Imphal Valley, Deb 266, 511, 848 & 2685 (CAL).

#### 9. *Ixora* L.

- 1a. Shrubs; leaves sessile, calyx teeth minute,  
shorter than ovary ..... 1. *I. coccinea*
- b. Shrubs or small trees; leaves petioled;  
calyx teeth filiform, much longer than ovary ..... 2. *I. subsessilis*

1. *Ixora coccinea* L., Sp. Pl. 110, 1753; Hook. f., Fl. Brit. India 3 : 145, 1880; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Much branched shrubs up to 2 m tall; branched glabrous. Leaves sessile, 5  $\times$  2 - 5 cm, oblong or elliptic, rounded or cordate at base, rounded or apiculate at apex. Flowers ca 3 mm long, scarlet in dense corymbose terminal cymes; calyx subulate, shorter than the ovary; corolla lobes broadly ovate. Berries ca 1 mm across, globose, fleshy, crowded by the calyx teeth, purple.

*Fl. & Fr* : July - November.

*Specimens examined* : West Manipur, C. B. Clarke 42373.

**2. *Ixora subsessilis*** Wallich ex G. Don, Gen. Syst. 3 : 573. 1834; Hook. f., Fl. Brit. India 3 : 139. 1880; Kanjilal *et al.*, Fl. Assam 3 : 69. 1939; Deb in Bull. Bot. Surv. India 3 : 311. 1961.

Tall shrubs or small trees, up to 3 m tall. Leaves 10 - 20  $\times$  2 - 9 cm, elliptic or oblanceolate, coriaceous; stipules sheathing long, cuspidate. Flowers deep red, in terminal corymbiform cymes; calyx longer than ovary, red; corolla tube 1.5 - 3 cm long, lobes 4, lanceolate, mouth glabrous. Fruits ca 1 cm across, oblong, 1 - 2 seeded, pyrenes concave.

*Fl. & Fr* : May - December.

*Specimens examined*: West Manipur 450 m, C. B. Clarke s.n.

#### 10. *Knoxia* L.

1a. Stems with 2 distinct lines of pubescence

stipules entire or cleft; cymes capitate ..... 1. *K. roxburghii*

b. Stems uniformly pubescent, villous or tomentose;

stipules bristled; cymes 3- chotomous ..... 2. *K. sumatrensis*

**1. *Knoxia roxburghii*** (Spreng.) M. A. Rau in Bull. Bot. Surv. India 10, Suppl 2 : 40. 1969; Hara & Gould in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 203. 1979. *Spermacoce roxburghii* Spreng., Syst. Veg. 1 : 404. 1824. *Knoxia microcarpa* Kurz in J. Asiat. Soc., Bengal 46 (2) : 138. 1877. *K. brachycarpa* R. Br. ex Hook. f., in Hook. f., Fl. Brit. India 3 : 310. 1880.

Erect rigid herbs ca 1 m tall, stem with 2 lines of pubescens. Leaves sessile, 5 - 10 cm long, linear - oblong, acute or rounded, pubescent at base; stipules entire or 3 cleft. Flowers minute in compound, unbranched corymbs; calyx teeth small, obtuse. Fruits didymous, truncate.

*Fl. & Fr* : August - December.

*Specimens examined* : West Manipur 690, C. B. Clarke s. n.

**2. *Knoxia sumatrensis*** (Retz.) DC., Prodr. 4 : 569. 1830; Mukerjee & Toth. in Rec. Bot. Surv. India, 20 : 118. 1973. *Spermiococe sumatrensis* Retz. Obs. Bot. 4 : 23. 1786. *Knoxia corymbosa* non Willd. 1797; Hook. f., Fl. Brit. India 3 : 128. 1880; Kanjilal *et al.*, Fl. Assam 3 : 63. 1936; Deb in Bull. Bot. Surv. India 3 : 311. 1961.

Fig. 69



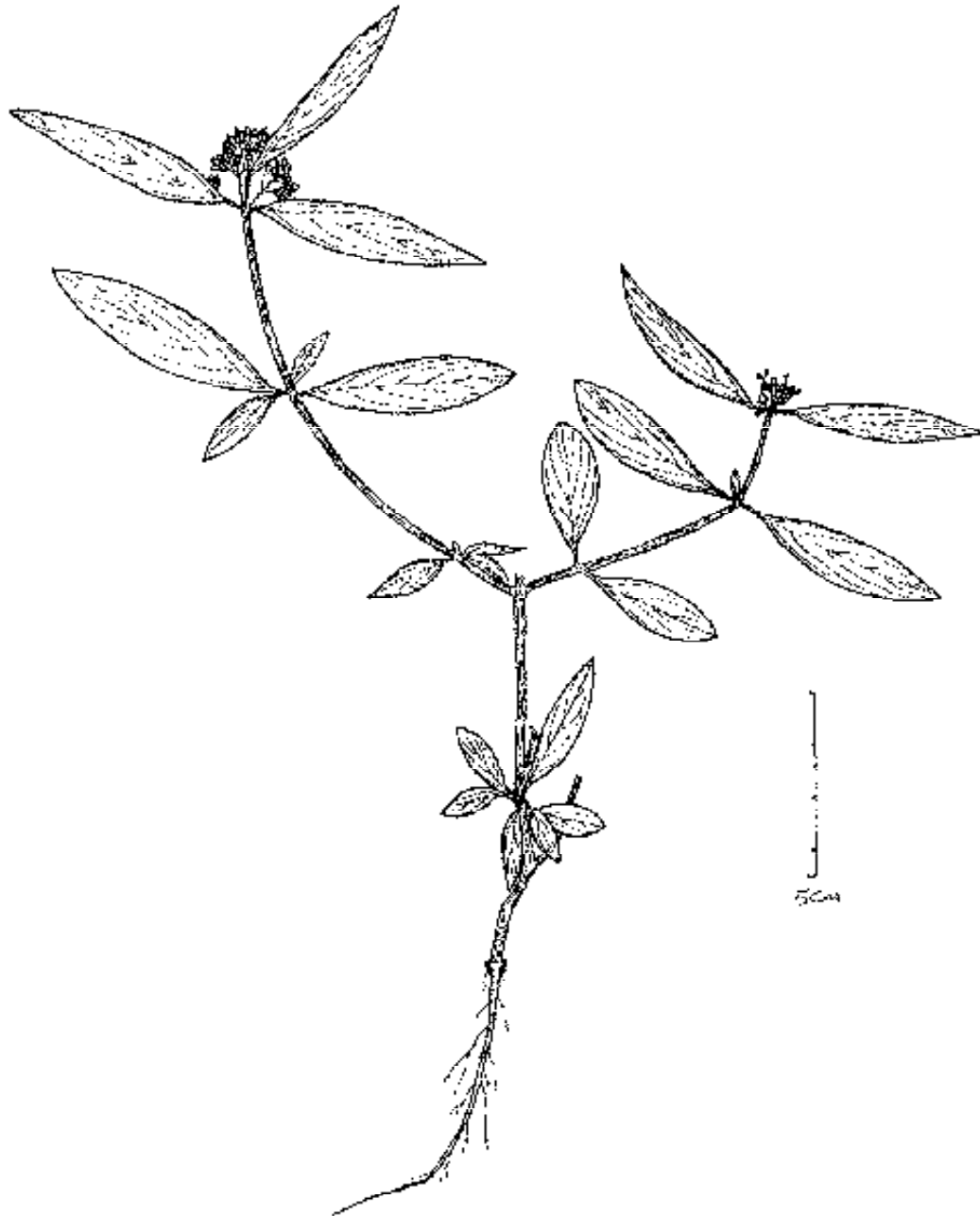


Fig. 69 : *Knoxia sumatrensis* (Retz.) DC. in flowering

Erect slender herbs, ca 1 m tall; stem terete or obscurely 4 -angled, villous or tomentose. Leaves 8 - 13 cm long, ovate- lanceolate or oblong; stipules bristles hairy. Flowers ca 8 mm long, white or purplish, in trichotomous, terminal cymes; calyx teeth minute, triangular, sub-equal; corolla tube hairy inside. Fruits ca 2 mm across, ellipsoid, 4 -angled, perforate at base, arranged in second spikes.

*Fl. & Fr.* : September - December.

*Specimens examined* : S. loc. Deb 126 & 2532 (CAL); Mt. Kerb. Mallick 1507 (BSIS).

### 11. *Lasianthus* Jack.

- 1a. Flowers bluish - white in peduncled cymes ..... 2. *L. longicauda*
- b. Flowers otherwise, in sessile cymes ..... 2
- 2a. Flowers ebracteate, onward ..... 1. *L. lancifolius*
- b. Flowers bracteate, sessile or subsessile cymes ..... 3
- 3a. Flowers creamy to pinkish - white; lateral nerves 8 - 10 pairs; calyx lobes acute ..... 3. *L. sikkimensis*
- b. Flowers creamy - white; lateral nerves 7 - 9 pairs; calyx lobes triangular ..... 4. *L. wallichii*

**1. *Lasianthus lancifolius*** Hook. f., Fl. Brit. India 3 : 187, 1880; Kanjilal *et al.*, Fl. Assam 3 : 92, 1939; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Shrubs. Leaves 12 - 20 × 2 - 4 cm, lanceolate, elliptic- lanceolate, acute at base, membranous; lateral nerves 8 -pairs; stipules 2 - 3 × 1 - 2 mm, triangular. Flowers axillary, sessile, calyx lobes 4 - 5, subulate; corolla lobes 5, ovate. Fruits sessile, ovoid, crowded with persistent calyx.

*Fl. & Fr.* : September - March.

*Specimens examined* : Pallel, Deb 1330 (CAL).

**2. *Lasianthus longicauda*** Hook. f., Fl. Brit. India 3 : 190, 1880; Kanjilal *et al.*, Fl. Assam 3 : 93, 1939; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Bushy shrubs up to 4 m tall. Leaves 6 - 15 × 2 - 3 cm, lanceolate, caudate acuminate, glabrous above, pale beneath; lateral nerves 8 - 12; stipules caducous. Flowers sessile bluish- white, in peduncled paniculate cymes. Fruits subglobose, blue.

*Fl. & Fr.* : June - November.

*Specimens examined* : Mao 1950 m, Deb 1842 (CAL).

**3. *Lasianthus sikkimensis*** Hook. f., Fl. Brit. India 3 : 180, 1880; Kanjilal *et al.*, Fl. Assam 3 : 90, 1939; Mallick & Safui in J. Econ. Tax. Bot. 10 : 5, 1987.

Shrubs, 1-3 m tall; branches ferruginous tomentose. Leaves 10-18 × 2-5 cm, elliptic, elliptic-lanceolate, acute at base, incurved at margin; lateral nerves 8-10 pairs; stipules lanceolate, acute. Inflorescence axillary, sessile, fasciated 1-3 flowered; bracts persistent, 4-8 mm, subulate. Flowers subsessile, 2-3 cm long, creamy to pinkish-white; calyx lobes 5, *ca* 2 mm long, acute; corolla lobes 5, *ca* 1 mm long, ovate-oblong. Fruits subsessile, ellipsoid, blue, crowded with persistent calyx; seeds 3-4 mm long.

*Fl. & Fr.* : July - November.

*Specimens examined* : Ainadhar, Malick 983; Jirimukh, Malick 1109 (BSIS).

4. *Lasianthus wallichii* Wight in Calc. J. Nat. Hist. Soc. 8 : 503. 1845; Hook. f., Fl. Brit. India 3 : 180. 1880; Kanjilal *et al.*, Fl. Assam 3 : 90. 1939; Deb in Bull. Bot. Surv. India 3 : 311. 1961.

Shrubs, 1.5 m tall, branchlets hirsute. Leaves 5-13 × 2.5-5 cm, oblong lanceolate or oblong-ovate, acute, slightly incurved at margin; lateral nerves 7-9 on each half; stipules 3-5 × 2-3 mm, linear-lanceolate or ovate-lanceolate, acute. Flowers sessile, creamy-white, axillary; calyx teeth 5, triangular or ovate, hirsute; corolla 5-lobed, ovate-oblong. Fruits sessile 4 × 3 mm, crowded with calyx; pyrens 5, dorsally convex; seeds *ca* 3 mm, flattened.

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

*Specimens examined* : Jirimukh, Malick 1109 (BSIS).

## 12. *Leptodermis* Wallich

*Leptodermis griffithii* Hook. f., Fl. Brit. India 3 : 198. 1881; Kanjilal *et al.*, Fl. Assam 3 : 76. 1939; Deb in Bull. Bot. Surv. India 3 : 311. 1961.

Bushy shrubs up to 3 m tall. Leaves 1-2.5 × 0.5-1.2 cm, ovate or elliptic, acute at base, narrowed, cuneate; lateral nerves 2-3 pairs. Flowers white or creamy, in terminal fascicles; calyx lanceolate; corolla up-curved. Capsules *ca* 5 mm, ovoid or cylindrical-ovoid, brown; seeds enclosed in reticulate fibrous covering.

*Fl. & Fr.* : June - November.

*Specimens examined* : North Manipur, G. Watt 6763 (CAL).

## 13. *Mitragyna* Korth. *nam. cons.*

*Mitragyna rotundifolia* (Roxb.) O. Kuntze. Rev. Gen. Pl. 289. 1891; Deb in Bull. Bot. Surv. India 3 : 311. 1961. *Nauclea rotundifolia* Roxb., Fl. Ind 1 : 516. 1820. *Stephagyne diversifolia* Hook. f., Fl. Brit. India 3 : 26. 1880; Kanjilal *et al.*, Fl. Assam 3 : 16. 1939.

Mani: Thinggalung

Medium sized trees. Leaves 7-20 × 4-15 cm, ovate or elliptic, obtuse to shortly acuminate, pubescent at the nerves beneath; lateral nerves 8-10 on each side. Flowers pink or greenish-white, in globose pedunculate heads; calyx truncate;

corolla funnel-shaped, valvate. Capsules *ca* 1.6 cm across, ovoid, ribbed, in globose heads; seeds winged.

*Fl. & Fr.* : August - February.

*Specimens examined*: Shugnu 1500 m, Deb 2618 (CAL); Jirimukh, Malick 813 (BSIS).

#### 14. *Morinda* L.

*Morinda angustifolia* Roxb., Pl. Corom., 3 (2) : t. 237, 1815; Hook. f., Fl. Brit. India 3 : 156, 1880; Kanjilal *et al.*, Fl. Assam 3 : 79, 1939; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Small trees up to 10 m tall. Leaves 6 - 13 × 2 - 10 cm, varying in size and shape, oblanceolate or oblong, elliptic, acuminate at apex, base narrowed to the petiole. Flowers *ca* 3 cm long, pentamerous, white, fragrant, in globose heads. Drupes *ca* 3 mm across, white.

*Fl. & Fr.* : February - October.

*Specimens examined* : Imphal, Deb 374 (CAL); Afnadhar, Malick 971 (BSIS).

#### 15. *Mussaenda* L.

- 1a. Rambling, almost glabrous shrubs ..... 1. *M. glabra*
- b. Erect or sub-scandent shrubs; branches hairy ..... 2
- 2a. Leaves hairy above; stipules broad,  
acute 2 fid; calyx teeth foliaceous ..... 2. *M. macrophylla*
- b. Leaves glabrous above; stipules triangular  
lanceolate; calyx teeth filiform ..... 3. *M. roxburghii*

1. *Mussaenda glabra* Vahl, Symb. Bot. 3:38, 1790; Hook. f., Fl. Brit. India 3 : 90, 1880; Kanjilal *et al.*, Fl. Assam 3 : 44, 1939; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Mani: *Hamurei*.

Climbing or scandent shrubs. Leaves shortly petioled, 5 - 15 × 2 - 6 cm, oblong or elliptic-lanceolate, acuminate at tip, cuneate or sub-acute at base; stipules small, 2-fid. Flowers yellow or orange-yellow, in terminal cymes; calyx teeth subulate or lanceolate, deciduous; corolla tube glabrous or with appressed hairs. Berries 1 - 1.5 cm long, globose, glabrous.

*Fl. & Fr.* : May - November.

*Specimens examined* : s. 1. Meebold 6310; Deb 377 (CAL).

2. *Mussaenda macrophylla* Wallich in Roxb., Fl. Ind. 2: 228, 1824; Hook. f., Fl. Brit. India 3 : 89, 1880; Kanjilal *et al.*, Fl. Assam 3 : 45, 1939; Deb in Bull. Bot. Surv. India 3 : 311, 1961.

Sub-scandent shrubs, 1 - 4 m tall; branches stout; hairy. Leaves 8 - 20 × 2 - 10 cm, elliptic or oblong-lanceolate, acuminate, cuneate at base; stipules broad, acute or 2-fid. Flowers *ca* 3 cm long, in terminal compact, trichotomous cymes; calyx lobes

orbicular, apiculate. Berries ca 1.6 cm long, ovoid with broad nectariferous scars, pubescent.

*Fl. & Fr.* : June - January.

*Specimens examined* : s. l. *Meebold* 6004; Ukhral, s. l. *Mukerjee* 3222; Deb 281, 834, 1077, 2617, 2726 (CAL); Kangrandhar, *Malick* 1017 (BSIS); Ukhral, *Chauhan* 94853 (ASSAM).

**3. *Mussaenda roxburghii*** Hook. f., *Fl. Brit. India* 3 : 87. 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 46, 1939; Deb in *Bull. Bot. Surv. India* 3 : 311, 1961.

*Mani*: *Hanurei*

Large erect shrubs, 1 - 3 m tall; stems hairy. Leaves 5 - 20 × 3 - 9 cm, ovate-lanceolate or ovate, acuminate, cuneate at base; stipules triangular lanceolate. Flowers orange-yellow, in terminal sub-capitate cymes; calyx teeth filiform; corolla silky, tube narrowed, lobes filiform. Berries ca 1.5 cm long, ellipsoid or globose with persistent calyx lobes.

- la. Leaves 10 - 15 cm long, oblong, lanceolate;  
bracts and flowers silky ..... var. *roxburghii*
- b. Leaves 13 - 25 cm long, elliptic;  
bracts and flowers villous ..... var. *glabra*

var. *roxburghii*

*Fl. & Fr.* : March - December.

*Specimens examined* : Jirighat, *Meebold* 6051 (CAL); Celjang, *Malick* 1415; Dibong, *Malick* 725; Nungba, *Malick* 1253 & 1262; Jirimukh, *Malick* 842 (BSIS).

var. *glabra* Hook. f., *Fl. Brit. India* 3 : 87. 1880; Deb in *Bull. Bot. Surv. India* 3 : 312, 1961.

*Fl. & Fr.* : March - December.

*Specimens examined* : Jirighat, *Meebold* 5762 (CAL).

**16. *Mycetia*** Reinw.

- la. Flowers in trichotomously corymbose,  
paniculate cymes, yellowish; calyx teeth,  
ovate or lanceolate, straight ..... 1. *M. longifolia*
- b. Flowers in rounded corymbose cymes,  
white; calyx teeth oblong, ovate, recurved ..... 2. *M. stipulata*

**1. *Mycetia longifolia*** (Wallich) O. Kuntze, *Rev. Gen. Pl.* 289. 1891; Kanjilal *et al.*, *Fl. Assam* 3 : 49, 1939; Deb in *Bull. Bot. Surv. India* 3 : 312, 1961. *Rondeletia longifolia* Wallich in Roxb. *Fl. Ind.* 2 : 137, 1824. *Adenosacme longifolia* Hook. f., *Fl. Brit. India* 3 : 95, 1880.

Shrubs or undershrubs up to 5 m tall; stem reddish. Leaves 6 - 20 × 2 - 8 cm, elliptic - lanceolate, tapering at base, acute to caudate - acuminate, glabrous above,

pubescent beneath. Flowers *ca* 6 mm across, yellowish, in trichotomous corymbose, paniculate cymes. Berries *ca* 6 mm across, sub-globose, white, crowned with calyx teeth; seeds angled, black.

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

*Specimens examined* : North Manipur 1050 m, C. B. Clarke s.n.; Uchathal, Malick 636 (BSIS); Litan, Chauhan 94644 (ASSAM).

2. *Mycetia stipulata* (Hook. f.) O. Kuntze, Rev. Gen. Pl. 289. 1891; Hara & Gould in Hara *et al.*, Enum. Fl. Pl. Nepal. 2 : 205. 1979. *Adenosacme stipulata* Hook. f., Fl. Brit. India 3 : 95. 1880; Deb in Bull. Bot. Surv. India 3 : 310. 1961.

Small shrub; branches slender. Leaves 15 - 35 × 6 - 14 cm, elliptic or elliptic-lanceolate, acuminate. Flowers shortly pedicellate, white, in rounded corymbose cymes; calyx 4 - 5 lobed; corolla valvate with exerted edges. Berries globose, white.

*Fl. & Fr.* : June - December

*Specimens examined*: West Manipur ex C.B. Clarke *l.c.*

### 17. *Myrioneuron* R. Br. ex Hook. f.

*Myrioneuron nutans* Wallich ex Kurz, For. Fl. Brit. Burma 2 : 55. 1877; Hook. f., Fl. Brit. India 3 : 96. 1880; Kanjilal *et al.*, Fl. Assam 3 : 50. 1939; Deb in Bull. Bot. Surv. India 3 : 311. 1961.

Shrubs up to 3 m tall. Leaves 12 - 20 × 8 - 15 cm, elliptic-obovate, abruptly acuminate, cuneate or acute at base, sub-scrabid beneath; lateral nerves 15 - 20 on either side. Flowers white, in dense pedunculate, bracteate corymbose cymes. Berries *ca* 5 mm across, globose, white; seeds angular, black.

*Fl. & Fr.* : July - March.

*Specimens examined* : Irong 900 - 1200m, Meebold 6616 (CAL).

### 18. *Neanotis* Lewis.

- 1a. Leaves 2 - 2.5 cm long, margin recurved;  
flowers pale purple ..... 1. *N. hohenackeri*
- b. Leaves 6 - 15 cm long, margin not recurved;  
flowers bluish white ..... 2. *N. oxyphylla*

1. *Neanotis hohenackeri* Daniel & Vajravelu in J. Econ. Tax. Bot. 3: 675. 1982. *Hedyotis foetida* Dalz. in Hook. Bot. & Kew Gard. Misc. 2: 134 1850. *Anotis foetida* (Dalz.) Benth. & Hook. f., Gen. Pl. 2: 59. 1880; Hook. f., Fl. Brit. India 3: 310. 1961. *Neanotis foetida* (Hook.f.) Lewis in Ann. Miss. Bot. Gard. 53: 37. 1966.

Mani: *Khut chappi*

Slender herbs, 9 - 15 cm tall. Leaves sessile, 2 × 0.1 cm, linear or linear lanceolate, margin recurved; stipules minute, bristly. Cymes on capillary erect peduncles. Flowers capitate, corolla funnel shaped, pale purple; calyx teeth apiculate. Capsules *ca* 5 mm, didymous, sessile.

*Fl. & Fr.* : August - November.

*Specimens examined* : Valley, Deb 72, 2548 (CAL).

2. *Neanotis oxyphylla* (G. Don) Lewis in Ann. Miss. Bot. Gard, 53 : 39. 1966. *Oldenlandia oxyphylla* G. Don., Gen. Syst. 3 : 531. 1834. *Anotis oxyphylla* Wallich ex Hook. f. in Hook. f., Fl. Brit. India 3 : 72. 1880; Kanjilal *et al.*, Fl. Assam 3 : 39. 1939; Deb in Bull. Bot. Surv. India 3 : 310. 1961.

Undershrubs; stem stout, rooting at the lower nodes. Leaves 4 - 10 × 0.5 - 1.5 cm. linear-lanceolate, acuminate; lateral nerves 3 on either half; stipules linear-lanceolate, sometimes lacinate; calyx teeth short; corolla much longer than the calyx tube. Capsules turgid, dehiscing loculicidally.

*Fl. & Fr.* : August - January.

*Specimens examined* : Mao, Deb 1842 (CAL).

#### 19. *Neolamarckia* Bosser

*Neolamarckia cadamba* (Roxb.) Bosser in Adansonia 6 (3) : 245 - 248. 1984. *Nauclea cadamba* Roxb., Fl. Ind. 2 : 121. 1824. *Anthocephalus cadamba* (Roxb.) Miq., Fl. Ind. Bot. 2 : 135. 1856; Hook. f., Fl. Brit. India 3 : 23. 1880; Kanjilal *et al.*, Fl. Assam 3 : 18. 1939; Deb in Bull. Bot. Surv. India 3 : 310. 1961. *A. chinensis sensu* A. rich. ex Walp. Repert. 2 : 491. 1843 non *Cephalanthus chinensis* Lam. 1785.

Mani.: Kadamba

Large deciduous trees, up to 35 m tall, with spreading branches at the top. Leaves shortly petiolate, 15 - 25 × 6 - 12 cm, ovate, elliptic-oblong, acute. Heads ca 5 cm across, yellowish-red. Flowers pentamerous, in dense terminal solitary globose heads; calyx and corolla segments imbricate. Fruits fleshy, 4 - 8 cm in diam., orange.

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

*Specimens examined* : Valley, Deb 127 (CAL).

#### 20. *Neonauclea* Merr.

*Neonauclea griffithii* (Hook. f.) Merr. in J. Wash. Acad. Sci. 5 : 540. 1915; Ridsdale in Blumea 24 : 341. 1878. *Adina griffithii* Hook. f., Fl. Brit., India 3 : 24. 1880; Deb in Bull. Bot. Surv. India 3 : 310. 1961. *Nauclea griffithii* (Hook. f.) Havil in J. Linn. Soc. Bot. 33 : 51. 1897; Kanjilal *et al.*, Fl. Assam 3 : 19. 1939; Haridasan & Rao, For. Fl. Meghalaya 2 : 493. 1987.

Small trees. Leaves 9 - 16 × 4 - 8 cm, coriaceous, narrowed into the short stout petiole. Peduncles 2 - 5 cm, stout, 1-headed; heads ca 3 cm in diam. Flowers intermixed with paleaceous bracts; calyx limbs 5-lobed, corolla lobes valvate. Capsules with 2 cocci, dehiscing longitudinally; many seeded.

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

*Specimens examined* : Kalanga hill 800 m, G. Watt 7295 (CAL).

21. *Ophiorrhiza* L.

- 1a. Bracteoles present, persistent:  
corolla short, ca 1.5 cm long ..... 2
- b. Bracteoles absent, if present early  
caducous; corolla ca 2.5 cm or more long ..... 3
- 2a. Peduncles of cyme more than 3 cm long;  
calyx tube orbicular ..... 1. *O. fasciculata*
- b. Peduncles of cymes less than 2.5 cm long;  
calyx tube otherwise ..... 4
- 3a. Herbs suffrutescent; corolla spur less ..... 2. *O. mungos*
- b. Shrubs glabrous; corolla with a short  
dorsal spur ..... 4. *O. ochroleuca*
- 4a. Corolla tubular, villous stipules subulate ..... 3. *O. nutans*
- b. Corolla funnel-shaped; hirsute;  
stipules lanceolate ..... 5. *O. treutleri*

1. *Ophiorrhiza fasciculata* D. Don, Prodr. Fl. Nep. 136. 1825; Hook. f., Fl. Brit. India 3 : 83. 1880; Deb in Bull. Bot. Surv. India 3 : 312. 1961. Fig. 70

Erect suffrutescent simple or branched herbs, 12 - 40 cm tall. Leaves 4 - 12 × 2 - 5 cm, elliptic, ovate or lanceolate, cuneate at base, acuminate, membranous; stipules lanceolate, long acuminate. Flowers ca 1.6 cm long, white in axillary or terminal spreading cymes; bracteoles lanceolate, pubescent; calyx tube orbicular, compressed, teeth very short; corolla tube slender, pubescent. Capsules globose, pinkish, pubescent.

Fl. & Fr : December - July.

Specimens examined : North Manipur 1050 m, C. B. Clarke s.n.

2. *Ophiorrhiza mungos* L., Sp. Pl 150. 1753; Hook. f., Fl. Brit. India 3 : 77. 1880; Kanjilal et al., Fl. Assam 3 : 42. 1939; Deb in Bull. Bot. Surv. India 3 : 312. 1961.

Mani.: Chak - Iambi.

Erect, suffrutescent herbs, up to 50 cm high. Leaves 5 - 12 × 2 - 6 cm, elliptic to oblong-lanceolate, acute or rounded at base, acuminate, puberulous beneath; stipules small. Flowers white, in sub-umbellate cymes; ebracteate; calyx tube very short; corolla glabrous, rounded at tip; lobes short obtuse, keeled. Capsules 4 - 8 mm diam.

Fl. & Fr : April - December.

Specimens examined : Koupru 1800m, Deb 2268 (CAL); Nutanlalpani, Malick 913 (BSIS).

3. *Ophiorrhiza nutans* C. B. Clarke ex Hook. f., Fl. Brit. India 3 : 84. 1880; Balakr., Fl. Jowai 1 : 249. 1981; Malick & Safui in J. Exon. Tax. Bot. 10 : 5. 1987.



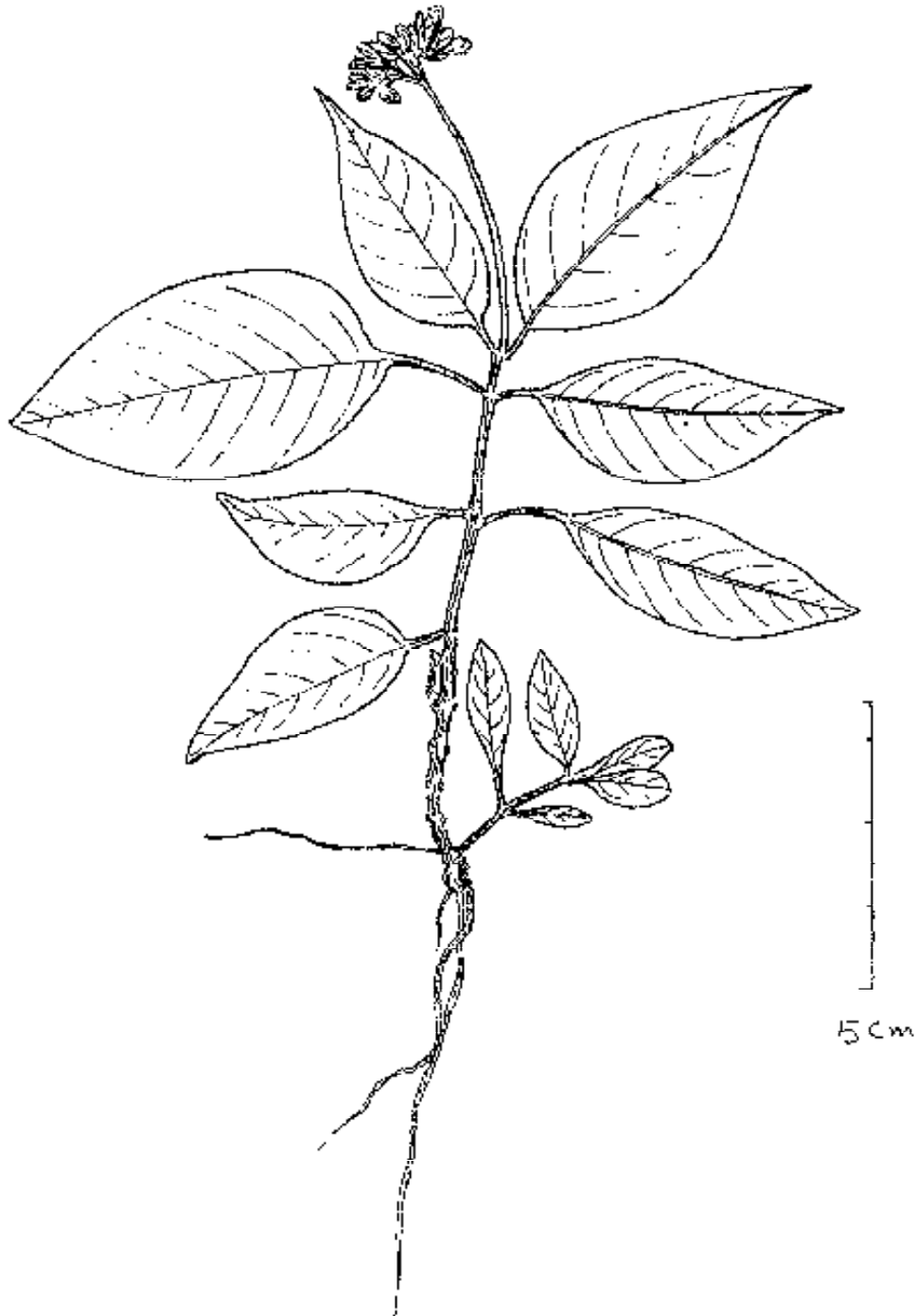


Fig. 70 : *Ophiorrhiza fasciculata* D. Don in flowering

Herbs up to 80 cm high; stem creeping below, then erect. Leaves 8-12 × 2-5 cm, elliptic-oblanccolate, acuminate, acute or cuneate at base, lurid when dry. Flowers white, in 2.5-0.5 cm across; cymes pubescent; calyx tube ovate, acute; corolla 2 cm diam., villous within. Capsule hispid.

*Fl. & Fr.* : May - October.

*Specimens examined* : Sibpurikhal, *Mallick* 1085 (BSIS).

**4. *Ophiorrhiza ochroleuca* Hook. f., Fl. Brit. India 3 : 78. 1880; Malick & Safui in J. Econ. Tax. Bot. 10 : 5. 1987.**

Herbs. Leaves 10-25 × 4-8 cm, elliptic or elliptic lanceolate, caudate, acuminate, lateral nerves 10-15 pairs on each half. Inflorescence in spreading cymes; bracts stout; corolla primrose-yellow. Capsules ca 6 mm in diam.

*Fl. & Fr.* : October - February.

*Specimens examined* : Nungba to Oinamlong, *Malick* 1257; Ainadhar, *Malick* 950 (BSIS).

**5. *Ophiorrhiza treutleri* Hook. f., Fl. Brit. India 3 : 83. 1880; Yamazake in Fl. E. Himal. 314. 1966.**

Low stout, pubescent herbs, 14-25 cm tall. Leaves 4-10 cm, elliptic-ovate or lanceolate, sub-cordate, acuminate; stipules lanceolate. Cymes branches stout, ascending, bracteoles long, linear, ca 1 cm, hispid, persistent; calyx tube subulate; corolla hirsute. Capsule pubescent.

*Fl. & Fr.* : August - December.

*Specimens examined* : *Chauhan* 94819 (ASSAM).

## 22. *Paederia* L. *nom. cons.*

- 1a. Fruits elliptic, compressed; pyrenes broadly winged ..... 1. *P. foetida*  
 b. Fruits subglobose, not compressed; pyrenes not winged ..... 2. *P. scandens*

**1. *Paederia foetida* L., Mant. Pl. 1 : 52. 1767; Hook. f., Fl. Brit. India 3 : 195. 1881; Deb in Bull. Bot. Surv. India 3 : 312. 1961.**

Mani.: *Oinam*

Twining glabrous shrubs. Leaves 5-12 × 2-7 cm, elliptic-ovate or ovate-lanceolate, sub-caudate at base, acuminate at tip. Flowers purplish, in axillary or terminal paniculate cymes; bracts minute, ovate or subulate; calyx tube campanulate, teeth short, triangular; corolla tomentose. Fruits reddish, compressed; pyrenes broadly winged.

*Fl. & Fr.* : June - October.

*Specimens examined* : Imphal valley, *Deb* 1750 & 1385 (CAL); Sripurikhal, *Malick* 1092; Coljang, *Malick* 1427 (BSIS); Imphal, *Chauhan* 94616 (ASSAM).

**2. *Paederia scandens* (Lour.) Merr.** in Contr. Arn. Arb. 8 : 163. 1934; Balakr., Fl. Jowai 1 : 251. 1981. *Gentiana scandens* Lour., Fl. Cochinch. 171. 1790. *Paederia tomentosa* Blume, Bijdr. 968. 1826; Hook. f., Fl. Brit. India 3 : 197. 1881; Kanjilal *et al.*, Fl. Assam 3 : 77. 1939.

Slender twiner. Leaves 2 - 8 × 2 - 5 cm, lanceolate, ovate-lanceolate or ovate, acute to acuminate, sub-cordate at base. Flowers ca 1.5 cm long, dark purple in side, white outside, in much branched paniculate cymes. Fruits ca 5 mm across, yellowish-orange; pyrenes convexo-concave.

*Fl. & Fr* : May - December.

*Specimens examined* : Nungba to Bishenpur, Malick 1227 (BSIS).

### 23. *Pavetta* L.

- 1a. Glabrous shrubs; cymes capitate ..... 2. *P. subcapitata*  
 b. Pubescent or tomentose shrubs or small trees; cymes corymbiform. .... 2  
 2a. Leaves 5-25 × 1.5-8 cm, pubescent or glabrous. .... 1. *P. indica*  
 b. Leaves 10 - 30 × 4 - 10 cm, puberulous above and pubescent beneath ..... 3. *P. tomentosa*

**1. *Pavetta indica* L.**, Sp. Pl. 110. 1753; Hook. f., Fl. Brit. India 3 : 150. 1880; Kanjilal *et al.*, Fl. Assam 3 : 72. 1939; Deb in Bull. Bot. Surv. India 3 : 312. 1961.

Mani.: *Kukuchura*

Shrubs or small trees, 3 - 9 m tall; branches glabrous, tomentose or pubescent. Leaves 5 - 25 × 1.5 - 8 cm, obovate, oblanceolate, acuminate, narrowed to the petiole, pubescent or glabrous; stipules acute. Flowers ca 2.6 cm long, bluish-white or white, fragrant, in terminal or lateral corymbose panicles; calyx pubescent, truncate; corolla salver-shaped. Drupes ca 8 mm across, globose, blackish-green.

*Fl. & Fr* : May - December.

*Specimens examined* : Imphal valley, Deb 223 & 1392 (CAL).

**2. *Pavetta subcapitata* Hook. f.**, Fl. Brit. India 3 : 150. 1880; Kanjilal *et al.*, Fl. Assam 3 : 72. 1939; Deb in Bull. Bot. Surv. India 3 : 312. 1961.

Shrubs up to 5 m tall. Leaves 5 - 15 × 2 - 6 cm, elliptic-lanceolate, oblanceolate or elliptic-obovate, acuminate, narrowed at base, finely pubescent beneath. Flowers ca 3.2 cm long, bluish-white or white in terminal sessile capitate cymes; calyx puberulous, teeth very short; corolla tube narrow, glabrous. Berries ca 8 mm across, rounded.

*Fl. & Fr* : April - November.

*Specimens examined* : Pallel, Deb 1367 (CAL).

**3. *Pavetta tomentosa* Roxb. ex Seem.** in Ress. Cyclop. 26 : 2. 1819; Haridasan & Rao, For. Fl. Meghalaya 2 : 496. 1987. *P. indica* var. *tomentosa* (Roxb. ex Seem.) Hook. f., Fl. Brit. India 3 : 150. 1880; Deb in Bull. Bot. Surv. India 3 : 312. 1961.

Large shrubs or small trees, up to 10 m tall. Leaves 10 - 30 × 4 - 10 cm, obovate,

elliptic to oblanceolate, acute, narrowed at base, glabrous or puberulous above, pubescent beneath. Flowers ca 1 cm long, white, in corymbose panicle cymes. Drupes ca 5 mm across, subglobose, purplish green.

*Fl. & Fr.*: March - October.

*Specimens examined*: Kakching & Shugnu, Deb 605 & 1197 (CAL).

#### 24. *Petunga* DC.

*Petunga roxburghii* DC., Prodr. 4: 399. 1830; Hook. f., Fl. Brit. India 3: 120. 1880; Malick & Safui in J. Econ. Tax. Bot. 10: 5. 1987.

Evergreen shrubs, ca 2 m tall. Leaves 5 - 12 × 2 - 4 cm, thinly coriaceous; petiole 4 mm; stipules broad, caducous, with an axillary ring of brown hairs. Spike short peduncled, 2.5 - 5 cm, spreading or recurved. Berries globose or shortly ellipsoid, orange-yellow.

*Fl. & Fr.*: July - December.

*Specimens examined*: Jirimukh, Malick 821 (BSIS).

#### 25. *Polysolenia* Hook. f.

*Polysolenia wallichii* Benth. & Hook. f., Gen. Pl. 2: 68. 1873; Hook. f., Fl. Brit. India 3: 94. 1880; Kanjilal *et al.*, Fl. Assam 3: 49. 1939; Deb in Bull. Bot. Surv. India 3: 312. 1961.

Stranded under shrubs, 20 - 40 cm tall, stem brownish-black, rigid. Leaves 6 - 12 × 3 - 7 cm, elliptic-lanceolate, acute to acuminate, cuneate at base, shining silvery beneath; bracts irregular. Flowers ca 3 cm long, white, in terminal solitary heads; calyx 5-lobed; corolla lobes valvate. Fruits ca 6 mm across, globose, greenish-white.

*Fl. & Fr.*: June - November.

*Specimens examined*: West Manipur 225 - 450 m, C. B. Clarke s.n.

#### 26. *Psychotria* L.

- |     |  |                          |
|-----|--|--------------------------|
| 1a. | Intra-marginal nerves conspicuous;<br>calyx tube 4-ciliate .....               | 1. <i>P. calocarpa</i>   |
| b.  | Intra-marginal nerves not conspicuous;<br>calyx teeth without cilia .....      | 2.                       |
| 2a. | Cymes obraceate and obraceolate .....  | 2. <i>P. denticulata</i> |
| b.  | Cymes bracteate and bracteolate .....  | 3.                       |
| 3a. | Plants glabrous or pubescent;<br>lateral nerves 14 - 20 paired .....           | 4.                       |
| b.  | Plants always glabrous; lateral nerves<br>6 - 14 paired .....                  | 5.                       |
| 4a. | Bracts broad, persistent; flowers in<br>subsessile dense corymbose heads ..... | 4. <i>P. monticola</i>   |
| b.  | Bracts minute, caducous; flowers in<br>pedicellate corymbiform cymes .....     | 5. <i>P. silhetensis</i> |

- 5a. Stipules 2-clift; pyrenes with 4 -dorsal ridges ..... 3. *P. erratica*  
 b. Stipules entire; pyrenes with  
 1-dorsal ridge ..... 6. *P. symlocifolia*

1. *Psychotria calocarpa* Kurz in *J. Asiat. Soc.* 41 (2) : 315. 1872; Hook. f., *Fl. Brit. India* 3 : 173. 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 83. 1939; Deb in *Bull. Bot. Surv. India* 3 : 312. 1961.

Herbs to undershrubs. Leaves 10 - 20 × 3 - 8 cm, elliptic - lanceolate, ovate or oblong, acuminate, lateral nerves 11 - 13 cm on each half; stipules 2- fid. Flowers yellow, in terminal or axillary cymes; calyx teeth 4 ciliate. Fruits red.

*Fl. & Fr.* : October - May.

*Specimens examined* : Koupru, *Meebold* 6094; Nungba, *Deb* 1509 (CAL); Nutanlalpani, *Malick* 906 (BSIS).

2. *Psychotria denticulata* Wallich in *Roxb., Fl. Ind.* 2 : 166. 1824; Hook. f., *Fl. Brit. India* 3 : 173. 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 83. 1939; Deb in *Bull. Bot. Surv. India* 3 : 312. 1961.

Shrubs with semi herbaceous branches. Leaves 8 - 20 × 7 - 12 cm, elliptic or oblanceolate, acuminate, attenuate at base; glabrous above, puberulous beneath; lateral nerves 14 - 16 on each side; stipules bifid. Flowers greenish, in peduncled, corymbiform, terminal and axillary cymes. Fruits ca 5 mm across, globose; pyrenes plano-convex.

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

*Specimens examined* : Koupru 400 m, *Meebold* 6552 (CAL).

3. *Psychotria erratica* Hook. f., *Fl. Brit. India* 3 : 168. 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 84. 1939; Deb in *Bull. Bot. Surv. India* 3 : 312. 1961.

Bushy shrubs up to 4 m tall. Leaves 6 - 18 × 2 - 6 cm, elliptic, oblanceolate, acuminate-cuneate at base. Flowers ca 3 mm across, white or greenish- white, in terminal trichotomous cymes. Fruits ca 8 mm across, globose, reddish-yellow or red.

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

*Specimens examined* : Barak, *Meebold* 5854 (CAL); Litan, *Chauthan* 94693 (ASSAM).

4. *Psychotria monticola* Kurz in *J. Asiat. Soc. Beng.* 2 : 175. 1872; Haridasan & Rao, *For. Fl. Meghalaya* 2 : 499. 1987. *P. fulva* Buchl. - Ham. ex Hook. f., *Fl. Brit. India* 3 : 169. 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 85. 1939; Deb in *Bull. Bot. Surv. India* 3 : 312. 1961.

Undershrubs, 1 - 2 m tall. Leaves 10 - 25 × 5 - 15 cm, broadly obovate, oblanceolate, acute, cuneate at base, chartaceous; lateral nerves 14 - 18 cm each half, sub parallel. Flowers ca 3 mm across, white or greenish - white, in peduncled axillary or terminal cymes. Fruits ellipsoid, reddish brown; pyrenes with 4 sharp dorsal ridges.

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

*Specimens examined* : Jiribam 1350m, *G Watt* 7289; Ainadhar, *Malick* 968; Chandrapur, *Malick* 781 (BSIS).

**5. *Psychotria silhetensis*** Hook. f., *Fl. Brit. India* 3 : 174, 1880; Deb in *Bull. Bot. Surv. India* 3 : 312, 1961.

Shrubs with short branches. Leaves 15 - 35 × 7 - 12 cm, oblong or elliptic, acuminate; nerves 15 - 20 pairs on either half, strong arched; stipules 2.5 cm, ovate, often cleft. Cymes terminal and axillary, cymbiform; calyx obconic, limb truncate; corolla tube short, throat hairy. Fruit ovoid, globose. Berries smooth, flat.

*Fl. & Fr.* May - December.

*Specimens examined* : Nongmaiching, *Deb* 2165 (CAL).

**6. *Psychotria symplocifolia*** Kurz, *For. Fl. Brit. Burma* 2 : 11, 1877; Hook. f., *Fl. Brit. India* 3 : 172, 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 85, 1939; Deb in *Bull. Bot. Surv. India* 3 : 312, 1961.

Shrubs or small trees, 3 - 5 m tall. Leaves 5 - 15 × 1 - 5 cm, elliptic-lanceolate or elliptic-ovate, acute, narrowed to the petiole, glabrous. Flowers white, in trichotomous cymes. Fruits ca 7 mm across, globose, black; pyrenes plano-convex.

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

*Specimens examined* : Koupru 1200 m, *Deb* 1458 (CAL); Kangrendhar, *Malick* 1004 & 1047 (BSIS); Sihngat, *Chauhan* 95079 (ASSAM).

## 27. *Randia* L.

***Randia wallichii*** Hook. f., *Fl. Brit. India* 3 : 113, 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 60, 1939; Deb in *Bull. Bot. Surv. India* 3 : 312, 1961.

Large trees, up to 20 m tall, with straight bole and ovoid crown. Leaves 5 - 15 × 1.5 - 4 cm, oblong, oblong-elliptic, acute to sub-acute, narrowed at base, glabrous. Flowers ca 6 mm, orange-yellow, in up to 10 cm across cymes. Berries ca 1.5 cm across, globose, green with white specked.

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

*Specimens examined* : Mao, *Deb* 1810 (CAL).

## 28. *Rubia* L.

- 1a. Leaves ovate-cordate; nerves 3 - 7;  
corolla lobes lanceolate ..... 1. *R. cordifolia*
- b. Leaves elliptic - lanceolate,  
nerves 3 - 5; corolla lobes subulate ..... 2. *R. sikkimensis*

**1. *Rubia cordifolia*** L., *Sp. Pl.* 397, 1753; Hook. f., *Fl. Brit. India* 3 : 202, 1880; Kanjilal *et al.*, *Fl. Assam* 3 : 94, 1939; Deb in *Bull. Bot. Surv. India* 3 : 313, 1961.

Fig. 71

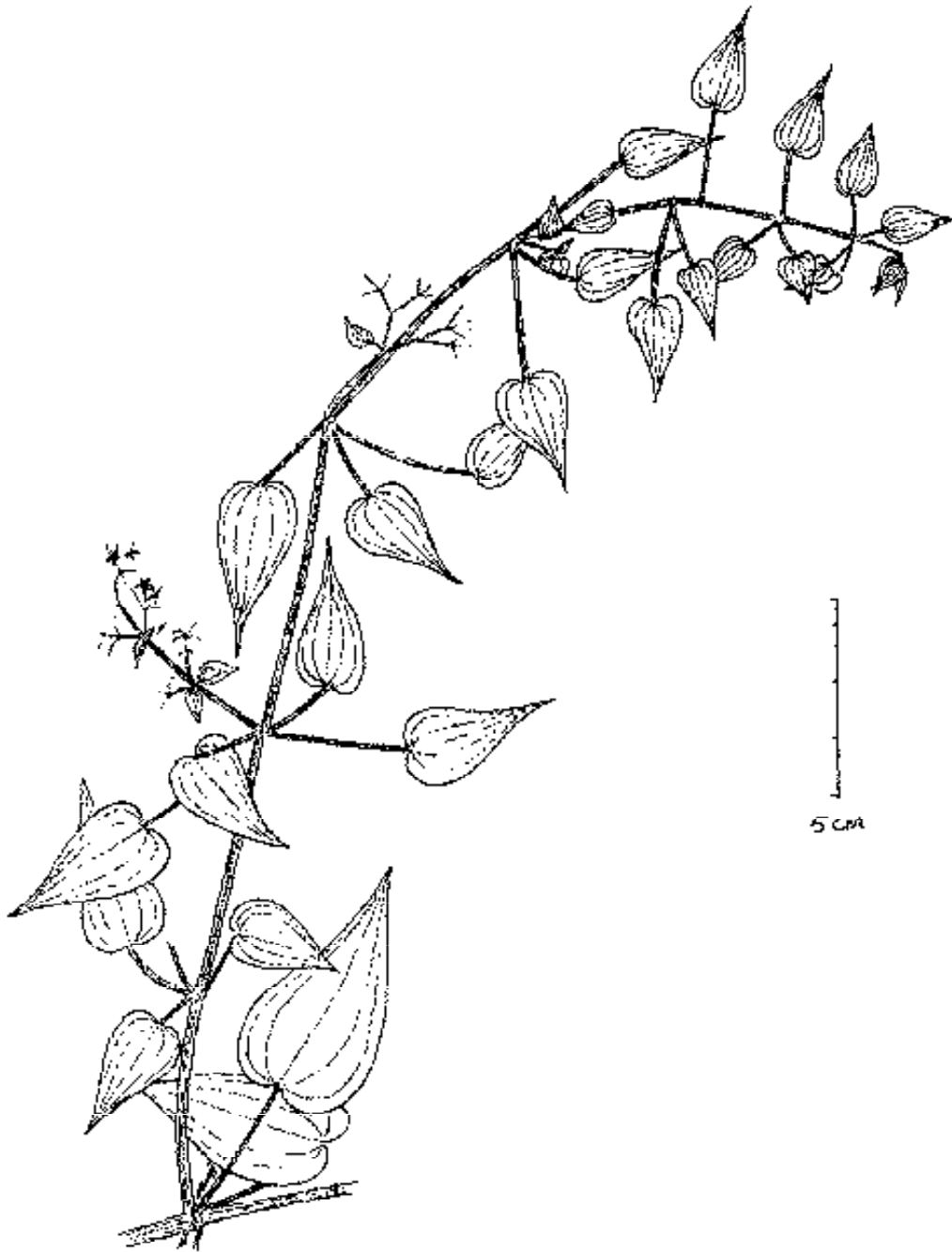


Fig. 71 : A twig of *Rubia cordifolia* L.

Mani.: *Moyun*

Scabrid climber. Leaves 2 - 8 × 1 - 4 cm. ovate, ovate lanceolate, base rounded or sub-cordate, hispid above, scabrous along nerves beneath; nerves 3 - 5 on either half; petiole 4 - 5 cm. Flowers *ca* 4 mm across, green or orange-red, in terminal panicles. Fruits *ca* 6 mm across, purplish when ripe.

*Fl. & Fr.* : July - November.

*Specimens examined* : Litan, Mukerjee 3677; Imphal Valley, Deb 1557 (CAL).

**2. *Rubia sikkimensis*** Kurz in J. Asiat. Soc. Beng. 43 (2) : 188, 1874; Hook. f., Fl. Brit. India 3 : 203, 1881; Deb in Bull. Bot. Surv. India 3 : 313, 1961.

Stout scabrid climber. Leaves 4 in whorls, 9 - 15 × 2 - 5 cm, elliptic or ovate-lanceolate, acute or acuminate, rarely cordate, scabrid on both surfaces, nerves deeply impressed above. Cymes a large panicle, spreading, leafy; corolla rotate, lobes sub-acute. Fruits 4 mm across.

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

*Specimens examined* : Imphal Valley, Deb 1422 (CAL).

### 29. *Saprosma* Blume

***Saprosma ternatum*** (Wallich) Hook. f. in Benth. & Hook. f., Gen. Pl. 2 : 131, 1873; Hook. f., Fl. Brit. India 3 : 193, 1881; Kanjilal *et al.*, Fl. Assam 3 : 88, 1939; Deb in Bull. Bot. Surv. India 3 : 312, 1961; Malick & Safui in J. Econ. Tax. Bot. 10 : 6, 1987. *Paederia ternata* Wallich in Roxb., Fl. Ind. 2 : 520, 1824.

Glabrous shrubs or small trees, up to 12 m tall; branches pale-dark, angled. Leaves 8 - 20 × 2 - 7 cm, elliptic-oblanccolate, acuminate, cuneate at base, whorled, with foetid smell; stipules very long, lanceolate, deciduous. Flowers *ca* 1 cm long, white, in trichotomous or corymbose fascicled cymes; calyx teeth 4 - 6, triangular; corolla infundibulate. Fruits succulent, black when ripe, 1 - (2) seeded.

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

*Specimens examined* : West Manipur, C. B. Clarke s.n; Ainadhr, Malick 978 (BSIS).

### 30. *Silyanthus* Hook. f.

***Silyanthus bracteatus*** Hook. f., Icon. Pl. 11 : 36, t. 1048, 1868; Hook. f., Fl. Brit. India 3 : 86, 1880; Kanjilal *et al.*, Fl. Assam 3 : 43, 1939; Deb in Bull. Bot. Surv. India 3 : 312, 1961.

Shrubs, branches spreading. Leaves 8 - 20 × 4 - 12 cm, elliptic-obovate or lanceolate, irregular at margin, membranous, glabrous; lateral nerves 10 - 12 on each half. Flowers white, in axillary and terminal cymes; calyx acresent; corolla 5-lobed, reflexed, tube hairy within. Capsule *ca* 6 mm across, globose, with acresent sepals; seeds black with ridges & furrows.

*Fl. & Fr.* : March - December.

*Specimens examined* : West Manipur 300 m, C. B. Clarke s.n; Jirimukh, Malick 834 (BSIS).



**31. Spermacoe L.**

- 1a. Septum persistent in fruits ..... 1. *S. hispida*
- b. Septum not persistent in fruits ..... 2
- 2a. Leaves linear-lanceolate ..... 4. *S. pusilla*
- b. Leaves elliptic to obovate ..... 3
- 3a. Stamens exerted ..... 2. *S. latifolia*
- b. Stamens not exerted ..... 3. *S. ocymoides*

**1. Spermacoe hispida** L., Sp. Pl. 102. 1753; Hook. f., Fl. Brit. India 3 : 200. 1881; Verdc. in Kew Bull. 30 : 307. 1975. *S. articularis* L. f., Suppl. 119. 1781, *Borreria hispida* (L.) Schum. in Engler & Prantl. Pflanzenfam 4(4) : 144. 1891, non Spruce ex K. Schum. 1888. *B. articularis* (L. f.) Williams in Bull. Herb. Boiss. ser. 2, 5: 956. 1905.

Mani.: *Gathari*

Procumbent herbs with quadrangular stem. Leaves 1.5 - 2.2 × 0.7 - 1.2 cm, elliptic lanceolate, obovate, obtuse; stipules truncate. Flowers ca 5 mm long, pale blue, in axillary clusters. Capsules ca 2 mm across, ellipsoid, hirsute, septum persistent.

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

*Specimens examined* : Kaibul Lamjau National Park, *Chauhan* 95131 (ASSAM).

**2. Spermacoe latifolia** Aublet. Hist. Pl. Guiane Fr. 1 : 55, t. 194. 1755; Deb & Dutta in Bull. Bot. Surv. India 18 : 216. 1979. *Borreria latifolia* (Aublet) K. Schum. in Mart. Fl. Bras. 6(6) : 61. 1881. *Hedyotis heddomi* non Hook. f., 1880 : Malick & Safui in J. Econ. Tax. Bot. 10 : 5. 1987.

Perennial prostrate herbs. Stem quadrangular woody. Leaves 2.5 - 4 cm, contracted into a short flattened petiole, margin recurved when dry; stipules acute. Flowers in terminal sub-sessile capitate cymes; corolla tube & lobes hispid outside. Capsule 4- seeded.

*Fl. & Fr.* : August - December.

*Specimens examined* : Uchothoi, *Malick* 612; Langal, *Malick* 1340; Nungba, *Malick* 1137 (BSIS).

**3. Spermacoe ocymoides** Burm. f., Fl. Ind. 34, t. 13, f. 1. 1768; Hook. f., Fl. Brit. India 3 : 200. 1881; *Borreria ocymoides* (Burm. f.) DC., Prodr. 4 : 544. 1830. *Neanotis wightiana* non (Wallich ex Wight & Arn.) Lewis : Malick & Safui in J. Eco. Tax. Bot. 10 : 5. 1987.

Procumbent herbs up to 40 cm tall, stem densely pubescent, winged. Leaves sessile, 1.8 - 2.5 × 0.9 - 1.5 cm, elliptic to obovate, acute. Flowers minute, in clusters at nodes, white; stamens inserted. Capsules ca 1 cm long, oblong, glabrous.

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

*Specimens examined* : Nungba, *Malick* 1300 (BSIS).

4. *Spermacoce pusilla* Wallich in Roxb., Fl. Ind 1 : 379. 1820; Verdc. in Polhill., Fl. Trop. E. Africa (Rubiaceae) : 356. 1967; Deb & Dutta in J. Econ. Tax. Bot. 5(5) : 1057. 1984. *Borreria pusilla* (Wallich) DC., Prodr. 4 : 543. 1830. *Spermacoce stricta* non L. f. 1781; Hook. f., Fl. Brit. India 3 : 200. 1881. *Borreria stricta* non K. Schum. 1891; Kanjilal *et al.*, Fl. Assam 3 : 533. 1939; Deb in Bull. Bot. Surv. India 3 : 310. 1961.

Erect herbs or undershrubs, branches quadrate, scabrid. Leaves sub-sessile, 2 - 5 × 0.3 - 1 cm, linear to ovate, acute. Flowers ca 1.5 mm long, white in axillary and terminal heads; calyx hispid or pubescent; corolla white. Capsules ca, 2 mm long, dehiscent septically.

Fl. & Fr. : August - December.

*Specimens examined* : s. loc. Deb 2687 (CAL); Langum Hill, S. N. Bal 472; Imphal, S. N. Bal. 410; Jiribam, Malick 814 (BSIS).

### 32. *Spiradiclis* Blume

- 1a. Flowers in paniculate simple or bifid cymes;  
fruits sub-globose ca 2 mm across ..... 1. *S. bifida*
- b. Flowers 1 or 3 flowered cymes;  
fruits linear-oblong ca 4 mm across ..... 2. *S. cylindrica*

1. *Spiradiclis bifida* Kurz in J. Asiat. Soc. Beng. 2 : 311. 1872; Hook. f., Fl. Brit. India 3 : 76. 1880; Kanjilal *et al.*, Fl. Assam 3 : 41. 1939; Malick & Safui in J. Econ. Tax. Bot. 10 : 6. 1987.

Undershrubs up to 50 cm tall. Leaves 7 - 14 × 3 - 8 cm, elliptic or elliptic lanceolate, acute or shortly acuminate, cuneate at base; lateral nerves 14 - 15 pairs on each half. Flowers pale creamy, in paniculate simple or bifid, 10 - 25 cm long, cymes. Capsules ca 2 mm, sub-globose; seeds black.

Fl. & Fr. : January - December.

*Specimens examined* : Nungba, Malick 1186; Oinamlong, Malick 1258 (BSIS).

2. *Spiradiclis cylindrica* Hook. f., Fl. Brit. India 3 : 76. 1880; Kanjilal *et al.*, Fl. Assam 3 : 41. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Creeping herbs, 10 - 25 cm tall. Leaves 5 - 10 × 1 - 5 cm, elliptic or elliptic-lanceolate, acute at base, lateral nerves 10 - 12 pairs on either side. Flowers pale-purple, opening one by one, in terminal or axillary, one or three flowered cymes. Capsules ca 4 mm across, linear-oblong; seeds reddish-brown.

Fl. & Fr. : April - December.

*Specimens examined* : West manipur, C.B. Clarke s.n.

### 33. *Tarenna* Gaertn.

*Tarenna odorata* (Roxb.) Robinson in Proc. Acad. Sci. 45 : 405. 1910; Balakr., Fl. Jowai 1 : 233. 1981. *Webera odorata* Roxb., Fl. Ind. 1 : 699. 1832; Hook. f., Fl.

Brit. India 3 : 102. 1881; Kanjilal *et al.*, Fl. Assam 3 : 52, 1939. *Chomelia odorata* L., 1753; Deb in Bull. Bot. Surv. India 3 : 310, 1961.

Shrubs or small trees, 2 - 5 m tall. Leaves 9 - 18 × 2.5 - 7 cm, elliptic - lanceolate, acuminate, acute at base; stipules acute, deciduous. Flowers ca 1.3 cm long, white, fragrant, in trichotomous corymbose cymes; bracts linear; corolla tube shorter than the lobes. Berries ca 8 mm across, sub- globose, black.

*Fl. & Fr.* : August - December.

*Specimens examined* : Manipur, C. B. Clarke s.n. (Specimens not seen).

### 34. *Uncaria* Schreb.

- 1a. Peduncles bracteate at top ..... 3. *U. macrophylla*
- b. Peduncles bracteate- middle or above middle ..... 2
- 2a. Stipules much divided into 2- subulate lanceolate recurved segments ..... 1. *U. homomalla*
- b. Stipules 2 partite ..... 3
- 3a. Branchlets terete, tomentose; corolla tube with short hairs ..... 4. *U. scandens*
- b. Branchlets quadrangular, glabrous; corolla tube glabrous ..... 4
- 4a. Peduncles bracteate in middle; bracts subulate; leaf nerves with tuft of hairs ..... 5. *U. sessilifructus*
- b. Peduncles bracteate above the middle; bracts obtuse, leaves glabrous ..... 2. *U. laevigata*

1. *Uncaria homomalla* Miq., Fl. Ind. Bat. 2:343. 1857; Hook. f., Fl. Brit. India 3: 30, 1880; Kanjilal *et al.*, Fl. Assam 3: 23, 1939; Deb in Bull. Bot. Surv. India 3: 313, 1961.

Climber, branches pubescent. Leaves 6 - 10 × 2.5 - 3.5 cm, oblanceolate, acuminate, puberulous above, shortly hairy beneath; lateral nerves 6 - 8 pairs; stipules bipartite, subulate, recurved. Flowers sessile, in heads; calyx limb short, obscurely toothed.

*Fl. & Fr.* : April - February.

*Specimens examined* : Leimatak, Meebold 1082 (CAL).

2. *Uncaria laevigata* Wallich ex Hook. f., Fl. Brit. India 3 : 30, 1880; Deb in Bull. Bot. Surv. India 3 : 313, 1961.

Climbing shrubs with 4- angled branches. Leaves elliptic- lanceolate, glabrous, shining above; lateral nerves 5 - 6 pairs; stipules bifid; bracts broad oblong. Inflorescence terminal and axillary; calyx obscurely toothed; corolla glabrous. Capsules sessile.

*Fl. & Fr.* : October - April.

*Specimens examined* : Manipur Valley, G. Watt 7294; s.l., Meebold 9192; s.l., Deb 76 (CAL).

3. *Uncaria macrophylla* Wallich in Roxb., Fl. Ind. 2 : 132. 1824; Hook. f., Fl. Brit. India 3 : 32. 1880; Kanjilal *et al.*, Fl. Assam 3 : 23. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Large woody climber. Leaves 9 - 20 × 4 - 9 cm, obovate lanceolate, elliptic, rounded or acute, cuncate at base, rusty tomentose. Heads 4 - 5 cm across, simple or paniced. Capsules linear-ellipsoid, crowned by persistent calyx, rusty tomentose.

Fl. & Fr. : September - January.

*Specimens examined* : Jirighat, Meebold 5686 (CAL.); Nungba, Malick 1176 (BSIS).

4. *Uncaria scandens* (Smith) Hutch. in Sarg. Pl. Wils. 3 : 406. 1916; Hara & Williams in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 208. 1979. *Nauclea scandens* Smith in Rees, Cyclop. 24 : Nauclea n. 9. 1819. *Uncaria pilosa* Roxb., Fl. Ind. 2 : 130. 1824; Hook. f., Fl. Brit. India 3 : 32. 1880; Kanjilal *et al.*, Fl. Assam 3 : 23. 1939; Malick & Safui in J. Econ. Tax. Bot. 10 : 6. 1987.

Straggling or climbing shrubs. Leaves 5 - 15 × 2 - 8 cm, ovate or elliptic, acuminate, sub cordate or rounded at base, hirsute; lateral nerves 8 - 10 on either half. Flowers light green to dull yellow-scented, in axillary pedunculate heads; calyx segments linear, pubescent; corolla yellow. Capsules clavate.

Fl. & Fr. : August - December.

*Specimens examined* : Nungba, Malick 1254 (BSIS).

5. *Uncaria sessilifructus* Roxb., Fl. Ind. 1 : 520. 1820; Hook. f., Fl. Brit. India 3 : 30. 1880; Kanjilal *et al.*, Fl. Assam 3 : 24. 1939.

Extensive climbers, branchlets quadrangular. Leaves 3.5 - 12.5 × 2 - 7 cm, elliptic-ovate, elliptic-orbicular, abruptly acuminate, rounded at base. Flowers white, in heads; corolla ca 1.5 cm long, tubular with spreading limb. Fruiting heads ca 3.5 cm in diam. Capsules sessile, 0.5 - 1.3 cm long, ellipsoid or club-shaped, tomentose, crowned by calyx lobes.

Fl. & Fr. : September - April.

*Specimens examined* : Kongpokpi, Malick 1367 (BSIS); Litan, Chauhan 94656 (ASSAM).

### 35. *Wendlandia* Bartl. ex DC. *nom. cons.*

- |     |   |                        |
|-----|---|------------------------|
| 1a. | Corolla lobes short, less than twice the length of tube .....           | 2                      |
| b.  | Corolla lobes twice or more longer than the tube .....                  | 3                      |
| 2a. | Stipules persistent; calyx hairy; corolla lobes shorter than tube ..... | 5. <i>W. puberula</i>  |
| b.  | Stipules caducous; calyx glabrous; corolla lobes longer than tube ..... | 7. <i>W. wallichii</i> |
| 3a. | Calyx glabrous .....  | 4                      |
| b.  | Calyx pubescent .....   | 5                      |

- 4a. Lateral veins with tuft of hairs at the axils; calyx teeth minute; stipules much broader than long ..... 1. *W. glabrata*
- b. Lateral veins puberulous; calyx teeth longer than or equalling the tube; stipules inconspicuous ..... 1. *W. pendula*
- 5a. Corolla lobes less than half the length of tube ..... 3. *W. paniculata*
- b. Corolla lobes more than half the length of tube ..... 6
- 6a. Shrubs; calyx tubes ovate, stigma bifid ..... 2. *W. grandis*
- b. Trees; calyx tubes oblong; stigma oblong ..... 6. *W. tinctoria*

**1. *Wendlandia glabrata* DC.**, Prodr. 4 : 411. 1830; Hook. f., Fl. Brit. India 3 : 39. 1880; Kanjilal *et al.*, Fl. Assam 3 : 34. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Small trees with spreading branches. Leaves 9 - 18 × 2 - 6 cm, ovate-lanceolate, elliptic - lanceolate, acuminate, base cuneate, often reddish brown beneath; lateral nerves with tuft of hairs at the axils; stipules much broader than long. Flowers ca 6 mm long, yellowish-white, in 20 cm long paniculate cymes; calyx lobes triangular; corolla lobes spreading. Capsules ca 2 mm in diam., globose.

*Fl. & Fr.* : February - June.

*Specimens examined* : Imphal Valley, Deb 1585 (CAL).

**2. *Wendlandia grandis* (Hook. f.) Cowan.** in Notes Roy. Bot. Gard. Edinb. 16 : 261. t. 233. f. 1932; Kanjilal *et al.*, Fl. Assam 3 : 36. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961. *W. tinctoria* DC. var. *grandis* Hook. f., Fl. Brit. India 3 : 38. 1880

Trees 8 - 15 m tall. Leaves 11 - 22 × 5 - 10 cm, obovate-elliptic or ovate-elliptic, acuminate, base narrowed, puberulous along nerves beneath. Flowers ca 4.5 cm long with narrow tube, in paniced cymes up to 25 cm long; calyx densely villous. Capsules ca 4 mm across.

*Fl. & Fr.* : January - August.

*Specimens examined* : Manipur 1200 m, Deb 706 (CAL).

**3. *Wendlandia paniculata* DC.**, Prodr. 4 : 411. 1830; Hook. f., Fl. Brit. India 3 : 39. 1880; Kanjilal *et al.*, Fl. Assam 3 : 34. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Trees, up to 3 m tall. Leaves 5 - 15 × 3 - 6 cm, elliptic, ovate or oblanceolate, acuminate, cuneat at base, scabrous above, pubescent beneath; stipules recurved. Flowers ca 4 mm long, white, in up to 25 cm long paniced cymes; calyx hairy; corolla lobes reflexed. Capsule ca 4 mm in diam.

*Fl. & Fr.* : July - December.

*Specimens examined* : Poishing, G. Wall 673; Mantripukhari, Deb 1983 (CAL); Nungba to Bishenpur, Malick 1209 (BSIS).

4. *Wendlandia pendula* (Wallich) DC., Prodr. 4 : 412. 1830; Hook. f., Fl. Brit. India 3 : 41. 1880; Deb in Bull. Bot. Surv. India 3 : 313. 1961. *Rondeletia pendula* Wallich in Roxb., Fl. Ind 2 : 140. 1824.

Mani.: *Pheija-manbi*

Shrubs with slender branches. Leaves sessile, 3-nately whorled, 7.5 - 12 × 3.7 cm, ovate or ovate-lanceolate, obtusely acuminate, puberulous on the nerves beneath; lateral nerves 6 - 7 pairs on either half; stipules inconspicuous. Flowers clustered; calyx glabrous; corolla lobes oblong.

Fl. & Fr. : October - April.

Specimens examined : Nungba, G. Watt 6671 (CAL).

5. *Wendlandia puberula* DC., Prodr. 4 : 412. 1830; Hook. f., Fl. Brit. India 3 : 37. 1880; Hara & Gould in Hara *et al.*, Enum. Fl. Pl. Nepal 2 : 208. 1979. *W. scabra* Kurz in J. Asiat. Soc. Beng. 41 (2) : 310. 1873; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Small trees. Leaves 10 - 15 × 5 - 8 cm, elliptic-membranous, nearly glabrous; lateral nerves 10 - 12 pairs on each half; stipules variable, persistent. Panicles pubescent.

Fl. & Fr. : February - August.

Specimens examined : Imphal Valley, G. Watt 6507, 7319; Deb 360 (CAL).

6. *Wendlandia tinctoria* (Roxb.) DC., Prodr. 4 : 411. 1830; Hook. f., Fl. Brit. India 3 : 38. 1880; Kanjilal *et al.*, Fl. Assam 3 : 33. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961. *Rondeletia tinctoria* Roxb., Fl. Ind 2 : 134. 1824. *Wendlandia tinctoria* (Roxb.) DC. var. *normalis* Hook. f., Fl. Brit. India 3 : 38. 1880.

Shrubs, up to 4 m tall. Leaves 8 - 20 × 3 - 8 cm, elliptic or ovate-lanceolate, acute to short acuminate, cuneate at base; lateral nerves 8 - 10 pairs; stipules subulate, erect. Flowers ca 4 mm long, white, in terminal panicles up to 20 cm long. Capsules ca 2 mm across, globose.

Fl. & Fr. : December - May.

Specimens examined : Nungba 1500m, Meebold 5492 (CAL)

7. *Wendlandia wallichii* Wight & Arn., Prodr. 402. 1834; Hook. f., Fl. Brit. India 3 : 38. 1880; Kanjilal *et al.*, Fl. Assam 3 : 33. 1939; Deb in Bull. Bot. Surv. India 3 : 313. 1961.

Shrubs or small trees up to 7 m tall. Leaves 6 - 15 × 2 - 8 cm, elliptic-lanceolate, ovate-elliptic or elliptic, acute or acuminate; lateral nerves 10 - 12 pairs on each half; stipules recurved, early caducous. Flowers ca 4 mm long, white in terminal lax or dense paniculate cymes; calyx glabrous; corolla lobes usually reflexed. Capsules ca 2 mm across, sub-globose.

Fl. & Fr. : September - January.

Specimens examined : Manipur Valley, G. Watt 6043; Meebold 5489; Deb 1419, 2164 (CAL).

**100. VALERIANACEAE**

Bastsch, Tab. Alfin. Regni. Veg. 227. 1802.

(A. S. Chauhan)

**PATRINIA** Juss. *non. cons.*

**Patrinia monandra** C.B. Clarke in Hook. f., Fl. Brit. India 3:210. 1881; Deb in Bull. Bot. Surv. India 3 : 329. 1961.

Erect perennial herbs, stems *ca* 1m. tall, pubescent. Leaves 1 -2 pinnatifid; apical lobes linear - oblong or oblong, crenate - serrate, sparsely pubescent. Flowers small, yellow, in 30 - 40 cm. long corymbosely panicled cymes; calyx rudimentary or wanting; petals *ca* 2mm long, unequal 5 - lobed, yellow; bracteoles *ca* 5mm long; broad, beautifully veined; ovary 3 - celled; stigma peltate. Fruits small, 3 - celled, 1 - seeded.

*Fl. & Fr.* : July - September

*Specimens examined* : North Manipur, C.B. Clarke s.n (Specimens not seen).

**101. DIPSACACEAE**

A. L. Jussieu, Gen. Pl 194. 1789

("Dipsacae").

(A. S. Chauhan)

**DIPSACUS** L.

**Dipsacus asper** Wallich ex DC., Prodr. 4 : 646. 1830; C.B. Clarke in Hook. f., Fl. India 3 : 218. 1881; Kanjilal *et al.*, Fl. Assam 3 : 98, 1939; Deb in Bull. Bot. Surv. India 3 : 329. 1961; Balakr., Fl. Jowai 1 : 254. 1981.

Erect stout, prickly perennial herbs up to 1.5m tall. Leaves opposite, simple or lower ones pinnatifid, 8 - 20 × 2 - 8 cm, ovate - oblong, pilose on both surfaces. Flowers white or pale purple, solitary or in clusters of *ca* 2cm diam., sub-globose heads; bracteoles obovate - lanceolate, ciliate. Achenes 8 - ribbed, crowned by epicalyx.

*Fl. & Fr.* : September - December.

*Specimens examined* : North Manipur, C.B. Clarke (Specimens not seen).

## 102. ASTERACEAE

Dumort., Comment. Bot. 55. 1822 ("Asteraceae") - Nom. alt. :

Compositae

(D.K.Singh)

1a.	Heads with all flowers similar .....	2
b.	Heads with disc flowers tubular and ray flowers ligulate .....	27
2a.	Heads with all flowers tubular .....	3
b.	Heads with all flowers ligulate .....	20
3a.	Trees .....	44. <i>Leucomeris</i>
b.	Herbs, shrubs or small trees .....	4
4a.	Heads homogamous .....	5
b.	Heads heterogamous .....	17
5a.	Pappus hairs present or absent .....	6
b.	Pappus hairs always present .....	12
6a.	Anthers cleft at base .....	7
b.	Anthers sub entire at base; style arm obtuse, papillose .....	9
7a.	Heads 1 to few-flowered, .....	26. <i>Elephantopus</i>
b.	Heads many flowered .....	8
8a.	Herbs; involucre sub campanulate; achenes 4-6-ribbed .....	30. <i>Ethulia</i>
b.	Herbs, shrubs, climbers or small trees; involucre ovoid-globose; achenes 10-ribbed .....	59. <i>Vernonia</i>
9a.	Twining herbs .....	46. <i>Mikania</i>
b.	Erect herbs or shrubs .....	10
10a.	Anthers truncate with glandular tips .....	2. <i>Adenostemma</i>
b.	Anthers appendaged .....	11
11a.	Involucre non campanulate; bracts 2-3 seriate, .....	3. <i>Ageratum</i>
b.	Involucre non campanulate; bracts multiseriate .....	31. <i>Eupatorium</i>
12a.	Receptacles always flat .....	13
b.	Receptacles either flat or convex .....	16
13a.	Receptacles naked .....	27. <i>Emilia</i>
b.	Receptacles pitted, fimbriate, bristled or paleaceous .....	14
14a.	Leaf margins entire, toothed or pinnatisect .....	35. <i>Gynura</i>
b.	Leaf margins spinescent or ciliate .....	15
15a.	Involucral bracts appendaged ; pappus paleaceous .....	14. <i>Carthamus</i>
b.	Involucral bracts nonappendaged; pappus plumose .....	17. <i>Cirsium</i>
16a.	Leaves petioled; involucral	



	bracts hoary; receptacle bristles shorter than pappus .....	49. <i>Saussurea</i>
b.	Cauline leaves sessile; involucre bracts glabrous; receptacle bristles longer than pappus .....	37. <i>Hemistepta</i>
17a.	Leaves alternate .....	18
b.	Leaves opposite or radical .....	19
18a.	Female flowers apetalous; receptacle paleaceous .....	60. <i>Xanthium</i>
b.	Female flowers 2-3 toothed; receptacle naked .....	7. <i>Artemisia</i>
19a.	Leaves opposite, toothed; involucre campanulate or hemispheric; receptacle paleaceous .....	51. <i>Siegesbeckia</i>
b.	Leaves radical, pinnatifid; involucre broad and short; receptacle naked .....	15. <i>Chrysanthemum</i>
20a.	Plants with white, milky latex .....	21
b.	Plants with watery, yellow juice .....	24
21a.	Involucral bracts biseriate .....	22
b.	Involucral bracts multiseriate .....	23
22a.	Capitula 3-6 mm in diam.; achenes elliptic-lanceolate, pale red .....	39. <i>Ixeris</i>
b.	Capitula up to 15 mm diam.; achenes oblanceolate, black .....	41. <i>Lactuca</i>
23a.	Leaves strictly rosulate; capitula up to 0.6 cm diam. ....	61. <i>Youngia</i>
b.	Leaves alternate or radical; capitula up to 2 cm in diam. ....	52. <i>Sonchus</i>
24a.	Plants with simple roots .....	4. <i>Ainsliaea</i>
b.	Plants with tuberous rootstock .....	25
25a.	Leaves alternate and radical; involucre bracts biseriate .....	16. <i>Cicerbita</i>
b.	Leaves always radical; involucre bracts multiseriate .....	26
26a.	Plants silky tomentose; leaves elliptic-ovate; heads heterogamous .....	48. <i>Piloselloides</i>
b.	Plants glabrous herbs; leaves oblong-spathulate; heads homogamous .....	43. <i>Lantana</i>
27a.	Plants with strictly homogamous or heterogamous heads .....	28

b.	Plants with both homogamous and heterogamous heads. ....	52
28a	Plants with homogamous heads. ....	29
b.	Plants with heterogamous heads. ....	31
29a	Leaves sessile, oblanceolate spatulate. .... 1. <i>Acanthospermum</i>	
b.	Leaves petiolate, oblong ovate. ....	30
30a	Leaves spirally arranged; involucre bracts 2-3 serrate; flowers yellow. .... 6. <i>Anisopappus</i>	
b.	Leaves alternate; involucre bracts multiseriata; flowers white-pale green. .... 47. <i>Myriactis</i>	
31a.	Plants strictly herbaceous. ....	32
b.	Plants shrubs or undershrubs. ....	51
32a.	Perennial herbs. ....	33
b.	Annual herbs. ....	38
33a.	Receptacles paleaceous. .... 58. <i>Tridax</i>	
b.	Receptacles naked. ....	34
34a.	Heads disciform; involucre campanulate. ....	35
b.	Heads radiate; involucre hemispheric. ....	36
35a.	Plants cottony, woolly, pubescent or glabrate; heads corymbose; involucre bracts multiseriata. .... 5. <i>Anaphalis</i>	
b.	Plants villous; heads terminal; leaf opposed; involucre bracts few-seriate. .... 34. <i>Cirangea</i>	
36a.	Plants rhizomatous; ray flowers multiseriata. .... 29. <i>Triglochin</i>	
b.	Plants rhizomatous; ray flowers 1-2-seriate. ....	37
37a.	Stems grooved, strigose; glabrescent; involucre bracts multiseriata; receptacle flat. .... 8. <i>Aster</i>	
b.	Stems striate, hispidate; scabrous or glabrous; involucre bracts few-seriate; receptacle convex-conical. .... 40. <i>Kalimeris</i>	
38a.	Heads radiate. ....	39
b.	Heads discoid. ....	42
39a.	Leaves opposite or alternate; receptacles convex, scaly. .... 10. <i>Blainvillea</i>	
b.	Leaves strictly opposite; receptacles flat-conical elongated, palaeaceous. ....	40

- 40a. Leaves sessile; involucre  
comprising only 4-bracts in  
two opposite pairs; pappus absent ..... 28. *Enhydra*
- b. Leaves petioled; involucre  
campanulate or hemispheric; pappus present ..... 41
- 41a. Plants strigose or hirsute;  
involucre campanulate; receptacle flat ..... 25. *Eclipta*
- b. Plants hispid or glabrous; involucre  
hemispheric; receptacle  
conical to elongate ..... 32. *Galinsoga*
- 42a. Receptacles pitted or fimbriate ..... 19. *Conyza*
- b. Receptacles always naked ..... 43
- 43a. Pappus present ..... 44
- b. Pappus absent ..... 49
- 44a. Involucre campanulate; bracts multiseriate ..... 45
- b. Involucre hemispheric; bracts sub 2-seriate ..... 48
- 45a. Plant parts pubescent tomentose;  
anther base sagittate ..... 46
- b. Plant parts glabrous -puberulous;  
anther base truncate or subentire ..... 47
- 46a. Style arms flattened or almost  
filiform; achenes small, subterete, angled;  
pappus white ..... 11. *Blumea*
- b. Style arms truncate or capitate;  
achenes oblong -obvoid;  
not ribbed; pappus yellow ..... 33. *Cnaphalium*
- 47a. Heads always paniced; flowers  
golden yellow ..... 12. *Blumeopsis*
- b. Heads sparsely paniced; flowers  
purple ..... 42. *Laggera*
- 48a. Plants pubescent; receptacles  
obovoid; flowers yellow -green ..... 24. *Dichrocephala*
- b. Plants glabrous; flowers yellow;  
receptacles flat ..... 57. *Thespis*
- 49a. Erect, aromatic herbs; outer  
flowers multiseriate ..... 22. *Cyathochme*
- b. Spreading -procumbent herbs;  
outer flowers 1-2-seriate ..... 50
- 50a. Plants glabrous; involucre  
hemispheric or campanulate;  
anther base obtuse, entire ..... 21. *Cotula*

- b. Plants tomentose villous;  
involucres narrow, anther base  
sagittate ..... 53. *Sphaeranthus*
- 51a. Leaves radical and alternate;  
heads radiate: receptacles flat  
or tumid, pitted to aereolate;  
style arms linear ..... 38. *Inula*
- b. Leaves alternate: heads  
disciform: receptacles flat.  
naked; style arms flattened ..... 45. *Microglossa*
- 52a. Annual herbs; leaves opposite;  
involucral bracts 2 seriate;  
receptacles paleaceous ..... 53
- b. Plants herbs, shrubs or climbing  
undershrubs; leaves alternate  
and radical: involucral bracts  
1 seriate: receptacles naked ..... 54
- 53a. Heads corymbosely paniced; ray  
flowers present or absent;  
receptacles flat ..... 9. *Bidens*
- b. Heads solitary; ray flowers  
present: receptacles elongate  
convex ..... 54. *Spilanthes*
- 54a. Heads turbinate or obconic ..... 52. *Senecio*
- b. Heads campanulate ..... 55
- 55a. Twining, arancose shrubs: leaves  
ovate - cordate or trilobate;  
involucral bracts glabrous ..... 18. *Cissampelos*
- b. Woody climbers or erect shrubs;  
leaves elliptic oblong,  
lanceolate: involucral bracts  
scarious tomentose ..... 55. *Synotis*

### 1. *Acanthospermum* Schrank

*Acanthospermum hispidum* DC., Prodr. 5 : 522. 1836 ; Deb in Bull. Bot. Surv. India 3 : 229. 1961 ; Kitam, in Fl. E. Himal. 329. 1966 ; Chowdhery in Hajra *et al.*, Fl. India 12 : 361. 1995, *Acanthospermum australe sensu* Raizada & Sharma in Ind. For. 88 (5) : 364. 1962 (*non*. Kuntze) ; Singh in Curr. Sci. 42 (2) : 68. 1973.

Erect, hirsute, divaricate herbs, 10 - 50 cm high ; stem sulcate. Leaves sessile subsessile, l 8 × 0.5 - 4.5 cm, elliptic, oblanceolate or obovate spatulate, cuneate - attenuate at base, margins serrulate to subdentate, none-obtuse, 3

nerved. Capitulum solitary, terminal or on deflexed peduncles in the axil of leaf, 0.5 - 2.5 cm in diam. ; involucre bracts 5 - seriate, ovate - elliptic, pubescent with ciliate margins ; flowers yellow ; ray florets uniseriate, disc florets tubular. Pappus absent.

*Fl. & Fr.* : July - May.

*Specimens examined* : Imphal valley, *Deb* 578, 2475 (CAL).

## 2. *Adenostemma* J. R. Forster & J. G. Forster

*Adenostemma lavenia* (L.) Kuntze, *Rev. Gen. Pl.* 1 : 304, 1891 ; *Deb* in *Bull. Bot. Surv. India* 3 : 329, 1961 ; Balakr., *Fl. Jowai* 1 : 259, 1981 ; Uniyal in *Hajra et al.*, *Fl. India* 12 : 346, 1995. *Verbesinia lavenia* L., *Sp. Pl.* 902, 1753. *Adenostemma viscosum* Forster, *Char. Gen.* 90, 1760 ; Hook. f., *Fl. Brit. India* 3 : 242, 1881.

Annual or perennial herbs ; plants 25 - 80 cm, erect or decumbent, glabrous or glutinose - pubescent. Leaves sessile or petiolate, upper ones alternate, lower opposite, 2.5 - 15 × 1 - 10 cm, linear to broadly oblong - ovate or elliptic, obtuse to attenuate at base, acute to acuminate, margins serrate. Capitulum terminal in corymbose panicles, 0.5 - 0.8 × 0.4 - 0.7 cm ; involucre bracts biseriate, oblong, obtuse - acute, glandular, glabrous or more or less scabrous ; flowers white. Achenes subtriangular, ribbed, pappus clavate.

*Fl. & Fr.* : March - January.

*Specimens examined* : Imphal valley, *Deb* 1163 (CAL).

## 3. *Ageratum* L.

*Ageratum conyzoides* L., *Sp. Pl.* 839, 1753 ; Hook. f., *Fl. Brit. India* 3 : 242, 1881 ; *Deb* in *Bull. Bot. Surv. India* 3 : 329, 1961 ; Balakr., *Fl. Jowai* 1 : 238, 1981 ; Uniyal in *Hajra et al.*, *Fl. India* 12 : 348, 1995.

Mani. : *Khongjainapi*.

Annual, hispidate, aromatic herbs, 20 - 100 cm, branches subterete, finely striate. Leaves petiolate, opposite (occasionally alternate above), 2.5 - 8 × 1 - 5 cm, rhomboid obovate - rhomboid, cuneate at base, obtuse to acute, margins crenate or crenate - serrate. Capitulum in terminal, dense, corymbose panicles 0.35 - 0.75 cm in diam. ; involucre bracts 2 - 3 - seriate, acute. Flowers tubular, homogamous ; ray florets pale blue, violet or white. Achenes black, 5 - angled ; pappus 5 - awned.

*Fl. & Fr.* : October - February.

*Specimens examined* : Imphal valley, *Deb* 178, 334 (CAL).

## 4. *Ainsliaea* DC.

1a. Annual, small herbs ; leaves oblanceolate, attenuated towards base ; petiole not

winged ..... 1. *A. angustifolia*

- b. Perennial, tall herbs ; leaves ovate cordate abruptly narrowed towards base; petioles broadly winged ..... 2. *A. latifolia*

1. *Ainsliaea angustifolia* Hook. f. & Thomson ex C. B. Clarke in J. Linn. Soc. 14 : 412, 1875 ; Hook. f., Fl. Brit. India 3 : 388, 1881 ; Deb in Bull. Bot. Surv. India 3 : 329, 1961 ; Rao in Hajra *et al.*, Fl. India 13 : 165, 1995.

Small, annual herbs ; plants sparsely hairy, 6.5 - 36 cm high. Leaves petiolate, alternate, oblanceolate to spatulate, 2.5 - 7.5 x 0.5 - 1.8 cm, gradually narrowed into long petiole, laxly denticulate, acute. Capitulum in compound racemes ; involucrel bracts multiseriate, subulate, purple or purplish- yellow; flowers chocolate - brown; corolla tubular. Achenes obscurely ribbed ; pappus as long as achenes, brown.

Fl. & Fr. : September - May.

Specimens examined : Mao, 1800 m, Deb 1762 (CAL).

2. *Ainsliaea latifolia* (D. Don) Schultz - Bip. in Pollichia 18, 19 : 190, 1861; Balakr., Fl. Jowai 1 : 264, 1981 ; Rao in Hajra *et al.*, Fl. India 13 : 167, 1995. *Liatris latifolia* D. Don, Prodr. Fl. Nep. 169, 1825. *Ainsliaea pteropoda* DC., Prodr. 7 : 14, 1838; Hook. f., Fl. Brit. India 3 : 388, 1881; Deb in Bull. Bot. Surv. India 3 : 329, 1961.

Perennial, scapigerous herbs ; plants more or less tomentose; erect, 0.3 -1.5 m tall. Leaves rosetted towards base, petiolate, 4-8 x 2.5 - 6 cm, cordate or ovate, white tomentose beneath, abruptly narrowed into a broadly winged petiole, acute, margins laxly crenate, distal leaves alternate, sessile. Capitulum in spikes or elongated paniced racemes, 5-7 -flowered, involucrel bracts multiseriate, linear, reddish- green. Flowers homogamous, pink, purple or white. Achenes oblanceolate, silky; pappus uniseriate, brown.

Fl. & Fr. : March - December.

Specimens examined : Mao, 1800, Deb 1761 (CAL) ; Ukhrul, Chauhan 84921 (ASSAM).

### 5. *Anaphalis* DC.

- 1a. Leaves 3-nerved, glabrous above ..... 4. *A. margaritacea*  
 b. Leaves 1 - nerved, pubescent above ..... 2  
 2a. Plants clothed with white silky wool;  
 leaves broadly elliptical ..... 1. *A. adnata*  
 b. Plants not clothed with silky wool;  
 leaves linear lanceolate ..... 3  
 3a. Involucrel bracts obovate spatulate ..... 2. *A. hirsuta*  
 b. Involucrel bracts broadly ovate  
 oblong. .... 3. *A. contorta*

1. *Anaphalis adnata* DC., Prodr. 6 : 274, 1838 ; Hook. f., Fl. Brit. India 3 : 282, 1881 ; Balakr., Fl. Jowai 1 : 276, 1981 ; Malik & Safui in J. Econ. Tax. Bot. 10 : 6, 1987 ; Pant in Hajra *et al.*, Fl. India 13 : 53, 1995.

Stout, woolly herbs or undershrubs, 0.6 - 1.2 m high. Leaves sessile, coriaceous, 2 - 15 × 0.5 - 3 cm, oblong - lanceolate to broadly elliptic, acute to subacute, base semiamplexicaul, margins entire, recurved. Capitulum in terminal or axillary clusters, subglobose - globose, 0.5 - 1.5 cm in diam.; involucre bracts ovate ; florets pale white to light yellow. Achenes very small, black ; pappus white.

Fl. & Fr. : August - February.

*Specimens examined* : Celjang, Malick 1451 (BSIS) ; Litan, Chauhan 94671 ; Ukhrul, Chanthan 94987 (ASSAM).

2. *Anaphalis busua* (Buch. - Ham. ex D. Don) DC., Prodr. 6 : 275, 1838 ; Pant in Hajra *et al.*, Fl. India 13 : 57, 1995. *Gnaphalium busuam* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 173, 1825. *Anaphalis araneosa* DC., Prodr. 6 : 275, 1838 ; Hook. f., Fl. Brit. India 3 : 283, 1881 ; Deb in Bull. Bot. Surv. India 3 : 329, 1961.

Large, annual herbs or undershrubs, 0.3 - 0.7 (1.2 - 1.5) m high, plants usually much branched. Leaves alternate, sessile, white and cottony beneath, 2.5 - 7 × 0.15 - 0.8 cm, linear - lanceolate, elliptical, base decurrent, acute, margins entire, recurved. Capitula in terminal paniced corymbs, globose-subglobose, 0.2 - 0.5 cm in diam.; involucre bracts 2 - 3 seriate, elliptic, obovate - spatulate, obtuse ; florets pale white or yellow. Pappus white.

Fl. & Fr. : April - March.

*Specimens examined* : s. loc., Deb 356 (CAL).

3. *Anaphalis contorta* (D. Don) Hook. f., Fl. Brit. India 3 : 284, 1881 ; Kitam. in Fl. Enum. Himal. 2 : 132, 1971 & 3 : 110, 1975 ; Balakr., Fl. Jowai 1 : 276, 1981 var. *contorta*. *Antemaria contorta* D. Don in Bot. Reg. 7 : t. 605, 1821 & Prodr., Fl. Nep. 175, 1825 ; Pant in Hajra *et al.*, Fl. India, 13 : 59, 1995.

Stout or slender herbs or undershrubs, 0.25 - 0.9 m high ; branches prostrate or decumbent, often clustered. Leaves sessile, alternate, silvery on the under surface, 0.5 - 2.8 × 0.1 - 0.5 cm, linear - lanceolate, base semiamplexicaul or auricled ; margins entire, recurved, acute to subacute. Capitulum terminal in simple or lobed corymbose clusters, globose, 0.4 - 0.8 cm diam. ; involucre bracts multiseriate, oblong to broadly ovate, obtuse, white, yellow or purple, glistening ; florets yellowish or yellowish brown. Pappus white.

Fl. & Fr. : April - March.

*Specimens examined* : North Manipur, Deb, s. n.

4. *Anaphalis margaritacea* (L.) Benth. in Benth. & Hook. f., Gen. Pl. 2 : 303, 1873 ; Rao *et al.*, in Fl. Ind. Enum. Ast. 4, 1988 ; Pant in Hajra *et al.*, Fl. India 13 : 68, 1995. *Gnaphalium margaritaceum* L., Sp. Pl. 850, 1753. *Anaphalis tinivua* D. Don, Prodr. Fl. Nepal 174, 1825 ; Balkar., Fl. Jowai 1 : 276, 1981. *Anaphalis*

*cinnamomea* C.B. Clarke. Comp. Ind. 104, 1876; Hook. f., Fl. Brit. India 3 : 281, 1881; Kanjilal *et al.*, Fl. Assam 3 : 114, 1939; Deb in Bull. Bot. Surv. India 3 : 329, 1961.

Erect herbs, 0.3 - 0.75 (-1.2) m high; stems clothed with white hairs. Leaves alternate, sessile, 4 - 11 × 0.5 - 1.7 cm, elliptic, lanceolate - falcate, acuminate, margins entire, undersurface, greyish, densely covered with white or grey wool, base semiamplexicaul or auricled. Capitulum in terminal paniced corymbs, white, globose. 0.6 - 1 cm in diam; involucre bracts multiseriata, elliptic - ovate, scarious, outermost woolly, ray florets fertile, disc florets sterile. Achenes linear - oblong.

Fl. & Fr. : August - February.

Specimens examined : Imphal valley. Deb 2036 (CAL).

#### 6. *Anisopappus* (L.) Hook. & Arnot.

*Anisopappus chinensis* (L.) Hook. & Arnot, Bot. Beech. Voy. 196, 1837; Deb in Bull. Bot. Surv. India 3 : 330, 1961; Kumar in Hajra *et al.*, Fl. India 13 : 4, 1995  
*Verbesina chinensis* L., Sp. Pl. 901, 1753. Fig. 72

Erect, laxly branched, herbs, 25 - 60 cm high; plants succulent. Leaves spirally aranged or alternate, pinnately nerved, 1 - 7 × 0.4 - 2.5 cm, oblong - ovate to lanceolate, narrowed at base, apex obtuse, margins crenulate. Capitula in terminal, long-peduncled corymbs, globose, 0.8 - 1.5 cm diam.; involucre bracts 2 - 3 - seriata, pubescent. Flowers yellow, tubular; ray florets ligulate. Achenes ribbed; pappus bristles slender, filiform.

Fl. Fr. : August - March.

Specimens examined : North Manipur, C.B. Clarke 41930, 41965, 41985 (CAL).

#### 7. *Artemisia* L.

- 1a. Capitulum homogamous; all florets fertile ..... 2. *A. maritima*
- b. Capitulum heterogamous: florets fertile or sterile ..... 2
- 2a. Stems grooved; leaves sessile, glabrous or glabrescent beneath; involucre glabrescent; disc florets sterile ..... 1. *A. japonica*
- b. Stem not grooved; leaves petiolate, white tomentose beneath or hairy on both surfaces; involucre pubescent; disc florets fertile ..... 3. *A. nilagirica*

1. *Artemisia japonica* Thunb., Fl. Jap. 310, 1784; Naithani in Hajra *et al.*, Fl. India 12 : 28, 1995. *A. parviflora* Roxb., Fl. Ind. 3 : 420, 1832; Kanjilal *et al.*, Fl. Assam 3 : 119, 1939; Deb in Bull. Bot. Surv. India 3 : 330, 1961.

Mani: *Leihakngou*.



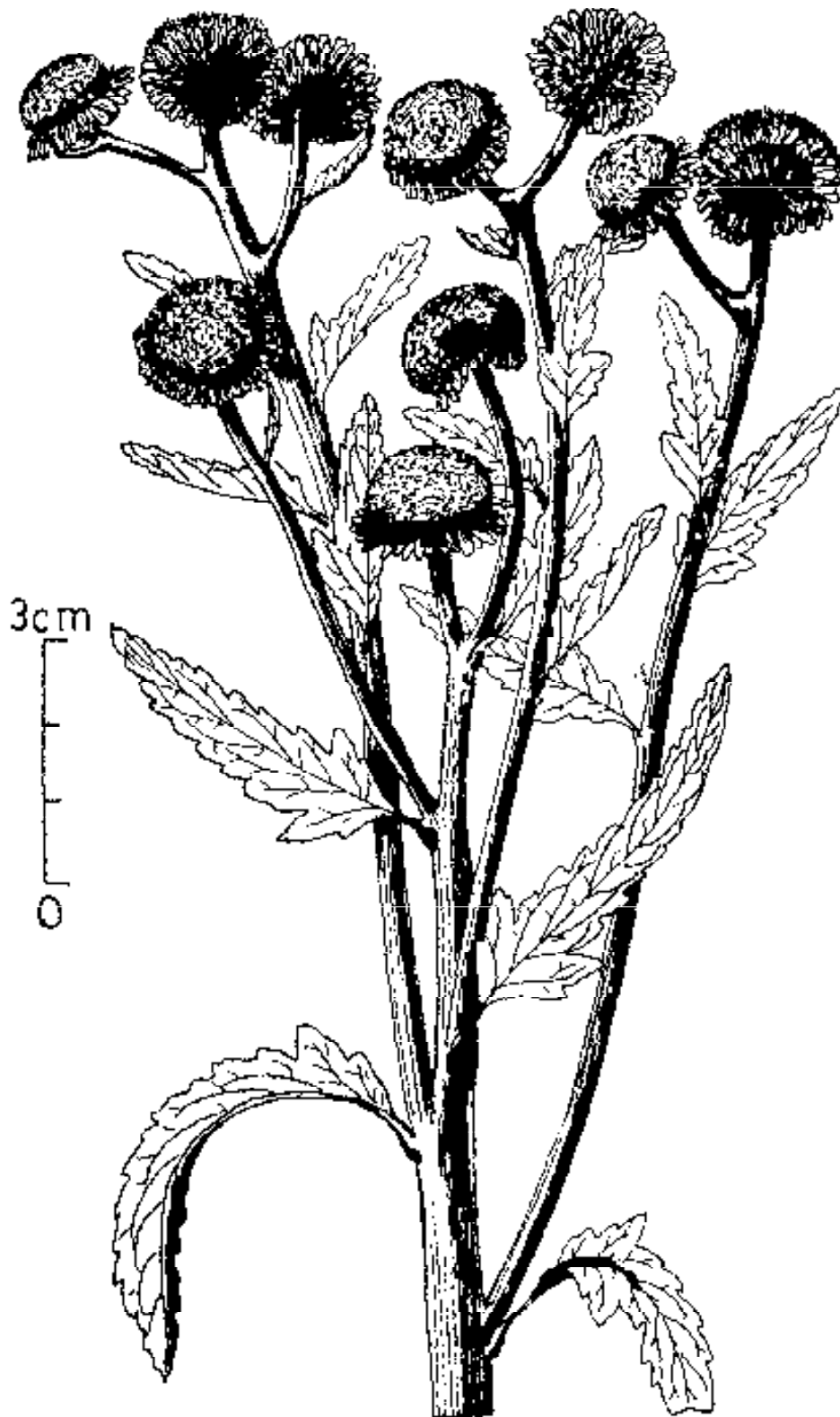


Fig. 72 : A flowering branch of *Antropappus chinensis* (L.) Hook. & Arnt.

Erect, inodorous, annual or perennial herbs or undershrubs, upto 1 (-5) m high; plants villous or glabrescent, stems paniculately branched. Leaves sessile, alternate, 1.5 - 4 × 0.1 - 0.9 cm, linear - cuneate, cuneate, apex acute or 2 - 5 toothed or lobed, sometimes lacerated, margins entire. Capitulum peduncled, in terminal or axillary racemes, 0.15 - 0.4 cm in diam.; flowers light yellow, involucrel bracts uniseriate, few, broadly oblong - ovate with scarious margins. Achenes minute, ellipsoid, smooth, brown.

*Fl. & Fr.* : August - February.

*Specimens examined* : Saprmentia, Deb 1147 (CAL).

Plants are medicinally used for curing sores in mouth.

2. *Artemisia maritima* L., Sp. Pl. 846, 1753 : C.B. Clarke, Comp. Ind. 159, 1876; Hook. f., Fl. Brit. India 3 : 323, 1881; Deb in Bull. Bot. Surv. India 3 : 330, 1961; Naithani in Hajra *et al.*, Fl. India 12 : 31, 1995.

Mani.: *Leibakngoumanba*.

Suffrutescent, incanus herbs, 10 - 15 cm high, with woody rootstock. plants more or less glaucous. Leaves sessile to subsessile, alternate, 1 - 4 cm long, highly lacerated, segments small, linear, obtuse; upper leaves simple, linear. Capitulum in terminal, fascicled spikes, ovoid globose, 0.2 - 0.5 cm in diam.; 3 - 8 flowered; involucrel bracts, linear or broadly oblong to ovate, biseriate, outer tomentose, inner glabrous.

*Fl. & Fr.* : August - December.

*Specimens examined* : Koupra 1800 m, Deb 1545 (CAL).

3. *Artemisia nilagirica* (C.B. Clarke) Pamp., Nov. Giorn. Bot. Ital. n.s. 33 : 452, 1926; Deb in Bull. Bot. Surv. India 3 : 330, 1961; Balakr. Fl. Jowai 1 : 261, 1981; Naithani in Hajra *et al.*, Fl. India 12 : 37, 1995. *A. vulgaris* var. *nilagirica* C.B. Clarke, Comp. Ind. 162, 1876. *A. vulgaris auct. non L.*: Hook. f., Fl. Brit. India 3 : 325, 1981; Kanjilal *et al.*, Fl. Assam 3 : 119, 1939.

Mani.: *Leibak-ngou*.

Perennial, fruticose, aromatic undershrubs; 1 - 2 (-3) m tall; stems paniculately branched, incanus, pubescent or tomentose. Leaves petiolate, upper ones sometimes sessile also, alternate, 1.5 - 8 × 1 - 4 cm, ovate, lacerated or pinnatifid, lobes acute, mucronate, pubescent above, white felted below. Capitulum solitary or fascicled in paniculate racemes, globose, 0.2 - 0.4 cm in diam., yellowish white; involucrel bracts 2 - 3-seriate, oblong - ovate, margins scarious. Achenes minute, oblong ellipsoid, blackish; pappus absent.

*Fl. & Fr.* : August - February.

*Specimens examined* : North Manipur, *Meebold* 6075 (CAL); *Deb* 2744 (CAL); Litan, *Chauhan* 94619 (ASSAM).

**8. Aster L.**

- 1a. Plants up to 2m tall, pedately branched; capitulum numerous; involucrel bracts multiseriate, spathulate; pappus reddish ..... 1. *A. ageratoides*
- b. Plants up to 0.9 m tall, simple branched; capitulum solitary; involucrel bracts 2-seriate, linear lanceolate; pappus white ..... 2. *A. peduncularis*

**1. Aster ageratoides** Turcz. subsp. *alto-petiolata* Kitam, in Fauna. Fl. Nep. Himal. 247, 1955; Hajra in Hajra *et al.*, Fl. India 12 : 79, 1995. *A. Ageratoides* subsp. *ageratoides* (Turcz.) Grierson in Notes R. Bot. Gard. Edinb. 26: 102, 1964; *A. trinervis* D. Don, Prodr. Fl. Nep. 177, 1825; Hook. f., Fl. Brit. India 3:252, 1881; Deb in Bull. Bot. Surv. India 3: 330, 1961. Fig. 73

Perennial, suffrutescent, erect, rhizomatous herbs; stems grooved, 0.3 - 2 m tall, stiffly or laxly strigose. Leaves narrow, ovate or elliptic - lanceolate, short petiolate, 3.5 - 10.5 × (0.7) 1.5 - 2(4.5)cm, trinerved, attenuate at base, upper surface densely scabrous or sometimes glabrescent finely pilose. Capitulum numerous in corymbose panicles, globose, 0.6 - 1.2 (1.5) cm in diam., involucrel bracts 3 to multi seriate, spathulate, acute or obtuse, green or purplish. Ray florets white; disc florets yellow. Achenes obovate, greyish brown, 2 - 3 -ribbed, pappus hairs reddish.

*Fl. & Fr.* : August - February.

*Specimens examined* : North Manipur, C.B. Clarke *s.n.*

**2. Aster peduncularis** Wallich ex Nees. Gen. Sp. Aster. 24, 1832; Rao *et al.*, Fl. Ind. Enum. Aster. 12, 1988; Hajra in Hajra *et al.*, Fl. India 12 : 93, 1995. *Aster asperulus* (DC.) Hook. f. Fl. Brit. India 3 : 252, 1881. *Amphiraphis peduncularis* DC., Prodr. 5 : 344, 1836. Fig. 74

Perennial, erect, rhizomatous herbs; stems laxly hairy or glabrescent, 0.15 - 0.9 m tall. Leaves petiolate, ovate - lanceolate, 4 - 9 × 2 - 3.5 cm, acuminate, margins serrate. Capitulum solitary or few in corymbs, large; involucrel bracts 2-seriate, linear lanceolate, acuminate, sometimes long and foliaceous, green or purplish; ray florets, bluish mauve; disc florets yellow simple, biseriate. Achenes obovate, hairy; pappus white.

*Fl & Fr.* : July - February.

**9. Bidens L.**

- 1a. Stems and leaves glabrous; leaflets narrow, elliptic or lanceolate, 2.0 - 3.5 (-4.5) × 1.2 - 2 cm; involucrel bracts biseriate ..... 1. *B. biternata*

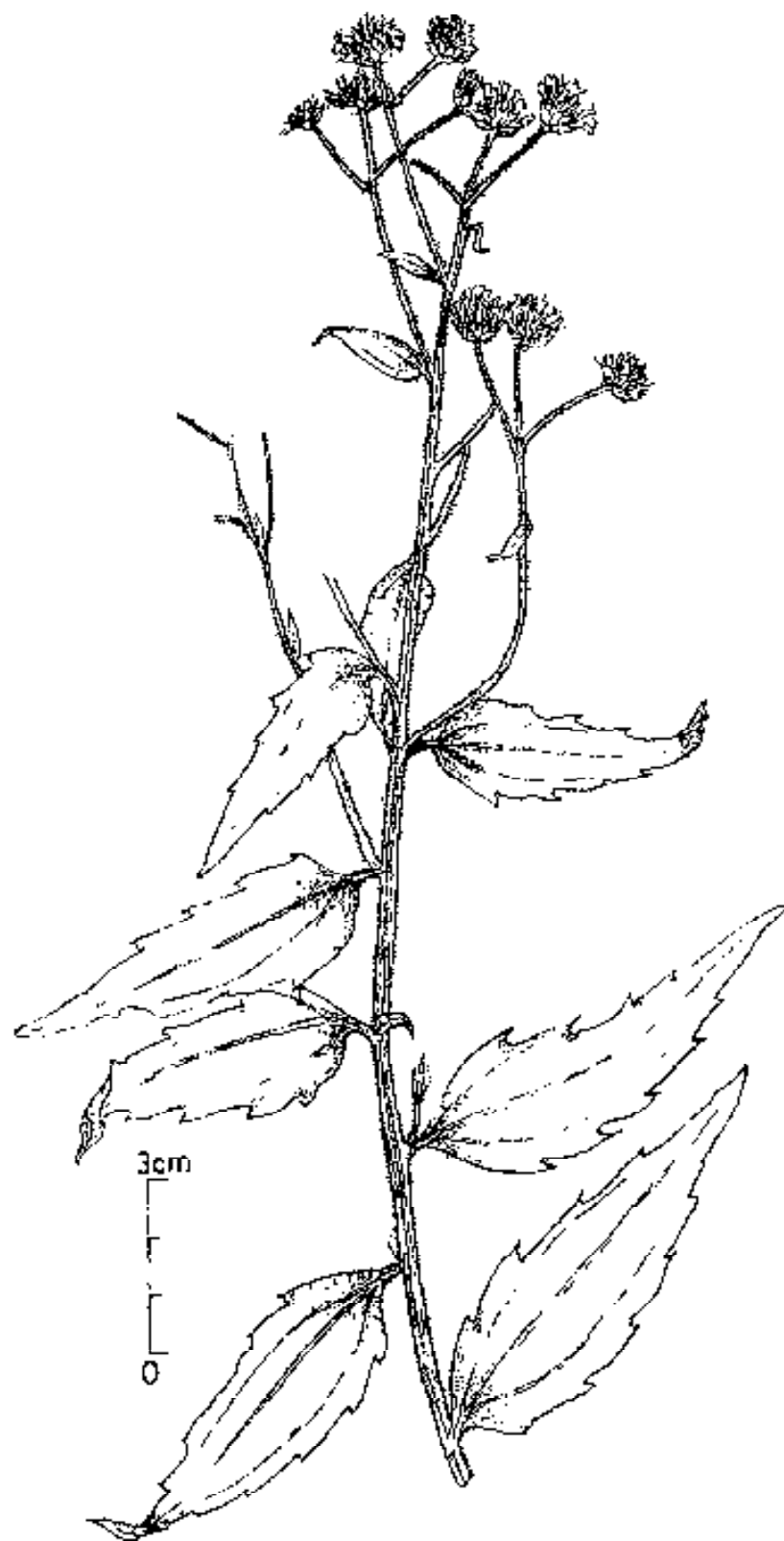


Fig. 73 : A flowering twig of *Aster ageratoides*  
Turcz. subsp. *alto-petiolata* Kitam



Fig. 74 : *Aster peduncularis* Wallich ex Nees in flowering

- b. Stems and leaves pubescent or glabrescent; leaflets broadly ovate, 3.5 - 6.5 × 1.5 - 3.5 cm; involucre bracts uniseriate ..... 2. *B. pillosa*

1. *Bidens biternata* (Lour.) Merr. & Sherff. in Bot. Gaz. 88 : 293. 1929; Deb in Bull. Bot. Surv. India 3 : 330. 1961; Chowdhery in Hajra *et al.*, Fl. India 12 : 367. 1995. *Coreopsis biternata* Lour., Fl. Cochinch. 508. 1790. *Bidens pilosa* auct. non L.; Hook. f., Fl. Brit. India 3 : 309. 1881.

Erect, annual herbs; stem angulate, striate, glabrous. Leaves opposite, biternate, petiolate, leaflets narrowly ovate, lanceolate or ellipsoid, acute or acuminate, margins serrate. Capitulum yellow, solitary, or corymbose, terminal or axillary, globose, 0.6 - 0.8 cm diam.; peduncles unequal; involucre bracts biseriata, outer linear-oblongate or subulate; inner ovate-lanceolate. Achenes slender, ribbed; pappus white, barbellately awned.

Fl. & Fr. : May - January.

Specimens examined : s. loc. Deb 333 (CAL).

2. *Bidens pillosa* L., Sp. Pl. 832. 1753; Chowdhery in Hajra *et al.*, Fl. India 12 : 372. 1995. *B. chinensis* auct. non Willd.; Hook. f., Fl. Brit. India 3 : 309. 1881.

Erect, annual, herbs or undershrubs; stem hairy or glabrescent, succulent, 0.3-1(-2)m tall, branches angular, finely striate. Leaves opposite, trifoliolate, petiolate, leaflets broadly ovate, acute or obtuse, margins broadly crenulate. Capitulum, solitary, on long, unequal peduncles; 0.8 - 1.3 cm in diam.; involucre bracts uniseriate, ligulate-spathulate; ray florets yellowish brown to chocolate brown. Achenes black, ribbed, very slender; pappus stout, spinescent with recurved hooks.

Fl. & Fr. : March - November.

#### 10. *Blainvillea* Cass.

*Blainvillea acmella* (L.) Phillipson in Blumea 6 : 350. 1950; Deb in Bull. Bot. Surv. India 3 : 330. 1961; Chowdhery in Hajra *et al.*, Fl. India 12 : 377. 1995. *Varbesina acmella* L., Sp. Pl. 901. 1753. *Blainvillea latifolia* (L., f.) DC. ex Wight, Contrib. Bot. Ind. 17. 1834; Hook. f., Fl. Brit. India 3 : 305. 1881. *Eclipta latifolia* L., f., Suppl. Sp. Pl. 378. 1781.

Erect, scabrid, annual herbs; plants di- or trichotomously branched, 0.3 - 1.3 m tall, branches terete or subterete, striate. Leaves opposite or alternate, petiolate, 5 - 10 × 2 - 3.5 cm, ovate or lanceolate, acuminate - subacute, margins crenate, base cuneate. Capitulum white, in panicle leafy cymes, globose - subglobose, 0.6 - 1 cm in diam; involucre bracts biseriata, oblong-ovate, obtuse; ligules yellow or pale. Achenes cuneate, truncate, 3-angled, glabrous except at angles; pappus barbellate.

Fl. & Fr. : May - October.

Specimens examined : Chingmairnag. Deb 933 (CAL).

**11. Blumea DC.**

- 1a. Plants tomentose villose, covered with white felted wool ..... 2
- b. Plants glabrate or pubescent, without white felted wool ..... 3
- 2a. Leaves large, 20-50 cm long, with winged or appendaged petioles ..... 1. *B. densiflora*
- b. Leaves small, 2-16 cm long, petiolate or sessile ..... 3. *B. hieracifolia*
- 3a. Plants herbaceous ..... 4
- b. Plants woody, either undershrubs or shrubs ..... 5
- 4a. leaves ovate-oblong, distantly dentate: capitula subsessile to pedunculate, paniculate ..... 4. *B. laciniata*
- b. Leaves oblong-lanceolate, serrate or incised, capitula sessile, glomerate ..... 2. *B. fistulosa*
- 5a. Scandent undershrubs; panicle pubescent; involucrel bracts biseriate, hirsute ..... 6. *B. riparia*
- b. Shrubs: panicles tomentose; involucrel bracts uniseriate, tomentose ..... 5. *B. lanceolaria*  
..... var. *lanceolaria*

**1. *Blumea densiflora* DC.**, Prodr. 5 : 446. 1836; Hook. f., Fl. Brit. India 3 : 269. 1881; Kanjilal *et al.*, Fl. Assam 3 : 112. 1939; Deb in Bull. Bot. Surv. India 3 : 330. 1961; Kumar in Hajra *et al.*, Fl. India 13 : 122. 1995.

Mani.: Karpoar.

Erect, annual herbs, up to 2m tall; stems stout, angulate, striate, covered with white felted wool. Leaves large, pinnatifid or irregularly deeply toothed, acute or obtuse, puberulous above, white felted beneath, 2-14 cm broad. Capitula tomentose or white felted, axillary or in branched terminal panicles. 0.6-1 cm in diam; involucrel bracts multiseriate, narrow; receptacles glabrous. Achenes 10-ribbed, pubescent; pappus red.

Fl. & Fr : January-May.

Specimens examined : Bishenpur, 1200 m, Meebold 5256; Jubza 1200-1500m. Meebold 6354 (CAL).

**2. *Blumea fistulosa* (Roxb.) Kurz** in J. Asiat. Soc. Bengal 46 (2) : 187. 1877; Balakr., Fl. Jowai 1 : 275. 1981; Kumar in Hajra *et al.*, Fl. India 13 : 124. 1995. *Comiza fistulosa* Roxb., Fl. Ind. 3 : 429. 1832. *Blumea glomerata* DC. in Wight, Contrib. Bot. Ind. 15. 1834; Hook. f., Fl. Brit. India 3 : 262. 1881; Deb in Bull. Bot. Surv. India 3 : 330. 1961.

Erect, pubescent or villous, annual herbs. 0.3-0.75 (-1) m tall; stems slender,

striate. Leaves alternate, subsessile or petioled above, oblong lanceolate to broadly oblanceolate or more or less spatulate, serrate or lyrate - pinnatifid, 3 - 11.5 × 3.5 cm, acute - obtuse, tomentose. Capitula sessile, in compact, globose, axillary panicles (clusters) all along the branches; involucrel bracts uni- or biseriata, subulate broadly lanceolate, scarious margined; flowers yellow or pinkish violet. Achenes 8 - 10 -ribbed, white - brown - glabrous or puberulous; pappus white.

*Fl. & Fr.* : December - July.

*Specimens examined* : Pallei, Deb 1346 (CAL).

3. *Blumea hieraciifolia* (D. Don) DC., in Wight, Contrib. Bot. Ind. 15. 1834 ; Hook. f., Fl. Brit. India 3. 263. 1881; Deb in Bull. Bot. Surv. India 3; 330. 1961; Balakr., Fl. Jowai 1: 273. 1981; Kumar in Hajra *et al.*, Fl. India 13 : 125. 1995. *Frigeron hieraciifolium* D. Don, Prodr. Fl. Nep. 172. 1825. *Blumea sericans* Hook. f., Fl. Brit. India 3 : 262. 1881.

Mani.: *Ching-Terapaibi*

Erect, tomentose - villose or copiously woolly, annual herbs or rarely undershrubs, 0.15 - 0.45 (2 - 2.5) m tall; stems robust, laxly striate. Leaves alternate or radical, petioled or sessile, elliptic, ovate or obovate - spatulate, serrate to dentate, sometimes entire, 3 - 9 × 0.8 - 3.2 cm, acute - obtuse. Capitula in dense, axillary or terminal fascicles or spikes, globose, 0.6 - 0.8 cm in diam.; involucrel bracts lanceolate, acuminate, greenish purple tipped; flowers yellow or greenish brown. Achenes hairy, violet; pappus white.

*Fl. & Fr.* : January - April.

*Specimens examined* : S. Inc., Meebold 5789 (CAL) ; Deb 1608 (CAL).

4. *Blumea laciniata* (Roxb.) DC., Prodr. 5 : 436. 1836 ; Hook. f., Fl. Brit. India 3 : 264. 1881 ; Deb in Bull. Bot. Surv. India 3 : 330. 1961; Balakr., Fl. Jowai 1 : 275. 1981; Kumar in Hajra *et al.*, Fl. India 13 : 128. 1995. *Conyza laciniata* Roxb., Fl. Ind. 3 : 428. 1832.

Erect, pubescent or laxly tomentose, annual herbs, 0.2 - 1 (1.5) m tall; stems stout, broadly striate. Leaves radical as well as cauline, petiolate, ovate - oblong, lyrate or subpinnatifid, dentate, 3 - 12 × 1 - 6 cm, acute to subacute. Capitula in large, terminal corymbose panicles, globose, 0.5 - 1 cm in diam.; involucrel bracts multiseriate, outer lanceolate, acuminate, villous, purplish; flowers yellow. Achenes ribbed, silky; pappus white.

*Fl. & Fr.* : January - April.

*Specimens examined* : Morch, Deb 715 (CAL).

5. *Blumea lanceolaria* (Roxb.) Druce, Rep. Bot. Exch. Club. Brit. Isles. 4 : 609. 1917; Kumar in Hajra *et al.*, Fl. India. 13 : 132. 1995. *Conyza lanceolaria* Roxb., Fl. Ind. 3 : 432. 1832. *Blumea myriocephala* DC., Prodr. 5 : 445. 1836 ; Hook. f., Fl. Brit.



India 3 : 269. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 112. 1939; Deb in Bull. Bot. Surv. India 3 : 330. 1961.

Mani.: *Terapaibi*

Puberulous to glabrous shrubs. 1 - 3 m tall, with perennial rootstocks : branches more or less angulate. Leaves glabrous, short petioled, elliptic- broadly oblanceolate, finely serrulate to entire. 6 - 22 × 0.8 - 5.5 cm, acute. Inflorescence 0.3 - 1 m long, branched, tomentose. Capitula clustered in panicles ; involucrel bracts uniseriate, tomentose, squarrosely recurved ; receptacle villose glabrate. Flowers yellowish brown. Achenes 10 ribbed, hairy; pappus red.

Fl. & Fr. : December - May.

Specimens examined : Itong, Meebold 5293 (CAL).

6. *Blumea riparia* (Blume) DC., Prodr. 5 : 444. 1836 ; Balakr., Fl. Jowai 1 : 274. 1981; Kumar in Hajra *et al.*, Fl. India. 13 : 141. 1995. *Conyza riparia* Blume, Bijdr. 899, 1826. ( non H.B.K. ) *Blumea chinensis* DC., Prodr. 5 : 444. 1836 p.p. ; Hook. f., Fl. Brit. India 3 : 268. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 112. 1939 ; Deb in Bull. Bot. Surv. India 3 : 330. 1961.

Scandent or scrambling shrubs or undershrubs, up to 2 m tall: branches glabrous or puberulous. Leaves petioled, alternate, elliptic lanceolate or oblong ovate, distantly denticulate to entire, 2.5 - 12 × 1 - 3.5 cm, acute to subacute, obtuse or acute at base. Capitula in axillary or terminal, pubescent, paniculate racemes, globose, 0.8 - 1.5 cm in diam.; involucrel bracts 1 (-2) - seriate, unequal, ovate - linear, puberulous; flowers white. Achenes strongly 10 ribbed, hairy; pappus simple, scabrous.

Fl. & Fr. : October - March.

Specimens examined : Bishenpur, Meebold 2982 (CAL).

## 12. *Blumeopsis* Gagnepain

*Blumeopsis flava* (DC.) Gagnepain in Bull. Mus. Hist. Nat. Paris 26 : 76. 1920; Kumar in Hajra *et al.*, Fl. India, 13 : 145. 1995. *Blumea flava* DC., Prodr. 5 : 439. 1836 ; Balakr., Fl. Jowai 1 : 274. 1981. *Laggera flava* (DC.) C.B. Clarke, Comp. Ind. 90. 1876 ; Hook. f., Fl. Brit. India 3 : 270. 1881 ; Deb in Bull. Bot. Surv. India 3 : 333. 1961.

Erect, annual herbs, glabrous or puberulous. 0.45 - 0.75 m tall, stem and leaves pale green: stem simple or corymbosely branched, grooved. Leaves radical or alternate, tomentose, ovate lanceolate, obvate or sometimes spatulate, oblong - cordate, 2.4 - 5.5 × 0.4 - 2.5 cm, semiamplexicaul at base, apex obtuse - mucronate, margins sharply denticulate. Capitula in axillary or terminal panicked cymes, 0.6 - 1.2 cm diam. ; involucrel bracts multiseriate, oblong ovate, glabrate or puberulous, yellow - bright yellow. Achenes very small, cylindrical, 10 ribbed, sub glabrate ; pappus white.

*Fl. & Fr.* : October - February.

*Specimens examined* : *s. loc.*, Deb 317, 1334 (CAL).

### 13. *Calendula* L.

*Calendula officinalis* L., Sp. Pl. 921. 1753; Hook. f., Fl. Brit. India 3 : 357. 1881; Deb in Bull. Bot. Surv. India 3 : 330. 1961; Rao in Hajra *et al.*, Fl. India 12 : 148. 1995.

Annual, erect, hispidately pubescent herbs; stem 20 - 60 cm tall, distally corymbosely branched. Leaves alternate, hispidate on both surfaces, more or less spatulate or obovate lanceolate above, 2 - 7 × 0.3 - 2 cm, entire - sinuate toothed, subacute - obtuse, base semiamplexicaul - cordate. Capitulum solitary, terminal, 2 - 5 cm in diam.; involueral bracts multiseriate, linear ovate, acuminate - obtuse; flowers yellow - purplish yellow. Achenes dorsally muricate - naviculate, outer ones warty ribbed, longer than the involucre; pappus absent.

*Fl. & Fr.* : February - June.

*Specimens examined* : Common garden plant, Deb 194 (CAL).

### 14. *Carthamus* L.

*Carthamus tinctorius* L., Sp. Pl. 830. 1753. C. B. Clarke, Comp. Ind. 244. 1876; Hook. f., Fl. Brit. India, 3 : 386. 1881; Kanjilal *et al.*, Fl. Assam 3 : 125. 1939; Deb in Bull. Bot. Surv. India 3 : 330. 1961; Hajra in Hajra *et al.*, Fl. India 12: 163. 1995.

Mani.: *Kushumlei*.

Pubescent or glabrous, thistle like, erect herbs. Leaves sessile, alternate, oblong lanceolate, 1.5 - 6 × 0.4 - 1 cm, entire or spinulose serrate. Capitula terminal, large, 2 - 3 cm across, homogamous; involueral bracts multiseriate, oblong ovate, outer foliaceous, green, spinous; receptacles pubescent; flowers purple or orange red. Achenes 4 - angulate, obovoid, truncate at top, glabrous; pappus absent.

*Fl. & Fr.* : February - April.

*Specimens examined* : Widely cultivated for dye. Seeds yield an edible oil ( safflower - oil ), *sin. loc.*, G. Watt 7325 (CAL); Deb 2500 (CAL).

### 15. *Chrysanthemum* L.

- 1a. Plants up to 45 cm; heads solitary ..... 1. *C. atkinsonii*  
 b. Plants 0.6 - 1 m; heads paniculate ..... 2. *C. indicum*

1. *Chrysanthemum atkinsonii* C. B. Clarke, Comp. Ind. 147. 1876; Hook. f., Fl. Brit. India 3: 315. 1881; Deb in Bull. Bot. Surv. India 3: 331. 1961; Naithani in Hajra *et al.*, Fl. India 12: 49. 1995. *Tanacetum atkinsonii* (C.B. Clarke) Kitam. in Enuri, Fl. Nepal, 3: 45. 1982.

Perennial, strongly aromatic herbs with tuberous rootstocks; stems single or paired, 15 - 45 cm, sparsely hairy. Radical leaves linear - oblong or lanceolate, pinnatisect, 10 - 15 cm long; segments ovate, alternate, acute. Capitula solitary, terminal, large, 2.5 - 4 cm in diam.; involucrel bracts multiseriate, oblong, obtuse, dorsally little woolly, margins scarioso, laciniate - dentate, purple. Achenes 5 angled; pappus absent.

*Fl. & Fr.*: November - March.

*Specimens examined*: Deb 162 (CAL). Cultivated as a garden plant.

**2. *Chrysanthemum indicum* L.**, Sp. Pl. 889. 1753; Hook. f., Fl. Brit. India 3: 314. 1881; Deb in Bull. Bot. Surv. India 3: 331. 1961; Naithani in Hajra *et al.*, Fl. India 12: 75. 1995.

Perennial herbs or shrubs, stem 0.6 - 1 m tall, pubescent, branches slender. Leaves bipinnatifid, 1.2 - 8 cm long, dissected nearly up to the midrib, deltoid - ovate in outline, ultimate segments linear or cuneate, tooth acute - mucronate. Capitula terminal, in paniculate corymbs, heterogamous, up to 1.5 cm diam. ; involucrel bracts 2 - many- seriate, oblong, spreading; outer ones scarious; middle one green and herbaceous. Achenes umbonate, partly compressed, 3 - grooved on both the face; pappus absent.

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

*Specimens examined* : Widely cultivated as an ornamental in gardens. *s. loc.*, Deb 1284 (CAL).

#### 16. *Cicerbita* Wallr.

***Cicerbita macrorhiza* (Royle) Beauv.** in Bull. Soc. Bot. Geneve ser. 2, 2 : 120. 1910; Mangain & Rao in Hajra *et al.*, Fl. India 12 : 272. 1995. *Mulgedium macrorhizum* Royle, III, Bot. Himal. 251. t. 61. f. 1. 1835. *Lactuca macrorhiza* (Royle) Hook. f., Fl. Brit. India. 3 : 408. 1881 p.p.; Deb in Bull. Bot. Surv. India 3 : 322. 1961.

Climbers or sparsely villous herbs; branches erect or decumbent, 8 - 35 cm, stem soft, terete, branched above. Leaves excessively variable, shortly petiolate, cauline leaves pinnatifid, with orbicular - ovate lobes, upper leaves sometimes entire ; petiole simple or dilated, winged with broad orbicular toothed or entire auricle. Capitula, 8 - 16 -flowered, on drooping peduncles, in terminal paniculate cymes ; involucrel bracts biseriate, outer lanceolate, shorter than linear oblong inner ones. Achenes dorsiventrally flat, elliptic - lanceolate, narrowed into a white beak ; inner pappus silky white, outer yellowish, numerous, unsted.

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

*Specimens examined* : Sepramentia 1200 m, Deb 1119 (CAL).

17. *Cirsium* P. Mill.

- 1a. Upper surface of leaves setulose :  
capitulum up to 6 cm in diam. ; corolla  
up to 3 cm long ; pappus up to 2.5 cm  
long, flabellate ..... 1. *C. interpositum*
- b. Upper surface of leaves smooth or  
scaberulous; capitulum up to 2.5 cm diam. ;  
corolla up to 1.6 cm long; pappus up to 0.8  
cm long, clavellulate ..... 2. *C. shansiense*

1. *Cirsium interpositum* Petrak in Feddes Rep. 43: 283. 1838; Hajra in Hajra *et al.*, Fl. India 12: 170. 1995. *C. lepskyi* Petrak in Feddes Repert. 9 : 197. 1911 ; Kanjilal *et al.*, Fl. Assam 3 : 124, 1939 ; Deb in Bull. Bot. Surv. India 3 : 331. 1961. *Cnicus griffithii* Hook. f., Fl. Brit. India 3 : 363. 1881.

Thistle - like, erect herbs, stem cottony, robust. Leaves sessile or base auricled, 6 - 15 × 1.5 - 7.5 cm, pinnately lobed, lobes lanceolate, acute, spinescent, under - surface white tomentose. Capitula terminal, clustered, glabrous ; involucrel bracts multiseriate, long, quite glabrous, outermost with acicular apex, rest linear - tortuous, aristate - acuminate. Achenes oblong - ovoid, obtused 4 - angled; pappus feathery, unequal in length.

Fl. & Fr. : October - February.

Specimens examined : Moirang, Deb (CAL) ; Ukhrul, Chauhan 94901 (ASSAM).

2. *Cirsium shansiense* Petrak in Mitt. Thuring. Bot. Ver. n.f. 1: 176. 1943; Hajra in Hajra *et al.*, Fl. India 12: 170. 1995. *C. segetum* Bunge, Enum. Pl. Chin. Bor. 36. 1831 ; Deb in Bull. Bot. Surv. India 3 : 331. 1961. *Cnicus sinensis* (Gard. & Chamb.) C.B. Clarke, Comp. Ind. 219. 1876 ; Hook. f., Fl. Brit. India 3 : 364. 1881.

Climbers or glabrescent herbs ; stem striate, branches slender, erect. Leaves sessile, linear - oblong or lanceolate, sinuately lobed or pinnatifid, 3 - 8.5 × 1. - 3.5 cm, base subdecurrent, lobes ciliate - spinescent, with 2 - 3 spines, sinus spinulose. Capitulum solitary, on terminal, long peduncles ; involucrel bracts numerous, imbricate, outer ones appressed, oblong lanceolate or obtuse, apices often spinulose, inner bracts linear, with inflexed acute tips. Achenes 0.4 cm long ; pappus up to 8 mm long.

Fl. & Fr. : September - November.

Specimens examined : North Manipur; Mao, Maram and Ukhrul, Deb s. n.

18. *Cissampelopsis* (DC.) Miq. *nom. cons.*

*Cissampelopsis volubilis* (Blume) Miq., Fl. Ind. Bat. 2 : 103. 1856 ; Mathur in

Hajra *et al.*, Fl. India 13 : 200, 1995, *Cacalia volubilis* Blume., Bijdr. 903, 1826. *Senecio araneosus* DC., Prodr. 6 : 364, 1838 : C. B. Clarke, Comp. Ind. 181, 1876 : Hook. f., Fl. Brit. India 3 : 351, 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 121, 1939 ; Deb in Bull. Bot. Surv. India 3 : 333, 1961.

Large, twining, arancose shrubs, glabrous or sparsely cottony, branches grooved. Leaves petiolate, exstipulate, ovate cordate, acuminate, sometimes broadly trilobate or more or less hastate, 5 - 15 x (2.2 - 3.5) - 9 ( - 11 - 13) cm, entire, serrate, sinuate toothed or lobulate, glabrous above, arancose below. Capitula clustered, in axillary or terminal, bracteolate, rounded corymbs, 0.8 - 1.2 cm in diam., creamy white, 12 - flowered; flowers pale green or yellowish brown ; involucre campanulate, bracts uniseriate, 8 in number, linear - obovate, glabrous, apex ciliate ; receptacles naked ; corolla campanulate, 5 - fid. Achenes subterete, ribbed; pappus white, of very fine hairs.

Fl. & Fr. : November - April.

Specimens examined : North Manipur, 1050 m, *s. n.*

19. *Conyza* Less.

- 1a. Plants glabrate, villous or woolly ; leaves obovate, spatulate or oblong lanceolate with serrate or crenate margins; involueral bracts strictly uniseriate ..... 2. *C. japonica*
- b. Plants hirsute or pubescent and glandular ; leaves linear - lanceolate, entire or serrate ; involueral bracts more than 1 - seriate ..... 2
- 2a. Plants hirsute, up to 30 cm tall; capitulum solitary, on slender stalks, forming a leafy corymbose panicle ; involueral bracts 2 - 3 seriate ; flowers pale, purple or white ..... 1. *C. bonariensis*
- b. Plants pubescent and glandular, 0.6 - 1.80 m tall ; capitula small, clustered ; involueral bracts sub biseriate ; flowers pink ..... 3. *C. leucantha*

1. *Conyza bonariensis* (L.) Cronq., in Bull. Torrey Bot. Club 70 (6) : 632, 1943; Shukla & Baishya, in J. Bombay Nat. Hist. Soc. 76 : 125, 1977; Hajra in Hajra *et al.*, Fl. India 12: 104, 1995. *Frigeron bonariensis* L., Sp. Pl. 863, 1753. *E. limifolius* Willd., Sp. Pl. 3 : 1955, 1803 ; C. B. Clarke, Comp. Ind. 50, 1876 ; Hook. f., Fl. Brit. India 3 : 254, 1881.

Stout, erect, hirsute herbs, 0.2 - 0.7 (-1) m high; stem striate, highly branched; branches small. Leaves sessile, alternate, linear - lanceolate or oblong lanceolate, 2.5 - 6(9 - 11) x 0.2 - 0.4 (1) cm, entire or coarsely dentate, acute - subacute. Capitula 0.5 - 1 cm in diam., in axillary or terminal racemes or corymbs ; outer involueral bracts

becoming gradually smaller, narrowly lanceolate, acuminate, margins scarious, outer surface - pubescent; ray florets multiseriate, filiform, with the apices 2 - 4- dentate. Achenes minute, narrowly oblong, flat, glabrous; pappus straw yellow or dull.

*Fl. & Fr.* : January - September

*Specimens examined* : Tongbram vill. near Loktak lake, Jain 63469 (ASSAM).

2. *Conyza japonica* (Thunb.) Less., Syn. Comp. 204. 1832; Deb in Bull. Bot. Surv. India 3 : 331. 1961; Hajra in Hajra *et al.*, Fl. India 12: 105. 1995. *Erigeron japonicum* Thunb. in Fl. Jap. 312. 1784; Hook. f., Fl. Brit. India 3 : 258. 1881.

Mani.: *Terapaibi*.

Erect, annual herbs, 15 - 30 cm high; stem simple usually unbranched. Leaves usually radical, sessile, obovate - spatulate, broadly elliptical or lanceolate, 2.5 - 7 × 0.5 - 2.5 cm, margins serrate - crenate, apex obtuse - acuminate, villous on both the surface. Capitula usually solitary on racemed, axillary or terminal peduncles, globose, 0.6 - 0.8 cm diam.; involucre bracts lanceolate with scarious margins, green with pink tips; flowers white, homogenous. Achenes more or less glabrous; pappus white or reddish brown.

*Fl. & Fr.* : September - May.

*Specimens examined* : Common throughout the valley, Meebold 5266 (CAL); Deb 193 (CAL).

3. *Conyza leucantha* (D. Don) Ludlow & Raven in Kew Bull. 17 : 71. 1963; Deb. Fl. Tripura 2 : 210. 1983; Hajra in Hajra *et al.*, Fl. India 12: 105. 1995. *Erigeron leucanthus* D. Don, Prodr. Fl. Nep. 171. 1825. *Conyza viscidula* Wallich ex DC., Prodr. 5 : 383. 1836; C.B. Clarke, Comp. Ind. 63. 1876; Hook. f., Fl. Brit. India 3: 258. 1881; Deb in Bull. Bot. Surv. India 3 : 331. 1961.

Annual - biennial herbs, 0.6 - 1.8 m high; stem branched, prominently striate. Leaves shortly petiolate or sessile, lanceolate or slightly elliptic, narrowed at both ends, 2 - 8 × 0.6 - 2 cm, margins entire or serrulate, apex, acute - subacute, surface puberulous or viscidulous. Capitula in terminal panicles, borne on axillary, pinkish or red branches, small, globose, 0.3 - 0.5 cm in diam., involucre bracts 10 - 15 in number, lanceolate, acuminate, dorsally puberulous, margins smooth or scarious; flowers violet, white or pink. Achenes small, flat, obvate - lanceolate, glabrate; pappus smaller, reddish or white.

*Fl. & Fr.* : December - March.

*Specimens examined* : North Manipur, 1500 m Deb 1758 (CAL).

## 20. *Cosmos* Cav.

*Cosmos bipinnatus* Cav., Icon. 1 : 10. t. 14. 1791; Deb in Bull. Bot. Surv. India 3 : 331. 1961.

Annual herbs ; stems slender, 1 - 3 m tall, angulate, nodes more or less cupulate, all parts glabrous or somewhat pubescent. Leaves opposite, petiolate, bipinnately dissected, 2.5 - 8(11) × 2 - 5 (12) cm, lobes linear - lanceolate, elliptic or filiform, entire. Capitulum solitary on terminal, di- or trichotomously branched peduncles, 2 - 7.5 cm across ; involucrel bracts uniseriate, subulate, ligulate or lanceolate, acute-acuminate; flowers white, pink or red; corolla lobes truncate or dentate. Achenes glabrescent, linear, ribbed, 1 - 1.5 cm long, with an abrupt beak; pappus 2 (-4), retrorsely barbed.

*Fl. & Fr.* : November - March.

*Specimens examined* : Widely cultivated as garden plant.

### 21. *Cotula* L.

*Cotula hemisphaerica* (Roxb.) Wallich ex Benth. & Hook. f., Gen. Pl. 2 : 429. 1873 ; C.B. Clarke, Comp. Ind. 150. 1876 ; Hook. f., Fl. Brit. India 3 : 316. 1881 ; Deb in Bull. Bot. Surv. India 3 : 331. 1961 ; Naithani in Hajra *et al.*, Fl. India 12: 54. 1995. *Artemisia hemisphaerica* Roxb., Fl. Ind. ed. 2, 3 : 422. 1832.

Erect or procumbent annual herbs ; plants glabrous or villous above ; stem striate, often purplish tinged, 10 - 20 cm long, rooting at lower nodes. Leaves sessile, pinnatifid or simple above, 1 - 7.5 cm long, lobes linear, linear - lanceolate, aristate or 1 - 2 spinuled at apex, glabrous on both the surfaces. Capitula solitary, peduncled, globose - subglobose, 0.2 - 0.6 cm in diam., axillary or terminal; involucrel bracts 1 - 2 seriate, oblong, slightly connate at base, obtuse, glabrous; florets yellow; corolla 2-toothed or absent. Achenes exalate or angled, wingless, glandular pubescent; pappus absent or short, auriculate.

*Fl. & Fr.* : September - March.

*Specimens examined* : Common in low, moist grounds or grasslands - *s. loc.* Deb 301, 1567, 2037 (CAL).

### 22. *Cyathocline* Cass.

*Cyathocline purpurea* (Buch. - Ham. ex D. Don) O. Kuntze, Rev. Gen. Pl. 333. 1891; Hajra in Hajra *et al.*, Fl. India 12: 111. 1995. *Tanacetum purpureum* Buch. Ham. ex D. Don, Prodr. Fl. Nep., 181. 1825. *Cyathocline lyrata* Cass. in Ann. Sci. Nat. ser. 1. 17 : 420. 1829 ; Hook. f., Fl. Brit. India 3 : 246. 1881.

Erect or procumbent, annual herbs ; plants sweetly aromatic, scabrous or pubescent, 15 - 60 cm high, stem slender, sulcate, often tinged with reddish purple. Leaves sessile, lower obovate, upper lyrate 1 - 2 pinnatifid, 2 - 14 cm long, surface viscidly glandular - pubescent; lobes oblong, 0.5 - 2.5 × 0.2 - 1.5 cm, serrate - dentate or lobed, glabrous or laxly hairy. Capitulum in small, rounded, terminal, corymbose panicles, globose - subglobose, 0.2 - 0.8 cm diam., rose purple ; involucrel bracts biseriate, linear - lanceolate, acute, pilose or ciliate on margins; florets rose - purple or white. Achenes, oblong, brownish, smooth ; pappus absent.

*Fl. & Fr.* : October - March.

23. *Dahlia* Cav.

- 1a. Leaves bluntly toothed or crenate ;  
petioles more or less winged ..... 2. *D. pinnata*
- b. Leaves sharply serrate ; petioles  
slightly or not at all winged ..... 1. *D. coccinea*

1. *Dahlia coccinea* Cav., Ic. 3:33. 1794; Deb in Bull. Bot. Surv. India 3 : 331. 1961.

Glabrous or glabrescent, annual herbs, up to 1 m tall; plants slender, stem glaucous. Leaves bipinnate, the ultimate segments narrower, ovate-acuminate, foliage not so heavy. Capitulum solitary, terminal; involucrel bracts biseriate, inner ones thin, scaly; outer 5 in number, reflexed. Florets scarlet-red. Achenes oblong-obovate, compressed; pappus absent.

*Fl. & Fr.* : June - October.

*Specimens examined* : Widely cultivated for ornamental purpose, *s. loc.*, Deb 130 (CAL).

2. *Dahlia pinnata* Cav., Ic. 1 : 57, t. 80, 1791; Bailey, Man. Cult. Pl. 1000, 1949. *D. variabilis* Desf., Cat. Hort. Par. ed. 3 : 182. 1829; Deb in Bull. Bot. Surv. India 3 : 331, 1961.

Glabrous or so, erect, annual herbs, perennating by tubers, 1 - 1.25 m tall. Leaves opposite, bipinnate or upper ones 1-pinnate, ovate, petioles expanded, connate, surface dark green above, greyish green below. Capitula solitary on long, terminal stalk, 12 - 20 (-25) cm diam.; involucrel bracts biseriate, outer 6 - 7 in number, foliaceous; florets rose-red; rays 8 in number, ovate, obscurely tridentate at apex. Achenes compressed; pappus absent.

*Fl. & Fr.* : June - November.

*Specimens examined* : Commonly cultivated as most popular garden plant. *S. loc.*, Deb 226, 239.

24. *Dichrocephala* L., Herit. ex DC.

*Dichrocephala integrifolia* (L. f.) O. Kuntze., Rev. Gen. Pl. 1 : 333. 1891; Harja in Hajra *et al.*, Fl. India 12 : 114. 1995. *Hippia integrifolia* L. f., Suppl. Sp. Pl. 389. 1781. *Dichrocephala latifolia* (Pers.) DC. in Wight, Contrib. Bot. Ind. 11. 1834; Deb in Bull. Bot. Surv. India 3 : 331. 1961. *Cotula latifolia* Pers., Pers. Syn. 2: 464. 1805; Hook. f., Fl. Brit. India 3 : 245. 1881. Fig. 75

*Mani.*: *Lolukok*.

Erect or spreading, annual, pubescent or white villous herbs, 20 - 60 cm high. Leaves petiolate, highly variable, ovate-lanceolate, entire or lyrate-pinnatisect, segments oblong, lateral ones 0.3 - 1.5 × 0.3 - 1 cm, terminal segments broadly ovate, 2 - 5 × 2.5 - 5 cm coarsely dentate, villous on both surfaces. Capitula globose, 0.4 - 0.6 cm in diam., on branched, divaricating peduncles, yellow or purple; involucrel bracts usually 10 in number, lanceolate; female florets, whitish; bisexual



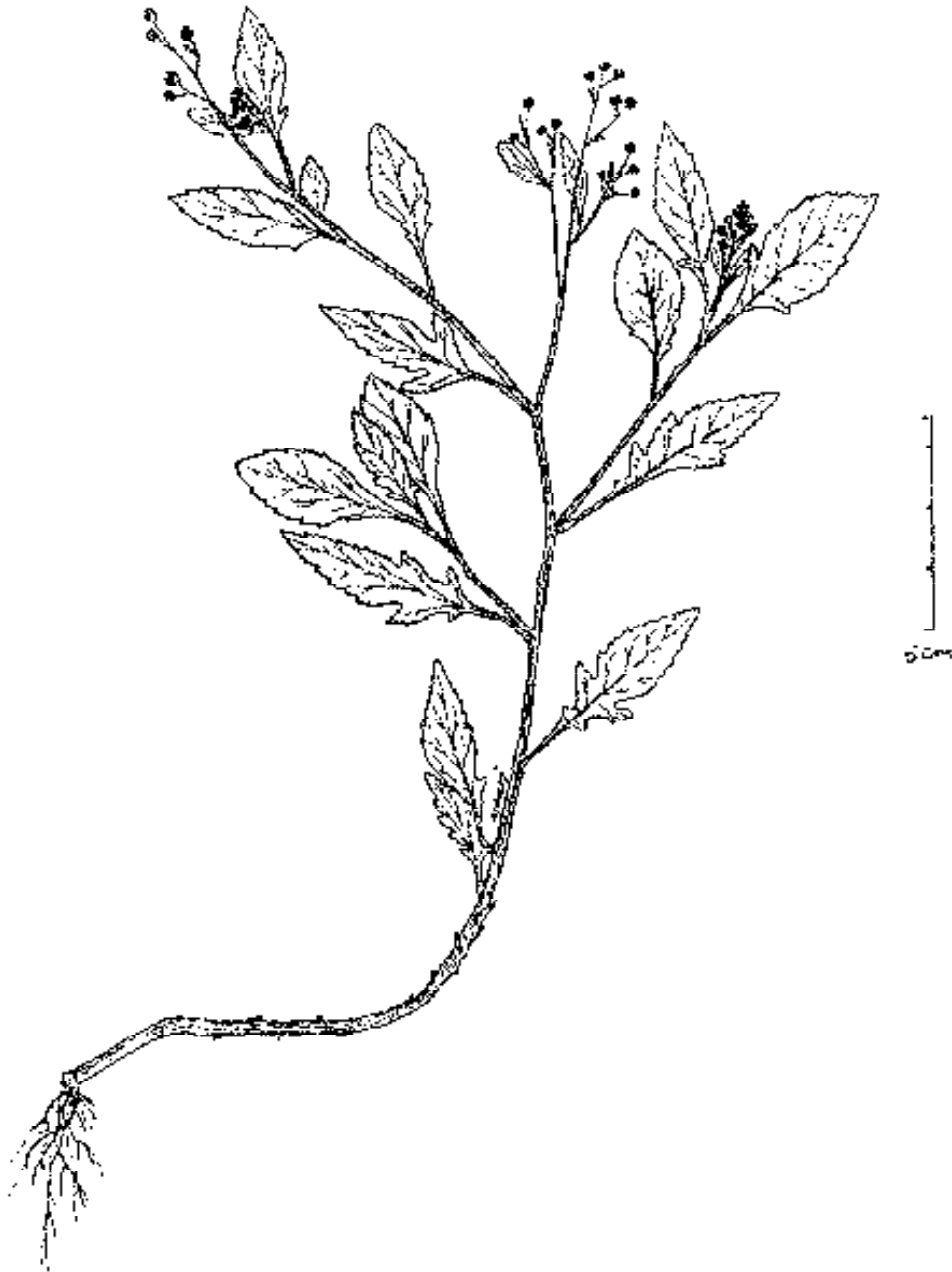


Fig. 75 : *Dichrocephala integrifolia* (D. Don) O. Kurtze in flowering

florets yellow green. Achenes obovoid, glabrous or minutely glandular towards apex; pappus of hermaphrodite achenes with 2 or 3 bristles.

*Fl. & Fr.* : June - February.

*Specimens examined* : *S. I. Deb* 108, 312 (CAL).

### 25. *Eclipta* L. *nom. cons.*

*Eclipta prostrata* (L.) L., *Mant. Pl.* 2 : 286. 1771 ; *Deb in Bull. Bot. Surv. India* 3 : 331. 1961; Chowdhery in *Hajra et al., Fl. India* 12: 381. 1995. *Verbesina prostrata* L., *Sp. Pl.* 902. 1753. *Eclipta alba* (L.) Hassk., *Pl. Jav. Rar.* 528. 1848 ; *Hook. f., Fl. Brit. India* 3 : 304. 1881 ; *Kanjilal et al., Fl. Assam* 3 : 117. 1939.

*Mani.* : *Cochirsumbal*.

Erect or procumbent, hirsute or strigillose, annual herbs ; plants 15 - 55 cm, repeatedly branched, rooting at the lower nodes. Leaves opposite, short petiolate, linear, elliptic or oblong - lanceolate, 2 - 10 × 0.4 - 2.2 cm, margins subdentate, acute or acuminate, base cuneate. Capitula 1 - 3, borne on axillary, short slender peduncles ; involucrel bracts biseriate, outer twice as long as flowers, foliaceous, ovate, obtuse subacute, inner ones narrow ; receptacles flattened, pales plumose. Achenes smooth, blackish with pale margins ; pappus obscure or of 1 - 2 minute bristles.

*Fl. & Fr.* : July - December.

*Specimens examined* : Common in different habitats but thrives best in moist conditions. *s. loc., Deb* 322, 730, 1248, 1298 (CAL) ; *Litan, Chauhan* 94837 ; *Singhat, Chauhan* 95074 (ASSAM).

### 26. *Elephantopus* L.

*Elephantopus scaber* L., *Sp. Pl.* 814. 1753 ; C.B. Clarke, *Comp. Ind.* 28. 1876 ; *Hook. f., Fl. Brit. India* 3 : 242. 1881 ; *Kanjilal et al., Fl. Assam* 3 : 107. 1939 ; *Deb in Bull. Bot. Surv. India* 3 : 331. 1961; *Uniyal in Hajra et al., Fl. India* 13: 333. 1995.  
Fig. 76

*Mani.* : *Shijakpui*.

Perennial, scabrous herbs ; plants dichotomously branched. 15 - 60 cm high, rootstock creeping. Leaves sessile, in radical rosettes, obovate, oblong - lanceolate, 3 - 23 × 1.5 - 5 cm, crenate - serrate, surfaces scabrous or hirsute - villose, apex subacute, obtuse or sometimes emarginate. Capitula homogamous, violet. 2 - 5-flowered in dense cluster, each cluster subtended by usually 3, cordate - ovate, foliaceous, hirsute, usually conduplicate bracts ; involucrel bracts pungent, 2 - 3-seriate, outer ovate - lanceolate, inner narrow ; corolla glabrous, purple, 4 - 5-toothed. Achenes truncate, 10 - ribbed, hairy, with an oblique callus towards base ; pappus of 4 - 5 rigid bristles, dilated at base.

*Fl. & Fr.* : July - December.

*Specimens examined* : Common in waste lands and moist grassland. *S. loc., Deb* 505 (CAL) ; *Litan, Chauhan* 94642 (ASSAM).

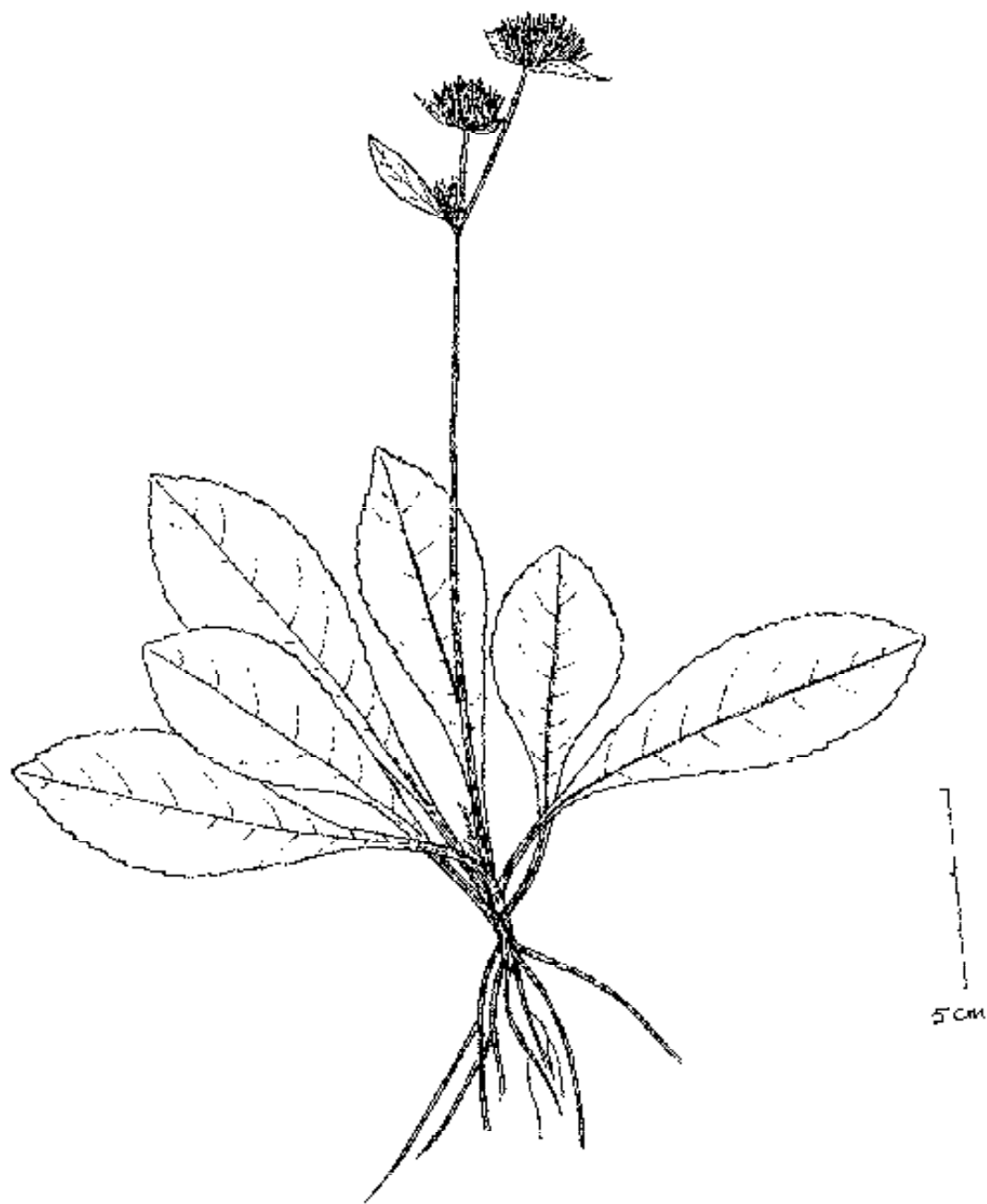


Fig. 76 : *Elephantopus scaber* L. in fruiting

27. *Emilia* Cass.

*Emilia sonchifolia* (L.) DC. in Wight, Contrib. Bot. Ind. 24, 1834; C.B. Clarke, Comp. Ind. 174, 1876; Mathur in Hajra *et al.*, Fl. India 13: 212, 1995. *Cacalia sonchifolia* L., Sp. Pl. 1835, 1753; Hook. f., Fl. Brit. India 3: 336, 1881; Kanjilal *et al.*, Fl. Assam 3: 120, 1939; Deb in Bull. Bot. Surv. India 3: 332, 1961.

Slender, sparsely puberulous, glabrous or scabrid, annual herbs; plants erect or procumbent, up to 1 m high, often branched at base. Lower leaves radical, slightly petiolate, lyrate-pinnatifid or obovate, dentate or entire, 3-10 × 1-6 cm; upper leaves cauline, lanceolate, oblong-lanceolate, entire or sparsely dentate, amplexicaule, auricled at base. Capitula small, 0.8-1.2 cm across, in lax corymbs; involucrel bracts connate at base; florets purple. Achenes scabrid, 5-ribbed; pappus soft white, prominent.

*Fl. & Fr.* : April-October.

*Specimens examined* : Common in shaded, moist localities. *s. loc.*, Deb 107 (CAL); Chandel, Chauhan 94946 (ASSAM).

28. *Enhydra* DC.

*Enhydra fluctuans* Lour., Fl. Cochinch. 511, 1790; Hook. f., Fl. Brit. India 3: 304, 1881; Kanjilal *et al.*, Fl. Assam 3: 126, 1939; Deb in Bull. Bot. Surv. India 3: 332, 1961; Chowdhery in Hajra *et al.*, Fl. India 12: 384, 1995.

*Mani.*: *Komprek-tujombi*.

Scaberulous-pubescent or glabrous herbs; stem 20-50 cm, procumbent, rooting at nodes. Leaves sessile, opposite, oblong-linear, 2-7 × 0.5-1.5 cm, entire, subdentate or serrate, acute or obtuse, base narrowed or truncate. Capitula terminal or axillary, subsessile, heterogamous, yellow, 0.8-1.5 cm in diam., unilateral or in alternate axils; involucrel bracts 4 in number, in 2 opposite pairs, foliaceous, slightly rounded, obtuse, yellowish green; ray florets female, multiseriate, ligule 3-4 toothed, corolla 3-lobed; disc florets bisexual or inner sterile. Achenes oblong, enclosed in rigid palea, outer dorsally and inner ones laterally compressed; pappus absent.

*Fl. & Fr.* : October-February.

*Specimens examined* : Common throughout the valley on rich damp soil or aquatic along the margin of ponds. Leaves are used as vegetables as well as laxative, antibilious and dermatitis *s. loc.*, Deb 1596, 1652 (CAL).

29. *Erigeron* L.

- 1a. Plants pubescent; leaves all cauline;  
capitulum 5-8 cm in diam. .... 3. *E. multiradiatus*
- b. Plants hispidate or glabrous; leaves  
radical and cauline; capitulum  
1-3.5 cm in diam. .... 2
- 2a. Leaves oblong-spathulate (cauline-  
linear-lanceolate); capitulum 2.5

- 3.5 cm in diam. : ligules always twice as long as pappus ..... 2. *E. kumaonensis*  
 b. Leaves obovate-oblong; capitulum 1-2 cm in diam; ligule rarely exceeding the length of pappus ..... 1. *E. alpinus*

1. *Erigeron alpinus* L., Sp. Pl. 864. 1753; Hook. f., Fl. Brit. India 3 : 255. 1881, p.p. ; Rao *et al.*, Fl. Ind. Enum. Aster. 36. 1988.

Small, biennial or perennial, hispidate or glabrescent herbs; stem striate, obtusely angulate, 20-55 cm high. Leaves radical and cauline; radical leaves petiolate, 2-3.5 x 0.8-1 cm, obtuse, margins entire, surface hispidate; cauline leaves sessile 1.7-3.5 x 0.8 cm, subacute-acuminate, entire. Capitulum solitary, or on branched peduncles, pinkish white; involucre bracts biseriate, imbricate, subulate, covered with hairs, margins scarious. Achenes subsilky; pappus reddish.

*Fl. & Fr.* : July-October.

2. *Erigeron kumaonensis* (Vierh.) Wendelbo in Nytt. Mag. Bot. 1. 62. 1952; Hajra in Hajra *et al.*, Fl. India 12: 122. 1995. *Trimorpha kumaonensis* Vierh. in Beih. B. Centralb. 19 (2) : 467, t. 6. f. 1. 1906.

Robust, hispidate, biennial or perennial herbs; stem 20-35 cm. Leaves cauline, usually 3-nerved, semiamplexicaule or narrowed at base, margins entire, surfaces hairy. Capitula subsolitary, trimorphic, with ligulate florets, tubular female florets and tubular bisexual florets; peduncles often thickened distally, spreading; involucre bracts subulate-lanceolate, woolly. Achenes subsilky; pappus reddish.

*Fl. & Fr.* : July-October.

3. *Erigeron multiradiatus* (Lindley ex DC.) C. B. Clarke, Comp. Ind. 56. 1876; Hook. f., Fl. Brit. India 3 : 256. 1881; Deb in Bull. Bot. Surv. India 3 : 332. 1961; Hajra in Hajra *et al.*, Fl. India 12: 123. 1995. *Stenaectis multiradiata* Lindley ex DC., Prodr. 5 : 299. 1836.

Erect, annual herbs; stem slender or stout, simple or sparsely branched above. Leaves sessile, elliptical, ovate-lanceolate, obtuse-acute, entire or closely dentate, pubescent or almost glabrous. Capitula solitary or few on long peduncles; involucre bracts sub-biseriate, subequal, smaller, lanceolate, acuminate, dorsally pubescent, longer ones villous; ray florets in 2-3 series, dark purple, ligules 2-3 times longer than pappus. Achenes sparingly pilose, minute, oblong, compressed on both sides, subquadrangulate towards apex; pappus red, few somewhat white, multisetosous, semipaleaceous.

*Fl. & Fr.* : July-November.

*Spectimens examined* : Common in grasslands. *s. loc.*, Deb 1285 (CAL).

### 30. *Ethulia* L.

*Ethulia conyzoides* L., Decas Prima l. t. 1. 1762; C. B. Clarke, Comp. Ind. 1. 1876

; Hook. f., Fl. Brit. India 3 : 227, 1881; Deb in Bull. Bot. Surv. India 3 : 332, 1961; Uniyal in Hajra *et al.*, Fl. India 13: 335, 1995.

Erect, pubescent or almost glabrous, annual herbs; stem ribbed, hollow, 0.3-1 m high, branched. Leaves petiolate, never decurrent, alternate, elliptic-lanceolate, obovate-spathulate, (1.2) 3-10 × (0.4) 1-4 cm, entire towards base, coarsely serrate distally, surface glandulose-punctate. Capitula numerous, in paniced corymbs, terminal on lateral or main branches, globose, 0.5-0.8 cm in diam.; involueral bracts biseriata, ovate-lanceolate, truncate-subobtusate, outer smaller; florets purplish-red (whitish). Achenes 3-5-costate, slightly mamillate at apex, closely arranged in the capitulum; pappus absent.

*Fl. & Fr.* : March-August.

*Specimens examined* : Common throughout the valley. *s. loc.*, Deb 861 (CAL).

### 31. *Eupatorium* L.

- 1a. Leaves triangulate-ovate or deltoid; heads in trichotomous corymbs ..... 2. *E. odoratum*.
- b. Leaves ovate-elliptic or lanceolate; heads in paniculate corymbs ..... 2
- 2a. Undershrubs; leaves pubescent, coarsely serrate; achenes glabrous, glandular ..... 1. *E. nodiflorum*
- b. Herbs; leaves glabrous, entire; achenes pubescent on ribs ..... 3. *E. triplinerve*

1. *Eupatorium nodiflorum* Wallich ex DC., Prodr. 5 : 179, 1836; Balakr., Fl. Jowai 1 : 260, 1981; Uniyal in Hajra *et al.*, Fl. India 12: 353, 1995. *E. cannabinum auct. non* L. : Hook. f., Fl. Brit. India 3 : 243, 1881, p.p.; Kanjilal *et al.*, Fl. Assam 3 : 108, 1939; Malick & Safui in J. Econ. Tax. Bot. 10 : 6, 1987.

Erect, sparsely branched perennials, 0.5-1 m high; stem striate, tomentose. Leaves opposite, rarely alternate, simple or trisect, small petiolate, ovate-lanceolate or elliptical, 2.5-8.5 × 0.7-2.8 cm, acute, obtuse or cuneate at base, margins coarsely or finely serrate. Capitula in dense, terminal corymbs homogamous, 0.4-0.8 cm long; involueral bracts terminal 3-4-multiseriate, oblong-lanceolate, subacute, margins scarious; florets creamy white; corolla tubular, 5-lobed; stamens syngenaceous, anthers appendaged. Achenes black, minute, 5-7-ribbed; pappus multiseriate, milky white, much longer than achenes.

*Fl. & Fr.* : August-December.

*Specimens examined* : Mt. Kawab, Malick 1506 (BSIS).

1. *Eupatorium odoratum* L., Syst. Nat. ed. 10 (2) : 1205, 1759; Uniyal in Hajra *et al.*, Fl. India 12: 354, 1995. *Chromolaena odorata* (L.) King & Robinson in Phytologia 20 : 204, 1970. *Eupatorium coryzoides* Vahl, Symb. Bot. 3: 96, 1794; Hook. f., Fl. Brit. India 3 : 244, 1881; Deb in Bull. Bot. Surv. India 3 : 332, 1961.

Suffrutescent herbs or straggling shrubs, 1-2 (3-4) m high; plants much branched, pubescent-villose, branches angulate. Leaves opposite, petiolate, triangular-ovate or deltoid 3.5-11 × 1-6 cm, long acuminate, margins subentire-dentate, pubescent, base entire, acute. Capitula, cylindrical, 20-30-flowered, in terminal, trichotomous corymbs; involueral bracts multiseriate, acute-obtuse; florets white or purple, odorous. Achenes small, narrow oblong, 4-5 angled; pappus 0.5-0.7 cm long, white.

*Fl. & Fr.* : November-February.

3. *Eupatorium triplinerve* Vahl, *Symb.* 3 : 97, 1794; Malick & Safui in *J. Econ. Tax. Bot.* 10 : 6, 1987; Uniyal in Hajra *et al.*, *Fl. India* 12 : 356, 1995. *E. ayopona* Vent., *Hort. Malm.* 2 : t.3, 1804; Hook. f., *Fl. Brit. India* 3 : 244, 1881.

Annual herbs or undershrubs; stem creeping, red or purplish, rooting at lower parts, 30-75 cm high, striate, pubescent. Leaves opposite, petiolate, lanceolate or elliptical, 5-9.5 × 0.8-1.8 cm, acute, narrowed at both ends, margins entire. Capitula terminal or in axils of upper leaves, in paniculate corymbs, campanulate; involuere campanulate, bracts 3-seriate, linear, gradually smaller centrifugally, acuminate, ciliate; receptacle flat, glabrous; florets pink; corolla infundibulate, 5-lobed. Achenes oblong, 5-ribbed, laxly pubescent on the ribs; pappus shorter, white.

*Fl. & Fr.* : August-December.

*Specimens examined* : Nungba, Malick 1263 (BSIS).

### 32. *Galinsoga* Ruiz. & Pav.

*Galinsoga parviflora* Cav., *ic. et. Descr. Pl.* 3 : 41, t. 281, 1795; C. B. Clarke, *Comp. Ind.* 142, 1876; Hook. f., *Fl. Brit. India* 3 : 311, 1881; Deb in *Bull. Bot. Surv. India* 3 : 322, 1961; Chowdhery in Hajra *et al.*, *Fl. India* 12 : 388, 1995.

Mani. : *Hameng shampakpi*

Erect, hispid or glabrous, annual herbs, 15-25 cm high. Leaves opposite, petioled, membranous, ovate-oblong or ovate-lanceolate, 1.5-5 cm, obtusely acuminate, margins undulate-sub serrate. Capitula terminal and axillary, heterogamous, in corymbs, short, slightly pilose; peduncled; involueral bracts 1-2-seriate, broadly ovate, obtuse, striate, green. Achenes angled, outer dorsally compressed; pappus absent or of few scarious scales.

*Fl. & Fr.* : August-December.

*Specimens examined* : Mao, Deb 1769; Imphal, Deb 153 (CAL); Ukhrul, Chauhan 94904 (ASSAM).

### 33. *Gnaphalium* L.

- 1a. Capitula in leafy spikes ..... 2. *G. polycaulon*
- b. Capitula in leafless, corymbose clusters ..... 1. *G. luteo-album*

1. *Gnaphalium luteo-album* L., Sp. Pl. 851. 1753 ; Hook. f., Fl. Brit. India 3 : 288. 1881; Deb in Bull. Bot. Surv. India 3 : 332. 1961; Pant in Hajra *et al.*, Fl. India 13: 87. 1995.

Annual, erect; pubescent to densely woolly herbs, 10 - 45 cm high ; stems branching from base. Leaves entire sessile oblong spatulate, 2 - 5 × 0.8 - 7 cm. with glaucous hairs on both surface, apex obtuse - apiculate. Capitula in terminal clusters. 3 - 8 mm across, whitish yellow - golden yellow, tinged with brown ; involucre bracts multiseriate, elliptic - lanceolate, oblong, obtuse, pale dark brown or reddish brown or golden yellow . Achenes linear to oblong, subterete, tubercled or with curved bristles, minutely papillose or glabrous; pappus hairs white, minutely barbed.

- 1a. Involucre bracts dark or reddish brown ..... 1.2 subsp. *luteo-album*  
 b. Involucre bracts golden yellow, ..... 1.1 subsp. *affine*

1.1 subsp. *affine* ( D. Don) Koster in Blumea 4 (3): 484. 1941; Pant in Hajra *et al.*, Fl. India 13: 89. 1995. *G. affine* D. Don., Prodr. Fl. Nep. 173. 1825. *G. luteo-album* L. var. *multiceps* DC., Prodr. 6: 222. 1838; Hook. f., Fl. Brit. India 3: 288. 1881.

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

*Specimens examined* : Deb 195, 1642 (CAL).

1.2. subsp. *luteo-album*

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

*Specimens examined* : Deb 573 (CAL).

2. *Gnaphalium polycaulon* Pers., Syn. Pl. 2 : 421. 1807 ; Haridasan & Rao, For. Fl. Meghalaya 2 : 530. 1987; Pant in Hajra *et al.*, Fl. India 13: 91. 1995. *G. indicum auct. non* L.: Hook. f., Fl. Brit. India 3 : 289. 1881 ; Deb in Bull. Bot. Surv. India 3 : 332. 1961.

Annual, slender, erect - decumbent, woolly herbs up to 50 cm high, stems many from the root stock. Leaves sessile, alternate, linear - obovate or oblanceolate - spatulate, 0.5 - 3.5 x 0.1 - 0.5 cm, apiculate, entire, glabrate - pubescent, densely white woolly below. Capitula in dense terminal or axillary leafy, spikes or racemose clusters. 3 - 4 mm across ; involucre bracts multiseriate, linear - oblong acute, pale reddish brown. Achenes minutely papillose ; pappus hairs white, free.

*Fl. & Fr.* : January - June.

*Specimens examined* : Imphal, Deb 1643 (CAL)

### 34. *Grangea* Adans.

*Grangea madraspatana* (L.) Poiret in Lam., Encycl. (Suppl. 2) 825. 1812; Hook. f., Fl. Brit. India 3:247. 1881; Malick & Safui in J. Econ. Taxon. Bot.10: 6. 1987; Hajra in Hajra *et al.*, Fl. India 12: 127. 1995. *Artemisia madraspatana* L., Sp. Pl. 849. 1753.



Mani.: *Leihungon*.

Annual, prostrate herbs; stems procumbent - ascending, arising from woody rootstock, pubescent or villous. Leaves alternate, oblong - obovate, 2.5 - 6 cm long, pinnatifid, pubescent. Capitula 6-8 mm across, solitary or 2-3 together, leaf opposed, peduncled; involueral bracts multiseriate, ovate-elliptic, obtuse, pubescent. Achenes stipitate; pappus hairs connate, forming fimbriate tube.

*Fl. & Fr.* : January - June.

*Specimens examined*: Celjaug, Malick 1457 (BSIS); Keibul Lonjong National Park, Chauhan 95137 (ASSAM).

### 35. *Gynura* Cass.

- 1a. Root tuberous; stems very short. .... 3. *G. pseudochina*
- b. Roots not tuberous; stems very tall ..... 2
- 2a. Plants pubescent or subtomentose;
  - lower leaves petioled, base cuneate ..... 2. *G. nepalensis*
- b. Plants glabrous; leaves sessile
  - throughout, base auricled ..... 1. *G. bicolor*

1. *Gynura bicolor* (Roxb. ex Willd.) DC., Prodr. 6: 299. 1838; Mathur in Hajra *et al.*, Fl. India 13: 218. 1995. *Cacalia bicolor* Roxb. ex Willd., Sp. Pl. 3: 1731. 1804. *Cacalia cusimbua* D. Don, Prodr. Fl. Nep. 179. 1825. *Gynura angulosa* DC., Prodr. 6: 298. 1838; Hook. f., Fl. Brit. India 3: 334. 1881. *Gynura cusimbua* (D. Don) Moore in J. Bot. 1: 212. 1912; Deb in Bull. Bot. Surv. India 3: 332. 1961.

Mani.: *Terapaihi*.

Succulent herbs, up to 3 m; stems robust, corymbosely branched. Leaves sessile, spirally arranged, obovate or elliptic-lanceolate or oblong, acuminate, 8 - 25 × 2 - 8 cm, margins irregularly toothed, glabrous or with scanty hairs mostly on veins. Capitula in large terminal panicles, 12-25 mm across, peduncled; involueral bracts linear-lanceolate, corolla orange yellow. Achenes with or without long obtuse papillae; pappus white, copious.

*Fl. & Fr.* : August - March.

*Specimens examined*: *s. loc.* Deb 1522, 1766, 2030 (CAL); Litan, Chauhan 94658 (ASSAM).

2. *Gynura nepalensis* DC., Prodr. 6: 300. 1838; Hook. f., Fl. Brit. India 3: 333. 1881; Deb in Bull. Bot. Surv. India 3: 332. 1961; Mathur in Hajra *et al.*, Fl. India 13: 221. 1995. *Gynura foetens* Wallich ex DC., Prodr. 6: 300. 1838.

Tall, perennial, shrubs; stems corymbosely branched above, grooved. Leaves ovate or oblong-lanceolate, acuminate, 7-20 × 2-7 cm, margins irregularly toothed, base cuneate. Capitula in discoid, paniculate corymbs, 16-25 mm across; involueral bracts linear-subulate, villose, corolla yellow. Achenes glabrous or sparsely pubescent, deeply many-ribbed; pappus white.

*Fl. & Fr.* : March - August.

*Specimens examined* : Deb 1356 (CAL).

3. *Gynura pseudochina* (L.) DC., Prodr. 6 : 299, 1838 ; Hook. f., Fl. Brit. India 3 : 334, 1881 ; Deb in Bull. Bot. Surv. India 3 : 332, 1961; Mathur in Hajra *et al.*, Fl. India 13: 223, 1995. *Senecio pseudochina* L., Sp. Pl. 867, 1753.

Perennial, erect herbs with tuberous roots; stems short, up to 50 cm high. Leaves subradical, obovate or oblong - elliptic, cuncate at base, 4 - 20 × 3 - 5 cm, denticulate or pinnatisect, petioled. Capitula spicate, on long, leafless scapes; involucrel bracts minutely pubescent, lanceolate; corolla orange yellow. Achenes red or brown, glabrous or sparingly pubescent; pappus white.

*Specimens examined* : Karuppon, Meebold 5283 (CAL).

### 36. *Helianthus* L.

*Helianthus annuus* L., Sp. Pl. 904, 1753 ; C. B. Clarke, Comp. Ind. 139, 1876; Deb in Bull. Bot. Surv. India 3:332, 1961; Chowdhery in Hajra *et al.*, Fl. India 12:431, 1995.

*Mani.*: *Numitlei*.

Robust, hairy, annual undershrubs, 1 - 4 m high ; stem often mottled. Leaves alternate, ovate, 10 - 30 × 8 - 14 cm, long petioled, apex acute - acuminate, margins serrate. Capitula solitary, terminal, 7 - 15 cm in diam. (up to 35 cm in cultivated plants) ; involucrel bracts ovate - lanceolate, acuminate, strongly ciliate; flowers yellow. Achenes obovate ; pappus subulate, deciduous.

*Fl. & Fr.* : July - October.

*Specimens examined* : S. loc., Deb 304 (CAL).

### 37. *Hemistepta* Bunge ex Fischer & Mey.

*Hemistepta lyrata* Bunge ex Fischer & Mey. in Index Sem. Hort. Bot. Petrop. 2 : 38, 1835; Hajra in Hajra *et al.*, Fl. India 12: 181, 1995. *Saussurea affinis* Spreng. ex DC., Prodr. 6 : 540, 1838 ; Hook. f., Fl. Brit. India 3 : 373, 1881 ; Deb in Bull. Bot. Surv. India 3 : 333, 1961.

Annual herbs ; stems 0.5 - 1.5 m tall, corymbosely branched, may or may not be pubescent. Radical leaves petioled, cauline sessile, lyrate - pinnatifid or entire, 10 - 20 cm long, pubescent or glabrescent above, cottony or white tomentose below. Capitula long peduncled, 2 - 3 cm in diam., in corymbose panicles ; involucrel bracts multiseriate, pale or little cottony, ovate - lanceolate, acuminate; florets pale red. Achenes obovoid - oblong, 10 - costate ; pappus uniseriate, plumose.

*Fl. & Fr.* : February - June.

*Specimens examined* : Saithon, Meebold 6529 (CAL).

**38. Inula L.**

- 1a. Leaves alternate; involucrel bracts subulate ; pappus dirty white ..... 1. *I. cappa*
- b. Leaves spirally arranged; involucrel bracts linear-oblong; pappus pale brown ..... 2. *I. eupatorioides*

**1. *Inula cappa*** (Buch. - Ham. ex D. Don) DC., Prodr. 5 : 469. 1836 ; Hook. f., Fl. Brit. India 3 : 295. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 116. 1939; Deb in Bull. Bot. Surv. India 3 : 332. 1961; Kumar in Hajra *et al.*, Fl. India 13: 13. 1995. *Conyza cappa* Buch. -Ham. ex D. Don, Prodr. Fl. Nep. 176. 1825. Fig. 77

Stout undershrubs, 1.2 - 2.5 m tall; stems brownish, silky or woolly, corymbosely branched. Leaves narrowly elliptic or oblong - lanceolate, 5 - 15 × 1.5 - 5 cm, distantly serrate, lower petioled, upper sessile, pubescent above, silky tomentose below. Capitula in terminal or axillary corymbose panicles, 5 - 11 mm in diam.; involucrel bracts multiseriate, linear; flowers deep yellow. Achenes ribbed, pubescent ; pappus plumose.

*Fl. & Fr.* : August - February.

*Specimens examined* : Moreh, Deb 615; Pallel & Deb 1331 (CAL) ; Litan. Chauhan 94824 ; Kcibul, Chauhan 94622 (ASSAM).

**2. *Inula eupatorioides*** DC., Prodr. 5 : 469. 1836 ; Hook. f., Fl. Brit. India 3 : 295. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 116. 1939 ; Deb. in Bull. Bot. Surv. India 3 : 332. 1961 ; Balakr., Fl. Jowai 1 : 265. 1981; Kumar in Hajra *et al.*, Fl. India 13: 17. 1995.

Woolly, stout shrubs, 1 - 2 m tall, stems pubescent. Leaves elliptic - oblong or lanceolate, 3 - 25 × 2 - 8 cm, acute - acuminate, irregularly serrate, scaberulous above, pubescent below. Capitula numerous, peduncled in terminal corymbose panicles, 5- 8 mm in diam. ; involucrel bracts linear, subulate, tomentose; flowers yellow. Achenes silky pubescent; pappus plumose.

*Fl. & Fr.* : October - February.

**39. Ixeris Cass.**

- 1a. Plants glabrous; stem 30-60 cm, apices leafless, dichotomously pinnate ; capitulum narrow, few flowered ..... 1. *I. gracilis*
- b. Plants glabrous or puberulous ; stem 15 - 45 cm ; capitulum oval, many flowered ..... 2. *I. polycephalla*

**1. *Ixeris gracilis*** (Wallich ex DC.) Stebbins, in J. Bot. 75 : 50. 1937; Mangain & Rao in Hajra *et al.*, Fl. India 12: 278. 1995. *Lactuca gracilis* Wallich ex DC.,



Fig. 77 : A fruiting twig of *Inula cappa* (Buch. Ham ex D. Don) DC.

Prodr. 7 : 140. 1838 ; Hook. f., Fl. Brit. India 3 : 410. 1881 ; Shukla & Baishya in J. Bombay Nat. Hist. Soc. 76 : 225. 1977.

Placid annuals. Radical leaves very long, linear-lanceolate, 8 - 15 × 0.3 - 1.2 cm, usually entire, acuminate. Capitula 3 - 8-flowered ; 3 - 6 mm in diam. ; involucre bracts biseriata, outer narrow, inner linear, flowers yellow. Achenes pale red, many ribbed; pappus deciduous, pale yellow with brown tinge.

Fl. & Fr. : September - February.

Specimens examined : Nagaram (Thanga), Jain 63458 (ASSAM).

2. *Ixeris polycephala* (Benth. & Hook. f.) Cass., Dict. Sci. Nat. 24 : 59. 1937; Mangain & Rao in Hajra *et al.*, Fl. India 12: 279. 1995. *Lactuca polycephala* Benth. & Hook. f., Gen. Pl. 2 : 526. 1873 ; Hook. f., Fl. Brit. India 3 : 410. 1881. Kanjilal *et al.*, Fl. Assam 3 : 534. 1939.

Glabrous, slender annual herbs; stems ribbed. Leaves membranous, linear lanceolate, 7 - 25 × 0.6 - 1.8 cm, rarely pinnatifid. Capitula 10 - 20-flowered, in dichotomous or subumbellate corymbose panicles, 4 - 6 mm in diam. ; involucre bracts biseriata, inner elliptic-lanceolate, outer squamiferous; flowers yellow. Achenes red-brown, elliptic-lanceolate ; pappus silvery.

Fl. & Fr. : November - March.

#### 40. *Kalimeris* Cass.

*Kalimeris indica* (L.) Sch. - Bip., Zoll. Syst. Verz. Ind. Archip. 125. 1854 - 55; Hajra in Hajra *et al.*, Fl. India 12: 130. 1995. *Aster indicus* L., Sp. Pl. 876. 1753. *Boltonia indica* (L.) Benth., Fl. Hongk. 174. 1861 ; C.B. Clarke, Comp. Ind. 40. 1876 ; Hook. f., Fl. Brit. India 3 : 249. 1881 ; Deb in Bull. Bot. Surv. India 3 : 330. 1961.

Erect, rhizomatous, perennial herbs, 0.3 - 0.6 m tall ; stem hispidate - scabrous or glabrous, striate. Leaves alternate, glabrescent or sparsely scabrous - pubescent especially on margins and veins beneath, oblong-lanceolate or oblanceolate, 3 - 7 × 0.5 cm, entire or subserrate distally, apex acute. Capitula numerous in terminal, leafy panicles, 0.5 - 1 cm in diam. ; involucre bracts 2 - 3-seriate, oblanceolate, acute or obtuse; flowers purplish. Achenes may or may not be triangulate, brown or pale, finely pubescent, glandular above ; pappus scanty, deciduous, lateral setae slightly longer.

Fl. & Fr. : July - September.

Specimens examined : Karong, 1065 m, Rup Chand 3713 (E, MICH).

#### 41. *Lactuca* L.

*Lactuca sativa* L., Sp. Pl. 795. 1753 ; Deb in Bull. Bot. Surv. India 3 : 332. 1961 ; Mangain & Rao in Hajra *et al.*, Fl. India 12: 300. 1995. *L. scariola* var. *sativa* Boiss., Fl. Orient. 3: 809. 1875; Hook. f., Fl. Brit. India 3 : 404. 1881.

Mani : *Salad-manhi*.

Annual or biennial herbs; stems 0.6 - 1.5 m, with woody root stock, corymbosely branched. Leaves succulent, pinnatifid or entire, ovate-oblong, 10 - 18 cm long, minutely spinulose toothed. Inflorescence yellowish on incurved ascending corymbose branches, up to 30 cm in diam., involucrel bracts biseriate, inner linear, outer ovate. Achenes black, glabrous or hairy, 6- 8-ribbed; pappus thin, soft.

*Fl. & Fr.* : March - November

#### 42. *Laggera* Sch. - Bip. ex Koch.

- 1a. Plants pubescent or tomentose; stem with entire wings; receptacles pilose ..... 1. *L. alata*  
 b. Plants glabrous or puberulous; stem with deeply dissected wings; receptacles glabrous ..... 2. *L. crispata*

1. *Laggera alata* (D. Don) Sch. Bip. ex Oliver in Trans. Linn. Soc. 29 : 94. 1873; Hook. f., Fl. Brit. India 3 : 271. 1881; Deb in Bull. Bot. Surv. India 3 : 332. 1961; Kumar in Hajra *et al.*, Fl. India 13: 148. 1995. *Erigeron alatum* D. Don, Prodr. Fl. Nep. 171. 1825.

Erect, stout herbs; stem 0.3 - 1 m. Leaves oblong - subovate, 2 - 10 cm long, sessile, margins dentate, apex, somewhat obtuse. Capitula 1.5 - 2 cm in diam., racemed or on axillary, winged peduncles; involucrel bracts biseriate, outer oblong, acute, pubescent, inner chartaceous, acuminate, subglabrate; florets purplish. Achenes cylindrical, pilose, 10 - triate; pappus white.

*Fl. & Fr.* : October - February.

*Specimens examined* : *s. loc.*, Deb M/31 (CAL).

2. *Laggera crispata* (Vahl) Hepper & Wood in Kew Bull. 38 : 83. 1983; Kumar in Hajra *et al.*, Fl. India 13: 151. 1995. *Coryza crispata* Vahl, Symb. Bot. 1 : 71. 1790. *Laggera pterodonta* (DC.) Sch. - Bip. ex Oliver in Trans. Linn. Soc. 29 : 94. 1873; Hook. f., Fl. Brit. India 3 : 271. 1881. Deb in Bull. Bot. Surv. India 3 : 333. 1961.

Slender, annual or perennial, strongly aromatic herbs; stems 0.6 - 1.5 m; with deeply toothed, lobed or with membranous vertical laminac. Leaves oblanceolate, 6 - 19 × 1 - 5.5 cm, lyrate - pinnatifid. Capitula 1.2 - 1.6 cm in diam., sparsely paniced; involucrel bracts biseriate, outer small, viscid, inner elongate, acute, chartaceous; florets purple. Achenes cylindrical, pilose, 10 - costate.

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

*Specimens examined* : Chingmeirong, Deb 317; Koupro, 1334 (CAL).

#### 43. *Launaea* Cass.

*Launaea acaulis* (Roxb.) Babcock ex Kerr. in Craib, Fl. Siam. Enum. 2 : 299. 1936; Mangain & Rao in Hajra *et al.*, Fl. India 12: 304. 1995. *Prenanthes acaulis* Roxb., Fl. Ind. ed. 2, 3 : 304. 1832. *Crepis acaulis* Hook. f., Fl. Brit. India 3: 396. 1881. *Lactuca glabra* DC. in Wight., Contrib. Bot. Ind. 26 : 1834; Hook. f., Fl. Brit. India 3 : 396. 1881; Deb in Bull. Bot. Surv. India 3 : 331. 1961.

Dwarf herbs, with perennial rootstock ; stem 10 - 60 cm, dichotomously branched, quite glabrous. Leaves linear or oblong - spatulate, 10 - 15 × 0.6 - 2.5 cm, margins entire or ciliate - serrate or sinuate - dentate. Capitula narrowly cylindrical, up to 2.5 cm long, in corymbs, 6 - 12 -flowered; involucrel bracts biseriata; outer small, inner 5 - 8, linear - lanceolate, margins scarious. Achenes ellipsoid, fusiform, 4 - 5 -costate ; pappus uniseriate, snow white.

*Fl. & Fr.* : January - May.

*Specimens examined* : Pallel, Deb 1333 (CAL).

Rare.

#### 44. *Leucomeris* D. Don

*Leucomeris decora* Kurz in J. Asiat. Soc. Bengal 41 : 317. 1872 ; C. B. Clarke, Comp. Ind. 245. 1876 ; Hook. f. Fl. Brit. India 3 : 387. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 125. 1939 ; Deb in Bull. Bot. Surv. India 3 : 333. 1961 ; Rao in Hajra *et al.*, Fl. India 13 : 182. 1995.

Small, deciduous trees; young shoots villous -tomentose. Leaves narrowly elliptic or oblong - lanceolate, acute or acuminate, 12 - 18 cm long, glabrous on both surfaces. Capitula fragrant, in terminal panicles on leafless branchlets. 4 - 8 flowered ; involucrel bracts numerous, woolly, outer short - imbricate. Achenes oblong, villous ; pappus pale brown - reddish.

*Fl. & Fr.* : February - June

*Specimens examined* : *S. loc.*, G. Watt 7440, 5903 (CAL) ; Meebold 2976 (CAL). Deb 2120 (CAL).

#### 45. *Microglossa* DC.

*Microglossa pyrifolia* (Lam.) O. Kuntze, Rev. Gen. Pl. 1 : 353. 1891 ; Kanjilal *et al.*, Fl. Assam 3 : 109. 1939 ; Hajra in Hajra *et al.*, Fl. India 12 : 133. 1995. *Conyza pyrifolia* Lam., Encycl. 2 : 89. 1786. *Microglossa volubilis* DC., Prodr. 5 : 320. 1836 ; Hook. Fl. Brit. India 3 : 257. 1881.

Rambling shrubs, up to 3.5 m tall; branches grooved ; brown pubescent. Leaves petiolate, ovate - elliptic, 2 - 8 × 1 - 4 cm, entire or laxly serrate, acuminate, glabrous above, puberulous beneath. Capitula yellow ; clustered in corymbs; involucrel bracts 2 - 3 seriate, lanceolate, outer short; florets whitish yellow. Achenes minute, tetragonous, puberulous; pappus reddish, longer than achenes.

*Fl. & Fr.* : November - March.

*Specimens examined* : *S. loc.*, G. Watt 5042 (CAL).

#### 46. *Mikania* Willd.

*Mikania micrantha* Kunth. in H.B.K., Nov. Gen. Sp. 4 : 134. 1820 ; Balakr., Fl. Jowai 1 : 257. 1981 ; Uniyal in Hajra *et al.*, Fl. India 12 : 356. 1995. *M. scandens* auct. non Willd.; Hook. f., Fl. Brit. India 3 : 244. 1881. *M. cordata* (Burm. f.) Robins. var. *indica* Kitamura; Mallick & Safui in J. Ecol. Taxon. Bot. 10 : 6. 1987.

Mani.; *Cori-hingchabi*.

Extensive, subherbaceous twiners; branches slender, pubescent. Leaves opposite, petiolate, triangular-ovate, cordate or hastate, 3-12 × 1.5-10 cm, margins crenate-dentate, sparsely pubescent. Capitula in dense corymbose panicles, up to 6 mm in diam., 4-flowered; involucrel bracts lanceolate; florets white. Achenes blackish brown, truncate, 5-costate; pappus hairs 33-38 per achenes, connate at base, white.

*Fl. & Fr.* : August - January.

*Specimens examined* : Uchathol, *Malick* 639; Nungba, *Malick* 1238 (BSIS).

#### 47. *Myriactis* Less.

*Myriactis nepalensis* Less. in *Linnaea* 6: 128, t. 2, 1831; Hook. f., *Fl. Brit. India* 3: 247, 1881; Deb in *Bull. Bot. Surv. India* 3: 333, 1961; Hajra in Hajra *et al.*, *Fl. India* 12: 134, 1995.

Highly variable, glabrous or hispid herbs; stems ribbed, up to 0.6 m, branches glabrous or laxly villous. Leaves oblong-obovate or ovate, 3-9 × 0.8-3.5 cm, petiolate, margins serrate, usually glabrous on both surfaces or villous. Capitula subpaniculate, up to 1 cm in diam.; involucrel bracts multiseriate acute; florets white-pale green. Achenes beaked.

*Fl. & Fr.* : May - November.

*Specimens examined* : Imphal, *Deb* 265 (CAL).

#### 48. *Piloselloides* (Less.) C. Jeffery

*Piloselloides hirsuta* (Forsk.) C. Jeffery in *Kew Bull.* 21:218, 1967; Rao in Hajra *et al.*, *Fl. India* 13:184, 1995. *Arnica hirsuta* Forsk., *Fl. Aegypt Arab.* 151, 1775. *Gerbera piloselloides* (L.) Cass., *Dict. Sci. Nat.* 18: 461, 1820; Hook. f., *Fl. Brit. India* 3:389, 1881; Deb in *Bull. Bot. Surv. India* 3: 332, 1961. *Arnica piloselloides* L., *Pl. Afr. Rac.* 22, 1760.

Perennial, acaulescent, scapigerous herbs; root stock thick, silky villose. Leaves in whorls, short petioled, elliptic-ovate, 4-10 × 2-6 cm, apex obtuse, entire, villose below, glabrous or sparsely pilose above. Capitula 2-3 cm in diam., on 30-50 cm long, villose, ebracteate scape; involucrel bracts uniseriate, linear-lanceolate, hirsute; ligules purple inside, white outside. Achenes long-beaked, 5-6 ribbed, papillose; pappus red.

*Fl. & Fr.* : April - November.

*Specimens examined* : Koupru, *Deb* 2284 (CAL).

#### 49. *Saussurea* DC.

- 1a. Capitula 1.5 - 4 cm in diam.; corolla  
and pappus 1.2 - 1.7 cm long ..... 2. *S. deltoidea*
- b. Capitula 1 - 1.5 cm in diam.; corolla  
and pappus up to 6 mm long ..... 1. *S. crispa*



1. *Saussurea crispa* Vaniot in Bull. Geogr. B. Le Mans. 12 : 21. 1903; Hajra in Hajra *et al.*, Fl. India 12: 197. 1995. *S. deltoidea* var. *nivea* (DC.) Hook. f., Fl. Brit. India 3 : 375. 1881; *Aplotaxis nivea* DC., Prodr. 6: 541. 1838.

Herbs or undershrubs, up to 3 m tall ; stems corymbosely branched above. Leaves petioled, upper entire, ovate - lanceolate, 5 - 30 × 2.5 - 13 cm, scaberulous above, white tomentose below. Capitula in terminal panicles ; involucrel bracts multiseriate, ovate - obtuse, purplish red; florets - purple. Achenes highly variable; pappus up to 6 mm long.

*Fl. & Fr.* : October - March.

*Specimens examined* : Koupru, Karupam, Meebold 6074, 6628 (CAL).

2. *Saussurea deltoidea* (DC.) Sch. - Bip. in Linnæa 19 : 331. 1846 ; Hook. f., Fl. Brit. India 3 : 374. 1881; Hajra in Hajra *et al.*, Fl. India 12: 197. 1995. *Aplotaxis deltoidea* DC., Prodr. 6 : 541. 1838.

Shrubs, 2 - 3 m tall ; stems branched above, grooved, pubescent. Leaves ovate - lanceolate, lower lyrate - pinnatifid, 5 - 45 × 2 - 9 cm, terminal lobe large, deltoid or hastate, glabrous or scaberulous above, white tomentose below, margin sinuate dentate. Capitula paniced or racemose, sessile or peduncled ; involucrel bracts multiseriate, elliptic - lanceolate, blackish, woolly - pubescent. Achenes black, smooth or tubercled ; pappus white.

*Fl. & Fr.* : May - November.

#### 50. *Senecio* L.

- 1a. Plants herbaceous ..... 2. *S. linifolius*
- b. Plants shrubs or undershrubs ..... 2
- 2a. Climbing undershrubs ; leaves ovate-hastate ..... 5. *S. scandens*
- b. Erect shrubs or undershrubs ; leaves not ovate - hastate ..... 3
- 3a. Leaves lyrate - pinnatifid; achenes glabrous or puberulous ..... 1. *S. laetus*
- b. Leaves elliptic or elliptic-lanceolate ; achenes pilose, papillose or glabrous ..... 4
- 4a. Plants throughout pubescent ..... 4. *S. rhabdos*
- b. Plants glabrous or minutely villous ..... 5
- 5a. Heads bracteolate; achenes papillose; pappus white ..... 3. *S. obtusatus*
- b. Heads ebracteolate ; achenes glabrous; pappus yellowish - brown. .... 6. *S. swightii*

1. *Senecio laetus* Edgew., in Trans. Linn. Soc. Bot. 20 : 74. 1846; Mathur in Hajra *et al.*, Fl. India 13: 263, 1995. *S. chrysanthemoides* DC., Prodr. 6 : 365, 1838 ; Hook. f., Fl. Brit. India 3 : 339, 1881 ; Deb in Bull. Bot. Surv. India 3 : 333, 1961.

Herbs or undershrubs; stems 0.6 - 2 m tall, robust, striate, glabrous below, pubescent above, corymbosely branched above. Leaves petiolate, leaf lobe oblong, acute, serrate, 2.5 - 25 × 1.5 - 12 cm, usually glabrous. Capitula many-flowered, up to 1.5 cm in diam., in highly branched corymbs; involucrel bracts 10 - 12, oblong elliptic, subacute. Achenes strongly ribbed, oblong, 5 - angled; pappus white, dingy or reddish.

*Fl. & Fr.* : December - March.

*Specimens examined* : Maram, Deb 1950 (CAL).

2. *Senecio linifolius* C.B. Clarke, Comp. Ind. 202. 1876 ; Hook. f., Fl. Brit. India 3 : 343, 1881 ; Deb in Bull. Bot. Surv. India 3 : 333, 1961; Mathur in Hajra *et al.*, Fl. India 13: 267, 1995.

Suffruticose, glabrous herbs, stems ascending, 20 - 45 cm, branched from base. Leaves sessile, linear or narrowly oblong, 7 - 15 × 0.5 - 1 cm, subacute, margins distantly serrate - denticulate, base contracted. Capitula many, in lax corymbs ; involucrel bracts 16 - 20, narrowly oblong, acute. Achenes slender, deeply ribbed; pappus red, equal in length to achenes.

*Fl. & Fr.* : September - December.

*Specimens examined* : North Manipur, C.B. Clarke *s.n.*

3. *Senecio obtusatus* Wallich ex DC., Prodr. 6 : 367, 1838 ; Hook. f., Fl. Brit. India 3 : 340, 1881 ; Deb in Bull. Bot. Surv. India 3 : 333, 1961; Mathur in Hajra *et al.*, Fl. India 13: 273, 1995. *S. khasianus* Balakr. in J. Bomb. Nat. Hist. Soc. 67 : 62, 1970 (*nom. illegit. suppl.*)

Nearly glabrous herbs; stems erect, 0.3 - 1 m, very slender, more or less naked. Leaves radical at base, elliptic - lanceolate, 3 - 12 × 1 - 3.5 cm, acute - denticulate, glabrous on both surfaces. Capitula campanulate, many, 0.6 - 0.8 cm in diam., in lax corymbs, 20 - 30 -flowered ; involucrel bracts 8 - 10, oblong elliptic, acute. Achenes papillose; pappus white.

*Fl. & Fr.* : May - September.

*Specimens examined* : Ukhrul, Deb 646 (CAL).

4. *Senecio rhabdos* C.B. Clarke in J. Linn. Soc. 25. 40, t. 19. 1889 ; Kanjilal *et al.*, Fl. Assam 3 : 124, 1939 ; Deb in Bull. Bot. Surv. India 3 : 333, 1961; Mathur in Hajra *et al.* Fl. India 13: 276, 1995.

Perennial undershrubs ; stems slender, up to 2 m tall, grooved, pubescent with axillary, profusely flowered corymbs. Leaves blackish alternate, petiolate, elliptic-lanceolate, 5 - 7 × 2.5 - 3 cm, acute or acuminate, margins serrate, brown tomentose; petiole biauriculate. Capitula small, panicled in scariosae. Flowers pale yellow. Achenes sub - quadrate, angles pilose; pappus white.

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

*Specimens examined* : North Manipur, *Clarke* 41296 (CAL).

**5. *Senecio scandens*** Buch. - Ham. ex D. Don, Prodr. Fl. Nepal 178. 1825 ; Hook. f., Fl. Brit. India 3 : 352. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 122. 1939 ; Deb Bull. Bot. Surv. India 3 : 333. 1961.

Gregarious, woody climbers, 2 - 7 m ; branches pubescent. Leaves acuminate, 3 - 10 × 1.5 - 5 cm, margins crenate - dentate; petiole short auricled. Capitula oblong, 0.6 - 1.2 cm long, in dense axillary corymbs ; involucre bracts linear - oblong, 10 - 12, acute; florets yellow. Achenes 4 - angled, ribbed, ribs hirsute ; pappus white.

*Fl. & Fr.* : October - February.

*Specimens examined* : Eiripok, *Deb* 1963 (CAL) ; Ukhrul, *Chauhan* 94890, 94918 (ASSAM).

**6. *Senecio wightii*** (DC.) Benth. & Hook. f., Gen. Pl. 2: 248. 1873 ; Balakr., Fl. Jowai 1 : 268. 1981 ; Mathur in Hajra *et al.*, Fl. India 13: 283. 1995. *Doronicum wightii* DC. in Wight., Contrib. Bot. Ind. 23. 1834. *Senecio saxatilis* DC., Prodr. 6 : 367. 1838 ; Hook. f., Fl. Brit. India 3 : 344. 1881 ; Deb in Bull. Bot. Surv. India 3 : 333. 1961.

Mani.: *Maipuipin*.

Small, glabrous or villous undershrubs ; stems erect, 20 - 60 cm, laxly corymbose above. Leaves sessile, 10 - 18 × 0.4 - 1.2 cm, acute - acuminate, margins serrate. Capitula few, up to 2 cm in diam., in terminal, corymbose panicles ; involucre bracts 12 - 16, small, acute; florets yellow. Achenes linear - oblong, striated ; pappus white or reddish.

*Fl. & Fr.* : September - March.

*Specimens examined* : Langool Hill, *Deb* 1626 (CAL).

Rare.

### 51. *Siegesbeckia* L.

***Siegesbeckia orientalis*** L., Sp. Pl. 900. 1753 ; Hook. f., Fl. Brit. India 3 : 304. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 117. 1939 ; Deb in Bull. Bot. Surv. India 3 : 334. 1961 ; Chowdhery in Hajra *et al.*, Fl. India 12: 407. 1995.

Large, erect, annual, coarse herbs or undershrubs, up to 1.5 m tall ; stems branched, glandular, pubescent. Leaves opposite, triangular - ovate, elliptic, 3 - 12 × 0.5 - 3 cm, crenate - dentate, pubescent. Capitula small, peduncled in leafy corymbs ; involucre bracts biseriate, outer 5, spatulate, inner 5, naviculate; florets yellow. Achenes ovoid - oblong - blackish.

*Fl. & Fr.* : September - March.

*Specimens examined* : *Mukerjee* 2944 (CAL) ; *s. loc.*, *Deb* 2725, 155, 731 (CAL) ; Litan, *Chauhan* 94807 (ASSAM).

52. *Sonchus* L.

- 1a. Plants erect : leaves oblong ovate;  
flowers white ..... 1. *S. asper*
- b. Plants forming small rosettes: leaves  
lanceolate; flowers yellow ..... 2. *S. wightianus*  
..... *subsp. wightianus*

1. *Sonchus asper* (L.) Hill. Herb. Brit. 1 : 47. 1769 ; Hook. Fl. f. Brit. India 3 : 414. 1881 ; Shukla & Baishya in J. Bombay Nat. Hist. Soc. 76 : 225. 1977; Mangain & Rao in Hajra *et al.*, Fl. India 12:318, 1995. *S. oleraceus* var. *asper* L., Sp. Pl. 794. 1753.

Mani.: *Khomthokpi*.

Erect, annual, glabrous or laxly glandular herbs, up to 60 cm, umbellately branched. Leaves entire or runcinate, lanceolate or ovate-lanceolate, 7-22 × 3-9 cm. Capitula in terminal panicles, 1.2-2 cm in diam. ; involucre bracts 2-3-seriate, outer smaller, ovate-lanceolate. Achenes compressed, faces 3-ribbed, grooves faintly muricate; pappus white.

Fl. & Fr. : December - May.

Specimens examined : Keibul, Jain 63441 (ASSAM).

2. *Sonchus wightianus* DC. *subsp. wightianus* DC., Prodr. 7 : 187. 1838 ; Shukla & Baishya in J. Bombay Nat. Hist. Soc. 76 : 225. 1977; Mangain & Rao in Hajra *et al.*, Fl. India 12:323, 1995. *S. arvensis* auct. non. L.; Hook. f., Fl. Brit. India 3 : 414. 1881.

Mani.: *Khomthakpi*.

Annual or perennial herbs; rootstock long cylindrical, creeping; stems up to 1.2 m tall, glandular hairy. young parts and involucre with gland tipped hairs. Leaves 10-25 × 1.5-4.5 cm, usually entire-serrate, rarely runcinate, basal rosulate. Capitula axillary or in terminal racemes, 0.5-1.5 cm in diam. ; involucre bracts 2-3-seriate. Achenes narrow, subcompressed, moderately thick, muricate ; pappus dull white.

Fl. & Fr. : March - August.

Specimens examined : Churachandpur - Tipaimukh Road, Jain 63554 (ASSAM).

Uses : Leaves used in curry. Also eaten by horses and cattle.

53. *Sphaeranthus* L.

*Sphaeranthus indicus* L., Sp. Pl. 927. 1753 ; Hook. f., Fl. Brit. India 3 : 275. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 114. 1939 ; Shukla & Baishya in J. Bombay Nat. Hist. Soc. 76 : 225. 1977; Kumar in Hajra *et al.*, Fl. India 13: 160, 1995.

Spreading - procumbent herbs, up to 30 cm ; stems tomentose - villous. Leaves alternate, oblong - obovate, 0.5 - 1.5 × 0.2 - 0.5 cm, dentate - serrate, acute - obtuse, villous. Capitula small, globose - oblong, 1.2 - 1.6 cm across, on winged peduncles;

involucral bracts paleaceous, spatulate, acute, ciliate. Achenes angular, sub-glabrous; pappus absent.

*Fl. & Fr.* : January - May.

*Specimens examined* : Keibul. Jain 63397 (ASSAM).

#### 54. *Spilanthes* Jacquin

- 1a. Capitula solitary; achenes smooth ;  
pappus obsolete ..... 1. *S. clava*
- b. Capitula panicled : achenes strongly  
marginled; pappus hairs 1 - 2 ..... 2. *S. paniculata*

**1. *Spilanthes clava*** DC., in Wight., *Contrib. Bot. Ind.* 19, 1834; Chowdhery in Hajra *et al.*, *Fl. India* 12: 409, 1995. *S. acmella sensu* Hook. f., *Fl. Brit. India* 3 : 307, 1881 ; Deb in *Bull. Bot. Surv. India* 3 : 334, 1961, *S. acmella* var. *clava* (DC.) C.B. Clarke, *Comp. Ind.* 138, 1876.

Trailing herbs; stems sparsely pubescent. Leaves opposite, ovate lanceolate, 1.2 - 6 × 0.8 - 3 cm, distantly serrate, acute. Capitula ovoid, yellow; involucral bracts biseriata, unequal. Achenes compressed.

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

*Specimens examined* : Saptarmania. Deb 1116 (CAL).

*Uses* : Used for sore mouth. Also efficacious for toothache.

**2. *Spilanthes paniculata*** Wallich ex DC., *Prodr.* 5 : 625, 1836; Chowdhery in Hajra *et al.*, *Fl. India* 12: 410, 1995. *S. acmella* var. *paniculata* (DC.) C. B. Clarke, *Comp. Ind.* 139, 1876; Hook. f., *Fl. Brit. India* 3 : 307, 1881.

Tufted herbs; stems up to 30 cm, ribbed, branches divaricate. Leaves opposite, ovate or elliptic lanceolate, 1.5 - 5 × 0.4 - 2.3 cm, distantly serrulate denticulate, sparsely pubescent on lower surface. Capitula ovoid, 0.6 - 1.2 × 0.4 - 0.6 cm, orange yellow; involucral bracts biseriata, linear, ovate - lanceolate. Achenes triquetrous.

*Fl. & Fr.* : January - March.

*Specimens examined* : Tipaimukh, Baishya 95204 (ASSAM)

#### 55. *Synotis* (C. B. Clarke) C. Jeffrey & Y. L. Chen

- 1a. Woody climbers ..... 4. *S. trifigulata*
- b. Shrubs or undershrubs ..... 2
- 2a. Plants glabrous; heads turbinate ..... 1. *S. horii*
- b. Plants white felted; heads campanulate ..... 3
- 3a. Leaves with scattered stiff hairs above,  
white felted beneath; heads bracteolate ..... 2. *S. cappa*
- b. Leaves covered with light brown cottony  
wool below; heads ebracteolate ..... 3. *S. nagensium*

1. *Synotis borii* (Raiz.) Mathur in J. Econ Taxon. Bot. 8: 482. 1986 & in Hajra *et al.*, Fl. India 13: 290. 1995. *Senecio borii* Raiz. in J. Ind. Bot. Soc. 27: 206. 1948.

Perennial, glabrous shrubs; branches deep reddish, striate. Leaves petiolate, alternate, broadly elliptic-oblong, 12 - 20 × 3 - 6 cm, caudate-acuminate, serrate, glabrous above, pubescent below. Capitula turbinate, 0.4 - 0.6 cm in diam., in axillary corymbs; florets bright yellow; involucrel bracts uniseriate, 8 - 9, subequal, oblong-elliptic with deltoid apex; margins scarious. Achenes blackish, obconic, glabrous; pappus white, barbellate.

Fl. & Fr. : October - February.

2. *Synotis cappa* (Buch. - Ham. ex D. Don) C. Jeffrey & Y. L. Chen in Kew Bull. 39: 319. 1984; Matlur in Hajra *et al.*, Fl. India 13: 291. 1995. *Senecio cappa* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 179. 1825. *Senecio densiflorus* Wallich ex DC., Prodr 6: 369. 1838; Hook. f., Fl. Brit. India 3: 355. 1881; Kanjilal *et al.*, Fl. Assam 3: 123. 1939; Deb in Bull. Surv. India 3: 333. 1961.

Gregarious, perennial rhizomatous undershrubs; stems suffruticose, 0.3 - 1.5 m. Leaves short petiolate, ovate, elliptic - lanceolate, 10 - 22 × 2.5 - 10 cm., doubly serrate, acuminate. Capitula many-flowered, in axillary and terminal, subpanicked corymbs, up to 0.8 cm; involucrel bracts 8 - 12, linear - oblong, acute, white - light brown, tomentose; florets yellow. Achenes glabrous, oblong, 5-angled; pappus white.

Fl. & Fr. : November - April.

Specimens examined : *S. loc.*, Meebold 5934 (CAL); Deb 1219, 2346 (CAL); Chandel, Chauhan 94972 (ASSAM).

3. *Synotis nagensium* (C.B. Clarke) C. Jeffrey & Y.L. Chen in Kew Bull. 39: 321. 1984; Matlur in Hajra *et al.*, Fl. India 13: 295. 1995. *Senecio nagensium* C.B. Clarke in J. Linn. Soc. Bot. 25: 39. 1898; Kanjilal *et al.*, Fl. Assam 3: 125. 1939; Deb in Bull. Bot. Surv. India 3: 333. 1961. *S. densiflorus* Wallich ex DC. var. *mishmiensis* Hook. f., Fl. Brit. India 3: 355. 1881.

Perennial shrubs, up to 2.5 m; rhizomatous; branches angled, cottony. Leaves obovate - elliptic or lanceolate, 8 - 15 × 3 - 8 cm, coriaceous, serrate, shortly acuminate, upper surface arenose. Capitula few, discoid or slightly radiate, up to 1.2 cm in diam., cbracteolate; involucrel bracts 13, linear - lanceolate, acute with scarious margins. Achenes laxly villous; pappus white.

Fl & Fr. : August - May

Specimens examined : North Manipur, *S. loc.*,

4. *Synotis triligulata* (Buch. - Ham. ex D. Don) C. Jeffery & Y.L. Chen in Kew Bull. 39: 329. 1984; Mathur in Hajra *et al.*, Fl. India 13: 301. 1995. *Senecio triligulatus* Buch. - Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook. f., Fl. Brit. India 3: 356. 1881; Kanjilal *et al.*, Fl. Assam 3: 122. 1939; Deb in Bull. Bot. Surv. India 3: 333. 1961.

Herbs or shrubby; stems scrambling or erect, up to 1.3 m tall, sparsely pubescent. Leaves elliptic-lanceolate, 8-15 x 2.5-4 cm, caudate-acuminate, serrate-denticulate. Capitula up to 6 mm in diam., in axillary and terminal corymbose panicles, ebracteolate; involueral bracts 5-8, linear-narrowly oblong, acute. Achenes glabrous; pappus white-little dingy.

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

*Specimens examined*: North Manipur C. B. Clarke 41984 (CAL).

### 56. *Tagetes* L.

- 1a. Involucres smooth, bracts 8-13;  
capitula 4-10 cm diam. .... 1. *T. erecta*
- b. Involucres subangulate, bracts 5-7;  
capitula 2-4 cm diam. .... 2. *T. patula*

1. *Tagetes erecta* L., Sp. Pl. 887. 1753; C.B. Clarke, Comp. Ind. 143. 1876; Deb in Bull. Bot. Surv. India 3: 334. 1961; Rao in Hajra *et al.*, Fl. India 13: 327. 1995.

Mani.: Sanareti.

Erect, annual herbs; branches glabrous. Leaves opposite, pinnatifid, segments oblong-lanceolate, serrate, base cuneate. Capitula large, terminal on elongate subcylindrical peduncle; involueral bracts uniseriate, connate up to middle. Flowers yellow-orange. Achenes linear, compressed, pappus with 5-6 truncate, paleaceous scales.

*Fl. & Fr.*: July-November.

*Specimens examined*: Cultivated in gardens

2. *Tagetes patula* L., Sp. Pl. 887. 1753; C. B. Clarke, Comp. Ind. 142. 1876; Deb Bull. Bot. Surv. India 3: 334. 1961; Rao in Hajra *et al.*, Fl. India 13: 329. 1995.

Mani.: Sanareti

Erect, aromatic, annual herbs, profusely branched. Leaves opposite or alternate above, pinnatifid, segments oblong-lanceolate, serrulate, glandular, punctate. Capitula smaller, corymbose, peduncles long, thickened on one side; involueral bracts connate up to 2/3 of its length. Flowers yellow with red-brown markings. Achenes angled, slightly compressed; pappus with 1-2 subulate and 2-3 short, blunt scales.

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

*Specimens examined*: Deb 149 (CAL); Cultivated in gardens.

### 57. *Thespis* DC.

*Thespis divaricata* DC. in Guill. Arch. Bot. 2: 517. 1833 & Prodr. 5: 375. 1836; Hook. f., Fl. Brit. India 3: 259. 1881; Deb in Bull. Bot. Surv. India 3: 334. 1961; Hajra in Hajra *et al.*, Fl. India 12: 146. 1995.

Glabrous, annual herbs ; stem variable, 8 - 60 cm high, robust; branches spreading. Leaves alternate, sessile or with short petiole, elliptic - obovate, 1.5 - 4 cm long, serrate. Capitula small, globose, crowded in clustered cymes, up to 4 mm in diam., yellow ; involucre hemispheric, bracts biseriate, obtuse. Achenes small, laxly ribbed; pappus hairs 10, dilated.

*Fl. & Fr.* : October - February.

*Specimens examined* : Deb 308, 1765 (CAL).

### 58. *Tridax* L.

*Tridax procumbens* L., Sp. Pl. 900. 1753 ; Hook. f., Fl. Brit. India 3 : 311. 1881 ; Deb in Bull. Bot. Surv. India 3 : 334. 1961 ; Chowdhery in Hajra *et al.*, Fl. India 12: 418. 1995.

Perennial, straggling, hirsute herbs, up to 60 cm long. Leaves opposite, elliptic ovate to lanceolate, 2.5 - 6 cm long, pinnatisect, segments ovate lanceolate. Capitula up to 2 cm in diam., solitary on 25 - 40 cm long peduncles ; involucre bracts few - seriate, outer short, broad. Achenes turbinate - oblong, silky brown ; pappus with short - long aristate, plumose bristles.

*Fl. & Fr.* : March - August.

*Specimens examined* : Kakching, *s.n.* Very rare.

### 59. *Vernonia* Schreber

- |     |   |                            |
|-----|---|----------------------------|
| 1a. | Plants herbaceous .....   | 2                          |
| b.  | Plants shrubs or trees .....  | 5                          |
| 2a. | Plants glabrous or laxly scarbrid .....   | 12. <i>V. saligna</i>      |
| b.  | Plants pubescent or glandular pubescent .....   | 3                          |
| 3a. | Stems erect or decumbent; achenes terete; pappus persistent .....                       | 6. <i>V. cinerea</i>       |
| b.  | Stems always erect ; achenes 10 - ribbed ; outer pappus hairs deciduous .....           | 4                          |
| 4a. | Leaves tomentose on both surfaces ; heads 0.5 - 0.8 cm diam.; pappus white .....        | 10. <i>V. patula</i>       |
| b.  | Leaves puberulous on both surfaces; heads 1.5 - 1.8 cm diam., pappus reddish .....      | 2. <i>V. anthelmintica</i> |
| 5a. | climbing woody shrubs. ....   | 6                          |
| b.  | Erect shrubs or tree .....  | 8                          |
| 6a. | Branches slender, glabrous ; leaves glabrous ; head 10 - 25 -flowered .....             | 6 <i>V. blanda</i>         |
| b.  | Branches laxly pubescent ; leaves glabrescent -pubescent ; heads 6 - 12 -flowered ..... | 7                          |
| 7a. | Leaves pubescent beneath ; involucre bracts few - seriate ; achenes                     |                            |



	puberulous .....	1. <i>V. andersonii</i>
b.	Leaves glabrescent beneath, involueral bracts multiseriate; achenes glabrous pilose .....	16. <i>V. vagans</i>
8a.	Plants tree .....	9
b.	Plants shrubs .....	10
9a.	Leaves elliptic - oblong, margins entire, ovate ; pappus deciduous .....	3. <i>V. arborea</i>
b.	Leaves oblong lanceolate, margins sinuate dentate; pappus persistent. ....	17. <i>V. volkameriifolia</i>
10a.	Leaves subsessile sessile; heads 30 - 50 -flowered .....	11
b.	Leaves always petioled ; heads up to 30 - flowered only. ....	12
11a.	Scabrid pubescent shrubs ; leaf margins dentate ; achenes strongly 10 ribbed ; pappus deciduous .....	14. <i>V. squarrosa</i>
b.	Pubescent tomentose undershrubs; leaf margins serrate; achenes obscurely 10 striate; pappus persistent .....	15. <i>V. subsessilis</i>
12a.	Heads more than 15 flowered .....	13
b.	Heads less than 15 -flowered .....	15
13a.	Leaves puberulous below ; pappus white, persistent. ....	14
b.	Leaves glabrous, scabrid or pubescent below ; pappus white reddish, deciduous. ....	16
14a.	Puberulous shrubs: leaf margins denticulate ; achenes villous .....	4. <i>V. attenuata</i>
b.	Pubescent shrubs: leaf margins serrate ; achenes pubescent .....	7. <i>V. divorum</i>
15a.	Scabrid shrubs ; leaves sharply serrate ; achenes pubescent .....	11. <i>V. pyramidale</i>
b.	Scabrid scaberulous undershrubs ; leaves distantly serrate ; achenes glabrous .....	13. <i>V. silhetensis</i>
16a.	Leaves elliptic, ovate or rhomboid ; achenes glabrous glandulose ; pappus caducous .....	8. <i>V. divergens</i>
b.	Leaves oblong lanceolate; achenes pubescent ; pappus persistent .....	9. <i>V. extensa</i>

1. *Vernonia andersonii* C.B. Clarke, Comp. Ind. 27, 1876; Hook. f., Fl. Brit. India 3 : 241, 1881; Deb in Bull. Bot. Surv. India 3 : 334, 1961; Uniyal in Hajra *et al.*, Fl. India 13: 356, 1995.

Scandant shrubs; branches terete or striated angular, pubescent. Leaves petiolate, ovate lanceolate, 8 - 15 cm long, entire, acute, pubescent beneath. Capitula 6 - 15 flowered, in elongated, axillary panicles; involucrel bracts few seriate, outer small, inner oblong, subglabrate. Achenes clavate, puberulous; pappus red, outer hairs absent.

*Fl. & Fr.* : June - July.

*Specimens examined* : Makru, Meebold 5255 (CAL).

2. *Vernonia anthelmintica* (L.) Willd., Sp. Pl. 3 : 1634, 1803; Hook. f., Fl. Brit. India 3 : 236, 1881; Kanjilal *et al.*, Fl. Assam 3 : 104, 1939; Uniyal in Hajra *et al.*, Fl. India 13: 357, 1995. *Conyza anthelmintica* L., Sp. Pl. 861, 1753; Malick & Safui in J. Econ. Taxon. Bot. 10 : 6, 1987. *Centratherum anthelminticum* (L.) O. Kuntze, Rev. Gen. Pl. 1 : 320, 1891; Deb in Bull. Bot. Surv. India 3 : 330, 1961. Fig. 78

Tall, erect, branched herbs; stems glandular pubescent. Leaves petiolate, lanceolate or elliptic ovate, 6 - 20 cm long, coarsely serrate, puberulous on both sides, acute. Capitula 1.5 - 1.8 cm in diam., up to 40-flowered, subcorymbose; florets purple; involucrel bracts few-seriate, linear-oblong, with purplish tips Achenes cylindrical-oblong, truncate, 10-ribbed, ribs pilose; pappus reddish, outer longer, deciduous.

*Fl. & Fr.* : August - February.

*Specimens examined* : Bishenpur, Meebold 6436 (CAL); Ccljang, Malick 1439 (BSIS).

3. *Vernonia arhorea* Buch. - Ham. in Trans. Linn. Soc. London 14 : 218, 1825; Hook. f., Fl. Brit. India 3 : 239, 1881; Kanjilal *et al.*, Fl. Assam 3 : 104, 1939; Uniyal in Hajra *et al.*, Fl. India 13: 359, 1995.

Trees, 12 m high with spreading crown, often buttressed; young branches pubescent; bark brownish-yellow. Leaves petiolate, elliptic-oblong or ovate, 12 - 21 × 4.5 - 8 cm, entire, acute-acuminate, glabrous or pubescent beneath. Capitula up to 1 cm in diam., 3 - 6 flowered, in large, leafless, terminal panicles; involucrel bracts 5 - 6-seriate, oblong, tomentose; florets blue, pale blue-white. Achenes laxly 10-ribbed, compressed, 3-4-angled, puberulous; pappus white-pale.

*Fl. & Fr.* : September - April.

4. *Vernonia attenuata* DC., Prodr. 5 : 33, 1836; Hook. f., Fl. Brit. India 3 : 231, 1881; Uniyal in Hajra *et al.*, Fl. India 13: 360, 1995.

Erect, rigid undershrubs; stems 0.6 - 1.2 m; branches slender, grooved, puberulous. Leaves alternate, short petioled, elliptic-lanceolate, 7 - 15 × 1 - 2.5 cm, minutely dentate, acute, glabrous above, puberulous below. Capitula 1.2 - 1.8 cm



Fig. 78 : A twig of *Vernonia anthelmintica* (L.) Willd.

in diam., solitary or paniced in axillary or terminal corymbs. 15 - 20- flowered ; florets purple ; involueral bracts multiseriate, linear lanceolate, apices subscariose. Achenes 10 ribbed, villous ; pappus white.

*Fl. & Fr.* : August - November.

5. *Vernonia blanda* DC., Prodr. 5 : 32. 1836 ; Hook. f., Fl. Brit. India 3 : 241. 1881 ; Uniyal in Hajra *et al.*, Fl. India 13: 361. 1995.

Rambling shrubby climbers ; branches slender, ribbed, glabrous. Leaves alternate, petioled, elliptic obovate, 6 - 13 × 1 - 4.8 cm, entire, acuminate, glabrous. Capitula oblong, 0.6 - 1 cm, in elongate, branched, axillary or terminal panicles, 10 - 25 -flowered ; florets purple ; involueral bracts multiseriate, imbricate, linear oblong, acute, puberulous. Achenes 10 - ribbed, pilose, pappus red, outer hairs few.

*Fl. & Fr.* : October - February.

6. *Vernonia cinerea* (L.) Less. in *Limnea* 4 : 291. 1829 ; Hook. f., Fl. Brit. India 3 : 233. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 104. 1939 ; Uniyal in Hajra *et al.*, Fl. India 13: 367. 1995. *Conyza cinerea* L., Sp. Pl. 862. 1753. Fig. 79

Mani.: *Khongja-inapi*.

Perennial, pubescent herbs ; stems erect or decumbent, 15 - 50 cm high, grooved and ribbed. Leaves alternate, petiolate, ovate or lanceolate, 2 - 7.5 × 0.4 - 1.2 cm, subdentate, acute or obtuse, pubescent. Capitula 6 - 8 mm in diam., in round or open terminal corymbs. 15 - 20 -flowered ; involueral bracts 4 -seriate, linear - lanceolate, acuminate, spinulose. Florets purple. Achenes terete, apices broadened, striate ; pappus white - dirty white, outer hairs short.

*Fl. & Fr.* : January - December.

*Specimens examined* : Imphal, *Pamgrahi* 13470 (CAL); Keibul Lomju National Park, *Chauhan* 95107 (ASSAM).

7. *Vernonia clivorum* Hance, in *Seem. J. Bot.* 7 : 164. 1869 ; Hook. f., Fl. Brit. India 3 : 232. 1881 ; Malik & Safui in *J. Econ. Taxon. Bot.* 10 : 6. 1987 ; Uniyal in Hajra *et al.*, Fl. India 13: 369. 1995.

Shrubs or small trees; stems striated, pubescent. Leaves shortly petiolate, linear-lanceolate, 7 - 13 × 1.5 - 2 cm, distantly serrate, acuminate, puberulus beneath. Capitula small, up to 6 mm in diam., in elongated, axillary corymbose panicles, 15 - 25 -flowered ; involueral bracts few - seriate, linear, acute, outermost subulate. Achenes 10-ribbed, pubescent ; pappus white, outer with numerous persistent hairs

*Fl. & Fr.* : March - August.

*Specimens examined* : Langal, Imphal, Mt. Kawab, *Chungbenthao*, *Malick* 1321, 1501, 1528 (BSIS).

8. *Vernonia divergens* (Roxb.) Edgew., in *J. Asiat. Soc. Beng.* 21 : 172. 1853 ; Hook. f., Fl. Brit. India 3 : 234. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 104. 1939 ; Deb



Fig. 79 : A fruiting twig of *Vernonia cinerea* (L.) Less.

in Bull. Bot. Surv. India 3 : 334. 1961; Uniyal in Hajra *et al.*, Fl. India 13: 370. 1995. *Eupatorium divergens* Roxb., Fl. Ind. 3 : 414. 1832.

Stout, erect, tomentose pubescent shrubs ; stems 1.2 - 2.5 m, corymbosely branched above. Leaves petiolate, elliptic - ovate or rhomboid, 4 - 13 × 2 - 10 cm, serrate, acute, scabrous above, villous, subtomentose or pubescent below. Capitula 4 - 6 mm diam., in dense, highly branched paniced corymbs, 8 - 12 -flowered ; involucre bracts few - seriate, ovate, with greenish tips. Achenes 10 - ribbed, glabrous or glandular or pilose ; pappus red, hairs scabrid, outer very few or absent.

Fl. & Fr. : October - April.

Specimens examined : Koupru, Karupam, Meebold 5921 (CAL); Deb 1430 (CAL).

9. *Vernonia extensa* DC., Prodr. 5 : 33. 1836 ; Hook. f., Fl. Brit. India 3 : 238. 1881 ; Deb in Bull. Bot. Surv. India 3 : 334. 1961; Uniyal in Hajra *et al.*, Fl. India 13: 370. 1995. *V. cylindriceps* C.B. Clarke, Comp. Ind. 34. 1876; Deb in Bull. Bot. Surv. India 3: 334. 1961. Fig. 80

Large, erect, shrubs, stems 1.5 - 2.5 m tall, branches pubescent. Leaves shortly petiolate, elliptic, oblong - lanceolate, 15 - 25 × 5 - 8 cm, sharply serrate, more or less scaberulous above, pubescent beneath. Capitula up to 1.5 cm diam., in loose, terminal corymbs, 8 - 10 -flowered ; involucre bracts few - seriate, linear - oblong. Achenes 10 - ribbed, pubescent ; pappus red, outer hairs few, small.

Fl. & Fr. : October - June.

Specimens examined : Meebold 176 (CAL) ; Deb 1430 A (CAL).

10. *Vernonia patula* (Dryand) Merr., in Philipp. J. Sci. 3 : 439. 1908 ; Deb in Bull. Bot. Surv. India 3 : 334. 1961; Uniyal in Hajra *et al.*, Fl. India 13: 376. 1995. *Conyza patula* Dryand in Hort. Kew 3 : 184. 1789.

Erect herbs ; stems up to 75 cm high, branched, pubescent. Leaves alternate, petioled, ovate - elliptic, 2.5 - 5 × 0.8 - 2 cm, serrate, acute - acuminate or obtuse, tomentose on both surfaces. Capitula 0.5 - 0.8 cm in diam., in terminal, paniced corymbs; florets pink - purple ; involucre bracts 4 -seriate, linear, acute, outer small. Achenes 5 - angled, glabrous or glandular; pappus white.

Fl. & Fr. : September - October.

Specimens examined : Imphal valley, Deb 2348, 2526, 2590, 2688 (CAL).

11. *Vernonia pyramidale* (D. Don) S. N. Mitra in Ind. For. 99: 100. 1973; Uniyal in Hajra *et al.*, Fl. India 13: 380. 1995. *Eupatorium pyramidale* D. Don, Prodr. Fl. Nepal 170. 1825. *Vernonia aspera* Buch. - Ham. in Trans. Linn. Soc. London 14: 212. 1825. *V. roxburghii* Less. in Linnaca 6 : 647. 1831; Hook. f., Fl. Brit. India 3 : 232. 1881; Deb in Bull. Bot. Surv. India 3 : 334. 1961.

Mani.: *Khongjan-napi*.

Erect, scabrid shrubs, stems 0.3 - 1.5 m tall, pubescent. Leaves petiolate, ovate

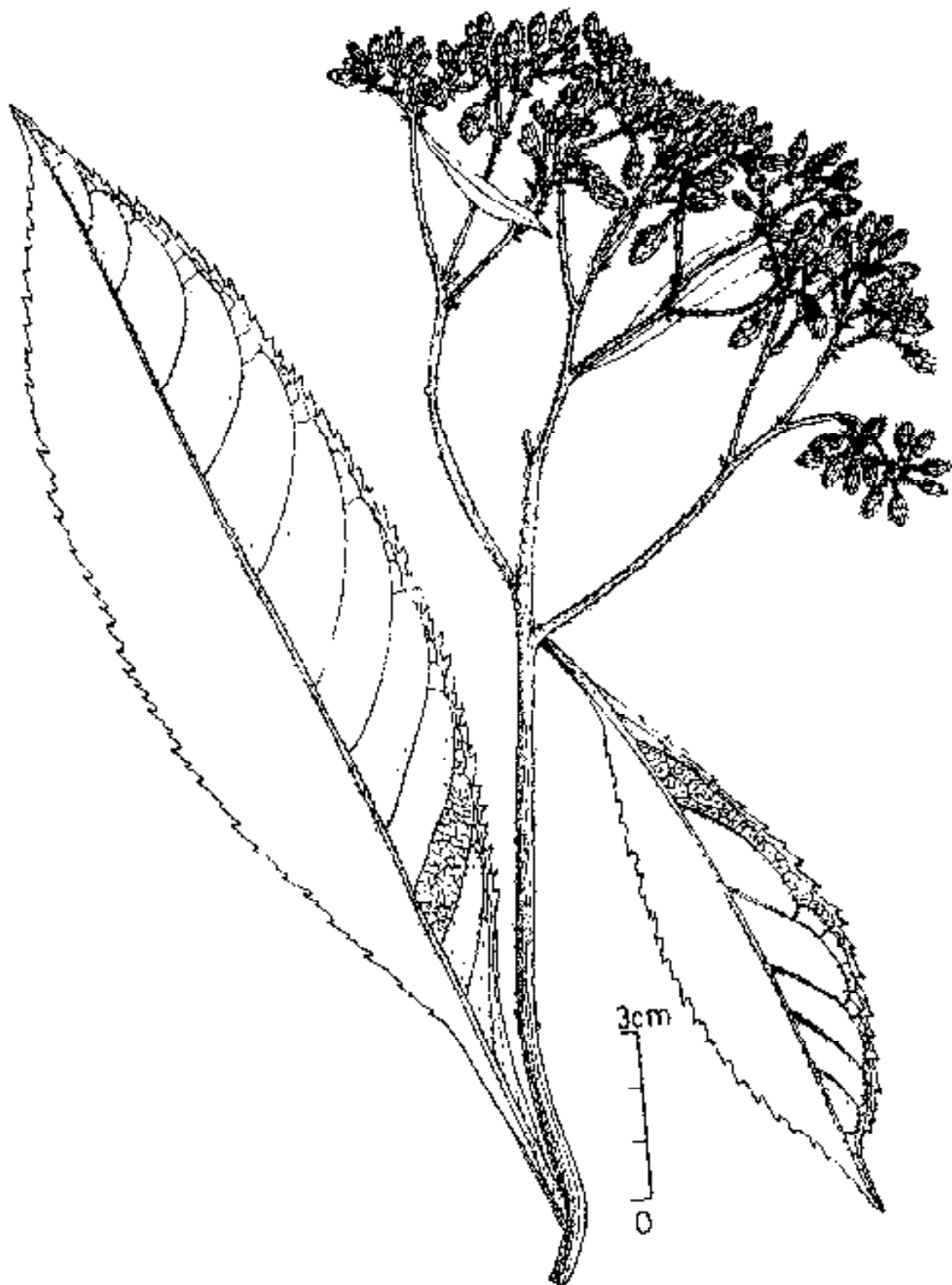


Fig. 80 : A fruiting twig of *Vernonia extensa* DC.

- elliptic or obovate - lanceolate, 3.5 - 13 × 1.2 - 5 cm, serrate, acuminate, scabrous above, villous, pubescent or glabrous beneath. Capitula in terminal, subcorymbose panicles, oblong, up to 1.5 cm, 30 - flowered; florets purple; involucre bracts multiseriate, outer subulate, inner linear, obtuse or apiculate. Achenes 10 - ribbed, truncate, sparsely hairy; pappus dull white - reddish, outer hairs deciduous.

*Fl. & Fr.* : November - February.

*Specimens examined* : Barak, Saithu, Maram, *Meebold* 5810, 6510, 5281 (CAL); Litan, *Chauhan* 94700 (ASSAM).

**12. *Vernonia saligna* DC., Prodr. 5: 33. 1836; Hook. f., Fl. Brit. India 3: 235. 1881, Deb in Bull. Bot. Surv. India 3: 334. 1961; Uniyal in Hajra *et al.*, Fl. India 13: 383. 1995.**

Herbs, stems highly branched, up to 2.5 m, glabrous or laxly scabrid. Leaves sessile - shortly petioled, elliptic, oblong or obovate, 5 - 14 × 1.5 - 5 cm, acute or acuminate, coarsely serrate. Capitula 0.6 - 1.2 cm in diam., in terminal, branched corymbs, 6 - 12 - flowered; involucre bracts purplish, few - seriate, linear - oblong, apices scarious or pubescent. Achenes 10 - ribbed, glabrous or glandular; pappus reddish or white, outer hairs deciduous.

*Fl.* : & *Fr.* : September - March.

*Specimens examined* : Mao, West Manipur, *Deb* 1757 (CAL); Litan, *Chauhan* 94804, 94698 (ASSAM).

**13. *Vernonia silhetensis* (DC.) Kerr., Fl. Siam. 2: 243. 1936; Uniyal in Hajra *et al.*, Fl. India 13: 387. 1995. *Decaneuron silhetense* DC., Prodr. 5: 67. 1836. *Vernonia bracteata* C.B. Clarke, Comp. Ind. 17. 1876; Hook. f., Fl. Brit. India 3: 232. 1881; Deb in Bull. Bot. Surv. India 3: 334. 1961.**

Rigid, scabrid or scaberulous undershrubs; stems sparingly branched, up to 80 cm. Leaves shortly petioled, elliptic - lanceolate, 5 - 10 × 1.5 - 2.5 cm, acute, distantly serrate, scabrid. Capitula up to 1.8 cm diam., in terminal corymbs, 25 - 30 flowered; involucre bracts multiseriate, linear - oblong, apices acicular, outer subulate, purple. Achenes 10 - ribbed, glabrous; pappus white - reddish, outer hairs deciduous.

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

*Specimens examined* : *Meebold* 7215 (CAL); *Deb* 905 (CAL).

**14. *Vernonia squarrosa* (D. Don) Less. in Linnæa 6: 627. 1831; Uniyal in Hajra *et al.*, Fl. India 13: 387. 1995. *Acilepis squarrosa* D. Don, Prodr. Fl. Nepal 169. 1825. *Vernonia teres* Wallich ex DC., Prodr. 5: 15. 1836; Hook. f., Fl. Brit. India 3: 229. 1881; Deb in Bull. Bot. Surv. India 3: 334. 1961.**

Small shrubs, stems 25 - 75 cm, rigid, scabrid - pubescent. Leaves subsessile, obovate - elliptic, or obovate - lanceolate, 4 - 12 × 2 - 5 cm, acute, dentate, scabrid on both surfaces. Capitula 1.8 - 2.5 cm diam., solitary, axillary or few in terminal panicle, 30 - 50 flowered; involucre bracts multiseriate, outer small, sparsely woolly. Achenes 10 - ribbed, silky; pappus yellowish or light reddish, outer hairs short, deciduous.



*Fl. & Fr.* : October - January.

*Specimens examined* : Maram, Kanglatombi, Bor 17702 (CAL) ; Meebold 6431 (CAL).

15. *Vernonia subsessilis* DC., Prodr. 5 : 62. 1836 ; Hook. f., Fl. Brit. India 3 : 230. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 103. 1939 ; Deb in Bull. Bot. Surv. India 3 : 334. 1971 ; Uniyal in Hajra *et al.*, Fl. India 13 : 388. 1995.

Stout undershrubs - shrubs, stems up to 2 m, corymbosely branched above, pubescent - tomentose. Leaves subsessile, lanceolate, obovate - lanceolate, 8 - 30 × 2 - 10 cm, acute, acuminate or rounded, serrate, glabrous above, tomentose on nerves beneath. Capitula 1.6 - 2.0 cm diam., in terminal, panicle corymbs, 30 - 50-flowered; florets purple, long peduncled, peduncles villous, involucrel bracts multiseriate, outer linear - subulate, squarrose, inner erect, narrowly acute. Achenes obscurely 10 - striate, villous; pappus reddish, outer hairs numerous, more or less chaffy, persistent.

*Fl. & Fr.* : October - February.

*Specimens examined* : Kangchup, Deb 2347 (CAL).

16. *Vernonia vagans* Wallich ex DC., Prodr. 5 : 32. 1836 ; Uniyal in Hajra *et al.*, Fl. India 13 : 391. 1995. *Vernonia scandens* DC., Prodr. 5 : 32. 1836 ; Hook. f., Fl. Brit. India 3 : 241. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 106. 1939 ; Deb in Bull. Bot. Surv. India 3 : 334. 1961.

Rambling, woody climbers ; branches slender, laxly pubescent. Leaves petioled, elliptic or obovate - lanceolate, 2 - 17 × 1.5 - 8 cm, acute or acuminate - entire, glabrescent beneath. Capitula 0.8 - 1.5 cm in diam., in long, leafy terminal panicles, 5 - 15 flowered ; involucrel bracts multiseriate, ovate, linear - lanceolate, ciliate. Achenes 10 - ribbed, glandulose, glabrous or pilose ; pappus red, outer hairs few, deciduous.

*Fl. & Fr.* : October - March.

*Specimens examined* : Itang, Meebold 5280 (CAL).

17. *Vernonia volkameriifolia* DC., Prodr. 5 : 32. 1836 ; Hook. f., Fl. Brit. India 3 : 240. 1881 ; Kanjilal *et al.*, Fl. Assam 3 : 105. 1939 ; Deb in Bull. Bot. Surv. India 3 : 334. 1961 ; Uniyal in Hajra *et al.*, Fl. India 13 : 393. 1995.

Small trees or large shrubs, up to 7 m ; young branches and leaves rusty pubescent. Leaves obovate - lanceolate, 10 - 30 × 3 - 10 cm, acute, entire or sinuate - dentate, glabrous above, pubescent beneath. Capitula numerous, 1.5 - 2 cm in diam., in terminal cymose panicles, 3 - 10 flowered; involucrel bracts oblong - ovate, puberulous. Achenes 10 - ribbed, glabrous - glandulose ; pappus stiff, white - dull white, filiform, persistent.

*Fl. & Fr.* : November - April.

*Specimens examined* : Meebold 5835 (CAL) ; Deb 2097 (CAL) ; Litan, Chauhan 94623 (ASSAM).

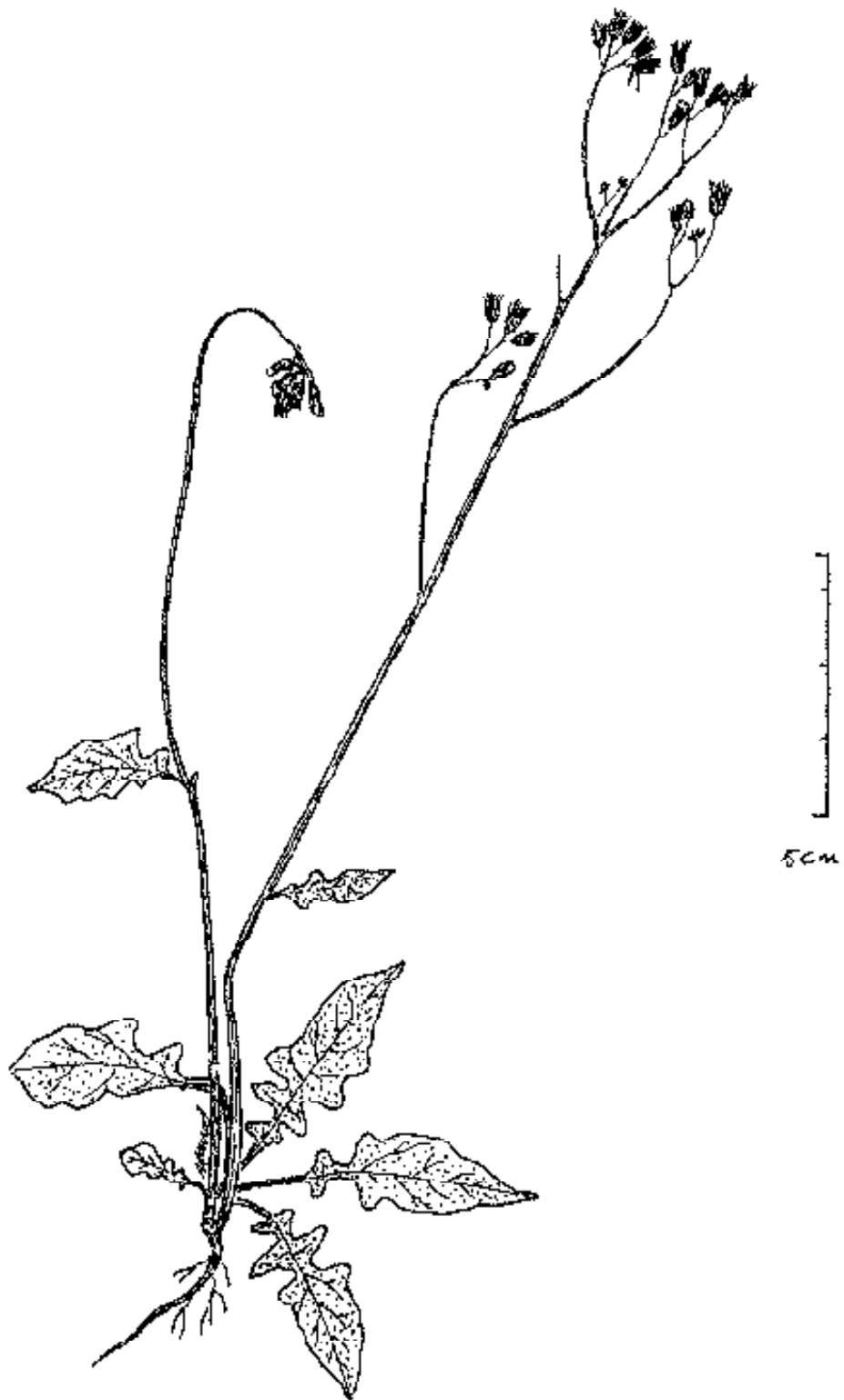


Fig. 81 : *Youngia japonica* (L.) DC. in flowering

60. *Xanthium* L.

*Xanthium indicum* Koenig in Roxb., Fl. Ind. 3: 601, 1832; Chowdhery in Hajra *et al.*, Fl. India 12: 427, 1995, *X. strumarium* L., Sp. Pl. 987, 1753; Hook. f., Fl. Brit. India 3: 303, 1881; Kanjilal *et al.*, Fl. Assam 3: 116, 1939; Deb in Bull. Bot. Surv. India 3: 334, 1961.

Coarse, annual herbs; stems hispid or strigose. Leaves alternate, petioled, triangular-ovate or sub-orbiculate, 3-12 cm long, acute, scabrid-hispid. Capitula in axillary and terminal racemes; fruiting involucre with hooked spines. Achenes enclosed in hardened utricle; pappus, absent.

*Fl. & Fr.* : October - April.

*Specimens examined* : Deb 408, 1272 (CAL); Rare.

61. *Youngia* Cass.

*Youngia japonica* (L.) DC., Prodr. 7: 194, 1838; Mangain & Rao in Hajra *et al.*, Fl. India 12: 329, 1995, *Prenanthes japonica* L., Mant. Pl. 107, 1767, *Crepis japonica* Benth., Fl. Hongk. 194, 1861; Hook. f., Fl. Brit. India 3: 395, 1881; Deb in Bull. Bot. Surv. India 3: 331, 1961. Fig. 81

Annual, glabrous or puberulous herbs, stems 15-75 cm, simple or branched. Radical leaves obovate, sinuate-toothed or runcinate, pinnatifid, 5-15 cm long. Flowering stems slender, naked, erect. Capitula 4-6 mm in diam., on bracteate peduncles; involucre bracts 6-8 narrowly oblong. Achenes reddish-brown, oblong, striated, ribs smooth; pappus small, white.

*Fl. & Fr.* : Throughout the year.

*Specimens examined* : Deb 1490 (CAL).

*Zinnia* L.

*Zinnia elegans* Jacq., Coll. 3: 152, 1789; Deb in Bull. Bot. Surv. India 3: 335, 1961 & Fl. Tripura State 2: 232, 1963.

Erect, annual herbs; stems 25-80 cm high, pubescent. Leaves sessile, ovate-elliptic, 3-15 × 2-8 cm, cordate, hispid, capitula solitary, terminal, 5-10 cm diam., involucre bracts pectinate-fimbriate. Flowers purple or lilac, rarely blue-green.

*Fl. & Fr.* : September - November.

*Specimens examined* : Deb 228 (CAL) Cultivated in the gardens.

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