

**Floristic Studies of Angiospermic Plants in Intangki
National Park, Nagaland, India**

by

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Declaration

I, **Ms. Asangla N. Jamir** bearing Ph. D. registration No. 581/2014 dated May 20, 2014 hereby declare that the subject matter of my Ph. D. Thesis entitled '**Floristic Studies of Angiospermic Plants in Intangki National Park, Nagaland, India**' is the record of original work done by me, and that the contents of this thesis did not form the basis for award of any degree to me or to anybody else to the best of my knowledge. This thesis has not been submitted by me for any Research Degree in any other University/Institute.

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(Asangla N. Jamir)

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CHAPTER – 1

INTRODUCTION

Flora refers to a systematic account of plants of any specific area that provides keys and description of plants for identification. Floras also provide useful data such as distribution, correct name, uses etc. The floristic studies are concerned with the plants of a particular region and is helpful in many ways (Rao & Chaudhary, 1999).

Biodiversity or biological diversity is the variety and variability of life on earth. Biodiversity provides humankind enormous direct benefits and essential services indirectly through natural ecosystem functions and stability. Biodiversity defines the variety of organism living together in a place (Convention on Biological Diversity, 1992).

North Eastern region is one of the richest reservoirs of flora and fauna in Indian subcontinent. This richness and the diversity of the flora are mainly due to the wide variation in climate, rainfall, temperature and altitudes. The region is the primary centre of origin of angiosperms i.e. the cradle of flowering plants (Takhtajan, 1969) and the N.E. region is considered as the home of many wild relatives of cultivated crop plants (Kumar *et al.*, 2003). Due to the high endemism, floristic richness and threats by environmental destruction, the region is included in the list of so far identified 35 Hotspots in the world (Conservation International, 2011).

Nagaland falls under Indo-Burma biodiversity hotspots and lies along Barail, Patkai and Disang mountain ranges. Out of the total geographical area 85.43%

(14,164 km²) constitute the forest cover where 5,137 km² is in dense forest and 9,027 km² is open forest category (State Level Biodiversity Strategy and Action Plan of Nagaland, 2005).

The increasing biotic and abiotic pressure is resulting to the loss of habitats and existence of the biodiversity. With the concern about conservation of natural resources the Wildlife (Protection) Act, 1972 (amended in 1983, 1986 & 1991) for the protection of wild plants and animals which control the hunting, trade and collection of specific Non Timber Forest Products, thus “Protected Area Network” plan came into power. The main objectives of the protected areas are to conserve biodiversity with the conservation of their natural habitats, to protect the genetic diversity within the species to sustain their evolutionary processes, to smooth monitoring and training for economic well-being of the indigenous people and to make sure to the local people participation in the conservation of natural resources.

In Nagaland, Land is protected by Article 371 A of the Indian constitution, which means the land belonging to the community, is owned by communities and is governed by customary laws. Therefore, all the Forest in Nagaland belongs to communities like villages, clans or to private individuals. In Nagaland more than 50% of land is under forest, however only 11.7 % under control of government and 5.5% percentage under protection due to the community ownership (FSI 2011). All of the protected areas in Nagaland are thus areas bought from villages by paying an agreed compensation. There are also a number of Community conserved areas declared by the communities, some declared totally voluntarily, some on initiation of Forest Department or various organizations. (Kumar & Kaul, 2013)

In the state of Nagaland, the total area comprising of the protected areas accounts for 1.46% of the state's total area (16,579 sq km). The State is managing one National Park (Intangki National Park) and three Wildlife Sanctuaries as *in-situ* conservation and a Zoological Park at Rangapahar, Dimapur and Tragopan Conservation Breeding Centre at Kohima as *ex-situ* conservation. (Wildlife Conservation and Management Initiative in Nagaland, 2013)

STUDY AREA

Intangki National Park is the only National Park in Nagaland. The Intangki National Park derives its name from the Intangki River flowing through the northern part of the protected area and western border of the sanctuary. Intangki was declared as a reserved forest in 1923 by the then British Crown Government. Intangki Reserved Forest got an additional 5120 acres in 18th July 1927. Subsequently it was notified as Wildlife Sanctuary in 22nd April 1975, National Park in 3rd March 1993 and Elephant Reserve in 2nd February 2005. Intangki National Park is located on the banks of Dhansiri river and Intangki river and forms a large contiguous patch of forest with Dhansiri river and Intangki river. This area is a highly critical habitat connecting the fragmented and isolated patches of forests in the states of Nagaland and Assam.

Geographical features

Intangki National Park (NP) is situated in Peren district of Nagaland within the geographical limits of 25° 18' to 25° 43' N & 93° 15' to 93° 43' E. It covers an area of 202.02 km² and located at an altitude of 200-682 MSL.

Topography

The area can be divided into –Alluvial Plains (150-500 m above msl) and Moderate Hills (500-682 m above msl). The highest point in the National Park is at Lungphudi peak (682m above msl). The Park is surrounded by Monglu river, Langru river, Intangki river, Tuilong river and Dhansiri river. There are nalas intercepting the Park areas and they are also source of water, viz., Hatibodisa, Gordisha, Longerdisa, Loisdungdisa, Misapdisa and others.

Soil

The soil is mainly alluvial with commonly loamy texture. The humus content is very high. Geologically this area consists of Barail group of minerals formed during the Oligocene age which is mainly composed of a variety of sandstone associated with sandy shales and mudstone (GSI, 2011).

Climate and Rainfall

The climate can be roughly divided into summer from March to May and rainy season from June to later part of October, and winter from later part of October to March. The advent of summer is characterized by thunder showers and hailstorm, the shower bring some relief in otherwise dry season. The rainy season is characterized by high humidity and intermittent dry spells which occur during month of July to September. The maximum annual rainfall is 2000 mm. The major precipitation takes place during the months of June to September. The winter

month is characterized by heavy dew fall, frost is however practically unknown. The minimum temperature seldom goes below 7° Celcius.

Surrounding Villages

There are about 15 villages of Nagas and Katchari tribes settled in around Intangki National Park. Four villages belonging to Zeilang tribe, seven to Kuki tribe and Dimasa Katchari inhabit two villages and rest belonging to Angamis and Chakesangs. (Longchar, 2013).

Flora based on the vegetation types

The vegetation type of a region depends on the topography, climate and soils. The forest types of Intangki National Park are as follows (Champion & Seth, 2005):

Tropical semi- evergreen forest:

This types of forest are mainly confined to the bordering areas of Langkhor Disa and Dima Hasao district bordering Assam. The top canopy is dominated by *Albizia procera*, *Agalia edulis*, *Artocarpus lakucha*, *Alstonia scholaris*, *Bombax ceiba*, *Bischofia javanica*, *Dillenia indica*, *Duabanga grandiflora*, *Dillenia indica*, *Garcinia sopsopia*, *Gynocardia odorata*, *Mangifera sylvatica*, *Magnolia hodgsonii*, *Morus laevigata*, *Pterospermum acerifolium*, *Syzygium coarctatum* etc The majority of tree species are entangled with lianas and epiphytes such as *Hodgsonia macrocarpa*, *Hoya globulosa*, *Porana spectabilis*, *Scindapsus officinalis*, *Thunbergia grandiflora*. The shrubby and herbaceous layer is mainly composed of *Clerodendrum infortunatum*,

Clerodendrum laevifolium, *Citrus indica*, *Homalomena aromatica*,
Larsenianthus careyanus, *Leea indica*, *Licuala peltata*, *Murraya paniculata*,
Sambucus javanica, *Saurauia armata*, *Tropidia angulosa* etc.

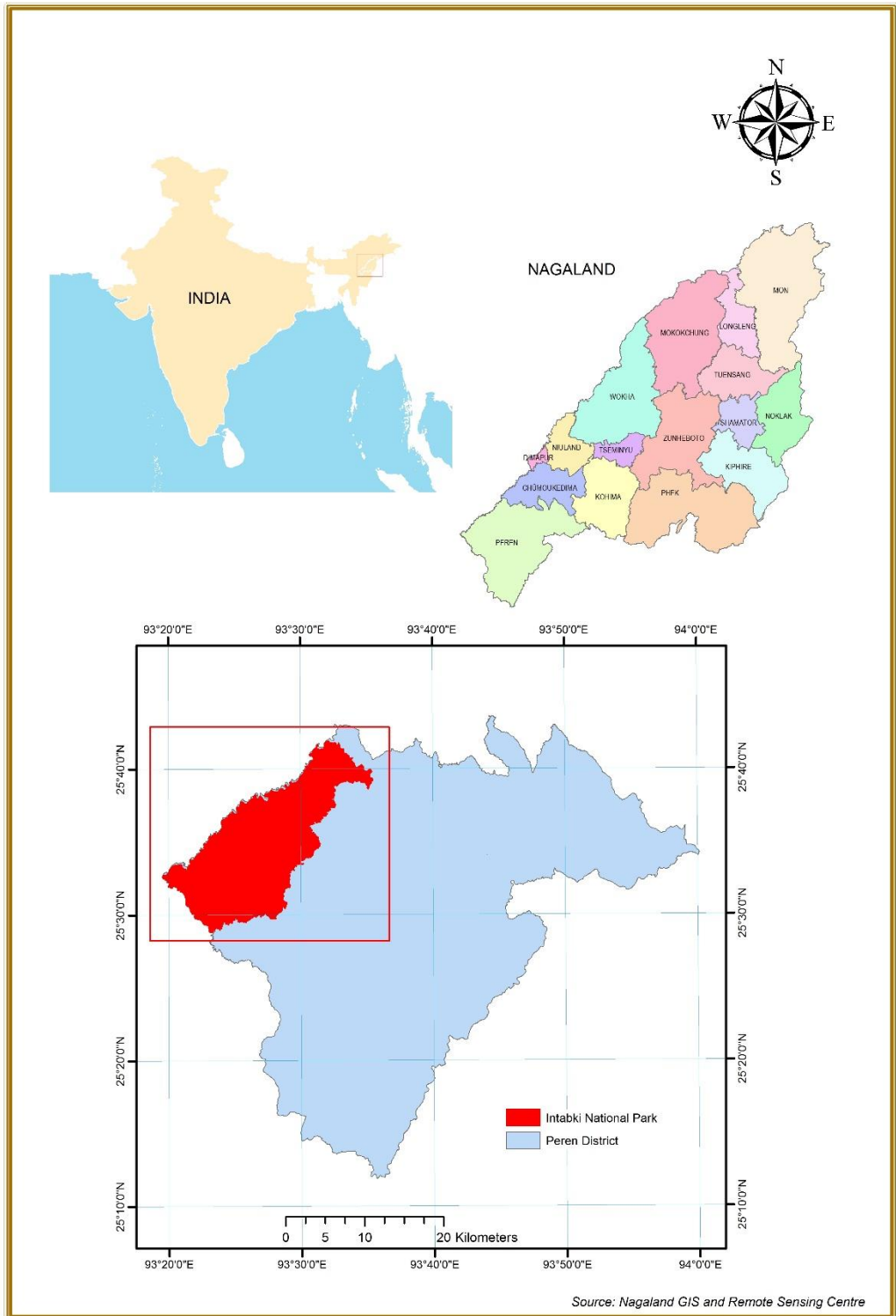
Tropical moist deciduous forest:

This types of forest occurs mostly in Kadhangse and Hatibudisa areas inside the national park. The vegetation is mainly composed of moist deciduous elements like *Erythrina stricta*, *Dillenia scabrella*, *Sterculia villosa*, *Firmiana colorata*, *Hymenodictyon orixense*, *Kydia calycina*, *Tetrameles nudiflora*, *Terminalia bellerica*, *Terminalia chebula*, *Terminalia myriocarpa*, *Wrightia coccinea* etc. The shrubby and herbaceous layer is mainly constitutes *Breynia lanceolata*, *Grewia abutifolia*, *Glycomis pentaphylla*, *Mussaenda glabra*, *Premna pinguis*, *Saurauia roxburghii*, *Styrax serrulatum*, *Zingiber rubens* etc. Epiphytes and climbers are not very frequent in this types of forest except few species such as *Adenia trilobata*, *Asparagus racemosus*, *Cuscuta reflexa*, *Pegia nitida*, etc.

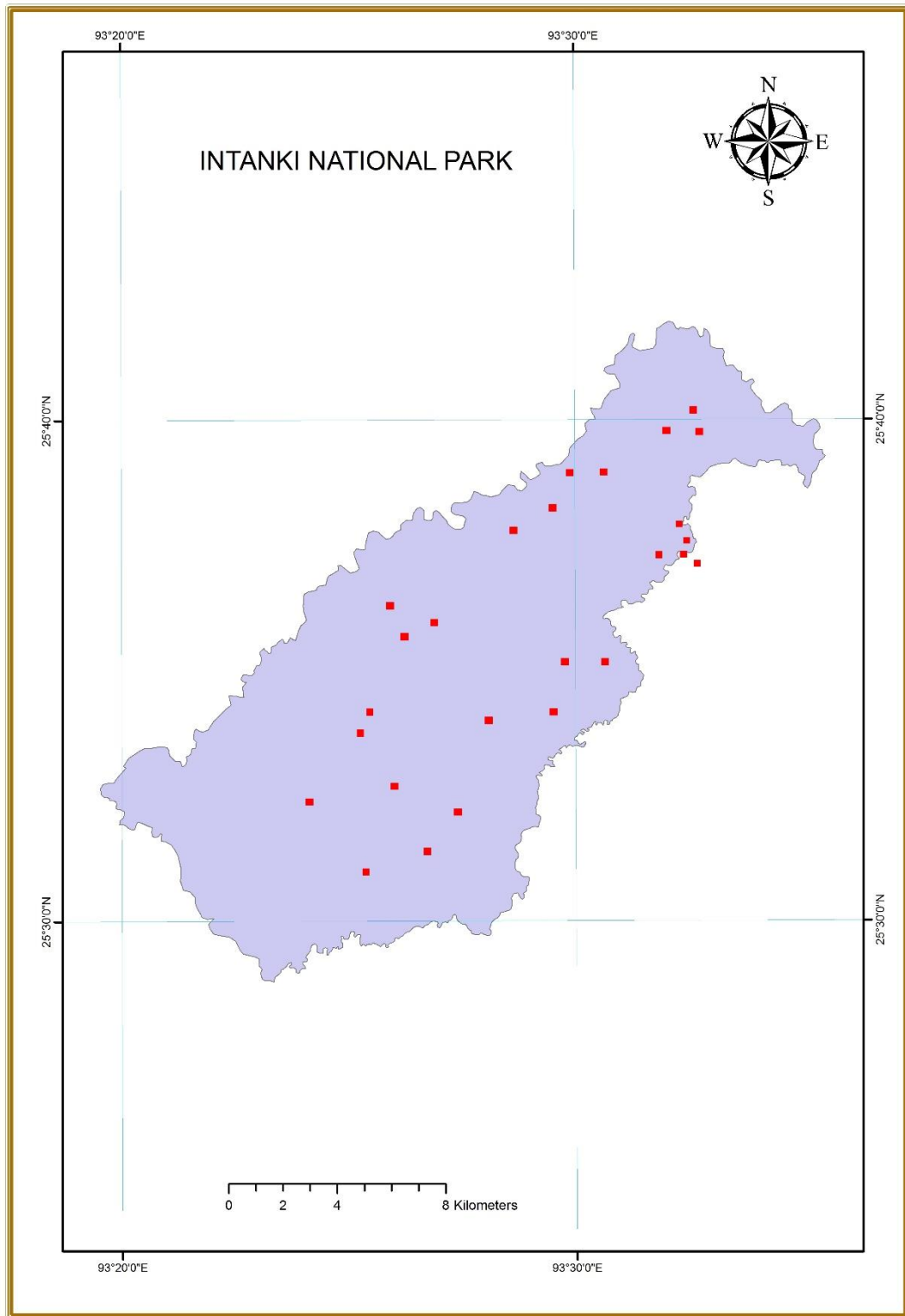
Degraded mixed forest:

This types of forest generally occurs towards the fringe areas of the Intangki National Park mostly in Misap Disa and Junction camp which mostly composed of different species of grasses and sedges such as *Chrysopogon aciculatus*, *Imperata cylindrica*, *Setaria palmifolia*, *Phragmitis karka*, *Carex baccans*, *Cyperus iria*, *Fimbristylis tetragona* etc These grassland are mostly intermixed with deciduous tree species such as *Bombax ceiba*, *Careya arborea*,

Dillenia scrabella, *Dillenia pentagyna* etc. Climbers like *Camonea umbellata*, *Merremia vitifolia*, *Pegia nitida*, are quite common in this type of grassland. The herbaceous species such as *Cuphea carthagenesis*, *Evolvulus nummularis*, *Heliotropium indicum*, *Imaptiens tripetala* are occasionally found in this types of forest.



Map 1. India map showing North-East India, Nagaland State, Peren District and Intabki National Park (INP)



Map 2. Map of Intangki National Park showing plant collection localities

MAJOR FOREST TYPES



Topical semi evergreen forest



Tropical moist Deciduous Forest



Mixed Degraded type of forest

AIMS AND OBJECTIVES

Protected areas have been known to act as benchmarks against which we understand human interactions with the natural world. At present, conservation is the only hope we have to stop many threatened or endangered species from becoming extinct. Also protected areas contain beautiful scenery and cornerstone that offers attractions for tourism and recreation. They also serve as places for scientific research, wilderness protection, maintenance of environmental services, education, eco-tourism and recreation, protection of specific natural and cultural features, maintenance of quality and availability of water and sustainable use of biological resources. In fact, Intangki National Park is one of the richest and very interesting floristic areas in the state. The

documentation and proper assessment of plant diversity is important for biodiversity conservation. Also for a full utilization of the natural resources of any area a thorough knowledge of the area is absolutely necessary. Taxonomy, which is one of the pioneer's subject in all of biological sciences is accredited for its major contribution in the understanding of importance and values of plants to mankind. It subsequently forms the basis of every understanding for utilisation of the natural plant wealth of the country, as well as scientific researches on every aspect concerning plant species.

However tropical forest like Intangki National (INP), even though it is a protected area is facing increasing anthropogenic pressure which will lead to fragmentation and has a consequence in the disappearance of certain invaluable ecological and economical species. There has so far not been any detailed work done on the floristic account of Intangki National Park. Therefore, the present study aims at contributing for the analysis of the floristic diversity and to bring out the knowledge of the angiospermic plants of the "Intangki National Park (INP)" in Peren District, Nagaland.

For the completion of the flora of the 'Intangki National Park', the following objectives will be taken up for study.

1. Survey, collection and documentation of the plants from Intangki National Park.
2. Identification of the collected plant species.
3. To describe the identified species.
4. Compilation of the flora with systematic keys on families, genus, and species level.

CHAPTER - 2

REVIEW OF LITERATURE

In India the first botanical expedition starts with the work of Van Rheedee who published Hortus Indicus Malabaricus (1678-1703) in 12 volumes with 749 plates. William Roxburgh also known as the Father of Botany who published Flora Indica (1820- 1824) made a great contribution in Indian Botany. Similar kind of work was carried out by several British botanists who worked in different parts of India which ultimately resulted in the Publication of the 'Flora of British India' in seven volumes by Hooker (1872–1897). Still now is this flora considered as most genuine source of plant identification in Indian subcontinent. This work was later decorated by Calder *et al.*, 1926; Razi, 1959; Naithani, 1990. Few notable world-renowned botanist as well as naturalist in early nineteenth and twentieth who made valuable contribution to the knowledge of Indian flora. Some of them were King & Pantling, 1898; Cook, 1901-1908; Prain; 1903; Duthie, 1903- 1929; Brandis; 1906 & Gamble & Fischer, 1915- 1936. Buchanan- Hamilton (1820) who collected many plant species from undivided Assam with detailed description.

Masters (1844) collected around 500 plant species from the range of Naga hill during his botanical survey in upper Assam. He made a view "the flora of this portion of the hills resembles in a great measure, that of the more elevated parts of the plains.....still I met with many plants which I have never seen in the plains and some of those which I have seen down are evidently not at home", and also made comments on the flora and the area and their methods of cultivation. Further he remarks "I presume it would occupy an experienced Botanist 10 years to explore the whole Naga Hills, from Booreediing to the

Dhansiri, in a satisfactory manner, none of them having been hitherto visited by any Botanist". These remarks illuminate the peculiarities and richness of the flora covering these hills.

C. B. Clarke (1866- 1887) in his publication ‘ *Plants of Kohima and Munneypore* listed 1050 species flowering plants and ferns on a survey from Golaghat district (the present Assam) via Kohima and Munneypore and published an account in *J. Linn. Soc. London* (Vol. 25.1889). He indicated that there is a great similarity between the flora of Naga hills with the flora of Drajeeling and Sikkim although it is 800 miles away to North- West within the width of Brahmaputra valley but showed marked difference with the flora of Khasia hills which is just 100 miles away.

Fischer (1938) made large- scale collections on Lushai hills (present Mizorum). The floristic survey was again accelerated by a group of Forest officer from N. E. India viz., U.N. Kanjilal, P.C. Kanjilal, A. Das C. Purkayastha and whose attempt finally resulted in the publication of ‘Flora of Assam’ (1934-1940), the only regional flora at that time. The first four volumes dealt with Dicotyledons plants mainly on woody plants. The fifth volume which comprises Gramineae (Poaceae) was done by N.L. Bor (1940), a British forest officer. With the establishment of Regional circle of Botanical Survey of India, BSI, Shillong in 1965 many floristic work on different parts of N.E. India have been worked out by many workers. Prominent among them are Joseph (1982), and Kataki (1986). An attempt has been made to complete the monocot flora of this region. Rao & Verma (1970-1976 & 1982) made series of publication on the monocotyledonous flora of this region. Further Shukla (1996) published the Grasses of North East India. Subsequently some notable state floras of the North Eastern region were also carried out

viz. Flora of Tripura, (Deb, 1981–1983), Forest Flora of Meghalaya (Haridasan & Rao, 1985–1987), Flora of Sikkim (Hajra & Verma, 1996), Flora of Manipur (Singh *et al.*, 2000^a), Materials for the Flora of Arunachal Pradesh (Hajra *et al.*, 2009; Giri *et al.*, 2008; Chowdhery *et al.*, 2009) and Flora of Mizoram (Singh *et al.*, 2002; Sinha *et al.*, 2012). Again with the reorganization of the Botanical Survey of India in the 1954 and creation of separate regional circle in Shillong in 1956, several floristic work published in the form of Flora of Jowai (Balakrishnan, 1981-1983); Flora of Nongpoh (Joseph, 1982); Flora of Balphakram Wildlife Sanctuary (Kumar, 1984); Forest Flora of Meghalaya (Haridasan & Rao, 1985-1987); Flora of Nokrek Biosphere Reserve (Phukan & Sinha, 2010); Flora of South Garo hills district (Roy & Sinha, 2016). The recent contribution in the form of Checklist of Flora of Meghalaya (Mao *et al.*, 2016) which deals with vascular plants.

These above mentioned research worked mainly confined with other parts of North East India except the present Nagaland state. The Ferns of Nagaland by Jamir & Rao, 1988; Lichen Flora of Nagaland, Singh & Sinha, 1994; Orchids of Nagaland, Deorani & Naithani, 1995; Orchids of Nagaland, Hynniewta *et al.*, 2000; Orchid Diversity of Nagaland, Deb & Imchen, 2008; Bamboos of Nagaland, Naithani, 2011; Flora of Dziiko/ Dzukou Valley, Mao & Gogoi, 2016 are some notable contributions on floristic research in Nagaland.

Hynniewta, 1999 on his descriptive account '*Nagaland*': In Floristic Diversity and Conservation Strategies in India Vol. 3 mentioned a number of information regarding topography, vegetation, floristic diversity, economic uses, vulnerability and major threats

After the establishment of Botany department in Nagaland University, several workers contributed towards the taxonomic knowledge on floristic wealth of the state. Among them the prominent workers are Gurung, on Flora of Mokokchung district (1993, Ph.D thesis, unpublished, NEHU,) Flora of Zunheboto district by Moaakum (2011, Ph.D thesis, unpublished, NU), Studies On The Floristic Diversity of Dimapur district, Nagaland by Mozhui, R. (2014, Ph.D thesis, unpublished, NU), Studies On the Floristic Diversity of Fakim Wildlife Sanctuary, Nagaland by Rongsensashi (2014, Ph.D thesis, unpublished, NU) and Studies On The Diversity of the Flowering Plants of Tuensang district, Nagaland (2019, PhD thesis unpublished).

Recently many significant published research works on floristic diversity in Nagaland has been carried out by different workers from time to time Noteworthy among them are Chaturvedi & Moaakum, 2007; 2008a; 2008b; Rongsensashi *et al.*, 2010 ; Rongsensashi *et al.*, 2011 ; Thomas *et al.* 2012; Benniamin *et al.*, 2012; Moaakum & Dey, 2013; Moaakum *et al.*, 2014; Deb *et al.*, 2014; Dey *et al.*, 2014; Jakha *et al.*, 2014; Gogoi *et al.*, 2015; Jakha *et al.*, 2015; Odyuo *et al.*, 2015; Jamir *et al.*, 2015; Odyuo *et al.*, 2016; Deb *et al.*, 2016; Lea *et al.*, 2016; Rongsensashi *et al.*, 2016; Moaakum *et al.*, 2017; Jakha & Dey., 2017; Odyuo *et al.*, 2017; Kapfo & Puro, 2017; Mao *et al.* 2017; Odyuo & Roy, 2018: Odyuo *et al.*, 2018; Odyuo *et al.*, 2019; Kamba & Deb, 2021; Roy *et al.*, 2021; Moaakum *et al.*, 2022a; 2022b; Dey *et al.*, 2022a; 2022b;. So far these works are considered the most updated work on the flora of Nag

CHAPTER-3

METHODOLOGY

The present work which deals with the Floristic studies of Angiospermic in Intangki National Park is the outcome of intensive field work and collection from 2014–2019. The study is based on regular field survey at different seasons for collection and documentation of plants. The plants were collected and herbarium were prepared following the field herbarium method (Jain & Rao, 1977).

1. Field Studies and Herbarium Preparation

a. Survey

Field surveys were conducted throughout the year so as to cover different seasons of the year at different areas of Intangki National Park. Photographs were captured in the field.

b. Collection

During the survey, various field data such as habit, habitat, size of plant, colour of flowers and fruits, date of collection, phenological data, associated plants, uses (if any), forest types etc. were recorded. Usually, two samples of each species were collected and they were put in a small perforated polythene bag. All the small polythene bags with the samples were then collected in a large and thick polythene bag so that plants remain fresh for a longer period. Usually, whole plants were collected in case of herbs, whereas in case of shrubs and trees only portions of flowering and sometimes fruiting twigs were collected. However, in certain areas where due to difficult terrain, plant specimen could not be collected therefore only photographic evidence was taken.

c. Pressing and Drying

At the base camp all the collected plant specimens were carefully pressed in newspapers and blotting papers. These sheets were pressed with the help of Plant press. Newspapers and blotting papers were regularly changed. Care was taken in selecting the specimens before pressing and following were taken note of:

1. It was ensured that the specimens were in flowering or fruiting condition.
2. It was ensured that specimens were free from fungal infection, insect feeding and pathological symptoms.
3. Generally single specimens were pressed in folded pressing paper. Large foliated specimens were cut into two or more pieces and each piece were arranged or pressed into two or more pressing papers.
4. Larger specimens were folded in the shape of 'V', 'N' or 'M' shapes and then pressed.
5. To avoid discoloration and molding, pressing papers were changed frequently depending upon the nature of specimen and humidity.

In rainy seasons when the atmosphere is humid, the materials were preserved in formaldehyde and alcohol solution containing one part of formaldehyde and two parts of 70% alcohol. The solution was kept in a spray bottle and applied to the specimens.

d. Preparation of Herbarium sheets

Once the specimens are fully dried then mounted on standard herbarium sheets (42cm × 28cm) by fevicol, a kind of adhesive glue. The mounted specimens were stitched with

thread to ensure perfect mounting. After mounting the specimens, these herbarium sheets are properly labelled showing field data *i.e.* name of species, details of locality, habit, habitat, colour of flower, diagnostic characters, date of collection, collection number, collector's name, etc. at its lower right-hand corner. All the Herbarium Sheets have been deposited in the herbarium of Department of Botany, Nagaland University.

2. Identification

The identification of plants has been done with the help of protologues, taxonomic revisions, monographs, published Floras and other relevant floristic literature. These tentatively identified plants were later confirmed by consulting the herbaria of Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM!) and also web databases such as POWO (powo.science.kew.org).

3. Microscopic Studies

For some of the critical examination of some interesting plants like floral details, hand lenses (10x) and compound microscope were used. Some detailed observation was done by dissecting the plants parts above black cloth using measuring scale.

4. Photographs

Photographs were taken in case of most of the plants in flowering or fruiting condition using Nikon 4500 DSLR. The photographs were arranged in Microsoft word.

5. Presentation of the style of the Flora

In presentation of systematic treatment of species, the families are arranged according to Bentham & Hooker's system (1862–1883) of classification. Indented keys are used for identification of families and the identification of genera and species. A detailed

description of the taxon along with the correct name, citation, synonyms (if any), habitat, phenological data (flowering and fruiting) and specimen examined have been given.

The correct name of the plant has been determined with the help of different floras, monographs, revisionary work, and published research paper. The author citation is followed as per standard abbreviations of using Brummitt & Powell (1992). The country distributional data was collected from BSI Database (efloraindia.bsi.gov.in) and the world distributional data was collected from POWO (powo.science.kew.org).

CHAPTER 4
ENUMERATION OF TAXONOMIC TREATMENT

KEY TO THE FAMILIES

1a. Vascular bundles open in stem, arranged in concentric rings; leaves usually reticulately veined; flowers 4 or 5-merous; seeds with 2 cotyledons:

2a. Plants parasitic or saprophytic

3a. Plants without leaves

4a. Climbers, parasitic on aerial parts of host plants CUSCUTACEAE

4b. Herbs, parasitic on roots of the host plants:

5a. Flowers unisexual, in spadices; ovules 1 -1 3; fruit a nut

BALANOPHORACEAE

5b. Flowers bisexual, solitary or in racemes; ovules many; fruit a capsule

OROBANCHACEAE

3b. Plants with leaves

LORANTHACEAE

2b. Plants neither parasitic nor saprophytic

6a. Fruit a legume:

7a. Corolla actinomorphic; sepals and petals valvate; stamens 4- many

MIMOSACEAE

7b. Corolla zygomorphic; sepals and petals imbricate; stamens mostly 10:

8a. Calyx united; corolla papilionaceous, posterior petal outermost; stamens mono or diadelphous

FABACEAE

8b. Calyx mostly free; corolla caesalpinaceous, posterior petal innermost; stamens free

CAESALPINACEAE

6b. Fruit otherwise, not a legume:

9a. Perianth present, biseriate or multiseriate:

- 10a. Corolla polypetalous or at least some of the petals free:
 - 11a. Stamens many or more than twice as many as petals:
 - 12a. Ovary superior or half superior
 - 13a. Pistils free, usually more than one:
 - 14a. Stamens perigynous arising from hypanthium ROSACEAE
 - 14b. Stamens hypogynous arising from receptacle:
 - 15a. Perianth 3- more seriate, 3-4-merous:
 - 16a. Sepals and petals valvate; fruits fleshy ANNONACEAE
 - 16b. Sepals and petals imbricate; fruit dry MAGNOLIACEAE
 - 15b. Perianth 2-seriate, 5-merous:
 - 17a. Trees; leaves with prominent lateral nerves; sepals persistent
DILLENIACEAE
 - 17b. Herbs, undershrubs or shrubs; leaves without prominent lateral
nerves; sepals usually deciduous
 - 18a. Leaves radical and alternate; petals with nectariferous gland
RANUNCULACEAE
 - 18b. Leaves alternate or opposite; petals without nectariferous gland
HYDRANGEACEAE
- 13b. Pistil one, united:
 - 19a. Stamens perigynous, arising from hypanthium:
 - 20a. Carpels 4 -20 SONNERATIACEAE
 - 20b. Carpels 2-3 LYTHRACEAE
 - 19b. Stamens hypogynous:
 - 21a. Stamens monadelphous or polyadelphous:
 - 22a. Anthers 2 – celled STERCULIACEAE
 - 22b. Anthers 1 - celled:

- 23a. Trees; leaves digitately compound; carpels 2-5 BOMBACACEAE
- 23b. Plants not as above; carpels many MALVACEAE
- 21b. Stamens free:
- 24a. Ovary long stipitate on a gynophores CAPPARACEAE
- 24b. Ovary sessile not stipitate:
- 25a. Flowers unisexuals:
- 26a. Ovary 3-carpelled; ovules 1-2 in each cell EUPHORBIACEAE
- 26b. Ovary not 3-carpelled; ovules 1-many in each cell:
- 27a. Plants usually with resinous juice; leaves opposite CLUSIACEAE
- 27b. Plants without resinous juice; leaves alternate THEACEAE
- 25b. Flowers bisexual:
- 28a. Venation palmate TILIACEAE
- 28b. Venation pinnate:
- 29a. Anthers dehiscence poricidal ELAEOCARPACEAE
- 29b. Anthers dehiscence otherwise:
- 30a. Sepals 2 PAPAVERACEAE
- 30b. Sepals 4 - 6 (usually 5):
- 31a. Leaves with pellucid aromatic glands RUTACEAE
- 31b. Leaves without glands ACTINIDIACEAE
- 11b. Stamens fewer, at the most twice as many as the petals:
- 32a. Leaves simple:
- 33a. Ovary I-celled:

34a. Climbers or scandent shrubs:

35a. Ovules many PASSIFLORACEAE

35b. Ovules single:

36a. Flowers unisexual, fruits not winged MENISPERMACEAE

36b. Flowers bisexual, fruits broadly winged CARDIOPTERIDACEAE

34b. Plants otherwise:

37a. Placentation free-central:

38a. Stamens alternate to petals CARYOPHYLLACEAE

38b. Stamens opposite to petals MYRSINACEAE

37b. Placentation otherwise:

39a. Ovary stipitate on gynophores CAPPARACEAE

39b. Ovary sessile or subsessile:

40a. Anther connectives with an appendage at apex TETRAMELACEAE

40b. Anther connectives without appendages at apex

41a. Ovules 1 - 2, in each cell of ovary, pendulous HERNANDIACEAE

41b. Ovules many, in each cell of ovary FLACOURTIACEAE

33b. Ovary 1 - many celled:

42a. Leaves aromatic gland dotted RUTACEAE

42b. Leaves not gland dotted

43a. Flowers zygomorphic:

44a. Sepals 3 BALSAMINACEAE

44b. Sepals 5:

- 45a. Inner 2 sepals petaloid; stamens 8, monadelphous; ovary 2- celled
POLYGALACEAE
- 45b. Sepals not petaloid; stamens 10, free; ovary 3-celled
MALPIGHIACEAE
- 43b. Flowers actinomorphic:
- 46a. Leaves opposite:
- 47a. Herbs
LYTHRACEAE
- 47b. Tress, shrubs or climbing shrubs
DICHAPETALACEAE
- 48a. Stamens 2
OLEACEAE
- 48b. Stamens 10
MALPIGHIACEAE
- 46b. Leaves alternate:
- 49a. Flowers in umbels or umbelules, ovules 2-many per cell
AQUIFOLIACEAE
- 49b. Flowers not in umbel or umbelules, ovules 1-2 per cell
- 50a. Plant twining herbs or shrubs, carpels 3
MENISPERMACEAE
- 50b. Plants herbs, shrubs or trees, carpe
EUPHORBIACEAE
- 51a. Plants climbing or creeping with tendrils
VITACEAE
- 51b. Plants of other habits, with tendrils:
- 52a. Fertile stamens 2 or 3:
- 53a. Fertile stamens 2; petals 4 -5
SABIACEAE
- 53b. Fertile stamens 3; petals 3
OLECACEAE
- 52b. Fertile stamens more than 3:
- 54a. Stamens opposite to petals:
- 55a. Sepals valvate, much reduced or open in bud; anthers
versatile; ovary 3-celled
RHAMNACEAE

- 55b. Sepals imbricate, well developed; anthers introrse, ovary 3-6 celled
LEEACEAE
- 54b. Stamens alternate to petals:
- 56a. Venation usually pinnate; sepals mostly imbricate:
- 57a. Ovary 1-3-celled; ovules many; placentation axile or parietal
ITEACEAE
- 57b. Ovary 1-5-celled; ovules 2-10; placentation otherwise
HIPPOCRATAEAE
- 56b. Venation palmate; sepals valvate:
- 58a. Stamens united
STERCULIACEAE
- 58b. Stamens free or slightly connate at base
TILIACEAE
- 32b. Leaves compound:
- 59a. Carpels free or deeply lobed
CONNARACEA
- 59b. Carpels united:
- 60a. Ovary 1-celled:
- 61a. Stamens 10, in 2 whorls
ANACARDIACEAE
- 61b. Stamens 3-5, in one whorl
HERNANDIACEAE
- 60b. Ovary 2 or more-celled:
- 62a. Leaves aromatic gland dotted
RUTACEAE
- 62b. Leaves not aromatic gland dotted:
- 63a. Herbs or climbers:
- 64a. Leaves biternately compound
SAPINDACEAE
- 64b. Leaves ternately or pinnately compound
OXALIDACEAE
- 63b. Trees or shrubs (sometimes scandent):
- 65a. Scandent shrubs with tendrils
VITACEAE
- 65b. Trees, shrubs or undershrubs without tendrils;

- 75a. Shrubs or trees; leaves stipulate; fruits baccate or drupaceous
ARALIACEAE
- 75b. Herbs; leaves exstipulate; fruit a schizocarp
APIACEAE
- 74b. Inflorescence otherwise:
- 76a. Fruits 4-winged
COMBRETACEAE
- 76b. Fruits not winged:
- 77a. Leaves stipulate
RHIZOPHORACEAE
- 77b. Leaves exstipulate:
- 78a. Ovules pendulous
ALANGIACEAE
- 78b. Ovules on axile, parietal or central placentas:
- 79a. Leaves basal or opposite, palmately nerved; antherd opening by pores
MELASTOMATACEAE
- 79b. Leaves cauline, alternate, pinnately nerved; anthers opening by slits
ONAGRACEAE
- 10b. Corolla gamopetalous variously, usually forming a long or short tube:
- 80a. Ovary fully or semi inferior:
- 81a. Plants climbing with tendrils; stems with bicollateral bundles
CUCURBITACEAE
- 81b. Plants of various habits, without tendrils; stems with collateral vascular bundles:
- 82a. Ovary 1 - celled:
- 83a. Flowers in heads
ASTERACEAE
- 83b. Flowers not in heads, various:
- 84a. Ovules solitary, pendulous
CAPRIFOLIACEAE
- 84b. Ovules 5, or more, not pendulous
MYRSINACEAE
- 82b. Ovary 2-many-celled:

- 85a. Leaves opposite; stipules inter or intra-petiolar RUBIACEAE
- 85b. Leaves otherwise, if opposite then stipules not interpetiolar
or absent:
- 86a. Stamens 10 STYRACACEAE
- 86b. Stamens 5 CAMPANULACEAE
- 80b. Ovary superior:
- 87a. Stamens more than corolla lobes:
- 88a. Petals connate at base THEACEAE
- 88b. Petals united most of their length EBENACEAE
- 87b. Stamens as many as corolla lobes or fewer:
- 89a. Stamens opposite to corolla lobes:
- 90a. Ovary 1-celled; placentation free central MYRSINACEAE
- 90b. Ovary 2-celled; placentation axile LEEACEAE
- 89b. Stamens alternate to corolla lobes:
- 91a. Flowers zygomorphic; stamens 2 or 4:
- 92a. Inflorescence distinctly bracteate ACANTHACEAE
- 92b. Inflorescence otherwise:
- 93a. Ovules and seeds few LAMIACEAE
- 93b. Ovules and seeds numerous:
- 94a. Leaves compound; seeds winged BIGNONIACEAE
- 94b. Leaves simple or dissected; seeds not winged:
- 95a. Placentation axile SCROPHULARIACEAE

95b. Placentation parietal

GESNERIACEAE

91b. Flowers actinomorphic; stamens 5:

96a. Leaves alternate:

97a. Flowers in scorpioid cymes

BORAGINACEAE

97b. Flowers not in scorpioid cymes:

98a. Corolla scarious

PLANTAGINACEAE

98b. Corolla not scarious:

99a. Ovules many in each cell

SOLANACEAE

99b. Ovules 1 - 2 in each cell:

100a. Sepals free; corolla lobes contorted and infolded

CONVOLVULACEAE

100b. Sepals connate; corolla lobes imbricate; fruits dry with 4 nutlets

BORAGINACEAE

96b. Leaves opposite, verticillate or radiclel:

101a. Plants scapigerous with petiole sheathing at base PLANTAGINACEAE

101b. Plants not as above :

102a. Anthers and stigma united to form a gynostegium; pollen in pollinia

ASCLEPIADACEAE

102b. Anthers and stigma not as above; pollen not in pollinia:

103a. Plants with milky sap; corolla lobes contorted; fruit of 2 follicles

APOCYNACEAE

103b. Plants with watery sap; corolla lobes contorted or not; fruit not follicular:

104a. Ovules 1 - 2 in each cell:

105a. Ovule 1 in each cell

VERBENACEAE

- 115b. Perianth 4-5-lobed; ovary 1-celled; ovules 1-3 COMBRETACEAE
- 112b. Ovary superior:
- 116a. Anthers dehiscing by valves LAURACEAE
- 116b. Anthers dehiscing otherwise:
- 117a. Bracts much larger than the fruits and adnate to them as wing JUGLANDACEAE
- 117b. Bracts if present otherwise:
- 118a. Perianth variously segmented and recurved backwards with free tips PROTEACEAE
- 118b. Perianth otherwise:
- 119a. Pistil 2 or more, free:
- 120a. Trees STERCULIACEAE
- 120b. Herbs or climbers RANUNCULACEAE
- 119b. Pistil 1:
- 121a. Ovary 1-celled:
- 122a. Stipules ochreate POLYGONACEAE
- 122b. Stipules if present not ochreate:
- 123a. Annual or perennial herbs:
- 124a. Flowers unisexual:
- 125a. Leaves exstipulate; ovules 2 MENISPERMACEAE
- 125b. Leaves usually stipulate; ovule solitary URTICACEAE
- 124b. Flowers bisexual AMARANTHACEAE
- 123b. Shrubs or trees:
- 126a. Stipules absent:
- 127a. Leaves without pellucid dots or lepidots THYMELAEACEAE

- 127b. Leaves often with pellucid dots or lepidots:
 - 128a. Stamens connate into a column; seeds arillate
MYRISTICACEAE
 - 128b. Stamens free; seeds not arillate
ELAEAGNACEAE
- 126b. Stipules present:
 - 129a. Style branched:
 - 130a. Anthers inflexed and reversed in bud; ovule 1, apical MORACEAE
 - 130b. Anthers erect in bud; ovules 1 - 2, apical or basal:
 - 131a. Ovule 1, apical ULMACEAE
 - 131b. Ovules 2, basal EUPHORBIACEAE
 - 129b. Style unbranched:
 - 132a. Leaves pinnate CAESALPINACEAE
 - 132b. Leaves simple:
 - 133a. Placentation parietal FLACOURTIACEAE
 - 133b. Placentation otherwise:
 - 134a. Ovule apical MORACEAE
 - 134b. Ovule basal URTICACEAE
 - 121b. Ovary 2-more-celled:
 - 135a. Plants armed with stipular spines RHAMNACEAE
 - 135b. Plants unarmed:
 - 136a. Inflorescence a spike or catkin EUPHORBIACEAE
 - 136b. Inflorescence other than spikes or catkin:

- 137a. Leaves opposite; fruit a double samara with 1-seeded; mericarps winged
ACERACEAE
- 137b. Leaves spirally arranged, alternate, sometimes in whorl; fruits not as
above SAPINDACEAE
- 1b. Vascular bundles scattered in stem; leaves usually parallel veined; flowers mostly 3-
merous; seeds with one cotyledon:
- 138a. Inflorescence a fleshy spadix or dense glomerule with inconspicuous flowers
and a large spathe ARACEAE
- 138b. Inflorescence not as above:
- 139a. Ovary inferior or semi inferior:
- 140a. Ovary 1-celled ORCHIDACEAE
- 140b. Ovary 2 or more-celled:
- 141a. Fertile stamen 1:
- 142a. Sepals free or at most connivent; anther 1-celled
MARANTACEAE
- 142b. Sepals united into spathaceous tube:
- 143a. Leaves spiral; sheaths closed COSTACEAE
- 143b. Leaves distichous; sheaths open
ZINGIBERACEAE
- 141b. Fertile stamens 2 or more:
- 144a. Flowers unisexual:
- 145a. Plants climbers, dioecious; leaves alternate or opposite; bracts
simple or absent; capsules winged DIOSCOREACEAE
- 145b. Plants tree like erect; monoecious; lamina at the tip; bracts
spathaceous; fruits fleshy not winged MUSACEAE
- 144b. Flowers bisexual:
- 146a. Placentation parietal TACCACEAE
- 146b. Placentation axile:

- 147a. Plants scapose with tunicated bulbous rootstock
AMARYLLIDACEAE
- 147b. Plants not scapose, with tuberous rhizome or corm
HYPOXIDACEAE
- 139b. Ovary superior:
- 148a. Perianth absent or rudimentary or reduced to scales or bristles:
- 149a. Plant arborescent:
- 150a. Leaves broadly plicate or pinnatisect ARECACEAE
- 150b. Leaves not as above POACEAE
- 149b. Plants herbaceous:
- 151a. Stems terete, cylindrical or flattened, noded; leafsheaths usually open;
flowers enclosed by 2 glumes; anthers dorsifixed or versatile
POACEAE
- 151b. Stems solid, triangular, not noded; leafsheaths entire or closed; flowers
enclosed by single glume; anthers basifixed CYPERACEAE
- 148b. Perianth distinct, petaloid at least in part:
- 152a. Perianth segment distinguishable into two heteromorphic series with outer
whorl sepaloid and inner petaloid COMMELINACEAE
- 152b. Perianth segments not distinguishable, both perianth segments usually of
the same colour, often petaloid or united into a tube below:
- 153a. Leaves modified into phyllode, without lamina
ASPARAGACEAE
- 153b. Leaves not modified, with distinct lamina:
- 154a. Flowers mostly dioecious; anthers 1-celled
SMILACACEAE
- 154b. Flowers mostly bisexual; anthers 2-celled:
- 155a. Plants climbers; stamens usually 4; placentation basal apical
STEMONACEAE
- 155b. Plants usually erect; stamens usually 6; placentation axile
COLCHICACEAE

RANUNCULACEAE Juss.

Herbs, annual or perennial, rarely shrubs or woody climbers. Leaves basal and cauline, alternate, sometimes opposite, entire or palmately, ternately or pinnately dissected, simple or compound; petiole sheathing, sometimes broadened into stipule-like auricles at base. Inflorescence 1-flowered racemose or paniculate. Flowers regular or irregular, bisexual or unisexual. Sepals 3-8, mostly free. Petals 0, or 3-5 or more, imbricate, often reduced. Stamens many, rarely 6-20. Carpels -1, many, superior, free or connate at base; stigma simple. Fruit a cluster of 1-seeded indehiscent achenes or many seeded follicles, rarely a berry.

Ranunculus L.

Herbs perennial or annual. Stems usually leafy. Leaves radical and cauline; whorled or alternate on stems, ternately lobed or dissected. Inflorescence a solitary or leaf- opposed corymbose panicles, flowers white or yellow in colour. Stamens numerous, or few. Fruits aggregate, globose, ovoid with numerous achenes.

Ranunculus sceleratus L. Sp. Pl. 776. 1753; Hook. f. & Th. in Hook .f. Fl. Brit. India 1: 19. 1872; Rau in Sharma *et al.*, (eds.), Fl. India 1: 128. 1993; Hajra *et al.*, (eds.), Mat. Fl. Arunachal Pradesh 1: 60. 1996.

Erect annual herbs, somewhat fleshy, up to 70 cm high; stem hollow, deeply furrowed outside. Radical leaves long, petioled, 2.4- 5 cm across, deeply 3-lobed; segments obovate, 3- 5-toothed; Cauline leaves shortly petiolate or sessile. Flowers several, sessile, bright yellow. Sepals 5, elliptic, pubescent, somewhat reflexed, caducous.

Petals 5, as long as sepals or shorter, yellow. Achenes small, obovoid, compressed, numerous beaked.

Fl. & Fr.: April - August

Distribution: India: Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Odisha, Punjab, Uttarakhand, Uttar Pradesh.

Almost throughout the world.

Specimen examined: AJNU 1352. **PL-18**

DILLENIACEAE Salisb.

Trees, shrubs or climbers. Leaves simple, usually spirally arranged, with numerous parallel lateral veins. Flowers bisexual, actinomorphic. Sepals 5, imbricate, persistent. Petals 5 or less, imbricate. Stamens numerous, free or united basally. Staminodes often present. Anthers basifixed. Carpels free or rarely 1. Fruiting carpels dehiscent or baccate. Seeds usually with crested or laciniate aril.

Dillenia L.

Trees. Leaves large; petioles channeled above. Flowers large, showy solitary or in terminal racemes; bracts and bracteoles caducous, if present. Sepals 5, persistent, enlarged in fleshy in fruit. Petals 5, yellow or white, caducous. Stamens numerous, free; filaments equal or unequal in length; anthers linear. Carpels 5-20 attached on a conical receptacle. Pseudocarps indehiscent, enclosed by enlarged thickened sepals.

Key to species

1a. trees deciduous; fruits more than 7cm in diameter

D. Indica

1a. Trees evergreen; fruits less than 2.5 in diameter

2a. leaves hispid above, pubescent beneath

D. Scabrella

2b. leaves glabrous above, glabrescent beneath

D. Pentagyna

Dillenia indica, L., Sp. Pl. 1: 535. 1753; Hook.f. & Th. in Fl. Brit. India 1: 36. 1872; Brandis, Ind. Trees 3. 1906; Kanjilal *et al.*, Fl. Assam 1: 10. 1934; Deb, Fl. Tripura 1: 101. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 52. 1985. *D. speciosa* Thunb., Trans. L. Soc. 1: 200. 1791 *nom. Superfl. Illeg.*; Roxb., Fl. Indica 2: 1650. 1832.

Evergreen tree with oval crown. Leaves petiolate, 12-28 x 5-11 cm, oblanceolate or elliptic, oblanceolate or elliptic, acute or acuminate, glabrous above, pubescent beneath, serrate. Flowers solitary, terminal. Sepals fleshy. Petals white. Stamens in two series. Fruit green, globose or subglobose.

Fl. & Fr.: June- January.

Distribution: India: Throughout except N.W. India; Myanmar, S. China, Sri Lanka, Malaysia, Thailand, Vietnam.

Specimen examined: AJNU 1193. **PL-17**

Dillenia scabrella, (D. Don) Roxb. Ex Wall., Pl. As. Rar. 1: 20. T 22. 1830; Hook.f & Th. in Fl. Brit. India 1: 38. 1872; Brandis, Ind. Trees 4. 1906; Kanjilal *et al.*, Fl. Assam 1: 11. 1934; Haridasan & Rao, Fl. Meghalaya 1: 53. 1985.

Deciduous tree. Bark brown. Leaves ca. 10-18 x 20-36 cm, oblanceolate to elliptic, hairy, base acute, petiole wings. Flowers appearing before the leaves, bracteates. Sepals glabrate. Petals yellow. Fruit orange or yellow with 5-7 carpels, globose.

Fl. &Fr.: March- August.

Distribution: India: West Bengal, N.E. India; Bangladesh, Nepal, Burma, Vietnam.

Specimen examined: AJNU 1388. **PL-17**

Dillenia pentagyna, Roxb., Pl. Corom. 1: 21. t. 20. 1795; Hook. f. & Th. in Fl. Brit. India 1: 38. 1872; Deb, Fl. Tripura 1: 102. 1981; Haridasan & Rao, For. Fl. Meghalaya 1; 53. 1985; Majumdar in Sharma et al., Fl. 1: 156. 1993; Bora & Kumar, Flo. Div. Assam 39. 2003.

Deciduous tree with horizontal branching. Bark greyish. Leaves 8-26 x 3-11 cm, oblanceolate, base narrowed, serrate, glabrous above, glabrescent beneath, petiole short. Flowers in fascicles of 3-8 appearing before the leaves. Sepals ovate. Petals yellow. Fruits pentacarpellary, subglobose.

Fl. & Fr.: March-October.

Distribution: India: Assam, Arunachal Pradesh, Meghalaya, Nagaland, Tripura, West Bengal China, Malaysia, Myanmar, Sri Lanka.

Specimen examined: AJNU 1221. **PL-17**

MAGNOLIACEAE Juss.

Trees or shrubs. Leaves simple, alternate, stipulate. Flowers solitary, showy, terminal or pseudo-axillary. Perianth spirally arranged or in 1 whorl of sepals and 2-4 whorls of petals. Stamens and carpels numerous. Fruit apocarpous or sometimes syncarpous, mature carpels usually dehiscent along dorsal or ventral sutures or indehiscent.

Magnolia L.

Trees or shrubs, evergreen. Leaves spirally arranged, folded in bud, erect when young, margin entire. Flowers terminal, solitary, bisexual, large, usually fragrant. Tepals 9-12, in whorls of 3 or 4. Carpels few to many. styles curved outward. Ovules 2 per carpel. Stigmas papillate. Fruit usually ovoid, mature carpels distinct, leathery or woody, dehiscent along dorsal sutures. Seeds 1 or 2 per carpel.

Magnolia hodgsonii (Hook. f. & Th.) Keng, Gard. Bull. Singapore 31: 129. 1978; Raju in Sharma et al., Fl. India 1: 168. 1993. *Telauma hodgsonii* Hook. f. & Th., Fl. India 74. 1855 & Fl. Brit. India 1: 40. 1872.

Small evergreen trees, upto 25 m high. Leaves oblanceolate, 15-44 x 6-10 cm, base attenuate or cuneate, acuminate or apiculate at apex, entire, glabrous; lateral nerves prominent beneath, 15-25 pairs; petioles 2-4 cm long, thickened at base with stipular scar along the entire length. Flowers large, terminal, white or pink; sepals 3, white, pinkish tinged, oblong, fleshy; petals 6-9, not reflexed; stamens sessile, yellowish; carpels sessile, glabrous. Fruit ovoid or ellipsoid; ripe carpels sharply beaked, ovoid. Seeds 3-4 in each carpel, red.

Fl. & Fr.: April-September.

Distribution: India (tropical and subtropical eastern Himalayas, N.E., India, West Bengal); Bangladesh, Bhutan, Myanmar, Nepal.

Specimen: AJNU 1387. **PL-7**

ANNONACEAE Juss.

Trees or shrubs or climbers. Leaves alternate, simple, entire; stipules absent. Flowers usually bisexual, regular, in terminal, axillary or leaf-opposed, solitary or in

cymes or panicles. Sepals 3, usually valvate. Petals 6, in two series, or the inner absent. Stamens many, rarely definite, closely packed on the torus; filaments short or absent; anthers connate. Carpels minute, usually numerous, free, superior; styles shortly elongated or absent. Fruits of numerous dry or fleshy carpels, rarely united into a fleshy berry-like fruit.

Key to Genera

- 1a. Petals all equal, spreading *Desmos*
- 1b. Petals unequal or subequal
 - 2a. Outer petals larger than inner; flowers red. *Milusa*
 - 2b. Outer petals larger than inner petals; flowers yellowish-green
 - 3a. Climbing or straggling shrubs
 - 4a. Outer petals flat and thin; ripe carpels 1-seeded *Friesodielsia*
 - 4b. Outer petals thick and fleshy; ripe carpels 2 or more seeded *Fissistigma*
 - 3b. Erect shrubs or trees *Mitrephora*

Desmos Lour.

Shrubs or scandent shrubs or small trees. Leaves often glaucous beneath, shiny above. Flowers bisexual, often solitary, extra-axillary or leaf-opposed, usually pendulous. Sepals 3, small, valvate in buds, free or connate at base. Petals 6 (3 + 3), sometimes the inner 3 absent, valvate, clawed at base. Stamens numerous; anther-thecae linear; connectives subglobose or truncate at top. Carpels numerous, pubescent; style oblong or ovoid; stigma oblong, ovoid or clavate, ovules 2- 8. Ripe carpels many, moniliform. Seeds subglobose or ellipsoidal.

Desmos dumosus (Roxb.) Safford in Bull. Torrey Bot. Club 39: 506. 1912; D. Mitra in Sharma *et al.*, Fl. India 1: 260. 1993. *Unona dumosa* Roxb., Fl. Ind. 2: 670. 1832; Hook. f. & Th. in Fl. Brit. India 1: 59. 1872; Kanjilal *et al.*, Fl. Assam 1: 35. 1934; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 78. 1938.

Scandent shrubs with thickened loops and coils. Leaves ovate, elliptic oblanceolate, 5-10 x 2.5-5 cm, base rounded or subcordate, acuminate at apex, entire at margins, glabrous or glabrescent above, pubescent on midrib; lateral nerves 8-12 pairs; petioles 2-5 cm long, hairy. Flowers extra axillary or terminal, solitary, pendulous, yellowish green, 10-12 cm across. Sepals ovate, pubescent. Petals 6(3+3), outer petals oblanceolate, fine pubescent; inner petals narrow. Stamens many. Carpels many. Ripe carpels dark red, many, moniliform, pubescent, constricted.

Fl. & Fr.: May - December

Distribution: India: Assam, Mizoram, Nagaland, Tripura and West Bengal.

Bangladesh, China, Laos, Malayasia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1164. PL-4

Fissistigma Griff.

Climbing or scrambling shrubs. Leaves with strong parallel nerves, pubescent to tomentose. Flowers bisexual, terminal, leaf-opposed or axillary, solitary or in cymes or branched panicles. Sepals 3, small, valvate, connate at base, persistent. Petals 6 (3 + 3), valvate, thick, leathery, tomentose; outer flat, plano-convex or trigonous; inner ones smaller, triquetrous above, shorter than outer. Stamens many, connectives ovoid,

quadrate or apiculate at top. Carpels many; ovules 2 or more; style oblong to clavate; stigma short. Ripe carpels ovoid or globose, berries, usually stalked. Seeds many.

Fissistigma polyanthum (Hook. f. & Thomson) Merr. in Philipp. J. Sci. (Bot.) 15: 135. 1919; D.Mitra in Sharma *et al.*, Fl. India 1: 299. 1993. *Melodorum polyanthum* Hook. f. & Th., Fl. Ind. 121. 1855 & in Fl. Brit. India 1:81. 1872; Kanjilal *et al.*, Fl. Assam 1: 49. 1934; Deb & Dutta in J. Econ. Tax. Bot. 10(1): 28. 1987.

Woody climbers; branches brown, glabrous. Leaves oblong-elliptic, 6-12 x 2.5-5 cm, base rounded or cuneate, acute at apex, coriaceous, glabrescent above and pubescent beneath; petioles 0.8-1 cm long. Flowers in sub-umbellate cymes, leaf opposed, bracteate and bracteolate, up to 6 mm across, pale orange-red, fragrant; sepals 3, ovate, greyish, tomentose; petals 6(3+3), red; outer ovate, tomentose outside, inner thicker, glabrous. Stamens numerous; carpels also numerous; styles hairy. Ripe carpels many, globose. Fruit berries, 1-2 cm across, apiculate.

Fl. & Fr.: April – December

Distribution: India: Assam, Manipur and Nagaland.

Bangladesh, China, Myanmar and Vietnam.

Specimen examined: AJNU 1368. **PL-4**

Friesodielsia Steenis

Climbers. Leaves parallel-nerved, forming broken or indistinct loops. Flowers bisexual, leaf-opposed or extra-axillary. Sepals 3, valvate. Petals 6 (3 + 3), valvate; outer larger than inner, flat or triquetrous, narrow, leathery; inner much smaller, ovate-ianceolate or oblong, conniving over stamens and carpels. Stamens many, linear-oblong

or cuneate, truncate; anther-thecae dorsal. Carpels oblong or cylindrical, strigose; ovules 1-2; style short, recurved; stigma subcapitate. Ripe carpels many, ovoid or oblong, stalked. Seed 1, subglobose.

Friesodielsia forniculata (Roxb) Das in Bull. Bot. Surv. India 5 (1): 43. 1963. *Uvaria forniculata* Roxb Fl. Ind. 2: 662. 1832. *Oxymitra furnicata* Hook f. & Th., Fl. Ind. 146. 1855, *et* in Hook f., Fl. Brit. Ind. 1:7 1. 1872; Gamble, Man. Ind. Timb. 20. 1902; Brandis, Ind. Trees 19. 1906; Kanjilal *et al.*, Fl. Assam 1 (1): 46. 1934.

Woody climbing shrubs. Leaves lanceolate or oblong-lanceolate, rounded at base, acuminate at apex, 9 -18 x 4 - 8 cm, glabrous and glaucous above, pubescent beneath; petioles present. Flowers extra-axillary, solitary, tomentose, Sepals connate at base, ovate-lanceolate, densely pubescent on the midrib, reddish outside. Petals greenish to pale yellow; outer larger than the inner, oblong-lanceolate, tomentose; inner ones ovate, acute. Stamens many, linear, truncate; connectives round. Carpels few, oblong, strigose; style glabrous, curved; stigmas subcapitate. Ripe carpels many, oblong, verrucose.

Fl. & Fr.: May - December

Distribution: India: Andaman & Nicobar Is., Arunachal Pradesh, Assam, Meghalaya and Nagaland.

Bangladesh, Cambodia, Myanmar and Vietnam.

Specimen examined: AJNU 1473. **PL-5**

Miliusa Lesch. ex A. DC

Small trees or shrubs, sometimes scandent. Leaves ovate or elliptic, membranous, pubescent or glabrate. Flowers usually bisexual, axillary or often apparently extra-axillary, solitary or 2-3-flowered fascicles or cymes; bracts ovate, elliptic or obovate, the

upper ones often foliaceous. Sepals 3, valvate. Petals 6 (3 + 3), free; outer petals sepaloid; inner ones larger and subsaccate at base. Stamens definite or indefinite; anthers ovoid, extrorse; connectives concealing the anther-thecae. Carpels indefinite, linear- oblong; ovules 1 -10; style oblong; stigma club-shaped. Ripe carpels many, globose or oblong, stalked or subsessile. Seeds 1 to many.

Miliusa dioica (Roxb.) Chaowasku & Kessler *Miliusa roxburghiana* (Wall) Hook. f. & Th. Fl. Ind. 150.1855; et in Hook f., Fl. Brit. Ind. 1: 87. 1872; Gamble, Man. Ind. Timb. 21. 1902; Brandis, Ind. Trees 112. 1906; Kanjilal *et at.*, Fl. Assam 1 (1): 42.1934; Balak. Fl. Jowai 1: 65.1981.

Small trees or large shrubs, 3-8 m tall. Bark grayish- brown, smooth. Leaves bifarious, ovate-lanceolate, rounded at base, abruptly acuminate at apex, 10 -16 x 3.4 - 6 cm, thinly coriaceous, glabrous above, pubescent beneath. Flowers solitary or 2-3, axillary, drooping, up to 1.5 cm long, red; bracts 1-3, linear-lanceolate, acuminate. Sepals 3, linear- lanceolate, acuminate, reflexed. Petals 6 (3 + 3); outer petals similar to sepals; inner ones ovate, blood red with dark veins. Stamens many; anther-thecae, extrorse. Carpels many, ovate or oblong; stigma sessile, capitate. Ripe carpels many, ovoid, subglobose, slightly pubescent. Seeds usually 1, ovoid.

Fl. & Fr.: March - December

Distribution: India: Arunachal Pradesh, Assam and Nagaland.

Bangladesh, Myanmar and Nepal.

Specimen examined: AJNU 1106. **PL-5**

Mitrephora (Blume) Hook.f. & Thomson

Trees. Leaves coriaceous, strongly ribbed. Flowers bisexual or rarely unisexual, usually terminal or leaf-opposed, extra-axillary. Sepals 3, orbicular or ovate, valvate. Petals 6 (3 + 3), valvate in buds; outer ones larger than inner, ovate, elliptic-oblong, veined; inner ones usually thin, narrowly long-clawed at base. Stamens many, oblong, cuneate; anther-thecae concealed by the flat-topped connectives. Carpels oblong or clavate; ovules up to 4, 2-seriate; styles oblong or clavate; stigma capitate. Ripe carpels globose or ovoid, stalked or subsessile, 2 - 3-seeded.

Mitrephora tomentosa Hook. f. & Th., Fl. Ind .113. 1855, *et* in Hook. f., Fl. Brit. Ind.1: 76. 1872; Gamble, Man. Ind . Timb. 19. 1902; Brandis, Ind. Trees 19. 1906; Kanjilal *et al.* Fl. Assam1 (1): 38. 1934.

Usually small trees, up to 18 m tall. Leaves ovate to oblong-lanceolate, rounded at base, acute to acuminate at apex, 11 - 24 x 3 - 7 cm, tomentose beneath, glabrous above except the midrib. Flowers in leaf-opposed cymes; pedicels 7-10 mm long, tomentose; bracts orbicular, large. Sepals 3, broadly ovate, acute brown tomentose. Petals 6 (3 +3); outer petals broadly lanceolate, acute, densely brown tomentose outside, yellow with faint purple veins inside. Stamens many, oblong-cuneate. Carpels few, ovate; stigma sessile. Ripe carpels many, subglobose, densely brown tomentose.

Fl. & Fr.: April - September

Distribution: India: Assam, Meghalaya and Nagaland.

Bangladesh, Cambodia, China, Laos Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1279. **PL-5**

MENISPERMACEAE Juss.

Erect or climbing shrubs, very rarely trees. Leaves alternate, simple or lobed, sometimes peltate, palmately nerved; petioles often swollen at base. Inflorescence usually axillary or on old woods, racemes, fascicles, panicles or cymes. Flowers small, unisexual, regular, and rarely asymmetrical. Sepals 6 in 2 whorls of 3, or sometimes 4-5 imbricate. Petals 3-6 in 1 or 2 whorls. Male flowers: stamens 2- many; filaments free or variously connate. Female flowers: staminodes 6 or absent; carpels 1-6, free. Fruit drupaceous.

Key to Genera

- | | |
|---|--------------------|
| 1a. Leaves apeltate | <i>Tinospora</i> |
| 1b. Leaves peltate | |
| 2a. Inflorescence umbellate or subcapitate | <i>Stephania</i> |
| 2b. Inflorescence paniculate cymose or racemiform | <i>Cissampelos</i> |

Cissampelos L.

Twining or erect shrubs. Leaves peltate or not, palmately nerved. Male flowers in axillary corymbose cymes, solitary or fascicled on peduncle; sepals 4; petals connate into cup-shaped corolla or nearly free; stamens 4(-10), connate into a peltate synandrium. Female flowers in elongated thyrsoid cymes or fascicled; sepal 1; petal 1 or 2-3; staminodes absent; carpel solitary. Fruit a drupe.

Cissampelos pareira L. var. **hirsuta** (Buch. - Ham. ex DC.) Forman, Pramaik & Gangopadhyay in Sharma *et al.*, Fl. India 1:317. 1993; Singh in Singh *et al.*, Fl. Mizo.

1:147. 2002; Yadav & Sardesai, Fl. Kolh. Dist. 37. 2002. *Cissampelos pareira* L., Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1:104. 1872; Kanjilal *et al.*, Fl. Assam. 1:52. 1982 (Repr.); Grierson & Long, Fl. Bhut. 1.2:338. 1984.

Twining shrubs, young parts tomentose. Leaves broadly ovate or orbicular, peltate, 3-7 x 4-9, apex mucronate, base truncate or cordate, margin entire, tomentose above, sparsely pubescent beneath, palmately 5-7 nerved; petioles inserted at base of lamina, puberulus. Bracts ovate-orbicular. Male flowers greenish-yellow in axillary subcorymbose cymes, pubescent; peduncles tomentose; sepals 4-6, pilose; petals 4; stamens 4, connate into a column. Female flowers greenish, crowded in the axils; sepals 1; petals 1, obovate; stigma 3-fid. Drupes obovate, reddish, ridged.

Fl. & Fr.: April-July

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1326 **PL-19**

Stephania Lour.

Twinning herbs. Leaves usually peltate, ovate or deltoid palmately nerved, margin entire; petiole usually long. Inflorescences axillary or on old stems, umbellate. Male flowers: sepals usually 6 or 8, in two whorls, free; petals 3 or 4, free; stamens 2-6, connate into a column bearing anthers at margin of peltate disc. Female flowers symmetrical or asymmetrical: sepals and petals as many as of the male flowers but sometimes fewer; carpel 1, style short, stigma short or many lobed. Fruit a drupe.

Stephania glandulifera Miers, Kanjilal *et al.*, Fl. Assam. 1:52. 1982 (Repr.); Grierson & Long, Fl. Bhut. 1.2:337. 1984; Gangopadhyay in Sharma *et al.*, Fl. India 1:334. 1993; Singh in Singh *et al.*, Fl. Mizo. 1:155. 2002; *Stephania rotunda* auct. non Lour., Hook. f. & Th. in Hook. f., Fl. Brit. Ind. 1:103. 1872.

Large climbers; branches grooved, warty. Leaves broadly or suborbicular, peltate, 5-10 x 4-8.5 cm, apex obtuse or mucronate, base truncate, thinly coriaceous, glabrous above, sparsely pubescent beneath; 8-12 basal nerves; petioles up to 7 cm long; bracts ovate-spathulate. Flowers small, yellowish in peduncled umbels. Male flowers: sepals 6-8, ovate-spathulate or obovate, glandular, papillose above; petals 3-5, orbicular, eglandular. Female flowers: glabrous; style short; stigma 5-fid. Drupes obovoid, 0.6-1 cm long, flattened, reddish when ripe.

Fl. & Fr.: March-May.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1062

Tinospora Miers

Woody climbers. Leaves ovate, subcordate, entire, sometimes dentate; basal nerves 3 – 5, palmate; lateral nerves distal, glandular patches; petioles swollen and geniculate at base. Inflorescences pseudo-paniculate. Male flowers sepals free, rarely connate at base, 6, in 2 whorls; outer 3 smaller, subelliptic; petals 3 - 6, obovate, cuneate, usually fleshy, glandular papillose; stamens 6, free. Female flowers: sepals and petals as in male ones; staminodes 6, subulate; carpels 3, curved-ellipsoid; style short; stigma peltate. Drupes 3, ovoid or ellipsoid.

Tinospora cordifolia (Willd.) Miers ex Hook. f. & Thomson, Fl. Ind.: 184. 1855 & in Fl. Brit. India. 1: 97. 1872; Kanjilal *et al.*, Fl. Assam 1: 54. 1934; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 78. 1938; Pramanik in Sharma *et al.*, Fl. India 1: 347. 1993. *Menispermum cordifolium* Willd., Sp. Pl. 4: 826. 1806.

Climber; stem succulent, up to 10 m high. Leaves broadly ovate-cordate, 6-10 x 5-8 cm, base sinuate, shortly acuminate at apex, glabrous; petioles 3-6 cm long, pulvinate. Flowers axillary or on leafless branches, 8-15 cm long, greenish-yellow, glabrous. Male flowers in few-flowered clusters, sepals in two whorls of 3 each; petals obovate; stamens 6, free, club shaped; anthers oblong. Female flowers solitary along axis, bracteate; bracts boat shaped; staminodes 6; carpels 3, ellipsoid. Fruit is drupes, globose-ellipsoid, red, rounded at both ends, papillose on surface.

Fl. & Fr.: February-April.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Delhi, Gujarat, Kerala, Karnataka, Maharashtra, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Bangladesh, Myanmar, Sri Lanka and Vietnam.

Specimen examined: AJNU 1358

PAPAVERACEAE Juss.

Herbs, annual, biennial or perennial. Stem erect, decumbent or straggling, sometimes climbing. Leaves alternate, or in a basal rosette; leaf blade simple, or compound. Inflorescences racemes, panicles, pseudumbels, or solitary flowers. Flowers regular or irregular, bisexual. Sepals 2-4, caducous. Petals 4-8, in 2-series, sometimes with basal spur. Stamens 4 or 6 to many. Ovary superior, 1-celled. Fruit a capsule.

Argemone L.

Herbs, annual, biennial, or perennial, usually stout, spiny. Leaves pinnate, lobes repand dentate, teeth apically spiny. Flowers solitary, terminal or arranged in cyme, trimerous; receptacles narrowly conical. Sepals caducous, apex with horned appendices. Petals in 2 whorls, contorted or imbricate. Stamens many, free; filaments filiform or slightly ampliate below middle; anthers linear, nearly basal, bifid, extrorse. Ovary ovoid, conical-ovoid, or nearly elliptic; carpels united; ovules many; styles very short or absent; stigmas as many as carpels. Capsule spiny, apex divided for a short distance into 3-6 valves, rarely parting nearly to base. Seeds many, spheroidal.

Argemone mexicana L., Sp. Pl. 508. 1753; Hook. f & Th., Fl. Brit. India 1: 117. 1872; Kanjilal et al., Fl. Assam 1:66. 1934; Debnath & Nayar in Sharma *et al.*, Fl. India 2: 1993; Chowdhery *et al.* in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1: 117. 1996; Bora & Kumar, Flo. Div. Assam 49. 2003.

Erect, prickly herbs, up to 1 m high. Leaves bluish, elliptic-oblong, 4-16 x 4-8 cm, base cordate, sessile, alternate, pinnatifid, sinuate-lobate, acute, toothed with spines along the margins, prickly beneath, glabrous above or sometimes both surfaces glabrous. Flowers terminal, solitary, golden-yellow; sepals elliptic, prickly outside; petals imbricate, obovate; Stamens many, caducous. Capsules oblong, 4-6 ribbed, usually prickly, dehiscing along sutures by short valves opposite each stigmatic lobe; seeds many, deeply reticulate, blackish-brown.

Fl. & Fr.: January-July.

Distribution: India (throughout of India); Native of Tropical America, naturalized in the Tropics.

Specimen examined: AJNU 1389. PL- 18

CAPPARACEAE Juss.

Herbs, shrubs, trees, sometimes scandant. Leaves alternate, simple, pinnately veined, entire or digitately compound. Inflorescence, terminal, axillary or supra-axillary racemose or paniculate. Flowers bisexual, actinomorphic or somewhat zygomorphic. Sepals 4-6, free. Petals 4 or 0. Stamens 6-numerous. Ovary superior. Fruit capsule or berry.

Key to the genera

- | | |
|--|-----------------|
| 1a. Sepals and petals 4; berry many seeded | <i>Capparis</i> |
| 1b. Sepals 6 petals absent; drupe 1-seeded | <i>Stixis</i> |

Stixis Lour.

Woody climber, unarmed. Leaves alternate, simple; petiole sometimes geniculate; Flowers small, many flowered, clustered in axillary racemes or terminal panicles. Sepals 6, connate at base. Petals absent. Stamens numerous; filaments unequal with outermost shortest. Ovary 1-celled; style solitary; stigmas entire or 3-lobed. Fruit a drupe, covered with lenticels, often crowned with persistent style; 1 seeded.

Stixis suaveolens (Roxb.) Bail, Bull. Soc. Linn. Paris 1: 655. 1887; Haridasan & Rao, For. Fl. Meghalaya 1:87. 1985. *Roydsia suaveolens* Roxb., Cor. Pl. 3.t. 289. 1820; Hook. f. & Th. in Hook. f., Fl. Brit. India 1: 180. 1872; Gamble, man. Ind. Timb. 36. 1902; Brandis, ind. Trees 36. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 79. 1934.

Woody climbers. Leaves 10-28 x 5-10cm, oblong or oblong-lanceolate, abruptly acuminate or apiculate, base cuneate, glabrous. Flowers white or yellowish white, fragrant. Sepals ovate-elliptic. Stamens borne on short gynophore above the base. Fruit obovoid, brown, warty.

Fl. & Fr.: February-November.

Distribution: India (N.E. India); South East Asia.

Specimen examined: AJNU 1008

Capparis L.

Erect, climbing or scrambling shrubs or small trees, unarmed or with stipulary thorns. Leaves simple, entire, cataphylls occasionally present at the base of shoots. Flowers white or coloured, often showy. Flowers 2-10 in vertical rows at or above leaf axils, rarely solitary or in lateral or terminal racemes, sometimes subumbellate or corymbose. Sepals 4 in two pairs. Petals 4 in two pairs. Stamens numerous. Ovary on long gynophores. Berry ellipsoid or globose.

Key to Species

- | | |
|--|-------------------------|
| 1a. Shoots unarmed | <i>C. acutifolia</i> |
| 1b. Shoots usually armed | |
| 2a. Cataphylls present atleast at the base of leaf | <i>C. olacifolia</i> |
| 2b. Cataphylls absent at base of leaf | <i>C. membranifolia</i> |

Capparis acutifolia Sw. Hort. Brit, ed 2: 585. 1830; Balak. Fl. Jowai 1: 74. 1981. *C. sabiaefolia* Hook. f. & Th. in Hook. f. Fl. Brit. Ind. 1: 179. 1872; Brandis, Ind. Trees 36. 1906; Kanjilal *et al.* Fl. Assam 1: 78. 1934.

Shrubs or small trees, up to 8 m tall; bark with a greenish blaze, smooth; unarmed or with few thorns; leaves 7-15 x 3-4 cm, ovate-oblong or oblong-lanceolate, caudate-acuminate, base rounded, obtuse or cuneate, glabrous, lateral nerves arching, raised on both surfaces. Flowers solitary or extra-axillary in 2-3 serial rows, 1-1.5 cm across, white; sepals obovate; fruits 1-1.5 cm long, globose, fruiting pedicels 4 - 4.5 cm long 1-3-seeded.

Fl. & Fr.: April-October.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Nagaland.

China, Laos, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1010

Capparis membranifolia Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42:70. 1874. *C.*

acutifolia Sweet subsp. *Vimineae* M.Jacobs in Blumea 12:429- 437. 1964. *C. viminea*

Hook. f. & Th. in Hook.f. Fl. Brit. Ind.1: 179, 1892.

Shrubs, trunk thorny. Leaves elliptic or oblong; 5-12 x 2-5 cm; base narrowed into the petiole, apex up to 1 cm acuminate, tip blunt to acute; herbaceous, subcoriaceous, light green when fresh; midrib comparatively broad, sunken above in the basal part, nerves 5-7 pairs, reticulation more or less distinct, surfaces glabrous but vestige of the tomentum long persistent on the main nerves. Inflorescence is supra-axillary, with 2-3 flowers in a vertical row. Flowers are mostly white, with dark anthers.

Sepals 4, equal, outside tomentose, glabrescent, the margins ciliate. Petals obovate, oblong, densely tomentose. Stamens 28-30, filaments white, anthers dark coloured or black. Fruits dark- coloured, pulp yellow.

Fl. & Fr.: March- June

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland and Sikkim; Cambodia, China, Hainan, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1476

Capparis olacifolia Hook .f. & Th. in Fl. Brit. India 1: 178. 1872; Kanjilal *et al.*, Fl. Assam 1: 77. 1934; Raghvan in Sharma *et al.*, Fl. India 2; 283. 1993.

Shrubs or small trees with spreading branches. Innovations at the base surrounded by a few cataphylls, densely fulvous or greyish tomentose with small stellate hairs, leaves glabrescent. Thorns slender, straight. Leaves ovate ,7-17 x 4-7 cm; base rounded, apex tapering, gradually acuminate, apex blunt to acute; midrib flat, nerves 5-8 pairs, obscure reticulation, abaxial surfaces is glabrescent, adaxial surface is rather glossy. Inflorescence supra- axillary with 2-3 in vertical rows, rarely solitary axillary. Flowers white, pedicels hairy. Sepals 6-11 x 3-7 cm, tomentose margin, outer pair boat-shaped, ovate, acute, surfaces glabrous, inner pair elliptic, membranous. Petals obovate, acute, rounded, tomentose outside towards the top and along the margins, outer white, inner pair with a purple or yellow blotch at base. Stamens 34-40.

Fl. & Fr.: March – June

Distribution: India: Assam, Nagaland; Bangladesh, East Himalaya, Myanmar, Nepal, Tibet

Specimen examined: AJNU 1478

FLACOURTIACEAE DC.

Evergreen or deciduous shrubs or trees. Leaves alternate or rarely opposite or whorled, simple, entire or glandular-toothed, commonly pinnately nerved; stipules present but often caducous. Flowers small, bisexual, regular, in various sorts of inflorescence. Sepals 4-many, free. Petals generally present, 2-3 to several times as many as the sepals. Stamens generally numerous, sometimes about 4 distinct or grouped into bundles opposite the petals. Fruit a capsule or sometimes a berry or a drupe.

Key to Genera

- | | |
|---|--------------------|
| 1a. Petals absent | <i>Flacourtia</i> |
| 1b. Petals present | |
| 2a. Sepals free; fruits borne on branches | <i>Hydnocarpus</i> |
| 2b. Sepals connate; fruits borne on short trunk | <i>Gynocardia</i> |

Flacourtia Comm. ex L'Her.

Trees or shrubs; trunk often armed with thorns Leaves alternate, serrate or entire, pinnately veined; stipules absent. Flowers unisexual, in axillary or terminal short bracteate racemes or racemose fascicles; pedicels articulated. Sepals 4-5, imbricate. Petal absent. Disc extrastaminal, usually consisting of distinct glands. Male flowers: Stamens

numerous; anthers oblong or globular, usually dorsifixed and versatile. Pistillode absent. Female flowers: Carpels 3 - 6, connate ; ovules usually 2 in each locule. Styles free or connate; stigma retuse or shortly bilobed. Fruit fleshy, an indehiscent berry, globose. Seeds 1 -2, ovoid to obovoid.

Flacourtia indica (Burm. f.) Merr., Interpr. Rumph. Herb. Amb. 377. 1917; Sleumer in Fl. Males. 1,5:76.1954. *Gmelina indica* Burm. f., Fl. Ind. 132, t. 39, f.5.1768. *Flacourtia sepiaria* Roxb., Pl. Corom. 1: 48, t. 68. 1796; Hook. f. & Th. Fl. Brit. India 1: 194. 1872. *Flacourtia ramontchii* L' Herit., Strip. Nov. 3: 59, t.30 & 30 B. 1786; Hook. f. & Th. Fl. Brit. India 1:193.1872, promaj. parte excl. var. *latifolia*.

Shrubs or small trees, dioecious, deciduous, up to 15 m tall; trunk often armed with branched thorns. Leaves obovate, ovate, oblong or suborbicular, acute, coarsely crenate to subentire 2- 4 x 1 - 3 cm, membranous to subcoriaceous, glabrous above and less pubescent along midrib; red, usually hairy. Flowers yellowish green, solitary or few in axillary bracteate glabrous racemose. Panicles up to 4 cm long; pedicels articulated, puberulous or glabrous. Sepals 4-5, slightly connate at base, ovate, obtuse, hairy inside. Male flowers: stamens numerous; filaments hairy at base; anthers versatile. Female flowers ovary globular, attenuate at apex; styles filiform; stigmas bilobed. Berries ellipsoid to subglobose, dark purple or red when ripe.

Fl. & Fr.: March - July.

Distribution: India: Almost throughout India.

Bangladesh, China, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1443. **PL-9**

Gynocardia R. Br.

A Monotypic genus and description and distribution as for the species.

Gynocardia odorata R. Br. in Roxb. Pl. Corom. 8: 95. t. 299. 1820; Hook. f. & Th.

In Fl. Brit. Ind. 1: 195.1872; Kanjilal *et al.*, Fl. Assam 1: 87. 1934

Evergreen dioecious tree, 10-25 m tall. Leaves alternate, entire, oblong, ovate-oblong, obovate-oblong, 10-32 x 3.6 -10.5 cm, dark green above, paler beneath, pinnately veined; petioles 0.6-2.2 cm long; stipules caducous. Inflorescence axillary and cauline; Male flowers pale yellow, 2.6 -3.5 cm across, fragrant, solitary or in axillary corymbs or some time arranged together in cluster on stems; sepals ovate, 0.6 - 0.7 cm across; petals ovate - oblong; stamens (in male flowers) with silky filaments; staminodes in female flowers; ovary green; stigma spreading. Fruits borne on the short trunk indehiscent, globose, 8-14 cm in diameter.

Fl. & Fr.: March- May

Distribution: India: Assam, Nagaland, Meghalaya.

Bangladesh, Myanmar, Nepal, Thailand, Tibet.

Specimen examined: AJNU 1297. **PL-9**

Hydnocarpus Gaertn.

Trees, dioecious. Leaves alternate; stipules small; petiole usually present, often thickened at apex; leaf blade leathery, pinnate-veined, margin entire or toothed. Flowers hypogynous in axillary cymes; bracts small to minute, sometimes persistent; pedicels

articulate. Sepals 3 or 4, imbricate, becoming reflexed, caducous. Petals 4 or 5, free, each with a thick and usually hairy scale inside at base. Staminate flowers: stamens 5 to many; filaments free, sometimes very short; anthers oblong to ovate-cordate, longitudinally dehiscent. Pistillate flowers: staminodes 5 to many; ovary 1-loculed; stigmas flattened, reflexed. Fruit baccate, globose, or ovoid; pericarp thick and hard, exocarp fibrous, mesocarp very hard. Seeds several to many, angular-ovoid, embedded in pulp.

Hydnocarpus kurzii (King) Warb. In Engl. & Prantl, Nat. Pflanzenfam. 3: 21. 1893; Kanjilal *et al.*, Fl. Assam 1: 87. 1934; Mitra in Sharma *et al.*, Fl. India 2: 421. 1993. *Taraktogenos kurzii* King in J. As. Soc. Bengal 59 (2): 123. 1890; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 80. 1938.

Evergreen trees, up to 30 m tall, branches hanging. Leaves bifarious, variable, 10-25 x 4-6.7 cm, oblong-lanceolate, elliptic-oblong, base cuneate, shortly acuminate at apex, margins entire, glabrous; lateral nerves 7-10 pairs; petioles 2-5 cm long, swollen and slightly geniculate at upper end. Inflorescence in axillary cymes. Male flowers pale yellow; sepals ovate-orbicular up to 5 mm, tomentose; petals ovate-orbicular, up to 4 mm long, white, pilose at apex; stamens 20-30. Female flowers 2-6 in a compact fascicles; staminodes 10-18; ovary villous. Fruit borne usually on branches, globose, 5-10 cm across, stout beaked, velvety.

Fl. & Fr.: February - November

Distribution: India: Assam; Bangladesh, Cambodia, India, Laos, Malaya, Myanmar, Thailand, Vietnam

Specimen examined: AJNU 1022

POLYGALACEAE Juss.

Herbs shrubs or woody climbers, rarely small trees. Leaves simple, entire, alternate or rarely verticillate or whorled or reduced to scales or absent; stipules absent or spinosely stipulate. Flowers bisexual, in axillary or terminal, racemes, spikes or panicles or solitary. Bracts and bracteoles present. Sepals 5 or rarely 4, free, the 2 inner ones mostly larger, coloured. Petals 3, free or variously connate, sometimes minute and scale; the upper 2 free or basally connate to staminal tube; the lower one keeled, saucer-shaped, and often lobed or crest. Stamens usually 8. Ovary of 2 fused carpels, 2-locular, each locule 1-seeded. Fruit a capsule.

Securidaca L.

Scandent shrubs or lianas. Leaves alternate, distichous, entire, sometimes biglandular. Inflorescences terminal and axillary, simple racemes or panicles; bracts present, often with 2 bracteoles. Sepals 5, unequal, deciduous, 2 inner ones largest, petaloid. Petals 3; 2 lateral ones free, violet with citrine top; lowermost one strongly folded, pink. Stamens 8, monadelphous; filaments united at base into a split sheath adnate at back to petals; anthers 2-locular. Ovary 1-loculed; 1-ovuled; style subterete; stigma emarginate. Fruit 1-seeded indehiscent samara; wings broad, coriaceous. Seeds exalbuminous, glabrous; cotyledons thick and fleshy.

Securidaca inappendiculata Hassk., PI. Jav. Rar. 295. 1848. *S. tavoyana* Bennett in Fl. Brit. India 1: 208. 1872.

Lianas with dark brown stem; branchlets puberulous. Leaves elliptic, obovate, oblong or oblanceolate, cuneate at base, cuspidate or abruptly acuminate at apex, entire,

4-12 x 2-4 cm, coriaceous, glabrous and deep green above, finely pubescent. Flowers lax in subcorymbose panicles; pedicels filiform, lower pedicels longer than upper; bracts ovate, hairy. Outer sepals 3, ovate-elliptic to rounded; inner wing sepals 2, elliptic. Petals 3; middle petal keeled, crested; lateral petals 2, adnate at base to keel, truncate. Ovary sessile, terete; stigma bilobed. Fruit corrugate; wings oblique, entire, oblong to obovate. Seeds suborbicular, compressed.

Fl. & Fr.: June - Feb

Distribution: India: West Bengal, Assam, Tripur, Meghalaya and Orissa; Nepal, Bhutan, Bangladesh, Myanmar, Vietnam, S. China and Malaysia

Specimen examined: AJNU 1459. **PL-8**

CARYOPHYLLACEAE Juss.

Annual or perennial herbs, subshrubs or rarely shrubs. Stems and branches swollen at nodes. Leaves opposite, rarely verticillate, simple, entire, serrulate, usually connate at base; stipules scarious or often absent. Flowers actinomorphic, bisexual, solitary or in cymes. Sepals 4-5, free or united, leaflike or scarious. Petals 4-5, free, small or rarely absent. Stamens upto 10, free, often in 1 or 2 series. Ovary superior or incomplete. Fruit usually a capsule opening by apical tooth- like valve, rarely fleshy, irregular dehiscent or an achene.

Drymaria Willd.

Annual or perennial, suberect branching herbs. Leaves opposite, petiolate, orbicular, stipules small, scarious. Flowers a cyme, axillary or terminal, 4 or 5 merous. Sepals 5, free. Petals white, 5, bifid. Stamens 2-3(-5), filaments joined at base. Ovary 1-

celled, styles 2-3, united at base. Fruit a capsule, 2 or 3 valved, seeds ovate, 1 to many seeds.

Drymaria cordata (L.) Willd. ex Schult., Roemer & Schultes, Syst. Veg. 5: 406. 1819; Edgeworth & Hook.f. in Fl. Brit. Ind. 1:244. 1874; Balakr., Fl. Jowai 1: 84. 1981; *Holosetum cordatum* L., Sp. Pl. 88. 1753.

Herbs, rooting at nodes. Leaves orbicular to reniform, or broadly ovate, 0.5-2.5 x 0.4-2 cm, base obtuse or rounded, apex acute, mucronate, glabrous; petioles 0.2-1 cm. Flowers terminal or axillary in dichasial cymes; pedicels slender, hairy. Sepals elliptic ovate, hairy. Petals white, deeply bifid. Capsule ovoid, dehiscent, 3-valved.

Fl. & Fr.: May - October

Distribution: Native Central and South America, cosmopolitan

Specimen examined: AJNU 1330

CLUSIACEAE Lindley

Evergreen trees, rarely shrubs with various resinous exudes. Leaves opposite, entire, usually coriaceous. Inflorescence terminal or axillary, fascicled, racemose or paniced, often reduced to solitary flowers. Flowers regular, bisexual or polygamous. Sepals 2- 6, imbricate or in decussate pairs. Petals 2-6, rarely more or absent, imbricate or contorted. Stamens many, free or variously united; reduced to staminodes in female flowers or absent. Fruit usually indehiscent baccate, capsular or drupaceous.

Keys to species

1a. Ovules one in each carpel; flowers unisexual or polygamous *Garcinia*

1b. Ovules more than one in each carpel; flowers bisexual or polygamous *Mesua*

Mesua L.

Mesua ferrea L., Sp. Pl.515. 1753; And., in Hook. f., Fl. Brit. India 1: 227. 1874; Gamble, Man. Ind. Timb.59.1902; Brandis, Ind. Trees 55. 1906; Kanjilal *et al.*, fl. Assam 1(1):111. 1934; Haridasan & Rao, Fl. Meghalaya 1:110 1985.

Trees up to 40m high. Bark dark grey to dark brown, smooth at first later warty. Leaves 8-14 x 1.5-3 cm, oblong, lanceolate, oblong-elliptic, acuminate, base rounded or narrowed, cuneate coriaceous, glabrous, green above, grey beneath. Flowers 5-10 cm across, white, fragrant. Drupe up to 5x4cm with persistent sepals. Seeds 1-04, brown, shinning.

Fl. & Fr.: April-October.

Distribution: India: Andaman & Nicobar Islands, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Tamil Nadu and West Bengal.

Bangladesh, Borneo, Cambodia, Laos, Malayasia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam

Specimen examined: AJNU 1220. **PL-10**

Garcinia L.

Trees usually with yellow sap. Leaves very rarely stipulate, petiolate, entire, mostly coriaceous, usually glabrous; lateral veins prominent, almost parallel. Flowers functionally unisexual in terminal panicles or racemes or in axillary cymes, triads or fascicles, or paired or solitary. Sepals 4-5, imbricate. Petals 4-5, imbricate. Male flowers with numerous stamens forming a globose mass or annular ring around a central rudimentary ovary, or united into 4-5 bundles. Female flowers usually apparently

bisexual but with 5-many free or connate staminodes; ovary 2-12 celled, ovules 1 in each cell; stigmas sessile, peltate, 2-5-lobed or entire. Fruit a berry, 1-8 seeded.

Key to species

1a. Anthers dehiscence longitudinal

2a. Ovary bilocular *G. stipulate*

2b. Ovary tri- multilocular *G. pedunculata*

1b. Anthers dehiscence transverse

3a. Male flowers in terminal panicles *G. sopsopia*

3b. Male & female flowers in axillary and terminal fascicles *G. lanceaefolia*

Garcinia paniculata (G. Don) Roxb. ex wight Fl. Ind. 2: 626.1832; Anderson in Hook. f. Fl. Brit. Ind. 1: 266. 1874; Gamble, Man Ind. Timb. 53. 1902; Brandis, Ind. Trees 50.1906; Kanjilal *et al*, Fl. Assam. 1 (1): 108.1934; Maheswari in Bull. 6 (2 -4): 124. 1964; Balakr., Fl. Jowai 1: 89. 1981. *Stalagmitis paniculata* G. Don, Syst. 1: 621. 1831.

Tall trees up to 25 m high ; crown lax, oval; bark brownish, smooth ; leaves 9 - 23 x 4 - 15 cm , oblanceolate, elliptic, obovate, acuminate, base cuneate, subcoriaceous, glabrous and shining above, entire, lateral nerves prominent beneath; panicles pinkish-white, up to 12 cm long; flowers dull white, upto 2 cm across; sepals smaller, thick ; petals dull white; male flowers : stamens forming a sub-globose mass; female flowers: in terminal spikes; ovary subglobose, 5- locular. Berries yellow, up to 3.4 cm in diam., spherical, succulent, crowded by stigma. Seeds 3-6, reniform; aril pulpy.

Fl. & Fr.: November-August.

Distribution: India: Assam, Meghalaya, Nagaland, Sikkim and Tripura.

Bangladesh, Myanmar and Nepal

Specimen examined: AJNU 1116. **PL-10**

Garcinia stipulata T. Anderson in Hook. f. Fl. Brit. India 1: 267. 1874; Pierre. loc. cit.9. t. 79 K; Vesgue, loc. Cit.365, excl. Syn.; Gamble, Man. Ind. Timb. 52. 1902; Brandis, Ind. Trees 50. 1907; Engler in Nat. Pfam. (ed.2) 21: 225. 1925.

Trees, ca 20 m tall. Leaves 20 - 30 x 5 - 10 cm, elliptic-oblong or lanceolate, obtuse or acute at base, acuminate at apex, thickly coriaceous, dark green above, pale green beneath; lateral veins 10 -16 pairs, alternate; petioles 1 - 2 cm long, sulcate; stipules paired, deciduous. Male flowers: 4 - 6 in axillary, shortly pedunculate cymes; pedicels stout; bracts scale-like, concave, acute or rounded; bracteoles 2 near the base of pedicels, concave. Sepals 4, orbicular, concave, pale green or yellow. Petals 4, yellow, obliquely ovate, acute. Stamens indefinite, monadelphous in an annular mass; filaments short; anthers bilocular. Female flowers axillary, solitary or paired, shortly pedicellate. Sepals persistent in fruit. Ovary bilocular; stigmas tuberculate. Fruit is berry, oblong, smooth, shortly acuminate, bilocular, locules 1-seeded, yellow, pulpy with yellow gum. Seeds oblong, flattened.

Fl. & Fr.: Aug. - May; fruits sometimes persist up to July.

Distribution: India: Assam, Arunachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal.

East Himalaya.

Specimen examined: AJNU 1273. **PL-10**

Garcinia pedunculata Roxb. Ex Buch.-Ham., Edinburgh J. sci. 7:45. 1827; And. in Hook.f., Fl. Brit. India 1:264. 1874. Gamble, Man. Ind. Timb. 51. 1902; Brandis, Ind. Trees 50. 1906; Kanjilal *et al.*, Fl. Assam 1: 107. 1934; Haridasan & Rao, For. Fl. Meghalaya 1:108. 1985.

Trees to 20 m tall. Bark thick, corky; branchlets obtusely 4-angled or subterete, lenticellate. Leaves 15-26 x 7-12 cm, oblong, obovate or oblong-lanceolate, base cuneate, apex rounded. Male flowers in paniculiform cyme; sepals ovate; petals yellow; stamen fascicles connate in capitate ring. Female flowers in pairs or solitary at apex of branchlet; with 2 suborbicular bracts at base; staminodes basally united; ovary subglobose, 8-10-loculed. Fruit yellow, large, oblate, 10-18x11-20cm. seeds 8-10, reniform.

Fl. & Fr.: October-July.

Distribution: India (N.E.India); Indo-Malaya.

Specimen examined: AJNU 1296

Garcinia lanceaefolia (G.Don) Roxb. [Hort. Beng. 42. (1814), *nom. nud.*], Fl. Ind. 2: 623. 1832; T. Anderson in Hook.f, Fl. Brit. India 1: 263. 1874; Kanjilal *et al.*, Fl. Assam 1: 106. 1934; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 81. 1938; N.P. Singh in Sharma *et al.*, 3: 116. 1993. *Stalagmitis lanceaefolia* G. Don, Gen Hist. 1: 621. 1831.

Large shrubs or small, evergreen trees, 4-12 m tall. Leaves narrowly lanceolate or elliptic-lanceolate, 6-10 x 2.5-3.5 cm, base cuneate, long acuminate at apex, entire along

margins, shining, green above, pale beneath, glabrous, midrib prominent; lateral nerves 8-10 pairs; petioles 0.8-1 cm long. Male flowers solitary or in pairs, terminal or axillary, creamy pink or reddish-yellow; sepals 4, oblong; petals 4, red, slightly oblique, somewhat shorter than sepals; stamens 18-40 in globose mass. Female flowers terminal or axillary, solitary, ovary 6-8-locular, obovoid, stigmatic rays 6-10, sessile, tuberculate. Fruit is berry, obovoid with persistent sepals, 6-8-seeded.

Fl. & Fr.: February-September.

Distribution: India: Assam, Meghalaya Nagaland and Tripura.

Bangladesh, Laos, Myanmar and Vietnam.

Specimen examined: AJNU 1019

THEACEAE Mirb. Ex Ker Gawl.

Trees or shrubs. Leaves alternate, simple, entire or serrate, often evergreen, exstipulate. Flowers in axillary or extra-axillary, solitary or fascicles, regular, bisexual, rarely unisexual. Sepals 4-7, free or partially united, persistent. Petals 4-7, free or united at base. Stamens numerous, adnate to petals, free or united at base. Ovary 3-5-celled, superior. Fruit a berry or capsule with persistent calyx.

Schima Reinw. ex Blume

Trees. Flowers bisexual, solitary or few in axils of uppermost leaves, pedicels bearing 2 deciduous bracteoles. Sepals 5, unequal. Petals 5, connate at base. Stamens numerous, adnate to base of petals. Ovary 5-celled; style simple, stigma capitate. Capsule woody, 5-valved.

Schima wallichii (DC.) Korth., Verh. Nat. Gesch. Ned. Bezitt., Bot. 143. 1842; Dyer in Hook.f., Fl. Brit. Ind. 1: 289. 1874; Kanjilal *et al.*, Fl. As. 1: 125. 1934; Balakr., Fl.

Jowai., 1: 91. 1981; Grierson & Long, Fl. Bhut. 1. 2: 365 .1984; Chauhan & Paul in Sharma *et al.*, Fl. Ind. 3: 168. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 221. 2002.

Trees. Leaves elliptic-oblong or ovate-lanceolate, or oblanceolate, 5-25 x 2.5-10 cm, apex acuminate, base cuneate, glabrous or sparsely hairy on midrib above, sparsely appressed hairy beneath, margin entire. Flowers solitary or paired, in short terminal racemes, white, fragrant. Petals obovate. Stamens many, adnate to base of corolla. Capsule subglobose to globose, with persistent calyx.

Fl. & Fr.: April - February

Distribution: India (NE India), Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam

Specimen examined: AJNU 1382

ACTINIDIACEAE Engl. & Gilg

Trees, shrubs, or sometimes climbers. Leaves alternate, simple, stipules absent. Flowers bisexual or unisexual, actinomorphic, cymose or paniculate, often drooping. Sepals 5, rarely 3-8, free, imbricate. Petals 5, rarely 3-8, free or shortly connate, imbricate. Stamens many, free or adnate to base of petals; dehiscent by apical pores or longitudinal slits. Ovary superior. Fruit a berry.

Saurauia Willd.

Shrubs or small trees. Branches usually scaly or strigose. Leaves clustered towards the ends of branches, simple, glabrous, serrate, numerous lateral parallel veins. Inflorescence axillary, often in axils of fallen leaves, panicles or cymes. Flowers bisexual, bracteate. Sepals 5, imbricate. Petals 5, imbricate, connate at base. Stamens numerous,

adnate to base of petals. Ovary 3-5 celled, styles 3-5, free or united. Fruit a berry, globose.

1a. Flowers in long panicles, more than 15 cm long *S. armata*

1a. Flowers in long panicles, more than 15 cm long *S. roxburghii*

Saurauia roxburghii Wall, Pl. Asiat. Rar. 2: 40. 1831; Kanjilal *et al.*, Fl. As. 1.1: 128. 1934; Dyer in Hook.f., Fl. Brit. Ind. 1: 287. 1874; Haridasan & Rao, For. Fl. Megh. 1: 125. 1985; Balakr., Fl. Jowai 1: 95. 1981; Brandis, Ind. Trees 63. 1906.

Shrubs or trees, upto 10m tall. Young parts covered with scurfy tomentose and subulate scales. Leaves elliptic-oblong, oblong lanceolate, 10-25×3-9 cm, base cuneate to rounded, apex acute or short acuminate, margin serrate, young leaves rusty tomentose, mature leaves glabrous, coriaceous, lateral nerves 15-25 pairs; petioles 2-5 cm long. Flowers pink, axillary cymes, often in axils of fallen leaves, peduncle upto 3 cm long, bracts small. Sepals ovate, glabrous. Petals broad ovate, fimbriate at apex and margin. Berry globose, 0.5 cm across.

Fl. & Fr.: April-August

Distribution: India (E Himalaya, NE India), China, Myanmar, Bangladesh, Bhutan, Thailand, Malaya

Specimen examined: AJNU 1222. **PL-16**

Saurauia armata Kurz in J. Asiat. Soc. Beng. 42: 59. 1873. *S. cerea* Griffith ex Dyer in Hook.f., Fl. Brit. India 1: 288.1874.

Shrubs or small trees, up to 7 m tall, stiff scales, ultimately glabrescent. Leaves 14- 45 x 9 -20 cm, obovate, acute or rounded at base, abruptly acute at apex, cuneate, remotely serrate, with stiff hairs, glabrous above, scattered stiff hairy on lateral veins beneath, ultimately becoming glabrescent. Petioles 1 - 2 cm long, stout, densely scaly. Flowers axillary, solitary or in clusters. Sepals elliptic or orbicular, tomentose and with sharp pointed scales outside, tomentose but without scales inside. Petals white with reddish base, orbicular-obovate, glabrous. Stamens numerous. Fruit a berry, ovoid, densely villous.

Fl. & Fr.: April - May.

Distribution: India: Eastern Himalayas in subtropical mixed forests between 300 and 900 m. Arunachal Pradesh, Assam and Meghalaya.

Nepal, Bhutan, Myanmar and China.

Specimen examined: AJNU 1084. **PL-16**

MALVACEAE Juss.

Herbs shrubs or seldom small trees. Branches often covered with stellate hairs. Leaves alternate, stipules present, simple lobed or digitately compound, usually palminerved. Bracteoles 3 or more, rarely absent, often forms epicalyx. Flowers regular, generally bisexual, axillary or terminal, solitary, fascicled or cymose paniculate. Sepals 5, fused at base. Petals 5, free. Stamens numerous; filaments united for most of their length to form a tube surrounding the ovary and styles. Ovary superior, of 4 or more carpels and usually a similar number of styles. Fruit a schizocarpic or a dry loculicidal capsule.

Key to Genera

- 1a. Styles and stigmas twice as many as carpels *Urena*
- 1b. Styles and stigmas as many as carpels
- 2a. Filament tube with anthers inserted along length; fruit a loculicidal capsule
- 3a. Calyx splitting along one side, deciduous with the corolla; capsule long and sharp angled *Abelmoschus*
- 3b. Calyx not splitting along one side and not deciduous with corolla; capsule cylindrical or globose *Hibiscus*
- 2b. Filament tube with anthers inserted along length or only at apex; fruit a schizocarp
- 4a. Trees, flowers in panicles; epicalyx present *Kydia*
- 4a. Shrubs or herbs, flowers solitary or in clusters; epicalyx absent *Sida*

Abelmoschus Medik.

Herbs, undershrubs or trees, often prickly hairy. Leaves palmilobed, often hastate or sagittate. Flowers solitary, axillary or in terminal; pedicels inarticulate. Epicalyx segments 4 -16, usually free, persistent or caducous. Calyx spathaceous, lobed or toothed at tip, split to the base on one side. Corolla large, mostly yellow with a dark purple centre, sometimes creamywhite or pink. Staminal column included, antheriferous throughout. Ovary 5-locular, many-ovuled; style 1, distally 5-branched; stigmas discoid. Capsules ovoid to oblong or cylindric, beaked or mucronate, loculicidally dehiscent with longitudinal slits. Seeds many in each locule, reniform.

Abelmoschus moschatus Medikus, Malv. 46. 1787; Ampl. Hochr. in Candollea 2: 86.

1924. *Hibiscus abelmoschus* L., Sp. Pl. 696. 1753; Masters in Fl. Brit. India 1: 342. 1874.

Herbs or undershrubs, up to 3 m high, hirsute all over. Leaves variable, 4 -16 x 3 - 18 cm, angular or 3 - 7-palmilobed , upper leaves narrower, often hastate or sagittate, lanceolate, ovate, obovate-oblong, obtuse, acute coarsely serrate to dentate, 5 - 9-nerved at base; petioles 2 - 18 cm long. Flowers axillary, solitary; pedicels 145-6 cm, accrescent. Epicalyx segments 6 - 10, free 10 - 14 x 1 - 2 mm, linear, persistent. Calyx 1.4 - 3 cm long, stellate-tomentose. Corolla yellow with dark purple centre, up to 10 cm across; petals obovate, rounded at apex, fleshy and ciliate at base. Capsules 4 - 10 x 2.4 cm, ovoid to globose, acuminate. Seeds 3 - 4 mm, ribbed, glabrous or minutely hairy.

Fl. & Fr.: October - November

Distribution: India: Almost throughout India.

Bangladesh, Borneo, Cambodia, China Laos, Malaysia, Myanmar, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1149. **PL-4**

Hibiscus L.

Herbs, shrubs or trees. Leaves simple, entire or palmately lobed, stipulate. Flowers bisexual, solitary, in axillary or terminal racemes or panicles, pedicels jointed. Epicalyx 5-15 segments, linear to ovate, free or connate below. Calyx 5-lobed, campanulate, or tubular. Corolla large, showy. Staminal column pollen bearing throughout or on upper half of tube. Ovary 5-celled; style 5 branched, stigma capitate. Fruit a capsule, 5-valved, loculicidally dehiscent.

Keys to species

1a. Trees

H. macrophyllus

1b. Herbs or Shrubs:

- | | |
|-----------------------------|-----------------------|
| 2a. Stipules foliaceous | <i>H. surattensis</i> |
| 2b. stipules not foliaceous | |
| 2a. plants not prickly | <i>H. scandens</i> |
| 2b. Plants Prickly | <i>H. aculeatus</i> |

Hibiscus aculeatus Roxb., Fl. Ind. 3: 206. 1832; T.K. Paul in Sharma *et al.*, Fl. India 3: 323. 1993. *H. furcatus* Roxb. (Hort. Beng. 51. 1814, nom. nud.) ex DC., Prodr. 1: 449. 1824, non Willd. 1809; Masters in Hook. f., Fl. Brit. India 1: 335. 1824; C.E.C. Fischer in Rec. Bot. Surv. India 12: 82. 1938.

Suberect or trailing undershrubs, up to 1.5 m high, covered with stiff sharp recurved bristles arising from a glandular base. Leaves unlobed or 3-5-lobed, 3-10 x 3-8 cm, base cordate, acute at apex, crenate-serrate along margins, pubescent beneath, prickly along the nerves; stipules ovate-lanceolate. Flowers solitary, axillary; buds with a tuft of hairs at the apex; epicalyx 8- 12-segmented; calyx deeply 5-lobed; lobes lanceolate, acute, hispid; corolla yellow with a crimson or purple centre. Capsules ovoid, covered with rigid, deciduous hairs, enclosed by a large calyx. Seeds reniform, brownish.

Fl. & Fr.: September-February.

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Philippines, Sulawesi, Sumatera, Taiwan, Thailand and Vietnam

Specimen examined: AJNU 1249

Hibiscus macrophyllus Roxb. ex Hornem. Hort. Haltn. Suppl. 149. 1819; Masters in Hook. f., Fl. Brit. Ind . 1; 337. 1874; Gamble, Man. Ind. Timb. 87. 1902; Brandis, Ind .Trees 74. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 142. 1934; Balak. Fl. Jowai 1 (1): 98. 1981.

Deciduous trees, up to 25 m high, trunk straight. Bark greyish-brown, smooth; young parts covered with golden yellow hairs. Leaves 12-30 cm across, cordate, orbicular, sharply acuminate, entire, ciliate tomentose on both surfaces, green above, greyish beneath, 7-9-nerved from base; panicles terminal, densely hairy; flowers caduceous bracteate, 4-4 x 2.4 cm, bracteoles many, linear-oblong, appressed hairy above, connate at base. Sepals 2.4-4 cm long. Petals 5, yellow changing to pink, deciduous; staminal column yellow; ovary villous; style and stigma deep purple. Fruit is capsules, 4-4 x 2.6 cm, oblong, pointed at tip; seeds hairy.

Fl. & Fr.: February-July

Distribution: India: Assam, Meghalaya and Nagaland.

Bangladesh, Malaya, Myanmar

Specimen examined: AJNU 1390. **PL-4**

Hibiscus scandens Roxb., Fl. Ind. 3: 200. 1832; Masters in Fl. Brit. India 1: 337. 1874.

Woody climbers. Young stems, petioles and pedicels stellate-tomentose. Leaves 5-12 x 4-12 cm, ovate-cordate, 5-7-nerved at base, 3-lobed or angled, lobes deltoid-lanceolate, acute or acuminate at apex, entire or dentate, stellate-pilose on both surfaces; petioles 2-7 cm long; stipules up to 5 cm long, linear-lanceolate, caducous. Flowers in terminal panicles; pedicels 1-3 cm long. Epicalyx segments 5, connate near the base; segments lanceolate, stellate-pilose, persistent. Calyx equal to or shorter than epicalyx,

densely stellate-pilose outside, distinctly long hairy inside, persistent. Corolla white or yellow with crimson centre. Petals up to 2.5 cm long, stellate-hairy outside, glabrous inside. Staminal column up to 1.4 cm long. Capsules up to 3 cm, ovoid-cylindric, densely hairy. Seeds, reinform, densely brownish-white hairy.

Fl. & Fr.: October - March

Distribution: India: Andaman & Nicobar Islands, Assam, Nagaland, Sikkim and Tripura. Bangladesh, Myanmar and Thailand.

Specimen examined: AJNU 1021

Hibiscus Surattensis L. Sp. Pl. 696. 1753; Masters in HooK. f., Fl. Brit. India 1:334. 1874; Kanjilal *et al.*, Fl. Assam 1(1): 144. 1934; Paul in Sharma *et al.*, Fl. India 3: 327. 1993; chowdhery *et al.* in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1:211. 1996; Bora & Kumar, Flo. Div. Assam 63. 2003.

Herbs, trialing, prickly, leaves ovate, palmately lobed, crenate-serrate. Flowers pale yellow, solitary, axillary. Episevals about 10. Sepal lobes ovate, acuminate, persistent. Petals yellow. Fruit ovoid, acute with small stellate hairs.

Fl. & Fr.: February-July.

Distribution: India: Almost throughout India.

Bangladesh, China, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1233. **PL-4**

Kydia Roxb.

Trees, with stellate hairs throughout. Leaves obscurely 3-5 lobed, midrib beneath with a linear gland, stipule deciduous. Flowers small, unisexual, in axillary and terminal panicles. Epicalyx 4-6, connate at base. Sepals 5, connate to middle. Petals 5, clawed, suborbicular. Male flowers with staminal column divided above into 5 branches each bearing 3-4 anthers. Female flowers with 3-celled ovary, style 3-branched; stigma peltate. Fruit a capsule, 3-valved.

Kydia calycina Roxb., Pl. Coromandel 3: 11. 1811; Masters in Hook. f., Fl. Brit. Ind. 1: 348. 1874; Kanjilal *et al.*, Fl. As. 1: 146. 1934; Balakr. Fl. Jowai 1: 98. 1981; Paul in Sharma *et al.*, Fl. Ind. 3: 344. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 235. 2002.

Deciduous trees, densely pubescent, 10-15 m tall. Leaves broadly ovate to suborbicular, 5-14 x 6-14 cm, base subcordate or rounded, apex acute to acuminate, margin entire or irregularly dentate or shallowly 3-lobed, basal nerve 5-7, stellate-hispid above, stellate-pubescent beneath; petioles 2-5 cm long. Flowers purplish to pinkish white in axillary or terminal close panicles. Epicalyx segments 4-6, pubescent. Calyx connate up to the middle, 5-lobed, pubescent. Petals 5, oblong, densely pubescent, adnate with staminal tube at the base. Stamens 15. Capsule subglobose, yellow, pubescent.

Fl. & Fr.: September - February

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China Laos, Myanmar, Nepal, Pakistan, Thailand and Vietnam.

Specimen examined: AJNU 1191. **PL-4**

Sida L.

Perennial subshrubs or shrubs. Leaves simple, dentate. Flowers solitary or paired, axillary or subterminal. Episeals absent. Sepals campanulate or cup-shaped, 5-lobed. Petals mostly yellow. Petals 5, free, basally connate. Schizocarp disk-shaped or globose. Seeds 1 per mericarp. Smooth, glabrous.

Keys to species

- 1a. Leaves linear-lanceolate, glabrescent, awns glabrous *S. acuta*

- 1b. Leaves ovate, oblong, rhomboid, stellate-pubescent on both surfaces, awns with or without retrorse hairs:
 - 2a. Awns retrorse hairy *S. cordifolia*

 - 2b. Awns not retrorse hairy *S. rhombifolia*

Sida acuta Burm. f., Indica. 147. 1768; Deb, Fl. Tripura 1: 306. 1981; Paul in Sharma *et al.*, Fl. India 3: 281. 1993; Chowdhery *et al.*, in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1:214. 1996; Bora & Kumar, Flo. Div. Assam 65. 2003; *S. carpinifolia* Masters in Hook. f., Fl. Brit. India 1: 323. 1874, non Linn. F.; Kanjilal *et al.*, Fl. Assam 1 (1): 140. 1934.

Herb or subshrub. Leaves 1.5-7 x .4-1.5 cm, linear-lanceolate, acute, base cuneate, serrate, Flowers axillary, solitary or in 2-5 flowered clusters. Sepal lobes acute.

Petals yellow, obovate; calyx 5-lobed, campanulate; ovary ovoid. Mericarps rugose with two awns at apex; awns glabrous

Fl. & Fr.: June- November.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1353

Sida cordifolia L., Sp. Pl. 684. 1753; Masters in Hook, f, Fl. Brit. India 1: 324. 1874; Kanjilal *et al.*, Fl. Assam 1: 140. 1934; T.K. Paul in Sharma *et al.*, Fl. India 3: 285. 1993.

Erect undershrubs, up to 1 m high. Leaves ovate-oblong or orbicular, 2.5-5 x 1-2 cm, base cordate, acute at apex, crenate-serrate along margins, densely velutinous with minute stellate hairs on both surfaces; lateral nerves 5-7 pairs; stipules filiform, pubescent. Flowers solitary, axillary or in axillary clusters of 2-5 flowers; calyx campanulate, lobes deltoid, acute, pubescent outside; corolla yellow; petals obliquely obovate; staminal column, hairy; ovary stellate-hairy. Mericarps reticulate with a pair of awns at the tip; awns retrorsely hairy, exceeding the calyx; seeds reniform, flattened, black.

Fl. & Fr.: Throughout the year.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1354

Sida rhombifolia L., Sp. Pl. 684. 1753; Roxb., Fl. Indica 3: 177. 1832; Masters, in Hook. f., Fl. Brit. India 1:324. 1874; Kanjilal *et al.*, Fl. Assam 1(1): 140. 1934; Deb, Fl. Tripura

1:307. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 132. 1985; Paul & Nagar in Fasc. Fl. India 20:212. 1988.

Herbs. Leaves 2-8 x 1-4 cm, ovate or obovoid-rhomboid, acute, serrate, base narrow truncate, pubescent above, stellately grey tomentose beneath. Flowers axillary, mostly solitary, sometimes in cluster of 2-5. Pedicel much longer than the petiole. Mericarps flattened, trigonous. Seeds flattened, reniform.

Fl. & Fr.: July- February.

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Jawa, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1404

Urena L.

Perennial shrubs, stellate. Leaves alternate, palmately lobed or sinuate. Flowers solitary or nearly fascicled, axillary. Episeals campanulate, 5-lobed. Sepals 5-parted; petals 5. Ovary 5-loculed; ovule 1 per locule. Fruit a schizocarp, subglobose; mericarps 5, ovoid, usually with spines. Seed 1, obovoid-trigonous, glabrous.

Urena lobata L., Sp. Pl. 692. 1753; Masters in Hook. f., Fl. Brit. India 1:329. 1874; Kanjilal *et al.*, Fl. Assam 1(1): 141. 1934; Deb, Fl. Tripura 1:309. 1981; Haridasan & Rao, For. Fl. Meghalaya 2:137. 1985; Paul & Nayar, in Fasc. Fl. India 20:228. 1988.

Shrubs up to 1 m high, stem hairy, leaves variable in shape and size, 4-6 x 2-8 cm, ovate, upper ones linear, lanceolate, coarsely serrate, base cordate, glabrous above,

pubescent beneath, 3-7 nerved at base, midrib with a linear gland near the base. Stipules lanceolate to obovate. Flowers axillary, solitary, sometimes 2-3 together. Episepals 5, shortly adnate to sepals at the base. Fruits depressed, globose, lobed.

Fl. & Fr.: June-February.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1150

BOMBACACEAE Kunth

Trees. Stems and branchlets aculeate, glabrous or with stellate hairs or simple hairs. Leaves alternate, simple or digitately compound; stipules present. Flowers regular, bisexual, often large and showy, solitary on axillary peduncles. Sepals 3-5, connate and cup-shaped at base. Petals 5, free, usually adnate to the base of the stamina tube. Stamens 5-many. Ovary 2-5 celled; ovules many in each cell. Fruit a 5-valved capsule.

Bombax L.

Deciduous trees. Branching from the trunks in all directions at particular interval. Leaves digitately compound, 5-9-foliolate; leaflets sessile or petiolulate. Flowers solitary or in axillary or sub terminal clusters. Sepals fused into cup-shaped with 5-7 irregular lobes at the apex. Petals 5, free. Stamens numerous in 2 whorls of 5-6 bundles, connate at base and divided above into numerous long filaments. Ovary 5 celled. Capsule oblong-ellipsoid, dehiscing longitudinally into 5 valves.

Bombax ceiba L., Nayar & Biswas in Sharma *et al.*, Fl. India 3:398. 1993; Singh in Singh *et al.*, Fl. Mizo. 1:244. 2002; Grierson & Long, Fl. Bhut. 2.1:195. 1991; Polunin & Stainton, Flow. Hima. 63. 2008 (Repr.). *Bombax malabaricum* DC., Masters in Hook. f. Fl. Brit. Ind. 1:349. 1874; Kanjilal *et al.*, Fl. Assam 1:147. 1982 (Repr.). *Salmalia malabarica* (DC.) Schoot & Endlicher, Haridasan & Rao, Forest Fl. Megh. 1:137. 1985.

Large trees. Trunk usually buttressed at base, covered with large conical prickles when young. Leaves digitately 5-7 foliolate; leaflets elliptic- lanceolate, 10-2 x 8-10 cm, apex long acuminate, base attenuate-cuneate, glabrous, margin entire. Flowers large scarlet, solitary in leaf axils or clustered towards the apex of leafless branchlets. Calyx green, campanulate; unequally 2-5 lobed, lobes broadly ovate, silky white hairy inside. Petals 5, fleshy, oblong- obovate, tomentose hairy. Stamens 60-80 in 5-6 bundles in 2 series. Styles longer than the stamens. Capsule ellipsoid, cuneate at ends.

Fl. & Fr.: January-May.

Distribution: India (throughout warmer regions); Bangladesh, Myanmar, S. China, Southwards to Sumatra, Java.

Specimen examined: AJNU 1050. **PL-13**

STERCULIACEAE Vent.

Trees, shrubs or woody climbers. Leaves alternate, often palmately veined at base, stipulate. Flowers bisexual, actinomorphic, in axillary or terminal fascicles, cymes, racemes or panicles. Sepals 3-5 lobed. Petals 5 or absent. Fertile stamens 5. Ovary superior, 4-5 celled. Fruit a capsule or follicles. Seeds 1 to many.

Key to genera

- 1a. Flowers without petals, unisexual; fruit apocarpous with separate follicles
- 2a. Fruit leathery, rarely woody, dehiscent when mature *Sterculia*
- 2b. Fruit membranous, dehiscent before maturity and foliaceous *Firmiana*
- 1b. Flowers with petals, bisexual; fruit usually syncarpous
- 3a. Gynandrophores distinct; stamens and carpels inserted at apex of gynandrophore
Pterospermum
- 3b. Gynandrophores absent; stamens and carpels inserted on receptacle
- 4a. Scandent shrubs; anthers 5. *Byttneria*
- 4b. Erect shrubs; anthers 15 - 25 *Abroma*

Abroma Jacq.

Shrubs or small trees. Leaves unlobed or palmately lobed. Flowers bisexual. Borne on leaf-opposed peduncles. Sepals deeply 5 lobed. Petals 5. Staminal cup 5-lobed. Ovary 5-celled. Fruit a capsule, 5-winged, membranous.

Abroma augusta (L.) L. F., Suppl. 341. 1781; Masters in Hook. f., Fl. Brit. India 1: 375. 1874; Gamble, Man. Ind. Timb. 104. 1902; Brandis, Ind. Trees 89. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 156. 1934; Haridasan & Rao, For. Fl. Meghalaya 1: 140. 1985

Shrub. Young parts stellate-tormentose. Leaves 18-27 x 10-25 cm, ovate to suborbicular, acuminate, base truncate or cordate, serrulate. Flowers in extra-axillary

peduncles. Sepals lanceolate. Petals spathulate. Anthers 15- 20. Ovary villous. Capsule obovoid, 5-winged.

Fl. & Fr.: June-November

Distribution: India: Nagaland and Uttar Pradesh.

Bangladesh, Cambodia, China, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1151

Byttneria Loefl.

Herbs, shrubs, often climbing, usually prickly. Leaves simple, alternate, lobed or entire; petiolate. Flowers minute, bisexual in branched axillary or terminal umbellate cymes. Sepals 5, connate at base. Petals 5 with a narrow claw and a hooded limb. Staminal cup with an inner series of 5 stamens and a outer series of 5 staminodes alternating with stamens; anther lobes reniform, divergent, extrose.

Byttneria grandifolia DC. Prodr. 1. 486. (Jan) 1824.- *Buttneria aspera* Colebr. ex Wall. in Roxb. Fl. Ind. 2: 383. 1824; Masters in Hook. f. Fl. Brit. Ind. 1: 377.1874; Kanjilal *et al.*, Fl. Assam 1(1): 160.1934; Balak. Fl. Jowai 1: 102. 1981.

Woody climbers; young branches densely tomentose. Leaves glabrous, 13- 19 x 10- 13 cm, orbicular, ovate-orbicular. Base cordate, 7-9 nerved, tomentose along nerves; petioles 8-16 cm Inflorescence long cymes axillary, umbellate. Flowers purplish; anthers 5; sepals lanceolate, tomentose; petals shorter than sepals; filaments purple; capsule globose, sharply spiny, 3-5 cm across.

Fl. & Fr.: May –November.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam,

Jharkhand, Meghalaya, Nagaland and West Bengal.

Bangladesh, Cambodia, China, Hainan, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1061

Firmiana Marsili

Trees, deciduous. Leaves palmately 3-7 lobed. Flowers unisexual, in axillary panicles. Sepals 5 lobed, persistent. Petals absent. Fruit of 4 or 5 free membranous wing-like follicles, each with 1-2 seeds attached to the margin of the follicle.

Firmiana colorata (Roxb.) R. Br., Bennet & Brown, Pl. Jav. Rar.235. 1844; Haridasan & Rao, For. Fl. Meghalaya 1: 142. 1985. *S.colorata* Roxb., Pl.Cor. t.25; 1795; Master in Hook. f., Fl. Brit. India 1: 359. 1874; Gamble, Man. Ind. Timb. 96. 1902; Brandis, Ind. Trees 84. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 151. 1934.

Tree. Leaves palmately 3-7 lobed, 7-20 x 8-27cm, ovate or suborbicular, acuminate, base cordate, margins entire. Flowers deep orange-red, in panicles without petals. Sepals 5, funnel-shaped, lobes triangular. Follicles oblong-lanceolate, 1-2 seeded.

Fl. & Fr.: March-July.

Distribution: India (throughout deciduous forests); Bhutan, China, Malaya.

Specimen examined: AJNU 1047

Pterospermum Schreb.

Trees. Leaves simple, unlobed or palmately veined at base. Flowers bisexual, solitary or 2-3 on short, axillary peduncles. Sepals 5, linear, deciduous. Petals 5, deciduous. Stamens 15 in 5 group of 3 alternating with staminodes. Ovary 5-locular. Fruit 5-valved capsule; seeds winged.

Key to species

1a. Leaves broadly ovate or oblong; capsules oblong *P. acerifolium*

1b. Leaves lanceolate; capsules ovoid *P. lancifolium*

Pterospermum acerifolium Willd. Sp. Pl.3: 729.1801; Masters in Hook.f. Fl. Brit. Ind.

1: 368.1874; Gamble, Man. Ind. Timb. 100 190 Ind. 2; Brandis, Ind. Trees 91. 1906;

Kanjilal *et al.*, Fl. Assam 1(1): 157.1934

Tall trees, 16-20 m high; branches stout, young parts densely brown tomentose; bark bluish-brown. Leaves 24- 37 x 14- 32 cm, broadly ovate to elliptic-oblong, cordate or peltate at base, apex acute, entire, lobed or toothed, coriaceous, glabrous above, white tomentose beneath; stipules caduceous. Flowers up to 30 cm across, white, fragrant; calyx lobes thick, densely brown, shining tomentose; petals 5, white, linear. Stamens linear, up to 7 cm long; ovary at the top of the androgynophore, oblong, ovoid, tomentose; styles 5-7 cm long; stigma club-shaped; capsules woody.

Fl. & Fr.: March –October.

Distribution: India (Throughout the hotter parts of India)

Bangladesh, China, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1073

Pterosperum Lancifolium DC. In Mem., Mus. Hist. Nat. Paris. 10: 112. 1823; Balak., Fl. Jowai 1: 100. 1985. *P. lanceaefolium* Roxb., Hort. Beng, 50. 1814 et Fl. Indica 3: 163. Gamble, Man. Ind. Timb. 102. 1902; Brandis, Ind. Trees 92. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 158. 1934; Haridasan & Rao, For. Fl. Meghalaya 1: 146. 1985.

Trees, evergreen up to 20 m high. Leaves 4-14 x 1.5-4 cm, lanceolate, oblong-lanceolate, acuminate, base rounded, truncate or narrowly subpeltate, 3-nerved at base, upper part glabrous, lower part stellately brown tomentose, entire or subentire. Flowers solitary, dull white, fragrant. Sepals 5. Petals dull white. Fruit ellipsoid.

Fl. & Fr.: April-June.

Distribution: India: Punjab, Uttar Pradesh, Assam, Meghalaya and Manipur. Nepal, Bangladesh and Myanmar.

Specimen examined: AJNU 1154

Sterculia L.

Trees or shrubs. Leaves simple, entire or palmately lobed. Inflorescence usually axillary, in panicles. Flowers unisexual. Sepals 5-lobed or 5-partite. Petals absent. Carpels 5. Fruit a group of follicles, dehiscent when mature.

Keys to species

1a. Leaf blade palmately 5-7 lobed *S. villosa*

1b. Leaf blade not divided *S. hamiltonii*

Sterculia hamiltonii (O. Ktze) Adelb., Backn. Fl. Java, Aufl. 4b. Fam 107: 23. 1944; Haridasan & Rao, For. Fl. Meghalaya 1: 149. 1985. *Gompanus hamiltonii* O. Ktze, Rev.

Gen. 77. 1891. *Sterculia coccinea* Roxb., Fl. Indica 3: 151. 1832 (non. Jack, 1920); Masters in Hook. f., Fl. Brit. India 1: 357. 1874; Gamble, Man. Ind. Timb. 95. 1902; Brandis, Ind. Trees 83. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 153. 1934.

Small trees or shrubs. Leaves 15-30 x 5-10 cm, oblanceolate, oblong-elliptic, acuminate, glabrous, base rounded or truncate. Panicles pink or pinkish- red. Follicles orange-yellow to crimson red, laterally compressed. Seeds 4-8, oblong-elliptic, acuminate, glabrous, base rounded or truncate. Panicles pink or pinkish- red. Follicles orange-yellow to crimson red, laterally compressed. Seeds 4-8, oblong.

Fl. & Fr.: August-May

Distribution: India (mainly confined to N.E. India). Bhutan, Myanmar.

Specimen examined: AJNU 1093

***Sterculia villosa* Roxb.** [Hort. Beng. 50.1814, nom. nud.] ex Smith in Rees, Cycl. 34: no. 16.1816; Roxb., Fl. Ind. 3: 153.1832; Masters in Fl. Brit. India 1: 355.1874

Trees, 10 - 20 m tall, deciduous. Leaves simple, 7-10 x 3-4 cm, cordate at base, oblong or ovate-oblong, acuminate at apex, entire, glabrescent or sparsely pubescent above and tomentose beneath; petioles nearly as long as leaves; stipules lanceolate, acuminate. Flowers pinkish yellow, drooping panicles. Calyx campanulate, pinkish inside, 5-lobed, hairy; lobes spreading. Male flowers anthers 10. Female flowers ovaries gynandrophore, hairy, globose with sterile anthers at base. Follicles oblong, spreading, rusty villous, red inside. Seeds 3 - 5 in each follicle, oblong, smooth, black.

Fl. & Fr.: April – September

Distribution: India-Throughout warmer parts of India, tropical Himalaya from Kumaon eastwards and Andaman and Nicobar Islands (Andaman Islands).

Nepal, Bhutan, Bangladesh and Myanmar

Specimen examined: AJNU 1282

TILIACEAE Juss.

Trees, shrubs, herbs with stellate or simple hairs. Leaves alternate, simple or lobed; generally stipulate, usually palmately nerved at base, entire or dentate. Flowers regular, bisexual, in axillary, terminal or leaf-opposed cymes or panicles. Bracts present. Sepals 4-5 free or partly united. Petals 4-5, free, contorted. Stamens 10-many, free or connate at base into bundles. Ovary superior, 2-10 celled; styles usually simple and divided at apex; stigma capitate. Fruit usually a drupe, capsule, or schizocarp, sometimes a berry or samara, 2-10-loculed. Seeds without aril.

Grewia L.

Small trees, shrubs or climbers, stellate-pubescent. Leaves alternate, stipulate, petiolate, serrate, dentate or entire along margin. Inflorescences axillary, leaf-opposed or terminal, solitary or clustered, pedunculate, umbellate cymes or panicles. Flowers bracteate, pedicellate, bisexual, 5-merous. Sepals 5, free, valvate, coriaceous, usually coloured, mostly glabrous. Petals 5, free, much shorter, clawed with a gland inside. Stamens numerous, free, inserted on more or less elevated receptacle or androphore; anthers dorsifixed, dorsally curved, dehiscent longitudinally. Ovary superior, 2 - 4-loculed. Drupes entire or 2 - 4-lobed.

Grewia abutilifolia Vent, ex Juss. in Ann. Mus. Paris 4: 92. 1804; Masters in Hook. f., Fl. Brit. Ind. 1: 390. 1874; Brandis, Ind. Trees 99. 1906; Kanjilal *et al.*, Fl. Assam 1 (I): 166. 1934.

Shrubs or small trees. Young branches stellate pubescent. Leaves broadly ovate or elliptic-ovate, 7.4-16 x 5-10 cm, apex acute-acuminate, base rounded, stellate hairy above, stellate tomentose beneath, margin irregularly serrate; petioles, 0.7-2 cm long, stellate tomentose.; stipules subulate. Flowers greenish-brown, in axillary, 3-4 flowered umbellate cymes. Sepals 5, narrowly oblong or lanceolate, 0.6-1 cm long, woolly outside. Petals 5, white, oblong, shorter than sepals, ciliate at base. Stamens many shorter than style. Ovary 2-celled. Drupe sub-globose, fleshy, stellate- tomentose.

Fl. & Fr.: June - October

Distribution: India: Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1212. **PL-4**

ELAEOCARPACEAE DC.

Trees or shrubs. Leaves alternate, simple, pinnately nerved, and stipulate. Flowers regular, bisexual, in axillary racemes, fascicles or solitary. Sepals 4-6, free or united at base. Petals 4-5, rarely united at base, toothed or fimbriate at apex, inserted outside the

disk. Stamens numerous, free, inserted on a fleshy disk. Ovary superior. Fruit a drupe or a capsule.

Elaeocarpus L.

Trees or rarely shrubs. Leaves alternate or spirally arranged, margin serrate or entire; pinnately nerved, often with minute glands at axils of veins beneath; stipules present, caducous; petiole usually long and swollen at both ends. Inflorescence axillary, racemose. Flowers bisexual, 4- or 5-merous. Sepals 4 or 5, free. Petals 4 or 5, free, margin lacinate, Stamens 8 to many. Ovary superior, 2-5 celled; 2-5 ovules in each cell. Fruit a drupe, endocarp hard, bony.

Elaeocarpus floribundus Blume, Masters in Hook. f., Fl. Brit. Ind. 1:401. 1875; Balakr., Fl. Jowai. 1:108. 1981; Kanjilal *et al.*, Fl. Assam 1:173. 1982 (Repr.); Grierson & Long, Fl. Bhut. 2.1:170. 1991; Murti in Sharma *et al.*, Fl. India 3:536. 1993; Singh in Singh *et al.*, Fl. Miz. 1:418. 2002.

Trees, upto 25 m high; branchlets glabrous. Leaves 5-21 x 2-8 cm, broadly ovate-elliptic, apex acute to acuminate, base cuneate or rounded, coarsely serrate, glabrous, subcoriaceous, glandular punctate beneath; petioles 3.5-5 cm long, swollen with a pair of small glands at apex. Racemes axillary, 20-30 flowered. Flowers white; pedicels 0.5-1.2 cm. Sepals lanceolate. Petals white, obtriangular, lacinate, ciliate along margin. Stamens 25-30, with or without short bristles at apex. Fruit ellipsoid to obovoid; stone smooth or shallowly rugose, 3-grooved.

Fl. & Fr.: June-September.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Borneo, Cambodia, Malayasia, Myanmar, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1492

MALPIGHIACEAE Juss.

Woody climbers, shrubs or trees. Leaves opposite, rarely alternate or verticillate, mostly petioled, simple, mostly entire; glands often present on petiole or on lower surface or margins of leaves. Inflorescence terminal, sometimes axillary, racemose, corymbose. Flowers bisexual; Calyx 5-partite; segments imbricate, one or more furnished with a large gland. Petals 5, fimbriate or dentate. Stamens usually 10; filaments often connate at base; anthers 2-locular, introrse. Ovary superior, generally 3-locular; ovules 1 in each locule; styles mostly 3. Fruit a samara surrounded by membranous wing.

Key to Genera

1a. Petals clawed *Hiptage*

1b. Petals not clawed *Aspidopterys*

Aspidopterys Juss. ex Endl.

Scandent shrubs. Leaves opposite, entire, stipules absent. Flowers in panicles or racemes, axillary or terminal; pedicels usually slender, bracteate at base, 2-bracteolate in middle. Calyx short, 5-partite, eglandular. Petals entire. Stamens 10; filaments filiform, free or connate at base; anthers ovate, glabrous. Ovary 3-lobed; lobes flattened on back, winged

along sides; styles 3, glabrous; stigmas capitellate. Samaras 3, surrounded by a membranous wing.

Aspidopterys indica (Roxb.) Hochr. In Bull. Inst. Bot. Btzg. 19: 45. 1904; Haridasan & Rao, For. Fl. Meghalaya 1: 176.1985. *A. roxburghiana* Juss. in Ann. Sci. Nat. Ser.2. 13. 267.1840; Hook. f. Fl. Brit. Ind.1: 420.1874; Gamble, Man. Ind. Timb. 110. 1902; Brandis, Ind. Trees 109. 1906. *A. glabriuscula* (*non* A. Juss). Kanjilal *et al.*, Fl. Assam 1(2): 189. 1934.

Climbing shrubs; Leaves ovate, elliptic-ovate, oblong, rounded at base, acuminate at apex, entire along margins, 5 - 16 x 2 - 7 cm, glabrous, slightly pubescent below; petioles 8 - 15 mm long. Panicles 8 - 15 cm long. Flowers ca 2 mm across. Calyx-lobes ovate, tomentose. Petals ovate to obovate, white. Filaments ca 1 mm long, connate at base. Ovary pilose; styles 3, stigma capitate. Fruits of 1-3 samaras, 3-winged, distinctly veined, glabrous.

Fl. & Fr: May - February.

Distribution: India: Andaman Islands, Assam, Meghalaya and Nagaland.

Borneo, Jawa, Philippines, Sumatera and Vietnam.

Specimen examined: AJNU 1203. **PL-7**

Hiptage Gaert.

Woody lianas, shrubs, or small trees. Leaves opposite, leathery, entire; stipules minute. Racemes axillary or terminal; peduncles bracteate; pedicels articulate, 2-bracteolate at articulation point. Flowers white, sometimes pinkish, bisexual. Calyx with

1 or 2 glands. Sepals 5, imbricate, basally connate. Petals 5, clawed, silky pubescent. Stamens 10, unequal; filaments connate at base. Ovary shallowly 3-lobed. Samaras 1-3, each 3-winged. Seed angular-globose.

Hiptage benghalensis (L.) Kurz in J. As. Sac. Beng. 48(2): 136. 1874. *Banisteria benghalensis* L. Sp. PL 437. 1753. *H. madablota* Gaertn., Fruct. 2: 169. t. 116. 1791; Fl. Brit. Ind. 1: 418. 1874; FL As. 1: 188. 1936.

Shrubs, often subscandent, up to 3 m. Leaves elliptic to ovate-lanceolate, acute to rounded at base, obtuse, to acuminate, 10-20 x 4-8 cm; lateral nerves 6-7 pairs. Inflorescence in terminal and axillary 10-20 cm long racemes. Flowers pinkish white; pedicels 1-2 cm, thickened upwards. Fruits of 1-3 samaras; mericarps globose; wings 3, oblong, obtuse, 2-5x1-2 cm, dark red.

Fl. & Fr: Throughout the year

Distribution: India: Almost throughout the hotter parts of India.

Bangladesh, Borneo, Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Sulawesi, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1038. **PL-7**

OXALIDACEAE R. Br.

Herbaceous annuals, with rhizomes, bulbs or bulbils, or woody perennials, shrubs or small trees. Leaves alternate or rosetted, digitately or palmately 3-foliolate; petioles articulate at base; stipulate or exstipulate. Inflorescence in basal or axillary umbels or panicles. Flowers regular, bisexual. Sepals 5, free, contorted in bud. Stamens 10, fused at base. Styles 5. Fruit a capsule.

Oxalis L.

Herbs, annuals or perennial, sometimes with rhizomes or bulb. Leaves 3-foliolate; leaflets sub-sessile. Flowers in umbels, axillary or basal peduncles. Sepals 5, imbricate. Petals 5, contorted. Stamens 10, free or united at the base. Fruit a capsule.

Key to the species

- 1a. Plants stemless with underground bulbous rootstock; flowers purple *O. corymbosa*
1b. Plants with prostrate stems; flowers yellow *O. corniculata*

Oxalis corniculata L., Edgew. & Hook.f. in Hook. f., Fl. Brit. Ind. 1:436. 1874; Balakr., Fl. Jowai. 1:109. 1981; Grierson & Long, Fl. Bhut. 1.3:742. 1987; Manna in Hajra *et al.*, Fl. India 4:242. 1997; Singh in Singh *et al.*, Fl. Mizo. 1:287. 2002 Polunin & Stainton, Flow. Hima. 68. 2008 (Repr.).

Prostrate herbs; stems rooting at nodes; branches erect and pendulous, hairy. Leaves palmately 3-foliolate; petioles 1-4 cm long; leaflets 0.6-1 x 0.8-1.4 cm, broadly obovate, obcordate or heart-shaped, apex rounded and deeply notched, base narrowly cuneate, sub-sessile; stipules adnate to petioles, oblong. Flowers yellow, borne on slender hairy peduncles in pseudo-umbellate inflorescence; peduncels up to 8 cm long hairy. Sepals 5, linear to oblong-lanceolate, 0.6-0.8 cm long, hairy. Petals 5, spatulate, apex emarginate, 0.6-0.9 cm long, hairy. Stamens 10. Styles 5, persistent in fruit. Capsule oblong, cylindrical, 5-angled.

Fl. & Fr.: March-June.

Distribution: India: Almost throughout India.

Bahamas, Colombia, Costa Rica, Cuba, Mexico, Netherlands, Peru, Puerto Rico and Venezuela.

Specimen examined: AJNU 1185

Oxalis corymbosa L., Grierson & Long, Fl. Bhut. 1.3:743. 1987; Manna in Hajra *et al.*, Fl. India 4:246. 1997; Singh in Singh *et al.*, Fl. Mizo. 1:289. 2002.

Herbs with underground bulbous rootstocks. Leaves radical, palmately 3-foliolate; petioles 6-19 cm long, hairy; leaflets broadly obcordate, 1-3 x 1-2.7 cm, apex rounded and deeply notched, base broadly cuneate, sub-sessile; stipules broadly ovate lanceolate. Flowers purple, borne on slender hairy peduncles in pseudo-umbellate inflorescence; peduncle up to 16 cm long hairy. Sepals 5, elliptic, 0.6-0.8 cm long, with 2 spots. Petals 5, spatulate, 1-1.2 cm long, hairy. Stamens 10 in 2 series. Styles 5. Capsule ovate with persistent calyx.

Fl. & Fr.: April-July.

Distribution: India: Assam, Manipur, Nagaland, Uttar Pradesh, Eastern Himalaya, Peninsular India.

Brazil, Colombia, Costa Rica, Paraguay, Peru and Venezuela.

Specimen examined: AJNU 1346

BALSAMINACEAE A. Richard

Annual or perennial herbs. Stems fleshy, erect to procumbent, rooting at the lower nodes. Leaves simple, spirally arranged, opposite or whorled, margin toothed or simple,

pinnately nerved, stipules absent. Inflorescence racemose, solitary or clustered at the leaf axils. Flowers zygomorphic, bisexual. Sepals 3-5, the lower larger pouched and with a spur, the 2 or 4 lateral sepals small and often greenish. Petals 5, unequal, the 4 lateral fused in pairs, the lower of each pair forming the lip, the upper forming the wings, the uppermost petal often larger and often helmet-like. Stamens 5, united into cap-like enclosing the ovary and stigmas. Ovary of 5-fused carpels. Fruit an capsule.

Impatiens L.

Description as for balsaminaceae, but lateral petals connate into pairs; carpels with 3 traces; ovule several or many in each locule. Fruit an explosively dehiscent loculicidal capsule, the valves curling and twisting in dehiscence.

Key to the species

- 1a. Leaves sparsely puberulus or hispid above: *I. tripetela*
- 1b. Leaves glabrous above:
 - 2a. Petioles glandular: *I. laevaigata*
 - 2b. Petioles eglandular *I. pulchra*

Impatiens laevigata Hook. f. & T., Hook. f., Fl. Brit. Ind. 1:473. 1875; Balakr., Fl. Jowai. 1:113. 1981; Vivekanathan *et al.* in Hajra *et al.*, Fl. India 4:167. 1997.

Perennials undershrubs. Stem erect, glabrous, woody below, branched. Leaves elliptic-lanceolate, 8-14 x 3-7 cm, apex acuminate, base obliquely cuneate, narrowed into

petiole, glabrous, margin distantly serrate; petioles 1-6 cm long, glandular. Inflorescence axillary racemes, solitary or densely flowered. Bracts large, ovate lanceolate. Flowers yellow with pink purplish streaks, 2.6-3.6 cm across. Sepals green, large. Lower sepal orbicular, spurred. Lip funnel-shaped narrowed into a hooked spur. Capsule linear, 1.9-2.5 cm long.

Fl. & Fr.: July-September.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Bangladesh, Myanmar and Nepal.

Specimen examined: AJNU 1292

Impatiens pulchra Hook.f. & Th. in J.Linn. Soc., Bot.4:139. 1860; Hook.f. Fl.Brit. India 1:459. 1874 & in Rec. Bot. Surv. India 4:12. 1905; Biswas, Pl.Darj. Sikkim Himal. 1. 205. 1966; Grey-Wilson in Grierson & Long, Fl. Bhutan 2:90. 1991; Vivek. & al.in Hajra & al., Fl India 4: 199. 1997.

Leaves confined mainly to upper part of stem, alternate; petiole to 1.5 cm long, green; blade to 5- 9 x 1-3 cm, glabrous, base cuneate, apex acute to acuminate, margins crenate; Inflorescence axillary; peduncle to 5.5 cm long; bud orange. Flower orange; pedicel to 2 cm long, green. Bracts at the base, subulate, green. Lateral sepals 2, ovate, green, apex acute, margins entire, non-membranous. Lower sepal navicular, at tip. Dorsal petal orange. Lateral united petals pale orange, bilobed, subequal.

Fl. & Fr.: May - October.

Distribution.: India: Arunachal Pradesh, Sikkim, Nagaland, West Bengal; Bhutan, Myanmar.

Specimen examined: AJNU 1195. **PL-3**

Impatiens tripetala Roxb. ex DC., Prodr. 1 :687. 1824; Roxb., Fl. Ind.2:453. 1832; Hook.f., Fl. Brit. India 1:470. 1875 & in rec. Bot. Surv. India 4:13. 1905; Vivek & al. in Hajra & al., Fl. India 4: 220. 1997; Karthigeyan & Gogoi in Phytotaxa 288(2): 193. 2016. *I. tripetala* Roxb. ex DC. Var. *microscypha* Hook. f. in Bull. Misc. Inform. 1910: 298. 1910.

Leaves opposite, rarely alternate at upper portion, petiole to 6 cm long, green; stipule at the base, papillate, 4-12 x 2-5 cm, puberulent on both sides, base attenuate, apex acuminate inflorescence axillary, usually epedunculate, fascicle up to 10- flowered, bud pink. Flower pink or partially purple, pedicel to 1.2 cm long, green purple; bract at the base, lanceolate or subulate, green persistent, lateral sepals 2, subulate, hairy, green. Lower sepal bucciniform, constricted into a spur, pink mouth slightly beaked. Dorsal petal pink. Lateral united petals bilobed, subequal, clawed, pink with white blotches. Capsule fusiform.

Fl. & Fr.: mostly March to September, but in some plants almost whole year

Distribution: Common in all the states of NE India and West Bengal in lower elevations; Bhutan, Bangladesh, Myanmar & Nepal.

Specimen examined: AJNU 1450

RUTACEAE Juss.

Trees, shrubs or rarely herbs, sometimes scandent, sometimes armed; leaves, flowers and fruits usually bearing numerous oil glands. Leaves alternate or opposite, simple or variously compound, exstipulate. Flowers regular, bisexual or unisexual, in axillary or terminal racemes, corymbs or panicles, sometimes solitary. Calyx 4-5 lobed, often connate at base. Petals 4-5 lobed, free, valvate or imbricate. Stamens as many or twice as many as petals or sometimes more; filaments free or connate; in female flowers stamens reduced to staminodes. Ovary superior; styles 1-5, free or united; in male flowers ovary reduced to pistillode. Fruit a capsule, cluster of follicles, berry or drupe. Seeds solitary or few in each cell.

Key to genera

- 1a. Petioles often winged; fruit a berry *Citrus*
- 1b. Petioles not winged; fruit capsular or drupaceous
 - 2a. Plants armed with spines *Zanthoxylum*
 - 2b. Plants unarmed
 - 3a. Leaves opposite *Glycomis*
 - 3b. Leaves alternate
 - 4a. Leaflets large, 6-15cm; petals valvate, styles and ovary
pubescent, 5-celled *Micromelum*
 - 4b. Leaflets small, 3-6 cm; petals imbricate, styles and ovary
glabrous *Murraya*

Citrus L.

Shrubs or small trees; young branchlets angular with axillary, single spines, leaves alternate, unifoliolate or simple, petioles usually winged. Inflorescences axillary, racemose, or cymose or of a solitary flower. Flowers bisexual or unisexual. Calyx with 4 or 5 sepals. Petals 4 - 8, imbricate, fleshy, white or tinged purplish or reddish. Stamens numerous, free or polyadelphous. Disk annular. Ovary depressed-sub globose; style cylindrical, caducous; stigma globose or capitate, glandular-sticky. Fruits is berry, multilocular, many-seeded; pericarp leathery; outer layer densely glandular. Seeds angular-obovoid.

Key to Species

- 1a. petiole narrowly or slightly winged *C. indica*
- 1b. Petiole broadly winged *C. hystrix*

Citrus indica Tanaka, Stud. Citrol. 2: 164. 1928; Bhattacharya & Dutta, Class. Citrus Fr. Assam 56. 1956; Swingle, Citrus Ind.1:384.1967.

Small trees, 3-4 m high; branchlets spreading, spiny, glabrous. Leaves unifoliolate; petioles short, slightly winged, articulated at apex; leaf blade 10-60 x 5-25 cm, oblong or lanceolate to elliptic-oblong, acute at base, attenuate at apex. Inflorescences usually a solitary flower; pedicels glabrous. Flowers bisexual. Calyx 4 or 5 lobed. Petals 5, oblong, obtuse, glandular, white. Stamens 22 - 25; filaments united at base, free above, glabrous, white; anthers introrse. Ovary 8-10 locular. Fruits small, deep orange to scarlet red, smooth, glandular; pericarp thin, slightly adherent; mesocarp thin, white, spongy, soft, sweet; endocarp segments 8-10. Seeds 5 - 7 per fruit.

Fl. & Fr.: November – April

Distribution: India: Assam, Manipur, Meghalaya and Nagaland.

Native to India.

Specimen examined: AJNU 1052. **PL-13**

Citrus hystrix DC., Cat. Pl. Horti Monsp. 97. 1813. *Citrus latipes* (Swingle) Tanaka in Stud. Citrolog. 2: 155. 1929 et al., in J. Bot. 68: 233. 1930. *C. ichangensis* var. *latipes* Swingle in J. Agri. Rs. 1: 2. 1913.

Trees, 3-6 m high; branchlets spiny. Leaves petiole winged, apex rounded to truncate; leaf blade, 6-8 x 2-4 cm, ovate, tertiary veins conspicuous, margin apically conspicuously and sparsely crenate, apex narrowly obtuse. Inflorescences with 3-5 flowers. Flower buds globose. Calyx 4 or 5 lobed. Petals white but pinkish red outside. Stamen filaments distinct. Style short, thick. Fruit yellow, ellipsoid to subglobose, slightly coarse or smooth, oil glands numerous and prominent, apex rounded; pericarp thick; sarcocarp in 11-13 segments, very acidic and slightly bitter. Seeds numerous.

Fl. & Fr.: March- December.

Distribution: India: Assam and Nagaland.

Bangladesh, Borneo, Cambodia, China, Malaysia, Myanmar, New Guinea, Philippines, Sulawesi, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1245

Glycosmis Correa

Shrubs or trees, unarmed, evergreen; bracts and sepals densely tomentose, mature parts glabrescent. Leaves alternate, or rarely opposite, usually imparipinnate; leaflets alternate or opposite, entire or serrate to denticulate; petioles often articulated at base. Inflorescences terminal or axillary, racemose or cymose panicles. Flowers bisexual. Sepals imbricate, distinct or connate at base. Petals imbricate, greenish to creamy-white, often glandular. Stamens 8 or 10, free; anthers ovoid-cordate, glandular-apiculate. Ovary ovoid-cylindric, fusiform or ellipsoid, 2 – 5 locular. Fruit is a berry, sub globose, 1 - 3-seeded, with thin pulp, smooth or pitted rind, creamy-white to reddish or purplish when ripe.

Glycosmis pentaphylla (Retz.) DC. Prodr. 1: 538. 1824. *Limonia pentaphylla* Retz., Obs. Bot. 5: 24. 1788. *G. pentaphylla* Hook.f.. Fl. Brit. India 1:499.1875. *G. cochinchinen* Gamble. Fl. Pres. Madras 1: 153. 1915.

Shrubs 4 -7 m high; branchlets woody. Leaves pinnate, 7 - 18 x 2 - 5 cm, oblong-elliptic or ovate to oblanceolate, cuneate or obtuse at base, acute or acuminate at apex, serrate along margins. Inflorescences paniculate; peduncle as long as or longer than leaf rachis. Flowers often in dense clusters, subsessile. Sepals 5, acute, acuminate or obtuse to rounded. Petals 5, imbricate, elliptic-obovate, obtuse at apex, creamy-white. Stamens 10. Ovary ovoid-cylindric, usually 5-locular with a single ovule in each locule; style continuous with ovary; stigma truncate or globose, obscurely lobed. Fruit is berry, sub globose, cream to crimson red or pinkish when ripe.

Fl. & Fr.: January – October

Distribution: India: Almost throughout mainland India.

Bangladesh, Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1020

Micromelum Blume

Shrubs or trees, unarmed. Leaves alternate, odd-pinnate; leaflets alternate. Flowers in corymbose panicles, terminal or terminal and axillary, bisexual. Calyx cupshaped, shortly 5-lobed. Petals 5, free, valvate in buds. Stamens 10, alternately unequal in length. Gynoecium 3-5 loculed, ovules 2 per locule; style as long as ovary. Fruit a berry, 1-2 seeded.

Micromelum integerrimum (Roxb.ex DC.) Wight& Arn.ex M. Roem., Fam. Nat. Syn. Monogr.1: 47. 1846; *Bergera integerrima* Roxb. (Fl. Ind. 2: 376. 1832) ex DC., Prodr. 1: 537. 1824.; *M.pubescens* auct non Blume, 1825; Hook.f., Fl. Brit. Ind. 1: 501. 1875; Kanjilal *et al.*, Fl. As. 1: 208. 1936; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 349. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 313. 2002.

Trees, upto 10 m tall. Branchlets appressed pubescent. Leaflets 7-15, alternate to subopposite, obliquely ovate-lanceolate, base obliquely cuneate, apex acuminate, margins wavy or entire, glabrous above, tomentose or pubescent beneath along the nerves, gland dotted; petiolules 0.3-0.4 cm. Flowers in terminal spreading corymbose panicles or axils of uppermost leaves, pubescent, dull white, fragrant. Calyx 5-toothed, pubescent. Petals 5, oblong, rounded at tip, pubescent. Stamens 10, alternately long and short. Ovary 5-

celled, subglobose or ellipsoid; stigma capitate. Berry ellipsoid or ovoid; orange or yellowish-red when riped.

Fl. & Fr.: November-June

Distribution: India (Himalaya, NE India), Bangladesh, Bhutan, China, Myanmar, Nepal

Specimen examined: AJNU 1214. **PL-13**

Murraya L.

Shrubs or trees, unarmed. Leaves alternate, imparipinnate; leaflets alternate, entire, petioluled. Flowers in lateral or terminal corymbs or cymes, bisexual. Calyx 5-lobed, connate at base or to half their length. Petals 5, free, imbricate. Stamens 10, filaments subulate, alternately unequal in length. Gynoecium 2-5 loculed, narrowed into style, stigma capitate. Fruit a berry, oblong, 1-2 seeded.

Keys to species

- | | |
|---|---------------------|
| 1a. Leaves 3-7-foliolate; fruit ellipsoid | <i>M.paniculata</i> |
| 1b. Leaves 11-35 leaflets; fruit globose | <i>M. koengii</i> |

Murraya paniculata (L.) Jack, Malay. Misc. 1: 31.1820; *Chalcas paniculata* L., Mant. Pl. 1: 68. 1767; *M.exotica* L. Man. Pl. 2: 563. 1771; Hook. f., Fl. Brit. Ind. 1: 502. 1875; Kanjilal *et al.*, Fl. As. 1: 207. 1936; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 352. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 314. 2002.

Shrubs or trees, upto 6 m tall. Leaves upto 15 cm long; leaflets 3-9, ovate, elliptic, 3-6×2-3 cm, base cuneate, apex obtusely acuminate, emarginated, margin entire, glabrous, petiolules 0.3-0.4 cm. Inflorescence terminal or axillary cymes . Flowers white, fragrant. Calyx 5, ovate, 0.1 cm. Petals 5, oblong-elliptic, 1.4-2 cm. Stamens 10. Ovary glabrous; stigma capitate. Berry ovoid, rugose, red when ripened.

Fl. & Fr.: March-July

Distribution: India (throughout), Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Sri Lanka, Australia, SW Pacific Islands

Specimen examined: AJNU 1027. **PL-13**

Murraya Koenigii (L.) spreng., syst. Veg. 2:315; Hook. f., Fl. Brit. India 1:503. 1875. 1906; Kanjilal *et al.*, Fl. Assam 1 (2): 207. 1936; Chowdhery *et al.* in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1:268. 1996; Bora & Kumar, Flo. Div. Assam 85. 2003.

Shrub or tree. Leaves imparipinnate. Leaflets 1.5-6.5 x 0.8-2.5 cm, ovate, acuminate, base rounded or cuneate, margins minutely crenate, sparsely pubescent or glabrous. Corymbs with more numerous flowers. Sepals ca. 1mm. petals ca. 5x 1.5mm. Fruit ovoid, red.

Fl. & Fr.: March-July

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Hainan, Laos, Malayasia, Nepal, Pakistan, Sri Lanka, Thailand.

Specimen examined: AJNU 1343

***Toddalia* Juss.**

Scrambling shrubs or woody climbers; stems armed with curved spines. Leaves alternate, palmately 3-foliolate; leaflets obovate, oblanceolate or lanceolate, crenulate or sub-entire. Inflorescence axillary and/or terminal in paniculate cymes, racemose. Flowers unisexual. Sepals 5, connate at base. Petals 5, valvate or imbricate in buds. Stamens 5, rudimentary in female flowers. Disc fleshy, grooved, glabrous. Gynoecium 4-7 loculed, syncarpous. Rudimentary in male. Fruit a globose, fleshy, berry.

Toddalia asiatica (L.) Lam., Tabl. Encycl. 2: 116. 1797; *Paullinia asiatica* L., Sp. Pl. 365. 1753; *T. aculeata* Pers., Syn. 1: 249. 1805; Hook.f., Fl. Brit. Ind. 1: 497. 1875; Kanjilal *et al.*, Fl. As. 1: 203. 1936; Balakr., Fl. Jowai, 1: 117. 1981; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 403. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 317. 2002.

Large scandent shrubs, with recurved prickles. Young shoots rusty tomentose. Leaves alternate, digitately 3-foliolate, petioles 3-5 cm long; leaflets oblong to oblanceolate, apex acute to acuminate, base cuneate, margin crenate or serrate, sessile. Flowers in axillary or terminal paniculate cymes, creamy white. Calyx 5-lobed, small, glandular, pubescent outside. Petals 5, oblong or lanceolate, gland dotted. Stamens 5, longer than the petals. Ovary ovoid, style short, stigma 5-lobed. Berry globose, obscurely 4-5 lobed, orange when ripened; rind smooth with translucent glands.

Fl. & Fr.: November-June

Distribution: India (throughout), Bangladesh, Bhutan, China, Indonesia, Japan,

Myanmar, Nepal, Philippines, Thailand, Sri Lanka, Vietnam, Africa

Specimen examined: AJNU 1042. **PL-13**

MELIACEAE Juss.

Trees or shrubs. Leaves alternate, generally pinnate; leaflets entire or serrate, generally oblique at base. Monoecious or dioecious. Flowers regular, bisexual, in axillary or terminal panicles. Sepals 3-6 lobed, free or connate at base. Petals 3-6, usually free or connate at base, stamens 4-12, with the filaments generally fused to corolla tube. Fruit a capsule, berry or drupe.

Key to Genera

1a. Ovules 1 – 2 in each cell

2a. Leaves serrate; fruits drupaceous

Melia

2b. Leaves usually entire or nearly so

3a. Leaves 3-5 foliate

Walsura

3b. Leaves 5 – many foliate

4a. Stigma sessile or subsessile

Aglaia

4b. Stigma on an elongated style

Dysoxylum

1b. Ovules numerous in each cell

Chukrasia

Aglaia Lour.

Trees. Leaves usually pinnate, rarely 3-foliolate or unifoliolate. Flowers unisexual, usually in axillary panicles; male inflorescence large, many-flowered; female inflorescence small, few-flowered. Calyx 3-5-lobed. Petals 3-5, free or united at base. Stamens as many as petals; staminal tube usually sub-globose, cup-shaped or cylindrical, apical margin entire, crenate, or shallowly lobed; anthers 5-10, glabrous, rarely hairy, included, slightly exerted. Ovary 1-3-celled, with 1 or 2 ovules per cells; style short or absent; stigma ovoid or lobed. Fruit a berry or nut.

Aglaia edulis A Gray in Bot. U.S. Explor. Exped. 1; 237. 1856, Hiern. in Hook. f. Fl. Brit. Ind. 1: 556. 1875; Gamble, Man. Ind. Timb. 149. 1902; Brandis, Ind. Trees 143. 1906; Kanjilal *et al.*, Fl. Assam 1(2): 239. 1936.

Tall trees; crown dense; bark greyish-brown, smooth. Leaves 7-17 x 2.5-4.5cm, lanceolate, oblanceolate, oblong-lanceolate, acute or subacute, base acute to rounded, entire, glabrescent at maturity, rusty tomentose when young; nerves obscure above; panicles rusty tomentose; flowers minute, yellow, 1-2 mm across; calyx lobes minute, ovate; petals ovate-oblong; fruits subglobose, yellowish, pulpy.

Fl. & Fr.: April-November.

Distribution: India: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya,

Nagaland, Tamil Nadu and Tripura.

Bangladesh, Borneo, Cambodia, China, Jawa, Laos, Malaysia, Myanmar, Philippines,

Thailand and Vietnam.

Specimen examined: AJNU 1435

Chukrasia Juss.

Medium sized deciduous trees with an indumentum of simple hairs. Leaves usually paripinnate; leaflets alternate, subopposite, acuminate .entire, unequally sized. Panicles axillary or terminal, usually shorter than leaves. Flowers 4-5-merous, unisexual. Calyx short, dentate. Petals 4 - 5, free, oblong, contorted, much longer than calyx. Staminal tube broadly cylindrical, entire or 10-crenate.. Ovary flask-shaped, stipitate, 3-5-locular; locules with numerous, 2-seriate ovules; style slender; stigma 3 -5-lobed or capitate. Pistillode similar to pistil. Fruit a capsule, ovoid, woody, 3-valved.

Chukrasia tabularis A. Juss. in Mem. Mus. Hist. Nat. 19: 251. T. 22.1830; Hiern. in Hook. f., Fl. Brit. India 1: 568. 1875; S.S. Jain & S.S.R. Bennet in Hajra *et al.*, Fl. India 4: 481. 1997.

Tree, up to 45 m tall with reddish brown bark. Leaves up to 60 cm long; leaflets 10-20, subopposite or alternate, ovate-oblong, oblique at base, entire along margins, acuminate at apex, 5 - 17 x 2.7 - 9 cm; secondary nerves 8-16 on each side; upper leaflets larger than the lower. Flowers up to 2 cm long, yellowish-white. Calyx small, obtusely 5-lobed, puberulous. Petals cream-colored, linear-oblong up to 1.6 x 0.5 cm, imbricate, pubescent. Staminal tube dark purple, glabrous; anthers 10, oblong, inserted. Ovary hairy, stigma about on the level of anthers. Capsules 5 - 6 x 2 - 2.5 cm, covered with brown lenticels.

Fl. & Fr.: May - March

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Bangladesh, China, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Sumatera, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1219

Melia L.

Trees, indumentums of simple hairs when young. Leaves 2-3-pinnate; leaflets petiolules, entire or serrate. Flowers in axillary thyrse. Calyx 5-lobed. Petals 5, free. Staminal tube cylindrical, anthers 10. Ovary 5-7-celled; stigma capitate, 5-lobed. Fruit a drupe, pulpy, stone bony.

Melia azedarach L., Sp. Pl. 384. 1753; Hiern in Hook. f., Fl. Brit. Ind. 1: 544. 1875; Brandis, Ind. Trees 140. 1906; Kanjilal *et al.*, Fl. As. 1: 228. 1936; Harodasan & Rao, Forest Fl. Megh. 1: 210. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 339. 2002.

Trees, 10-16 m tall. Leaves 2-3-pinnate; leaflets ovate or elliptic, 3-5 x 1-2 cm, apex acuminate, base obliquely cuneate, margin serrate, tomentose when young. Flowers pale lilac, in axillary panicles. Calyx lobes small, minutely tomentose. Petals linear oblong, pubescent outside. Staminal tube 0.9 cm, purple, glabrous. Drupe ovoid-ellipsoid, yellow when ripe; 1 seeded.

Fl. & Fr.: March - July

Distribution: India (throughout), Tropical Asia, Australia, Tropical Africa

Specimen examined: AJNU 1303

Dysoxylum Blume

Trees, usually glabrous. Leaves pinnate, opposite or alternate, elliptic, oblique at base, acuminate at apex, coriaceous. Flowers bisexual or unisexual, in axillary panicles, racemes or spikes. Calyx usually shallowly or deeply 4 – 5 lobed, spreading, valvate or imbricate. Petals 4-5, spreading, valvate or imbricate, free. Staminal tube cylindrical, entire at margin, crenate, irregularly toothed; anthers 8 or 10, short, glabrous. Ovary 2 - 5-locular; locules 1 - 2-ovuled; style about as long as staminal tube; stigma discoid or capitate. Fruit a loculicidal capsule.

Key to Species

1a. Leaflets opposite; calyx subtentire

D. gobara

1b. Leaflets alternate; Calyx 4 – 5 lobed

D. binectariferum

Dysoxylum gobara (Buch.-Ham.) Merr. in J. Arn. Arb. 23: 173. 1942. *Gnarea gobara* Buch.-Ham. in Trans. Wern. Soc. 6: 806, f. 1. 1832. *D. procerum* Hiern. in Fl. Brit. Ind. 1: 547. 1875; Fl. As. 1: 231. 1936.

Trees, 15-20 m high. Leaves 35-65 cm; rachis terete; leaflets opposite, obovate or elliptic-oblong, obliquely subacute at base, obtuse to broadly subacute, 13- 24 x 5-10 cm; lateral nerves 10-16 pairs; panicles axillary or on old. wood; flowers creamy-white, fragrant; calyx subtentire; bracts subulate; capsules 3-4-celled, pyriform, 4-8 cm. Seeds 2-3, black, shiny with orange aril.

Fl. & Fr.: December – August

Distribution: India: Assam, Meghalaya, Nagaland, Sikkim and Tripura.

Bangladesh, China, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Solomon Is., Sri Lanka, Sulawesi, Sumatera, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1131

Dysoxylum binectariferum (Roxb.) Hook. f. ex Bedd., Trans. L. Soc. 25: 212. 1866; Hiern in Hook. f., Fl. Brit. India 1: 546. 1875; Gamble. Man. Ind. Timb. 147. 1902; Brandis, Ind. Trees 138. 1906; Kanjilal *et al.*, Fl. Assam 1 (2): 232. 1936; Balak, Fl. Jowai 1:124. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 208. 1985; Bora & Kumar, Flo. Div. Assam 90. 2003.

Trees, up to 20 m. Leaves 25-40 cm; rachis 15-25 cm; leaflets alternate, obliquely ovate-oblong, cuneate at base, acute to acuminate, obscurely dentate, 6-15 x 2-7 cm; lateral nerves 5-10 pairs; panicles 20-30 cm. Flowers pale white, in axillary panicles. Calyx 4- 5 lobed. Sepals 5. Petals 5, white. Capsules obovoid, narrow at base, pale yellow to orange. Seeds 4, obovoid, shiny dark purple with large yellow hilum and white aril.

Fl. & Fr.: April-December.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Daman & Diu, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Sikkim, Tamil Nadu and Tripura.

Bangladesh, China, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1375

Walsura Roxb.

Trees; leaves 1-5-foliolate; leaflets opposite, entire; inflorescence axillary and terminal panicles; flowers bisexual, 4-5-merous; stamens shortly connate or nearly free; filaments forked above with anthers in the notch; disc annular; ovary immersed in the disc, or imperfectly 4-celled. Fruit a leathery berry, 1-4 seeded; seeds 1-4, arillate.

Walsura robusta Roxb. Fl. Ind. 2: 386. 1832; Fl. Brit. Ind. 1: 565. 1875; Fl. As. 1: 241. 1936.

Trees, 20-25 m; branchlets white-lenticellate. Leaves 9-25 cm; rachis flat above; petioles 4-6 cm; leaflets, 4-14 x 2-5 cm elliptic to oblong-lanceolate, acute to cuneate at base, bluntly short-acuminate; lateral nerves 5-7 pairs; petiolules; panicles terminal. Flowers white. Fruit is a berry sub globose, pubescent. Seeds enclosed in a fleshy aril.

Fl. & Fr.: December – August.

Distribution: India: Assam, Meghalaya, Nagaland and Sikkim.

Specimen examined: AJNU 1175

DICHAPETALACEAE Baill.

Small trees, shrubs or lianas. Leaves simple, spirally arranged but often seemingly distichous, petiolate, entire, cuneate or rounded and often slightly oblique at base, pinnately nerved, almost always with circular flat glands on lower surface of leaves especially near base. Inflorescence axillary, dichotomously branched umbels. Flowers typically 5-merous, bisexual, unisexual. Sepals slightly united at base, imbricate. Petals spatulate, bifid or notched, creamy white. Stamens in a whorl of 5 or 4. Fruit a drupe or capsule, oblong, compressed, hispid or pubescent, 1- or 2-locular.

Dichapetalum Thouars

Trees, shrubs or lianas, monoecious or dioecious. Leaves apparently distichous, usually thickened along margins by a nerve; stipules deciduous. Inflorescence axillary or seemingly terminal on leafless shoots or epiphyllous umbels. Flowers 5-merous, bi- or unisexual. Sepals slightly united at base, ovate, pubescent on both sides. Petals free, clawed, bipartite or bifid, white. Stamens 5, free or slightly adnate to petals; anthers as long as wide. Fruit a drupe or dehiscent.

Dichapetalum gelonioides (Roxb.) Engl, in Engl. & Prantl, Pflanzenfam. 3,4: 348. 1896.
Moacurm gelonioides Roxb., [Hort. Beng. 21. 1814, nomen], Fl. Ind. 2: 69. 1997 J832.
Chailletia gelonioides (Roxb.) Beddome, Fl. Sylv. S. India 59, t. 9, f. I. 1-8. 1870, p.p.;
Hook, f., Fl. Brit. India 2:570.1875.

Dioecious tree. Leaves elliptic or obovate, gradually acuminate, acute or blunt at apex, up to 15 x 6 cm; glands few, near acute base below. Inflorescence 6 – 10 flowered, in axillary clusters. Flowers. Disk lobes quadrate, round or cordate. Ovary pubescent in female flowers and pubescent to woolly in male flowers, 2- or 3-locular. Fruits bi-lobed, usually, grey- or tawny-tomentose or subglabrous and muricate; sutures clearly discernible.

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

Distribution: India: Assam, Meghalaya, Nagaland, Karnataka, Kerala and Tamil Nadu. Bangladesh, Borneo, China, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1266. **PL-19**

OLACACEAE Mirbel ex Candolle

Shrubs or trees, erect, scandent or climbing, usually unarmed Leaves alternate, simple, entire, exstipulate. Flowers bisexual, bracteate, in axillary racemes, panicles, spikes or fascicles. Sepals 3-6, forming a cupular calyx, toothed or lobed. Petals 3-6, free or connate at base. Stamens as many as or 2-5 times the number of petals. Staminodial filaments distinct or adnate to the sepals or petals or connate into a sheath around the style; anthers tetrasporangiate, opening by longitudinal slits Ovary generally superior. Fruit drupaceous or a nut, 1-seeded, with an accrescent calyx.

Key to Genera

- | | |
|---------------------------|--------------------|
| 1a. Climbers or Lianas | <i>Erythralium</i> |
| 1b. Shrubs or small trees | <i>Oxal</i> |

Oxal L.

Trees or shrubs, often scandent and prickly; racemes or panicles axillary; flowers bisexual; calyx usually truncate, fleshy in fruit; petals 1-6, variously connate; stamens opposite and adnate to the petals at base, often with staminodes; ovary surrounded by the cup-shaped disc, imperfectly 3-celled below and 1-celled above

Oxal acuminata Benth. in Trans. L. Soc. 18: 678. 1841; Masters in Hook. f. Fl. Brit. Ind. 1: 576. 1875; Gamble, Man. Ind. Timb. 163. 1932; Brandis, Ind. Trees 148. 1906; Kanjilal *et al.*, Fl. Assam 1(2): 247. 1936; Balak. Fl. Jow ai 1: 125. 1981.

Small trees or shrubs 6- 10 m high; bark brownish. Leaves 5-14 x 3-5 cm, ovate-lanceolate, oblong-lanceolate, acute-acuminate, base obtuse, glabrous or glabrescent,

nerves finely reticulate beneath. Flowers greenish-yellow; petals oblong; calyx usually truncate. Drupes 1.5-2 cm long, ellipsoid or ovoid, orange-red, 1-seeded

Fl. & Fr.: June – March

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Tripura and West Bengal.

Bangladesh, China and Myanmar.

Specimen examined: AJNU 1265. **PL-6**

Erythralum Blume

Scandent shrubs with axillary tendrils. Leaves alternate, slightly peltate, palmately 3-5-veined. Flowers in axillary cymes; peduncles and pedicels filiform. Calyx cupular, 4 - 5-lobed, accrescent and covering fruit. Petals 5, ovate, triangular. Stamens 5, epipetalous; filaments very short; anthers ovoid. Ovary inferior, 1- loculed; ovules 2 or 3. Drupe ellipsoid, crowned by persistent calyx, splitting at maturity.

Erythralum scandens Blume Bijdr. 921.1826; Fl. Brit. Ind.1: 578.1975; Fl. Assam 1:248.193; Balakr., Fl. Jowai. 1:125. 1981.

Lianas or climbers with woody stem. Leaves lanceolate, ovate- lanceolate or ovate-oblong, 8-23 x 5-15 cm, rounded and narrowly peltate at base, acute, palmately 3-5 nerved; petiole up to 6 cm long. Cymes axillary, subsessile or peduncled. Flowers white or yellow or greenish, minute, ca 4 mm long. Calyx copular. Petals ovate, with a tuft of short, white hairs. Stamens 5. Drupe ellipsoid or ovoid, obtuse, pendulous, yellowish- red becoming bright red on maturity.

Fl. & Fr.: May-November.

Distribution: India: Andamans & Nicobar Islands, Arunachal Pradesh, Assam, Karnataka, Kerala, Manipur. Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1269. **PL-6**

CARDIOPTERIDACEAE Blume

Climbing herbs with milky juice. Leaves spirally arranged, estipulate. Cymes axillary, branched, ebracteate. Flowers very small. Sepals 4 -5. Petals (4 or) 5, coherent at base. Stamens 4 or 5, epipetalous. Disk absent. Ovary superior, 1-loculed, apically with 2 pendulous ovules; styles 2, dissimilar, 1 longer and thicker, cylindrical or subclavate, persistent on fruit, other style shorter and thinner, with capitate stigma. Fruit a 2-winged samara, indehiscent, flat, 2-seeded; embryo minute, in fleshy endosperm.

Cardiopteris Wall.

Description same as that of families.

Cardiopteris quinqueloba (Hassk.) Hassk., Nat. Tijd. N. 10. 64. 1855; Mathur in N.P. Singh *et al.*, Fl. India 5: 47. 2000. *Peripterygium quinquelobum* Hassk., Tijd. Nat. Gesch. Phys. 10: 142. 1843; *Cardiopteris lobata* R. Br. (Wall. Cat. 8033. 1847, *nom. nud.*) ex Benn. & Br. Pl. Jav Rar. 246, t. 49. 1852, *nom. illeg.* 4, Masters in Hook. f. Fl. Brit. India 1:

597. 1875; Kanjilal *et al.*, Fl. As. 1: 254. 1936; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 86. 1938.

Climbing herbs with milky juice; stems terete. Leaves alternate, polymorphous, broadly ovate, 3-5-lobed, 7-15 x 10-16 cm, base cordate, palmately 7-9-nerved; lobes acute or acuminate at apex, glabrous. Petioles 4-9 cm long. Flowers 3-5 mm across, white in axillary racemes or paniced cymes; calyx persistent, puberulous; corolla caduceus. Samara shiny, ovate-orbicular or obcordate, winged with persistant calyx.

Fl. & Fr.: July - January.

Distribution: India: Arunachal Pradesh, Assam, Nagaland and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1438

AQUIFOLIACEAE Bercht. & J. Presl

Trees or shrubs. Leaves alternate, simple, glabrous, usually coriaceous; stipules 2. Flower regular, usually dioecious, sometimes bisexual, small, in axillary fascicles, umbels or congested cymes. Calyx 3-6 cleft or lobed; segments or lobes imbricate, persistent. Petals 4-5, more or less connate in the male flowers, imbricate, deciduous. Stamens 4-5, adnate to the petals or free. Ovary free, 3-16 celled; style short ; ovules 1-2, pendulous. Fruit a drupe with 2 or more 1-seeded stones; seed with a membranous testa; embryo minute.

Ilex Tourn. ex L.

Trees or shrubs, evergreen or deciduous. Leaves alternate, lamina leathery, margin entire, serrate; stipules minute. Inflorescence a cyme in axillary or solitary. Plants dioecious. Flowers hypogynous, unisexual; calyx persistent; corolla often white or cream, rarely green, yellow, pink, or red; petals imbricate. Male flowers: calyx 4-8-lobed; petals 4-8; stamens; anthers oblong-ovoid, longitudinally dehiscent; ovary subglobose. Female flowers: calyx 4-8-lobed; petals 4-8. Fruit a drupe, red, brown, or black usually globose

Ilex umbellatum (Wall.) Loes. Monogr. Aquifol. 1: 99. 1901; Balak. Fl. Jowai 1: 127. 1981. *Ehretia umbellatum* Wall. In Roxb. Fl. Ind. 2: 344. 1824. *Ilex godajam* Hook. f., Fl. Brit. Ind. 1: 604. 1875; Brandis, Ind. Trees 156. 1906. Kanjila *et al.*, Fl. Assam 1(2): 256. 1936. *Ilex sulcata* Hook. f., Fl. Brit. Ind. 1: 604. 1875.

Medium sized trees, evergreen, up to 35 m high. Bark grey, greenish-white. Stipules minute; petiole glabrous. Leaf oblong or ovate-oblong, 7-17 × 3.5cm, reticulate veins distinct on both surfaces, base rounded, margin entire, apex abruptly acuminate. Inflorescences umbelliform, solitary, axillary. Male inflorescences: 6-20 flowered; pedicels puberulent; bracteoles basal, deltoid, puberulent, apex acute; flowers whites; calyx puberulent, deeply 4- or 5-lobed, lobes ovate; corolla rotate, petals oblong; stamens equaling petals, anthers ovoid. Female flowers: sterile anthers sagittate; ovary ovoid. Fruit red, globose, crowned by persistent style.

Fl. & Fr.: September – April

Distribution: India: Andaman & Nicobar Islands, Assam, Arunachal Pradesh, Meghalaya and Nagaland.

Bangladesh, China, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1449. **PL-2**

HIPPOCRATEACEAE Juss.

Small trees or erect or climbing shrubs. Leaves opposite or alternate, simple, often coriaceous. Flowers usually very small in axillary dichotomous cymes or clustered, often on tubercles. Calyx 5 lobed, lobes imbricate. Petals 5, inserted below the disk. Disk fleshy, cup-shaped. Stamens usually 1, inserted on the inner side of the disk; filaments dilated. Ovary superior, triangular, tricarpeal; locules as many as the carpels, placentation axile; style terminal, subulate; stigmas as many as carpels; ovules 2-10 in each locule. Fruit 1-3 loculed drupe, berry or capsule. Seeds compressed often winged or angular, without endosperm.

Key to Genera

- | | |
|--|-------------------|
| 1b. Fruit capsular; seeds winged | <i>Reissantia</i> |
| 1a. Fruit drupaceous; seeds not winged | <i>Salacia</i> |

Salacia L.

Scandent or erect, shrubs or small trees. Branchlets often lenticellate. Leaves decussate, sometimes subopposite, rarely spiral. Flowers in axillary fascicles, cymes, thyrsiform or panicles. Calyx 5-lobed. Petals 5. Stamens 2 or 3, inserted at the base of the pistil, usually wider at base. Ovary partly or totally enclosed in the disc, conical or triangular, 3- or 2-loculed; ovules 2-8 in each locule, axile. Disc intrastaminal, fleshy. Fruits drupaceous, subglobose, 1-3-loculed. Seeds 1 to many, embedded in mucilaginous pulp.

Salacia salacioides (Roxb.) Rolla Rao & Hemadri in J. Bombay Nat. Hist. Soc. 67(92): 359. 1970; Ramamurthy & Naithani in N.P. Singh *et al.*, Fl. India 5: 162. 2000. *Johnia salacioides* Roxb. in Hort. Beng. 5:1844 & Fl. Ind. 1: 168. 1820. *Salacia roxburghii* Wallich ex Wight & Arn. Prodr. 105. 1834; M. Lawson in Hook. f., Fl. Brit. India 1: 627. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 275. 1936.

Lofty woody climbers, glabrous. Leaves elliptic-oblong or oblong-lanceolate, 9-14 x 4-6 cm, base acute or subacute, caudate-acuminate at apex, entire, glabrous, coriaceous; lateral nerves 6-8 pairs; petioles present. Inflorescences axillary fascicles, 3-6-flowered; flowers yellow-green or greenish-orange. Sepals orbicular, ciliolate. Petals rotundate, up to 1 mm long, sessile. Drupes globose, pinkish red, 2-3-celled with a solitary large seed.

Fl. & Fr.: March October.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland and Tripura. Bangladesh and Myanmar.

Specimen examined: AJNU 1057

Reissantia N. Hall'e

Climbing, scandent or erect shrubs; branches opposite, often coiled. Leaves opposite, serrate or crenate. Flowers small, minute in axillary umbelliform cymes or panicles. Calyx lobes 5, small, imbricate. Petals 5, imbricate. Disc inconspicuous, the uppermost part slightly extended outwards. Stamens 3, inserted at the base of the pistil. Ovary 3-loculed; styles short; stigma obscure; ovules 2 in each locule. Fruit capsular, consisting of 3 divergent separate follicles. Seeds compressed, winged, the wing being pointed towards the base of the fruit, exalbuminous, cotyledons large, connate.

Reissantia arborea (Roxb.) Hara in J. Jap. Bot. 40: 327. 1965. *Hippocratea arborea* Roxb., Pl. Corom. 3: 3, t. 205. 1819; M. Lawson in Fl. Brit. India 1: 625. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 273. 1936.

Climbing shrubs; branchlets coiled and robust. Leaves ovate, ovate-oblong, 10.5-15.4 x 6-8.3 cm, apex shortly acuminate, base rounded or subacute, glabrous, membranous, margin serrulate; petiolate. Inflorescence axillary, pedunculate, in dichotomous cymes. Calyx lobes 5. Petals 5. Stamens 3. Ovary partially embedded in the disc. Fruits capsular, obovateoblong, acute at both ends, thickly coriaceous. Seeds 2, yellowish brown, winged.

Fl. & Fr.: May - December.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Meghalaya, Nagaland, Tripura, Uttar Pradesh and West Bengal.

China, Myanmar and Nepal.

Specimen examined: AJNU 1039. **PL-16**

RHAMNACEAE Juss.

Trees or shrubs, erect or scandent, climbing with tendrils, often armed. Leaves simple, alternate or opposite, often with strong basal nerves. Stipules present. Inflorescence in fascicles or cymes, often arranged in panicles or racemes. Flowers small, greenish, regular, bisexual. Calyx 4-5 lobed. Petals 4 or 5, free, inserted on the calyx tube, rarely absent. Stamens 4-5, opposite to the petals. Ovary partly enclosed inside the calyx tube. Fruits a fleshy drupe or a nut.

Ventilago Gaertn.

Unarmed scandent shrubs. Leaves alternate, bifarious; stipules small, caducous. Flowers small, bisexual, bracteate, in axillary and terminal panicles. Calyx 5 fid, lobes spreading, keeled. Petals 5, deltoid, hooded, spreading. Stamens 5, adnate to the base of the petals. Disk 5-lobed, filling the calyx-tube, Ovary 2-celled, globose, sunk in the disk; style very short, bifid; ovule one in each cell. Fruit a nut prolonged above into a linear-oblong coriaceous wing with a prominent midrib; seed subglobose, exalbuminous.

Ventilago denticulata Willd. in Ges., Naturf. Fr. Neue. Schr. 3: 417.1801. *Ventilago alyculata* Tul. in Ann. Sci. Nat. Ser. 8, 4: 124. 1857; M. Lawson in Fl. Brit. India 1; 631. 1875. *Ventilago madraspatana* Gaertner var. *calyculata* King in J. As. Soc. Bengal 65: 378. 1896; Duthie, Fl. Upp. Gang. Pl. 1: 162.1903.

Large, woody, climbing shrubs; branchlets green, pubescent. Leaves 4-14 x 2.3-8.5 cm, obtuse or subacute at apex, oblique at base, crenate-serrate, pubescent, subcoriaceous; petioles 3-12 mm, pubescent. Panicles axillary or terminal, pubescent. Flowers pungent; pedicels 2-6 mm long. Calyx lobes deltoid, 2.6 mm long, hairy. Petals spatulate, 1.4 mm long, truncate. Stamens 1.5 mm long. Disc 5-lobed. Ovary bicarpellary, hairy. Fruit a samaras, 3.5-5 x 0.8-2 cm; fruit. Seeds ovate or subglobose, black.

Fl. & Fr.: September –June

Distribution: India: Andaman & Nicobar Islands, Assam, Bihar, Gujarat, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1035

VITACEAE A.L. de Juss.

Climbing, woody vines, commonly with leaf- opposed tendrils; tendrils simple or dichotomously branched. Leaves alternate; simple leaves palmately nerved and often palmately lobed; compound leaves trifoliolate or digitately; stipules present, often small. Flowers unisexual or bisexual, very small, in leaf- opposed or terminal, arranged in umbel, cymose or paniculate inflorescence .Calyx cup- shaped with 4-5 teeth. Ovary superior; styles short; stigma discoid or 4- lobed, fruit a berry.

Key to Genera

- | | |
|--|---------------------|
| 1a. Inflorescence bearing tendrils | <i>Ampelocissus</i> |
| 1b. Inflorescence not bearing tendrils | <i>Tetrastigma</i> |

Ampelocissus Planch.

Climbing shrubs; tendrils bifid or bifurcate. Leaves simple or compound. Flowers bisexual, in leaf-opposed panicles, corymbose cymes or thyrses. Calyx cup-shaped, entire or obscurely lobed. Pedals 5, free. Stamens 4 or 5. Disk angular, adnate to ovary, often 5-10 grooved. Ovary 2-celled; Style usually short and conical; stigma minute. Berry 1-4-seeded.

Ampelocissus divaricata (Wall. Ex Lawson) Planch., Grierson & Long, Fl. Bhut. 2.1:151. 1991; shetty & Paramjit in Singh et al., Fl. Ind. 5:251. 2000. *Vitis divaricata* wall. Ex Lawson in Hook. F., Fl. Brit. Ind. 1:657. 1875; Kanjilal *et al.*, Fl. As. 1:294. 1982 (Repr.).

Climbing shrubs; tendrils borne opposite the leaves, bifid towards the apex. Branches tomentose with reddish brown hairs. Leaves 3-5 foliolate, glabrous above, greyish red sparsely tomentose beneath; petioles striate, reddish brown tomentose; terminal leaflets elliptic-lanceolate, 10-18 x 4-7 cm long, apex acuminate, base cuneate to rounded, margin crenate-dentate; petiolules densely reddish brown tomentose. Inflorescence branched cymes. Flowers bisexual. Calyx cup-shaped, entire or obscurely lobed. Petal 5, free. Stamens 5. Berry globose.

Fl. & Fr.: June-October.

Distribution: India: Almost throughout the country.

Bangladesh, Nepal, Pakistan and Thailand.

Specimen examined: AJNU 1427

Tetrastigma (Miq.) Planch.

Large, woody or rarely herbaceous, dioecious vines; tendrils leaf-opposed, simple or branched. Leaves 3-7-foliolate, digitate or pedate, petiolate. Inflorescence axillary; cymes, pedunculate. Flowers unisexual. Calyx cupular or saucer-shaped, truncate or obscurely 4-lobed. Petals 4, free, usually hooded and sometimes with a dorsal spur at apex. Stamens 4; filaments short. Disc usually distinct, 4-lobed. Style short, thick or simulating ovary; stigma broad, usually 4-lobed. Berries globose or ellipsoid, usually succulent, 1-4-seeded.

Tetrastigma obovatum (M. Lawson) Gagnepain in Notul. Syst. 1: 266. 1910; P. Singh in N.P. Singh *et al.*, Fl. India 5: 315. 2000. *Vitis obovata* M. Lawson in Hook. f., Fl. Brit.

India 1: 658. 1875, *nom. illegit. non* Rafin., 1830; nec Baker 1857; Kanjilal *et al.*, Fl. Assam 1: 298. 1936.

Large climbers. Stem flattened, pubescent; tendrils leaf opposed, simple. Leaves digitately foliolate; petioles 8-15 cm long, covered with brown hairs. Leaflets obovate or elliptic, 7-14 x 5 - 12 cm, base acute to cuneate; acuminate at apex, crenate-serrate along margins, glabrous above, pubescent on nerves beneath. Inflorescence an umbellate cyme, shortly peduncled. Flowers greenish-yellow; calyx cupular, 4-toothed, pubescent; petals hooded, pubescent. Berries ellipsoid-globose, up to 2 cm across, black.

Fl. & Fr.: January - November.

Distribution: India: Assam, Sikkim, Arunachal Pradesh, Nagaland, Meghalaya.

Bangladesh, China, Myanmar, Thailand, Vietnam.

Specimen examined: AJNU 1359

LEEACEAE Dumort.

Erect herbs or shrubs. Leaves alternate or rarely opposite, simple or more often pinnately to tripinnately compound; petioles expanded and sheathing at base; stipules large persistent or caduceous. Flowers bisexual, regular, 5-merous, in leaf-opposed corymbose cymes. Calyx cup-shaped with short lobes, tomentose. Petals free, reflexed at anthesis. Stamens opposite the pedicels; filaments connate to some distance into a tube. Ovary superior. Fruit a depressed-globose berry.

Leea L.

Leaves alternate. Inflorescences compound dichasial or umbelliform. Flowers bisexual, 4- or 5-merous. Petals fused to stamina tube at base on disk. Staminodial tube 5-lobed at apex, tip of each lobe bifid. Ovary usually 6 celled, sometimes 4-10 celled, ovule solitary in each cell; style short. Fruit 4-6 seeded berry.

Key to Species

- 1a. Flowers red *L. alata*
- 1b. Flowers white or greenish-white or yellowish
 - 2a. Stems and petioles winged or crisp winged *L. compactiflora*
 - 2b. Stems and petioles not winged *L. indica*

Leea alata Edgew. in Trans. Linn. Soc. 20: 36. 1864; Laws in Hook. f., Fl. Brit. Ind. 1: 665. 1875; Brandis, Ind. Trees 179. 1906; Kanjilal *et al.*, Fl. Assam 1(2): 303. 1936.

Undershrubs, up to 4 m tall. Leaves 1- pinnate, rarely trifoliate; petioles 4- 9 cm long, grooved, reddish; rachis 5- 17 cm long, winged. Leaflets 5-9, elliptic-oblong to elliptic-lanceolate, 16-27 x 4-8 cm, acute at apex, rounded, unequal at base, dentate-serrate at margins, sessile, glabrous on both sides. Inflorescence reddish, glabrous, compact; peduncles 5-20 cm long. Flowers red. Calyx glabrous. Ovary 6-locular; style 1 mm long. Fruit red in color turning bluish- black during ripe.

Fl. & Fr.: May-June.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Sikkim, Uttar Pradesh and West Bengal.

Bangladesh, Myanmar and Nepal

Specimen examined: AJNU 1148. **PL-17**

Leea compactiflora Kurz, Grierson & long, Fl. Bhut. 2.1:163. 1991; Naithani in Singh *et al.*, Fl. Ind. 5:332. 2000; Singh in Singh *et al.*, Fl. Mizo. 1:388. 2002; *Leea trifoliata* M. A. Lawson in hook. f.; Fl. Brit. Ind 1:666. 1875. *Leea bracteata* C. B. Clarke, Kanjilal *et al.*, Fl. As. 1:308. 1982 (Repr.).

Straggling shrubs. Branchlets brown tomentose. Leaves trifoliolate or 1-2 pinnate; petioles winged at base; leaflets 5-15, ovate-elliptic or oblong-lanceolate, 8-25 x 4-10 cm, margin serrulate; 8-14 pairs of lateral nerves; 3 basal nerves; petioles pubescent. Flowers greenish- white in reddish-brown tomentose corymbs; bracts ovate, numerous, persistent. Calyx tomentose, lobes triangular. Petals glabrous, shortly lobed. Ovary pubescent. Berries depressed-globose.

Fl. & Fr.: April-June.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

Bangladesh, China, Laos, Myanmar, Nepal, Tibet and Vietnam.

Specimen examined: AJNU 1298. **PL-17**

Leea indica (Burm. f.) Merr. in Phil. J. Sci., Bot. 14; 245. 1919. *Staphylea indica* Burm. f. Fl. Ind. 75. t. 24. f. 2. 1788. *Leea sambucina* (L.) Willd. Sp. PI. 1: 1177. 1797; Fl. Brit. Ind. 1: 666. 1875; Fl. As. 1: 307. 1936. *Aquilicia sambucina* L. Mant. 2: 211. 1771.

Shrubs, up to 5 m high; main stems up to 10 cm thick at base; leaves up to 1.3 x 1.0 m; leaflets oblong, ovate-lanceolate, rounded to acute at base, acute to long-acuminate, sharply serrate at margins, 7 - 20 x 2 - 9 cm; of terminal leaflets 3 -5 cm; cymes 10-15 x 10 - 30 cm, in subterminal corymbs; peduncles 5 cm; flowers green. Fruit is berry, sub globose, red to black. Seeds 3-6.

Fl & Fr.: May – December

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Kerala, Madhya Pradesh, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Fiji, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1069

SAPINDACEAE Juss.

Trees or shrubs, sometimes woody or herbaceous climbers with axillary tendrils. Leaves alternate, innate, palmate or trifoliolate; petiolules swollen into a pulvinus. Inflorescence axillary or terminal cymes, racemes or panicles. Flowers regular or irregular, bisexual or functionally unisexual, usually small. Sepals 4 - 5, imbricate. Petals free, mostly 4 or 5, imbricate. Stamens usually 8; filaments free, often pubescent-hairy, long in the male, short in bisexual flowers; anthers 2-locular, opening by longitudinal slits. Ovary superior, usually of 3 carpels; style terminal, free; ovules 1 – 2. Fruits capsules, drupes or nuts, smooth, rough, hairy or spiny.

Key to Genera

- 1a. Flowers irregular, disk unilateral or Oblique *Allophylus*
- 1b. Flowers more or less regular; disk annular
- 2a. Fruit capsular *Harpullia*
- 2b. Fruit indehiscent
- 3a. Fruit not divided *Lepisanthes*
- 3b. Fruit divided into 1-3 lobes *Sapindus*

Allophylus L.

Shrubs, subscandent or small trees. Leaves alternate, exstipulate, 1-3- foliolate; leaflets entire or serrate. Flowers small, pedicellate, fascicled in simple or branched axillary thyrses, white or yellowish. Sepals 4, imbricate, outer smaller. Petals 4. Disc unilateral, usually with 4-glands. Stamens 8, inserted and in bisexual flowers surrounding the ovary. Ovary usually 2-lobed, 2-loculed; in male flowers merely a pistillode; styles 2, ovule I in each cell. Fruits indehiscent, 1 -2-lobed, lobes subglobose. Seeds with short aril.

Allophylus subfalcatus Radik, in Rec. Bot. Surv. India 3(3): 342. 1907; Pant in N.P. Singh *et al.*, Fl. India 5: 351. 2000. *Allophylus cobbe* Blume, Rumph. 3: 131. 1847; C.E.C. Fischer in Rec. Bot. Surv. India 12: 87. 1958. *Allophylus cobbe* forma *distachyus* Hiern. in Hook.f., Fl. Brit. India 1: 674. 1875; Kanjilal *et al.*, Fl. Assam 1: 315. 1936.

Woody shrubs, up to 5 m high. Leaves alternate, trifoliolate; rachis 5.6-18 cm long; leaflets highly variable, elliptic, oblanceolate or oblong-lanceolate, 7.6-20 x 2.6-9

cm, base oblique acuminate at apex, crenulate along margins, glabrous to glossy. Racemes dense flowered, simple, up to 10 cm long; flowers greenish white, minute; sepals 4 in opposite pairs, outer smaller, inner caudate, imbricate; petals white. Capsules globose, orange-red when ripe.

Fl. & Fr.: June - December

Distribution: India: Andaman & Nicobar Islands, Nagaland, Tamil Nadu and West Bengal.

Bangladesh, Cambodia, China, Malaysia, Myanmar, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1373

Harpullia Roxb.

Shrubs to medium sized trees. Leaves alternate, exstipulate, pinnate; leaflets alternate or rarely opposite, narrowly obovate, entire, variably hairy to glabrous. Flowers unisexual, dioecious, in axillary, terminal, sometimes pseudoterminal racemes; bracts and bracteoles mostly caducous. Sepals 5, imbricate, hairy, sometimes with glandular hairs along the margin. Petals 5, either distinctly clawed with a pair of auricles above the claw or sessile, glabrous or ciliate. Disc annular, rarely 5-lobed. Stamens 5-8, exerted in male flowers. Ovary 2 or 3 loculed. Fruits inflated, rounded, coriaceous. Capsule 2 or 3-lobed, glabrous

Harpullia arborea (Blanco) Radlk., Sitzb. Math.-Phys. Cl. Koeigl. Bayer. Akad. Wiss. Munch.16: 404. 1890; Pant in N.P. Singh *et al.*, Fl. India 5: 365. 2000; P. Daniel in Fl. Kerala 1: 779.2005. *Ptelea arborea* Blanco, Fl. Filip. 63. 1837. *Harpullia cupanoides* auct. non Roxb. 1824: Hiern in Hook. f., Fl. Brit. India 1: 692. 1875.

Trees or shrubs up to 45 m tall. Young parts pubescent. Leaves attenuate, imparipinnate; leaflets oblong-lanceolate, 5.6 -20 x 3-7 m, apex acute to rounded, base obtuse or cuneate, entire, glabrous, sometimes hairy on midrib and nerves beneath, shining light green. Flowers in lax, drooping in axillary panicles. Sepals 4 or 5, oblong-ovate to oblanceolate, free. Petals 5 distinctly clawed, spatulate, free, margin ciliate. Stamens 5 or 7, dull pale green; ovary superior, 2 locular; style free, pale brown to pinkish. Capsule dehiscent, ellipsoid, obovoid or globular, inflated, coriaceous, fleshy, orange to red, loculicidally 2- valved.

Fl. & Fr.: March - May

Distribution: India: Assam, Karnataka, Kerala, Maharashtra, Nagaland and Tamil Nadu. Bangladesh, Cambodia, Fiji, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1277

Lepisanthes Blume

Trees or shrubs. Leaves paripinnate or imparipinnate, rarely simple, with or without stipules; leaflets opposite or alternate, margin entire. Inflorescence axillary or terminal, simple or branched. Flowers unisexual, mostly monoecious. Sepals 4-6, free, outer 2 mostly smaller, imbricate, mostly ciliate. Petals 4-7, mostly distinctly clawed, partly ciliate, hairy at base; scales mostly well developed. Disc crescent shaped, slightly lobed. Stamens up to 8, in male flowers distinctly exerted or filaments very short to absent; anthers hairy or glabrous. Ovary lobed or not, hairy or glabrous, 2 or 3, rarely 1 or

4-loculed; ovules 1 in each cell. Fruits smooth or slightly warty. Seeds shining brown to black.

Lepisanthes senegalensis (A. L. Juss. ex Poiret) Leenh. in Blume 17(1): 85. 1969; Deb & Dutta in J. Econ. Tax. Bot. 10(1): 33. 1987; Pant in N.P. Singh *et al.*, Fl. India 5: 371. 2000. *Sapindus senegalensis* A.L. Juss. ex Poiret, in Lamk. Enc. 6: 666, 1805. *Sapindus attenuatus* Wallich ex Hiern. in Hook.f., Fl. Brit. India 1: 684. 1875: C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 88. 1938.

Evergreen shrubs or small trees, up to 10 m. Leaves alternate, crowded at the end of the branches, usually paripinnate; leaflets 8-10. subopposite, ovate-lanceolate, elliptic-oblong, 10-20 x 4-7 cm. base rounded acute or acuminate at apex, entire along margins, glabrous on both surfaces. Panicles terminal, axillary, up to 26 cm long, puberulent; flowers small, red, glabrous; sepals 5, ciliolate; petals 5, ciliolate. Fruits ellipsoid, 1.6-2.5 cm long, red or deep purple.

Fl. & Fr.: February - June

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Bangladesh, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1006

Sapindus L.

Trees or shrubs. Leaves alternate, paripinnate, exstipulate; leaflets entire, coriaceous, subopposite. Flowers polygamous, in terminal and axillary panicles. Sepals up to 5, in two series, ovate-rounded in outline. Petals 4-5; scales present or absent. Disc annular, fleshy. Stamens 8-10, inserted; filaments pilose. Ovary entire or 2-4-lobed; ovule solitary. Fruits fleshy or coriaceous, indehiscent, globose. Seeds usually globose with two integuments, outer hard, inner membranous.

Sapindus mukorossi Gaertner, *Fruct.* 1:342, t. 70. f. 3 g.h, 1788; Hiern. in *Hook.f.*, *Fl. Brit. India* 1: 683, 1875; Kanjilal *et al.*, *Fl. Assam* 1:320, 1936; C.E.C. Fischer in *Rec. Bot. Surv. India* 12(2): 88. 1938; Pant in N.P. Singh *et al.*, *Fl. India* 5: 382. 2000.

Deciduous trees, up to 15 m high with. Bark greenish brown with fine lenticels and fissures; branchlets tomentose. Leaves paripinnate, crowded at the branch heads; leaflets alternate-subopposite, 4-12 x 1.6-7 cm, base oblique-cuneate, acuminate at apex, entire along margins, coriaceous, glabrous; lateral nerves 14-22 pairs. Panicles terminal, 25-35 cm long, pubescent; flowers polygamous, white or purplish white. Sepals 4-5, ciliate; petals 5, with a woolly scale; stamens 8 with woolly filaments and exerted anthers. Fruits fleshy or coriaceous, wrinkled and often translucent.

Fl. & Fr.: April - December

Distribution: India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

China, Japan, Korea, Laos, Myanmar, Nepal, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1381

ACERACEAE Juss.

Trees or erect shrubs. Leaves opposite, simple, often palmately lobed; stipules absent. Flowers regular, polygamous, axillary or terminal, pendulous racemes or panicles. Sepals and petals mostly 5, isomerous, free, sometimes petals absent. Stamens 4-12, often 8; filaments free, filiform. Ovary of 2 carpels, 2 ovules in each; style 2 mostly connate at base. Fruit a samara; mericarps 2, winged on the outer side, 1-2 seeded.

Acer L.

Trees or shrubs. Leaves mostly simple and palmately 3-7-lobed, entire or toothed or pinnately 3-7-foliate. Inflorescence on terminal or lateral braches. Petals usually as many as sepals, rarely absent. Stamens exserted in male flowers, inserted in bisexual flowers. Fruit a winged schizocarp, commonly a double samara, usually 1-seeded.

Acer thomsonii Miq., Grierson & Long, Fl. Bhut. 2.1:66. 1991; Singh in Singh *et al.*, Fl. Mizo. 1:404. 2002; Nayar & A. Dutta in N. P. Singh *et al.*, Fl. India 5:410. 2000. *Acervillosum* Wall. var. *thomsonii* (miq.) W. P. Hiern. in Hook. f., Fl. Brit. Ind. 1:695. 1875.

Large tree. Leaves subcoriaceous, broadly ovate or suborbicular, 3-lobed; middle lobe broadly triangular, larger than the lateral ones, 7.5-18 x 5.5- 14 cm, apex acuminate, base cordate, glabrescent, margin entire or remotely serrate; petioles 5-18 cm long, canaliculated. Flowers yellowish-green, in lateral spicate racemes, appearing with leaves. Sepals elliptic-ovate, ciliate. Petals linear-oblong, ciliate. Samaras brown, 5-7 cm long; wings straight.

Fl. & Fr.: November-April.

Distribution: India: Arunachal Pradesh, Himachal Pradesh, Manipur, Mizoram, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

China, Myanmar, Nepal, Thailand and Tibet.

Specimen examined: AJNU 1488. **PL-19**

STAPHYLEACEAE Martinov

Trees or shrubs. Leaves opposite or rarely alternate, pinnate or trifoliolate. Flowers in terminal or axillary panicles, regular, 5-merous, bisexual, actinomorphic. Calyx 5, free, imbricate, petaloid. Petals 5, free, imbricate, inserted on or below hypogynous disc. Stamens 5, free, alternating with petals. Ovary 2-3 celled. Fruit a berry or capsule. Seeds few, truncate at the base.

Turpinia Pers.

Trees or shrubs. Leaves opposite, imparipinnate, stipulate. Leaflets opposite, stipellate, serrulate, generally shining, often more or less oblique at the base. Panicles terminal, often running down to the axils of the upper leaves, sometimes wholly axillary. Flowers whitish. Filaments flattened: anthers small. Ovary sessile, 3-celled. Fruit 3-lobed and 3-celled berry. Seeds angular; testa shining.

Turpinia pomifera (Roxb.) DC., Prodr., 2:3. 1825; Pant in Singh *et al.*, Fl. Ind. 5: 418.2000; Kanjilal *et al.*, Fl. Assam 1: 309.1934; Haridasan & Rao For. Fl. Meghalaya 1: 264.1985. *Dalsympelea pomifera* Roxb., Pl. Caron, 3: 76, t. 279.1819.

Trees up to 20 m high; crown oval, basal branches drooping; bark brown, grayish-brown, bole straight; leaves 25-30 cm long; leaflets 8-17 x 2.5-7 cm, ovate-oblong, oblong-lanceolate, caudate, acuminate, base rounded, glabrous, serrate; stipules broadly obovate, up to 1.6 cm long; panicles 10-18 cm long; flowers yellowish white, up to 0.5 cm across. Calyx ovate to oblong, unequal; petals oblong-oblong; stamens glabrous, included. Fruits up to 1 cm across, globose, obscurely 2-3 grooved, fleshy, purplish black.

Fls. & Frts.: February-October.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland and Sikkim.

Bangladesh, China, Laos, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1009. **PL-8**

SABIACEAE Blume

Trees, shrubs, scramblers or twinnings. Leaves alternate, simple or imparipinnately compound; stipules absent. Flowers usually small, regular, bisexual or sometimes unisexual, in terminal or axillary panicles or solitary. Sepals 4-5, imbricate, free or connate at base. Petals 4-5, mostly free, equal or unequal. Stamens as many as petals, equal or unequal, sometimes only 2 larger fertile and the rest staminodes. Ovary 2-celled; style 2-3, free or connate; stigma simple or 2-3 lobed. Fruit a drupe.

Meliosma Blume

Trees. Leaves alternate, simple or imparipinnate; leaflets subopposite. Inflorescence terminal, sometimes axillary panicles. Flowers numerous, small, bisexual, irregular. Sepals distinct. Petals 5, outer 3 larger, convex, inner 2 smaller, entire or bifid.

Disc smaller, annular, more or less irregularly 5-dentate. Stamens 5 - 3 staminodial, 2 fertile; anthers large, globose. Ovary 2-loculed, each locule with 2 superposed ovules; styles and stigmas simple. Fruits drupaceous, oblong to globose. Seeds exalbuminous.

Meliosma pinnata (Roxb.) Maxim, in Bull. Acad. Sci. St. Pet. 12: 64 in Obs. 1867; Hook.f., Fl. Brit. India 2: 6. 1876. *Millingtonia pinnata* Roxb., Fl. Ind. 1: 103. 1820. *Meliosma rhoifolia* Maxim, ssp. *barbulata* Cufod.. Oest. Bot. Z. 88: 254. 1939.

Small to large trees, up to 20 m tall; flowering twigs glabrous to densely pubescent. Leaves 20 x 5 cm, ovate-oblong, elliptic or lanceolate, entire to dentate, with or without domatia in axils of nerves beneath; nerves 3-15 pairs. Panicles terminal, erect, profusely branched. Sepals 5 or 4, ovate, unequal - inner 3 or 4 bigger. Petals 5, glabrous or pubescent; inner petals more or less deeply bifid and glabrous. Fruit globose to ovoid, 4-10 mm across when ripe.

Fl. & Fr.: April – October

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh, Borneo, Malaysia, Philippines and Tibet.

Specimen examined: AJNU 1345

ANACARDIACEAE L.

Trees or shrubs, sometimes scandent, often with an acrid and milky juice. Leaves alternate, rarely opposite, simple, trifoliolate or imparipinnate, exstipulate. Inflorescence axillary or terminal panicle. Flowers small, bisexual or unisexual, actinomorphic. Calyx

3-5 partite. Petals 3-5, free, valvate or imbricate in bud. Stamens 5-10, sometimes not all fertile. Ovary superior, rarely inferior, styles 1-5. Fruit a drupe, with resinous mesocarp.

Key to Genera

- 1a. Fruit fleshy; one stamen fertile *Mangifera*
- 1b. Fruit not fleshy; all or most stamens fertile
 - 2a. Scandent shrubs *Pegia*
 - 2b. Erect shrubs or trees
 - 3a. Drupe compressed, dry, less than 1cm *Rhus*
 - 3b. Drupe oblong, ellipsoid, fleshy, more than 3cm *Spondias*

Pegia Colebr.

Scrambling shrubs, dioecious. Leaves compound, alternate, imparipinnate. Inflorescence terminal or axillary paniculate. Flowers 5-merous. Calyx and petals 5. Stamens 10, anthers subglobose. Style 5, stigma 3-5 lobed. Drupe ovoid or oblong, fleshy.

Pegia nitida Colebr., Trans. Linn. Soc. London 15: 364. 1827; *Tapirira hirsuta* Hook.f., Fl. Brit. Ind. 2: 28. 1876; Brandis, Ind. Trees 200. 1906; Kanjilal *et al.*, Fl. As. 1.2: 339. 1936; Grierson & Long, Fl. Bhut. 2. 1: 58. 1991; Haridasan & Rao, For. Fl. Megh. 1: 274. 1985.

Woody climbers, densely tomentose. Leaves upto 35 cm, imparipinnate; leaflets 3-7 pairs, ovate-oblong, ovate-elliptic, 3-7×1.5-3.5 cm, base subcordate or rounded, apex acuminate, margin crenate, hairy on both surfaces. Inflorescence laxly paniculate, upto 40

cm long. Flowers white, small. Calyx glabrous, lobes ovate. Petals spreading, oblong-elliptic. Drupe obliquely ovoid, black when ripe, 0.8 cm long.

Fl. & Fr.: February-July

Distribution: India (E Himalaya, NE India), Bangladesh, China, Myanmar, Nepal, Thailand

Specimen examined: AJNU 1432. **PL-1**

Rhus L.

Deciduous shrubs or trees. Leaves imparipinnately compound; leaf rachis sometimes winged; leaflets petiolate or sessile, margin serrate or entire. Inflorescence terminal, paniculate or thyrsoid. Flowers unisexual or bisexual, 5-merous. Drupe globose, slightly compressed, mixed glandular pubescent and pilose, red at maturity.

Rhus chinensis Mill., Gard. Dict.ed.8.n. 7. 1768; *R. semialata* Murray, Comm. Soc. Sci. Gott. 6: 27. 1784; *R. javanica* L. Sp. Pl. 1: 265. 1753; Balakr. Fl. Jowai 1: 147. 1981; Kanjilal *et al.*, Fl. As. 1.2: 331. 1936; Hook.f. Fl. Brit. Ind., 2:10. 1876; Grierson & Long, Fl. Bhut. 2. 1: 55. 1991; Haridasan & Rao, For. Fl. Megh. 1: 276. 1985.

Small trees, upto 15 m tall. Leaves imparipinnate; leaflets 4-6 pairs, opposite, oblong-lanceolate or elliptic-lanceolate, sessile, base rounded or oblique, acuminate apex, margin deeply dentate or crenate, glabrous above, tomentose beneath. Panicles terminal, conical, dense flowered. Flowers small, whitish or pale green, Sepals small, pubescent. Petals oblong, ciliate. Drupe subglobose, compressed; dark pink when matured.

Fl. & Fr.: July-November

Distribution: India (E & W Himalaya, NE India), Bangladesh, Bhutan, China, Japan, Myanmar, Nepal, Thailand, Vietnam

Specimen examined: AJNU 1302. **PL-2**

Mangifera L.

Evergreen trees. Leaves alternate, simple, petiolate, and coriaceous. Flowers small, polygamous in terminal panicles; bracts deciduous. Calyx 4-5, imbricate, deciduous. Petals 4-5, imbricate with thickened longitudinal nerves. Stamens inserted between the lobes of the fleshy disk, usually one on 1 perfect and much larger than the others. Ovary sessile, 1-lobed, oblique; style lateral, simple; ovule 1, pendulous from a basal funicle. Drupe large, fleshy; stone fibrous, more o

Mangifera sylvatica Roxb., Fl. India 1: 644. 1820. Hook. f., Fl. Brit. India 2:15. 1876; Brandis, Ind. Trees 206. 1906; Gamble, Man. Ind. Timb. 213. 1902; Kanjilal *et al.*, Fl. Assam 1(2): 336. 1936; Bora & Kumar, Flo. Div. Assam 108. 2003.

Trees up to 20 m tall. Leaves 15-25 x 3-6 cm, lanceolate to oblong-lanceolate, acuminate, base cuneate. Inflorescence in terminal panicles. Flowers pinkish-white, on glabrous pedicels. Calyx 5-lobed, very small. Petioles 5, oblong, twistedly imbricate. Disk slightly grooved. Stamen inserted in the cavity of the disk. Ovary obliquely oval; style subulate. Drupe ovate, obliquely tapering acuminate so as to be often hooked, very slightly compressed; stone less firm, less fibrous and less furrowed than of the mango.

Fl. & Fr.: June-February.

Distribution: India (N.E. region); Bangladesh, Bhutan Myanmar, Thailand.

Specimen examined: AJNU 1024. **PL-1**

Spondias L.

Entirely or partly deciduous trees. Leaves alternate, imparipinnately compound. Inflorescence terminal or axillary. Flowers 4-5 merous, polygamous. Stamens 8-10. Ovary 4-5 cellular. Fruit drupaceous.

Spondias pinnata (L. f) Kurz., Prelim. Rep. 44. 1875; Balak, Fl. Jowai 1: 146. 1981; Deb, Fl. Tripura 1: 466. 1981; Chowdhery et al. in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1:343. 1996; *Mangifera pinnata* L. f., Suppl. 156. 1781. *Spondias mangifera* Willd., Sp. Pl. 2: 751. 1799; Kanjilal *et al.*, Fl. Assam 1(2): 340. 1936.

Deciduous trees, upto 10-15 m high. leaves imparipinnate. Leaflet 7-15 x 4-5 cm, ovate-oblong to elliptic-oblong, acuminate, base cuneate to rounded. Inflorescence in terminal panicles. Sepals 5, lobes triangular. Petals 5, white. Stamens shorter than petals. Ovary subglobose. Drupe ovoid, greenish yellow.

Fl. & Fr.: March-December.

Distribution: Throughout India; Tropical Asia.

Specimen examined: AJNU 1144. **PL-2**

CONNARACEAE R. Br.

Trees small, shrubs, or vines, erect or scandent, evergreen or deciduous. Leaves alternate, exstipulate, petiolate; leaf blade 3-foliolate; leaflets margin entire. Inflorescences terminal, pseudoterminal, or axillary, bracteate. Flowers bisexual, small. Sepals, imbricate or valvate, persistent and clasping base of fruit. Petals free, imbricate or valvate. Stamens 5–10, hypogynous or perigynous, in 2 whorls alternately longer and

shorter, those opposite petals often shorter and abortive; filaments free or shortly connate at base. Carpels free, 1-celled, hirsute. Style subulate or filiform; stigma subcapitate, simple or 2-lobed. Ovules 2 in each carpel. Fruit a usually solitary follicle, sessile or stipitate, dehiscent along adaxial suture.

Connarus L.

Trees, shrubs or lians; leaves imparipinnate; leaflets alternate or opposite, entire; panicles terminal and upper axillary; flowers 5-merous; petals ligulate; stamens 10, alternate one shorter; carpels 5, usually 1 fertile; seeds arillate.

Connarus paniculatus Roxb. Fl. Ind. 3: 139.1832; Hook.f. Fl. Brit. Ind. 2: 52.1876; Gamble, Man. Ind. Timb. 226. 1902; Brandis, Ind. Trees 212. 1906; Kanjilal *et al.*, Fl. Assam 2: 2. 1938; Balak Fl. Jowai 1: 148. 1981.

Lianas, bark brownish black; leaves up to 37 cm long; leaflets 3-16 x 1.5- 7cm, ovate, ovate-oblong or elliptic-lanceolate, shortly acuminate or obtuse, rounded or obtuse at base; panicles up to 35 cm long, conical; flowers white or pinkish white, 0.8- 1 cm long; sepals up to 0.5 cm long; petals up to 0.8 cm long; stamens equal to petals; follicles 3-5 cm long; compressed.

Fl. & Fr.: August-October.

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Mizoram, Nagaland and Tripura.

Bangladesh, Cambodia, Laos, Malaysia, Thailand and Vietnam.

Specimen examined: AJNU 1098

FABACEAE Lindl.

Herbs, shrubs or trees. Leaves simple, sometimes digitate, and usually pinnate; leaflets often stipellate. Flowers bisexual, irregular. Calyx gamosepalous, bilipped. Petals usually 5, imbricate, more or less clawed ; the two innermost which are free or connate; forms the keel; the two laterals which are parallel to each other, forms the wings; the uppermost which is longer than the others, forms the standard. Stamens usually 10, diadelphous, sometimes monodelphous, rarely fgree, inserted with the petals on the calyx- tube. Styles usually upwardly curved. Fruit a pod (legume).

Key to Genera

1a. Leaves 1-foliolate or 3- foliate

2a. Leaves 1- foliate

3a. Bracts and bracteoles large, Opposite concealing the flowers *Dalhousiea*

3b. Bracts and bracteoles not concealing the flowers

4a. Stipules absent; pods not jointed

5a. Keeled petal beaked distally *Crotalaria*

5b. Keeled petal rounded or acute *Flemengia*

4b. Stipules present; pods jointed

8a. Pod segments folded on top of one another or coiled in segments

Uraria

8b. Pod segments in a straight line	<i>Desmodium</i>
2b. Leaves 3- foliate	
9a. Prostrate or erect herbs, shrubs or trees	<i>Erythrina</i>
9b. Woody or herbaceous twinnings	
10a. Flowers borne in branched terminal panicles	<i>Spatholobus</i>
10b. Flowers borne in axillary or terminal racemes	
11a. Standard not more than half as long as the keel	<i>Mucuna</i>
11b. Standard as long as or longer than the keel	<i>Mastersia</i>
1b. Leaves simply pinnate	
12a. Leaves paripinnate	<i>Abrus</i>
12b. Leaves imparipinnate	
13a. Leaflets elliptic or oblong	<i>Tephrosia</i>
13b. Leaflets elliptic or obovate	<i>Millettia</i>

Abrus Adans.

Climbing shrubs. Leaves paripinnate; leaflets numerous pairs; stipules present Flowers in axillary or terminal racemes fasciculate on upper part of rachis. Calyx campanulate; limb with short teeth. Corolla Papilionaceous, Stamens 9, Filaments connate into a sheath split

above. Ovary with numerous ovules; style glabrous .Legumes oblong, compressed, 2-valves, thinly septate.

Abrus fruticosus W. & A. Prodr. Fl. Pen. Ind. Or. 236. 1834; Baker in Hook. f. Fl. Brit. Ind. 2: 176. 1876. *A. pulchellus* Thw. Enum. Pl. Zeyl. 91. 1859; Baker in Hook. f. Fl. Brit. Ind. 2: 175. 1876; Brandis, Ind. Trees 225. 1906; Kanjilal *et al*, Fl. Assam 2: 62. 1938; Balak. Fl. Jowai 1: 171. 1981.

Climbing shrubs; stems slender, glabrous; leaves 5-15 cm long; leaflets 2-3 X 0.7-1.3 cm. oblong, elliptic-lanceolate, rounded or obtuse, mucronate, emarginate at tip , base subcordate or narrowed, often oblique, glaucous and sparsely hairy beneath; racemes 9-18 cm long; flowers white, pinkish-white or yellow, 1-1.3 cm long; pods 2-7 X 0.8-1.5 cm , strap-shaped, 6-10-seeded.

Fl. & Fr.: September-January.

Distribution: India: Andhra Pradesh, Karnataka, Maharashtra, Meghalaya, Nagaland, Rajasthan, Tamil Nadu and Uttar Pradesh.

Cameroon, China, Kenya, Madagascar, Sudan, Tanzania and Zimbabwe.

Specimen examined: AJNU 1392.

Crotalaria L.

Erect herbs or undershrubs. Leaves simple or digitately 3-foliolate, leaflets entire; stipels small or absent. Flowers in terminal or leaf opposed lax racemes. Calyx tube short; teeth subequal or shortly connate and bilipped, upper lip smaller. Corolla exerted or equalling the calyx; standard orbicular, clawed; wings obovate- oblong, shorter; keel

broad and about as long as the wings. Stamens monodelphous, tube split dorsally; filaments alternately long; anthers basifixed and versatile. Style long, abruptly incurved at the base, bearded; stigma minute, oblique. Pod straight, linear or oblong, turgid, not septate, subtended by persistent calyx.

Key to the species

- 1a. Leaves simple
 - 2a. Flowers yellow; leaves pubescent above *C. ferruginea*
 - 2b. Flowers purple; leaves glabrous above *C. occulta*
- 1b. Leaves digitately 3-foliolate *C. pallida*

Crotalaria ferruginea Grah., Baker in Hook. f., Fl. Brit. Ind. 2:68. 1876; Balakr., Fl.

Jowai 1: 153. 1981; Grierson & Long, Fl. Bhut. 1.3:735. 1987; Kanjilal *et al.*, Fl. Assam 2:12. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:443. 2002.

Herbs or undershrubs. Stems erect or trailing, appressed or spreading brown hairs. Leaves simple, subsessile, elliptic to obovate-oblong, 2-6 x 0.2-2.5 cm, apex acute-rounded, base acute-obtusely rounded, appressed brownish sericeous on both surfaces; margin entire; stipules lanceolate, 0.4-0.6 cm long, pubescent. Flowers yellow, few-flowered in leaf opposed lax racemes. Bracts linear-elliptic, 0.3-0.8 cm long, hairy. Calyx deeply divided, 1-1.3 cm long, golden brownish, silky pubescent; teeth ovate-lanceolate. Petals as long as the calyx. Pod linear-oblong, 2-2.5 cm long, glabrous.

Fl. & Fr.: July-September.

Distribution: India, Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam

Specimen examined: AJNU 1391

Crotalaria occulta Grah., Baker in Hook. f., Fl. Brit. Ind. 2:72. 1876; Balakr., Fl. Jowai 1: 152. 1981; Grierson & Long, Fl. Bhut. 1.3:734. 1987; Kanjilal *et al.*, Fl. Assam 2:14. 1997 (Repr.).

Small undershrubs. Stems and branches covered densely with appressed brown silky hairs. Leaves simple, sessile, elliptic-oblanceolate, 3.5- 8 x 0.5-1.2 cm, apex acute, base cuneate, glabrous above, grey densely appressed villous pubescent beneath, margin entire; stipules linear, villous. Flowers purple, in terminal racemes on short peduncles. Bracts setaceous, villous, 0.4-0.5 cm long. Calyx densely villous, deeply divided up to the base into 5 lobes; lobes ovate lanceolate, up to 0.6 cm long, much enlarged in fruit, up to 1.3 cm long. Corolla glabrous, as long as the calyx. Pod oblong- obovate, about 1 cm long, glabrous, with persistent style.

Fl. & Fr.: August-October.

Distribution: India: Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Rajasthan and Tamil Nadu.

Specimen examined: AJNU 1501.

Crotalaria pallida Aiton, Grierson & Long, Fl. Bhut. 1.3:732. 1987; Singh in Singh *et al.*, Fl. Mizo. 1:445. 2002; Yadav&Sardesai, Fl. Kolh. Dist. 143. 2002. *Crotalaria striata* DC., Baker in Hook. f., Fl. Brit. Ind. 2:84. 1876, excel. Syn. *Crotalaria laburnoides* Klotz. ; Kanjilal *et al.*, Fl. Assam 2:16. 1997 (Repr.).

Undershrubs. Branches hirsute pubescent. Leaves digitately 3-foliolate, petioles pubescent, 3.5-4 cm long; leaflets obovate, 1.8-4.5 x 1-3 cm, apex obtuse-rounded, emarginate and shortly mucronate, base acute-cuneate, glabrous above, pale pubescent beneath, margin entire; stipules linear-lanceolate, pubescent, deciduous. Flowers bright yellow with reddish purple veins, in terminal and lateral, many flowered, lax racemes, up to 25 cm long; pedicels pubescent. Bracts ovate, pubescent. Calyx pubescent; tube broadly campanulate; teeth subequal, lanceolate. Corolla exerted, twice as long as the calyx. Pod turgid, cylindrical, glabrous with persistent style at the apex.

Fl. & Fr.: May-August.

Distribution: India: Almost throughout India.

Bangladesh, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1377. **PL-19**

***Dalhousiea* Graham ex Benth.**

Climbing shrub. Leaves 1-foliolate. Inflorescence branched or simple racemes; flowers white; calyx teeth very short; petals equal in length; stamens free; anthers versatile; ovary subsessile; pods compressed, 1-3 seeded.

***Dalhousiea bracteata* (Roxb.) Grah. ex Benth.**, Ann. Wien. Mus. Nat. 2: 65. 69. 1838; Baker in Hook. f., Fl. Brit. India 2: 248. 1878; Kanjilal *et al.*, Fl. Assam 2: 116. 1938. *Podolyria bracteata* Roxb., Pl. Corom. 3: t. 259. 1820.

Evergreen, woody climbing shrubs. Leaves 1-foliolate, simple, ovate to obovate-orbicular, 5-20 x 6-12.5 cm, base rounded or subcordate, shortly mucronate at apex, glabrous on both surfaces; petioles 1.4-5 cm long, swollen at both ends. Flowers in

axillary corymbs; bracts in pairs, rounded, persistent, 0.4-1 cm long; bracteoles larger, up to 1.5 cm long. Flowers 6 - 9 mm long. Calyx hairy outside. Corolla white; stamens free, glabrous. Pods turgid, 7-10 x 3-4 cm, compressed, tapering at both ends, 1-3-seeded.

Fl. & Fr.: June - September.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Nagaland.

Bangladesh and Myanmar.

Specimen examined: AJNU 1169.

Desmodium Desv.

Herbs, shrubs or trees. Leaves pinnately 3-foliolate or 1-foliolate; stipule persistent; leaflets with stipules. Flowers in axillary or terminal racemes, panicles, occasionally in axillary umbels or fascicles. Calyx campanulate or turbinate; tube short; teeth 5, the two upper often subconnate. Corolla exserted; standard obovate or orbicular; wings obliquely oblong, more or less adhering to the keel. Stamens monodelphous or didelphous (9+1). Pod compressed, usually composed of several one-seeded, indhiscent joints or dehiscent along lower suture.

Key to Species

1a. Leaves 1-foliolate; petioles winged

2a. Petioles winged

D. triquetrum

2b. Petioles not winged

D. velutinum

1b. Leaves 3- foliolate

3a. Inflorescence racemiform; persistent bracts *D. pulchellum*

3b. Inflorescence umbellate corymbose; bracts caduceus *D. heterocarpon*

Desmodium heterocarpon (L.) DC., Prodr. 2: 337. 1825; *D. polycarpum* (Poir.) DC., Prodr. 2: 334. 1825; Baker in Hook.f. Fl. Brit. Ind. 2: 171. 1876; Kanjilal *et al.*, Fl. As. 2: 54. 1938; Grierson & Long, Fl. Bhut. 1.3: 674. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 460. 2002.

Herbs or undershrubs, upto 1.5 m tall, branches grey tomentose. Leaves 3-foliolate; petioles grey pubescent; leaflets elliptic-oblong or obvate, 2.5-6×1.2-3 cm, base obtuse or rounded, apex rounded and notched; glabrous above, appressed grey pubescent beneath; petiolules small; stipules lanceolate. Flowers in axillary or terminal dense racemes; bracts ovate, deciduous. Calyx funnel shaped, deeply divided, teeth longer than the tube. Corolla purple, standard elliptic-suborbicular, wings and keel oblong or obovate. Pods upper suture nearly straight, lower suture undulate and divided into 5-8 segments, sparsely pubescent.

Fl. & Fr.: June – October.

Distribution: India, Bhutan, China, Laos, Pakistan, Vietnam

Specimen examined: AJNU 1232.

Desmodium pulchellum (L.) Benth. Fl. Hongk. 83. 1-861; Baker in Hook. f. Fl. Brit. Ind. 2: 162. 1876; Gamble, Mao. Ind. Timb. 239. 1902; Brandis, Ind. Trees 223. 1906; Kanjilal *et al.*, Fl. Assam 2: 47. 1938; Balak. Fl. Jowai 1: 156. 1981. *Hedysarum pulchellum* L. Sp. Pl. 747. 1753.

Shrubs, up to 2.5 m high. Leaves 3-foliolate; petioles 0.5-1.4 cm long; leaflets elliptic to ovate-oblong, 4-12 x 2-5 cm; base rounded, acute at apex, entire, glabrous above, finely pubescent beneath; lateral nerves 8-10 pairs; petiolules up to 1 mm long. Inflorescence racemiform, axillary or terminal, consisting of series of paired, leafy, elliptic or suborbicular, bracts on densely pubescent stalks; flowers, in 2-6-flowered fascicles, each being concealed by a pair of bracts; calyx hairy; corolla white or pale yellow. Pods brown when ripe, 2-seeded.

Fl. & Fr.: June– December.

Distribution: India: Assam, Karnataka, Maharashtra, Nagaland and Tamil Nadu
China, Malaysia, Myanmar, Nepal, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1306.

Dosemodium triquetrum DC., Baker in Hook. f., Fl. Brit. Ind. 2:163. 1876; Balakr., Fl. Jowai 1 :157. 1981; Haridasan & Rao, Forest Fl. Megh. 1:299. 1985; Grierson & Long, Fl. Bhut. 1.3:669. 1987; Kanjilal *et al.*, Fl. Assam 2:56. 1997 (Repr); Singh in Singh *et al.*, Fl. Mizo. 1:471.2002.

Suberect undershrubs, up to 2.5 m high. Branches triquetrous, sparsely pilose at angles. Leaves 1-foliolate, ovate-oblong or lanceolate, 6-16 x 2-5 cm, apex acuminate, base rounded, glabrous or sparsely pilose above, pilose on nerves beneath, margin entire; petioles winged; wing oblanceolate; petiolules, pilose hairy; stipules ovate-lanceolate, striate, glabrous. Flowers purplish-pink, fascicled in terminal and axillary racemes. Bracts ovate-lanceolate. Calyx pubescent; tube campanulate; teeth ovate-

lanceolate. Pods oblong, shallowly undulate along lower sutures, and divided 5-8 segments, densely hairy.

Fl. & Fr.: August – October.

Distribution: India: Assam, Karnataka, Maharashtra, Nagaland and Tamil Nadu. Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1442. **PL-19**

Desmodium velutinum (Willd.) DC., Prodr. 2: 328. 1825; Deb & Dutta in J. Econ. Tax. Bot. 10(1); 35. 1987. *Hedysarum velutinum* Willd., Sp. Pl. 3:117. 1803. *Desmodium latifolium* (Roxb.) DC, Prodr. 2; 328. 1825; Baker in Hook .f., Fl. Brit. India 2; 168. 1876; Kanjilal *et al.*, Fl. Assam 2: 56. 1938.

Shrubs, up to 3 m tall; branches densely tomentose. Leaves 1-foliolate. broadly ovate, 4-8 x 3-4.6 cm, base truncate or cordate, obtuse to subacute at apex, hispid above, densely soft tomentose beneath; petioles hairy; stipules subulate. Inflorescence racemes 5-15 cm long, axillary or terminal; flowers. Calyx hairy, campanulate. Corolla purplish-pink. Pods oblong, densely pubescent with hooked hairs.

Fl. & Fr.: September - February.

Distribution: India: Almost throughout India.

Bangladesh, China, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1308

Erythrina L.

Trees or shrubs. Branches with prickles. Leaves pinnately 3-foliolate; leaflets with fleshy and gland-like stipels; stipules caducous or persistent. Flowers in axillary or terminal racemes, usually appearing before or with new leaves. Calyx spathaceous, campanulate, or cone-shaped, deeply divided dorsally, truncate or 2-lobed. Corolla usually longer than calyx; petals extremely unequal, shortly clawed; standard large, often folded over wings and keel; wings sometimes absent; keels much shorter than standard. Stamens monodelphous, about as long as standard. Ovary with 2 to many ovules; style inflexed. Legume usually curved, often constricted between seeds, not septate.

Erythrina stricta Roxb., Baker in Hook. f., Fl. Brit. Ind. 2:189. 1876; Haridasan & Rao, Forest Fl. Megh. 1:301. 1985; Grierson & Long, Fl. Bhut. 1.3:683. 1987; Kanjilal *et al.*, Fl. Assam 2:70. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:476. 2002. Polunin & Stainton, Flow. Hima. 91. 2008 (Repr.).

Small trees, up to 20 m tall. Branches with conical spines. Leaves pinnately 3-foliolate; petioles 12-20 cm long, glabrous; leaflets broader than long, broadly ovate, 10-21 x 12-22 cm, apex acute or shortly acuminate, base rounded, glabrous and shining, glaucous and sparsely pubescent on nerves beneath; stipules falcate. Flowers scarlet, appearing before leaves, in dense one-side spike-like racemes at the ends of stout leafless branches; pedicels tomentose. Calyx spathe-like, split dorsally to the base, densely brown pubescent; standard oblong-lanceolate, twice as long as keel. Stamens monadelphous, about as long as standard. Pod obscurely torulose, sharply pointed, glabrous; 1-3 seeded.

Fl. & Fr.: February-April.

Distribution: India, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimen examined: AJNU 1046.

Flemingia Roxb. ex W. T. Aiton

Erect shrubs or undershrubs, rarely herbs. Leaves digitately 3-foliolate or simple, gland-dotted beneath; stipels absent; stipules present, striate. Flowers in axillary and terminal racemes, panicles or globose heads. Bracts sometimes conspicuous, deciduous or persistent, bracteolae minute or absent. Calyx campanulate, short; teeth 5, narrow, acute. Corolla equal to or little longer than calyx; petals equal in length; standard auricled; wings obliquely oblong or obovate, fused to hooked keel. Stamens diadelphous (9+1); filaments free, often thickened near base. Style filiform, glabrous; stigma capitate. Pod obliquely oblong, turgid, not septate, usually 2 seeded.

Key to the species

1a. Flowers pale purple with purple-pinkish veins; petioles 3-6 cm long *F. macrophylla*

1b. Flowers purple; petioles 6-12 cm long *F. stricta*

Flemingia macrophylla (Willd.) O. Kuntze ex Merr., Balakr., Fl. Jowai 1: 165. 1981; Haridasan & Rao, Forest Fl. Megh. 1:302. 1985; Grierson & Long, Fl. Bhut. 1.3:707. 1987; Singh in Singh *et al.*, Fl. Mizo. 1:478. 2002. *Flemingia congesta* Roxb., Baker in Hook. f., Fl. Brit. Ind. 2:228. 1876; Kanjilal *et al.*, Fl. Assam 2:90. 1997 (Repr.);

Flemingia congesta Roxb. ex Ait. f. var. *latifolia* (Benth.), Baker in Hook. f., Fl. Brit. Ind. 2:229. 1876.

Shrubs, up to 2 m tall. Branches angular, appressed sericeous. Leaves 3-foliolate; petioles 3-6 cm long, narrowly winged; leaflets elliptic-obovate or ovate to oblong-lanceolate, 7-14 x 2.5-5.2 cm, apex acuminate, base rounded or truncate, oblique in lateral leaflets, scabrous and densely greyish pubescent on nerves above, pubescent on nerves and gland dotted beneath; petiolules, densely tomentose; stipules lanceolate, caducous, tomentose. Flowers pale purple with purple-pinkish veins, in axillary racemes, longer than petiole or in terminal panicles; pedicels very short. Bracts ovate, shining brownish tomentose. Calyx appressed shining greyish brown pubescent; tube funnel-shaped; teeth unequal, lanceolate. Corolla little longer than the calyx. Pods ovoid-ellipsoid, turgid, finely greyish pubescent.

Fl. & Fr.: September-November.

Distribution: India: Almost throughout India.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1100

Flemingia stricta Roxb., Baker in Hook. f., Fl. Brit. Ind. 2:228. 1876; Grierson & Long, Fl. Bhut. 1.3:708. 1987; Kanjilal *et al.*, Fl. Assam 2:89. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:480. 2002.

Shrubs, up to 4 m tall. Branches angular, hairy. Leaves 3-foliolate; petioles 6-12 cm long, triquetrous, deeply sulcate, narrowly winged; leaflets ovate to oblong-

lanceolate, 10-28 x 7-13 cm, apex acuminate, base rounded or cuneate, oblique in lateral leaflets, glabrous and densely hispid pubescent on nerves above, pubescent on nerves and gland dotted beneath; petiolules densely hairy; stipules lanceolate, caducous, tomentose. Flowers purple, in dense spike-like racemes; racemes often fascicled. Lower bracts larger than the others, sub-persistent; upper bracts linear, closely imbricating the flowers in bud forming a cone-shaped. Calyx dense hairy; tube funnel-shaped; teeth unequal, lanceolate. Corolla longer than the calyx. Pods ellipsoid, turgid, finely brownish pubescent.

Fl. & Fr.: March-May.

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1100.

Mastersia Benth.

Woody climbers. Leaves pinnately 3-foliolate; leaflets entire; stipules caducous; stipels present. Racemes axillary and terminal. Flowers borne in clusters of 2-3 at small nodes; bracts and bracteoles present. Calyx lobes longer than tube, upper 2 connate into a broad entire lip. Petals shortly clawed; standard suborbicular; wings obliquely oblong; keel broad, slightly incurved. Stamens diadelphous. Ovary with numerous ovules; style glabrous; stigma capitate. Legumes oblong-linear, compressed, narrowly winged along upper suture, indehiscent. Seeds numerous, oblong, transversely arranged.

Mastersia assamica Benth., Grierson & Long, Fl. Bhut. 1.3:694. 1987; Kanjilal *et al.*, Fl. Assam 2:76. 1997 (Repr.). *Mastersia cleistocarpa* Baker in Hook. f., Fl. Brit. Ind. 2:195. 1876.

Woody climber. Branches terete, glabrous. Leaves 3-foliolate; petioles 4-11 cm long, sparsely appressed hairy; leaflets elliptic-obovate or ovate-lanceolate, 8.5-13 x 5-7 cm, apex shortly acuminate, base rounded or truncate, lateral leaflets oblique at base, puberulus above, pale and minutely pubescent beneath; stipels linear; stipules ovate-triangular with broad base. Bracts ovate, striate, hairy. Flowers purplish orange, fascicled on swollen nodes of long rachis, in axillary and terminal racemes. Calyx golden yellowish hairy; tube campanulate; teeth lanceolate, the upper two connate. Corolla longer than the calyx; standard suborbicular; wings oblique, oblong; keel obtuse, incurved. Stamens diadelphous. Styles short, incurved, glabrous; stigma capitate. Pod oblong, flattened, narrowly winged along upper suture, glabrous, indehiscent.

Fl. & Fr.: August-October.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Nagaland.

Myanmar and Tibet.

Specimen examined: AJNU 1081.

Millettia Wight & Arn.

Trees or woody climbing shrubs. Leaves imparipinnate; leaflets opposite; stipules present; stipules small, caducous or persistent. Flowers in simple and axillary racemes or terminal panicles. Calyx campanulate, teeth short or truncate. Corolla much longer than

the calyx; standard broad, oblong, obovate; wings oblong, not fused with keel, clawed at base; keel not beaked, clawed at base. Stamens monadelphous or diadelphous; filaments filiform, sometimes connate from the middle. Styles filiform, incurved, glabrous; stigma capitate. Pod linear or oblong, flat or turgid.

Key to Species

1a. Climbers; racemes paniced

2a. Leaflets 5; stamens diadelphous

M. cinerea

2b. Leaflets 11-17; stamens monadelphous

M. pachycarpa

1b. Shrubs or small trees; racemes simple; stamens monadelphous *M. pulchra*

Millettia cinerea Benth., Baker in Hook. f., Fl. Brit. Ind. 2:106. 1876; Balakr., Fl. Jowai 1: 161. 1981; Haridasan & Rao, Forest Fl. Megh. 1:304. 1985; Grierson & Long, Fl. Bhut. 1.3:658. 1987; Kanjilal *et al.*, Fl. Assam 2:28. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:487. 2002.

Large woody climber. Leaves 5-foliolate, 8-25 cm long; petioles 1.2-5 cm long, densely hairy; leaflets elliptic or obovate-oblong, 4-14 x 1.2-4.5 cm, apex acute or shortly acuminate, base rounded or obtuse, glabrous, sparsely hispid on nerves above, finely grey pubescent beneath; petiolules, hairy; stipules linear, hairy; stipules subulate. Flowers crimson or purplish, in terminal paniculate racemes; racemes silky pubescent; pedicels up to 0.6 cm long, densely silky hairy. Bracts linear, hairy. Calyx densely silky; tube campanulate, 0.4-0.5 cm long; teeth unequal, short, triangular. Corolla standard not

auricled, densely silky on the back. Stamens diadelphous. Pods flattened, 6-16 x 2-3 cm, densely brown tomentose, constricted between seeds; 1-3 seeded.

Fl. & Fr.: July-October.

Distribution: India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Thailand, Tibet and Vietnam.

Specimen examined : AJNU 1215.

Millettia pachycarpa Benth., Baker in Hook. f., Fl. Brit. Ind. 2:106. 1876; Haridasan & Rao, Forest Fl. Megh. 1:305. 1985; Grierson & Long, Fl. Bhut. 1.3:658. 1987; Kanjilal *et al.*, Fl. Assam 2:27. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:487. 2002.

Tall climbing shrubs. Young shoots and branches brown velvety. Leaves 30-50 cm long, 11-17 foliolate; petioles up to 12 cm long; leaflets obovate-oblanceolate, 5-18 x 2.3-6 cm, apex shortly acuminate, base cuneate, glabrous or sparsely pilose above, densely appressed brown pubescent beneath; petiolules 0.4-0.6 cm long; stipules broadly ovate-triangular, about 0.4 x 0.5 cm. Flowers pinkish-white, fascicled at nodes in paniculate racemes; pedicels 0.3-0.5 cm long. Calyx campanulate, 0.5-0.6 cm long, densely brown pubescent; teeth very short, broad triangular. Corolla 2-2.5 cm long. Stamens monadelphous. Pod 6-20 x 3-5 cm, constricted between seeds, pubescent then becomes glabrous later; 1-3 seeded.

Fl. & Fr.: April-July.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh, China, Laos, Myanmar, Nepal, Taiwan, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1271.

Millettia pulchra Kurz, Baker in Hook. f., Fl. Brit. Ind. 2:104. 1876; Balakr., Fl. Jowai 1: 161. 1981; Haridasan & Rao, Forest Fl. Megh. 1:305. 1985; Kanjilal *et al.*, Fl. Assam 2:25. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:490. 2002.

Shrubs or small trees, up to 10 m tall. Young shoots densely tomentose; branches pubescent. Leaves 17-26 cm long, 15-21 leaflets; petioles pubescent; leaflets elliptic-oblong or obovate-elliptic, 5-7.5 x 2.2-4 cm, apex acute or shortly acuminate, base rounded or obtusely cuneate, finely pubescent on both the surfaces, pale beneath; stipules minute, ovate, hairy; stipules ligulate. Flowers white, fascicled on short peduncles from the main rachis, in axillary racemes. Calyx hairy; tube campanulate; teeth minute. Corolla 0.8-1 cm long; standard sparsely hairy. Stamens monadelphous. Pod flattened, 5-10 x 1-1.5 cm, appressed hairy; 2-3 seeded.

Fl. & Fr.: September-November.

Distribution: India: Assam, Manipur, Meghalaya and Nagaland.

Bangladesh, China, Laos, Myanmar, Taiwan, Vietnam.

Specimen examined: AJNU 1500.

Mucuna Adans.

Climbing herbs and shrubs. Leaves pinnately 3-foliolate; stipellate; stipules small, caducous. Flowers large, fascicled in axillary or lateral racemes on old leafless wood.

Calyx broadly campanulate; upper two teeth connate; lowest longer than the middle ones. Corolla much exserted; standard not more than half as long as the rostrate keel; wings little shorter or equal to keel. Stamens diadelphous. Styles incurved, glabrous; stigma capitate. Pod variously shaped, usually covered with irritating bristles.

Mucuna imbricata DC., Baker in Hook. f., Fl. Brit. Ind. 2:185. 1876; Haridasan & Rao, Forest Fl. Megh. 1:308. 1985; Grierson & Long, Fl. Bhut. 1.3:686. 1987; Kanjilal *et al.*, Fl. Assam 2:66. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:491. 2002.

Large woody climber. Branches puberulus. Leaves 3-foliolate; petioles 3.5-8 cm long; leaflets 6.5-16 x 4-10 cm, glabrescent above, sparsely pale hairy beneath; terminal one ovate, apex acuminate, base rounded- truncate; lateral ones obliquely ovate, base shallowly cordate; petiolules hairy; stipules minute, linear; stipules lanceolate, hairy, caducous. Flowers dull purple, on long pendulous pedunculate laxly 8-10 flowered racemes, borne on old leafless wood; pedicels grey hairy. Bracts broadly ovate. Calyx campanulate, bristly hairy; teeth ovate triangular- ovate- lanceolate. Corolla 4-4.5 cm long; standard apex emarginate; keel abruptly bent inward at the tip. Pod oblong 6-12 x 3.5-5 cm, winged at both sutures, obliquely plaited, and densely covered with brittle ferruginous bristles. Seeds large; 2-4 seeded.

Fl. & Fr.: June-September.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Manipur, Mizoram, Nagaland, Sikkim, Uttarakhand and West Bengal. Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka.

Specimen examined: AJNU 1361.

Spatholobus Hassk.

Climbing shrubs. Leaves pinnately 3-foliolate; stipules small, caduceous. Panicles axillary or terminal. Flowers small and numerous, usually few clustered at nodes of rachis or branches; bracts and bracteoles small. Calyx campanulate or terete, usually with short teeth, 2-lipped. Corolla exserted; petals all clawed; standard ovate or suborbicular, apex emarginate or lobed; wings oblong, obovate-oblong, or subspatulate, base sometimes auriculate, apex obtuse or rounded; keel shorter or longer than wings, apex obtuse. Stamens diadelphous; anthers elliptic or suborbicular, equal in size or 5 larger and 5 smaller. Ovary shortly stipitate or sessile, 2-ovuled; style slightly incurved, glabrous or hairy; stigma small, terminal, capitate. Pods sessile or stipitate, oblong, compressed, densely puberulent, 1-seeded, dehiscent. Seed flat.

Spatholobus parviflorus (Roxb.) Kuntze, Rev. Gen. Pl. 1:205 1891; Ohashi in Fl. E. Himal. 164. 1966. *Butea parviflora* Roxb. Fl. Ind. ed. 2, 3: 248. 1832. *Spatholobus roxburghii* Benth. in Miq. Fl. Jungh. 238. 1852; Baker in Hook. f. Fl. Brit. Ind. 2: 193. 1876; Gamble, Man. Ind. Timb. 243 1902. Brandis, Ind. Trees 229. 1906; Kanjilal *et al.*, Fl. Assam 2: 75. 1938.

Large evergreen woody climbers; branches pubescent. Leaves 3-foliolate; common petioles 5-15 cm long; leaflets 7-18 x 4-10 cm, terminal leaflet broadly elliptic, ovate-obovoid, lateral leaflets oblique, base rounded or cuneate, shortly acuminate at apex, glabrous above, densely silky grey tomentose beneath; lateral nerves 7-10 pairs. Flowers in terminal, long tomentose panicles; flowers 0.5-1 cm long, creamy-white.

Calyx densely pale pubescent. Petals subequal. Pods erect, 8-15 cm long, coriaceous, flat, wing like, containing one distal side, densely brown, velvety, dehiscing from apex.

Fl. & Fr.: June– October.

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1460.

Tephrosia Pers.

Tephrosia candida DC., Baker in Hook. f., Fl. Brit. Ind. 2:111. 1876; Balakr., Fl. Jowai 1: 171. 1981; Haridasan & Rao, Forest Fl. Megh. 1:313. 1985; Kanjilal *et al.*, Fl. Assam. 2:31. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:499. 2002.

Shrubs. Stems much- branched; branchlets obscurely angled, densely silky tomentose. Leaves imparipinnate; rachis tomentose; leaflets 15-27, elliptic-oblong, 3-7.2 x 1-1.7 cm, apex acute with mucronate tip, base cuneate, pubescent above, pale brownish silky appressed hairy beneath, margin densely ciliate; petiolules densely hairy; stipules lanceolate. Bracts lanceolate, ciliate. Flowers creamy-white, fascicled on swollen nodes of rachis, in axillary and terminal racemes; pedicels densely hairy. Calyx densely appressed pubescent; tube funnel-shaped; teeth short, triangular. Corolla brownish silky pubescent outside; standard broad suborbicular-obovate; wings oblong-obovate, slightly adnate to keel; keels incurved. Stamens diadelphous. Styles flattened, silky. Pod linear, flattened, 7-12 x 0.7-1 cm, densely appressed fine silky hairy; 7-12 seeded.

Fl. & Fr.: August-November.

Distribution: India: Almost throughout India.

Bangladesh and Nepal.

Specimen examined: AJNU 1309.

Uraria Desv.

Perennial herbs or under shrubs. Leaves 1-foliolate or 3-9-foliolate. Racemes or panicles, terminal or axillary. Flowers numerous, dense, small. Bracts deciduous or persistent, imbricate; bracteoles absent. Calyx 5-lobed, lower 3 lobes usually longer, upper 2 lobes partly connate. Standard orbicular or broadly obovate, clawed, auriculate; wings shortly clawed, auriculate; keel obtuse, slightly incurved, auriculate. Stamens diadelphous (9+1); anthers uniform. Ovary sessile, 2-10-ovuled; style incurved, linear; stigma capitate. Legume small, jointed; articles 2-8, plicate or peltate, not dehiscent, with 1 seed per article.

Uraria crinita (L.) Desv. ex DC., Prodr. 2: 324. 1825; Baker in Hook.f., Fl. Brit. India 2: 155. 1876; Kanjilal *et al.*, Fl. Assam 2: 40. 1938; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 91. 1938. *Hedysarum crinitum* L., Mant. 1: 102. 1767.

Shrubs, up to 1.5 m tall. Leaves 12-24 cm long, 3-7-foliolate; petioles 5-12 cm long. Leaflets oblong, 6-12 x 2-4 cm, base rounded, acute to mucronate at apex, coriaceous, glabrous above and hairy along the nerves beneath; petiolules up to 2 mm long. Inflorescence a raceme, 5-30 cm long, simple, terminal, hairy; bracts ciliate. Calyx segments densely plumose. Corolla purple. Pods compressed, slightly pubescent, divided transversely into 4-6 segments. Seeds orbicular, black in color.

Fl. & Fr.: April –September.

Didtribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Tripura.

Bangladesh, Cambodia, China, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1224.

CAESALPINIACEAE R. Br.

Trees, shrubs or herbs, sometimes twining or climbing. Leaves pinnate, simple or 1-foliolate. Flowers zygomorphic, large, in elongated racemes or spikes. Sepals 5. Petals 5 or fewer, unequal. Stamens 10, free. Fruit a legume, indehiscent.

Key to Genera

1a. Leaves 1-foliolate, entire or bilobed

2a. Trees or shrubs, without tendrils

Bauhinia

2b. Climbers with tendrils

Phanera

1b. Leaves pinnate

3a. Petals absent; calyx segments petaloid

Saraca

3b. Petals present; calyx segments not petaloid

Cassia

Bauhinia Plum.ex L.

Trees or shrubs, erect or climbing by tendrils. Leaves simple, usually bilobed at apex, palmately nerved; stipules small, caducous. Flowers bisexual or dioecious, in axillary or terminal racemes or panicles. Bracts and bracteoles small, caducous. Calyx tube cylindrical or turbinate, limb 5, entire or spathe-like. Petals 5, subequal, usually clawed at base. Stamens 10, often 5 or more reduced to staminodes, filaments free,

anthers versatile. Ovary stalked, many ovuled. Pods linear, oblong, flat, dehiscent or indehiscent.

Bauhinia purpurea L., Sp. Pl. 375. 1753; Baker in Hook. f., Fl. Brit. India 2: 284. 1878; Kanjilal *et al.*, Fl. Assam 2: 141. 1938; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 91. 1938; *Phanera purpurea* (L.) Benth. in Miq., Pl. Jungh. 262. 1852.

Medium sized, erect tree, 5-10 m tall. Leaves 6-15 x 5-12 cm, shallowly cordate; lobes obtuse-subacute at apex, glaucous above, minutely puberulous on the nerves beneath; petioles swollen at both ends. Racemes corymbose or paniculate, tomentose; bracts and bracteoles minute, deltoid, tomentose. Flowers pinkish purple; calyx tomentose; petals oblanceolate, long clawed, reddish; stamens 3, fertile. Pods oblanceolate-subfalcate, 16-28 x 1.5-2.5 cm, flat, 12-15-seeded. Seeds flattened, smooth, roundish, dark brown.

Fl. & Fr.: September-April.

Distribution: India: Almost throughout India.

Bangladesh, Myanmar, Nepal and Pakistan.

Specimen examined: AJNU 1138. **PL-19**

Cassia L.

Trees, shrubs or herbs. Leaves even-pinnate, rachis often with glands between the leaflets or at the base. Stipules present. Flowers solitary, axillary, or in axillary or terminal racemes or panicles. Sepals and petals 5, unequal. Stamens 10, rarely all perfect or equal. Pods linear, flat.

Key to the species

- 1a. Leaf rachis with a gland at the base
 - 2a. Leaflets 4-5 pairs *C. occidentalis*
 - 2b. Leaflets 6-12 pairs *C. sophera*
- 1b. Leaf rachis with two glands between the two lowest pairs of leaflets *C. tora*

Cassia occidentalis L., J. G. Baker in Hook. f., Fl. Brit. Ind. 2:262. 1878; Haridasan & Rao, Forest Fl. Megh. 1:320. 1985; Grierson & Long, Fl. Bhut. 1.3:631. 1987; Kanjilal *et al.*, Fl. Assam 2:129. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:516. 2002; Yadav & Sardesai, Fl. Kolh. Dist. 172. 2002.

Herbs or under-shrubs. Leaf rachis glabrous, with a conical gland at the base; leaflets 4-5 pairs, shortly stalked up to 0.2 cm long, ovate- elliptic, apex acuminate, base rounded, margin ciliate; stipules ovate, obliquely cordate, caducous. Flowers yellow with distinct purple nerved in terminal or axillary, few flowered racemes. Bracts ovate, base oblique, apex acuminate, up to 1cm long. Sepals ovate, glabrous. Petals obovate. Stamens 10; 2 larger, 4 smaller, 4 minute sterile. Pods slightly curved, compressed.

Fl. & Fr.: September-December.

Distribution: India: Almost throughout India.

Argentina, Bahamas, Brazil, Colombia, Costa Rica, Cuba, Mexico, Netherlands, Paraguay, Peru, Puerto Rico, Trinidad-Tobago, Uruguay and Venezuela.

Specimen examined: AJNU 1322

Cassia sophera L., J. G. Baker in Hook. f., Fl. Brit. Ind. 2:262. 1878; Grierson & Long, Fl. Bhut. 1.3:631. 1987; Kanjilal *et al.*, Fl. Assam 2:130. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:518. 2002; Yadav & Sardesai, Fl. Kolh. Dist. 174. 2002.

Annual under-shrubs. Leaf rachis villous pubescent, with a conical gland at the base; leaflets 6-12 pairs, shortly stalked ovate-elliptic, apex acute, base cuneate- rounded, villous pubescent on both the surface; stipules ovate, caducous. Flowers yellow in axillary, few flowered racemes. Bracts small, ovate. Calyx lobes elliptic- ovate, pubescent with long hairs outside. Petals obovate. Stamens 10. Pods linear, sub-terate, straight or curved, covered densely with golden pubescent long hairs when young.

Fl. & Fr.: September-December.

Distribution: India: Almost throughout India.

Bahamas, Cuba, Jamaica, Netherlands Panamá, Puerto Rico and Trinidad-Tobago

Specimen examined: AJNU 1322

Cassia tora L., J. G. Baker in Hook. f., Fl. Brit. Ind. 2:263. 1878; Balakr., Fl. Jowai. 1: 176. 1981; Haridasan & Rao, Forest Fl. Megh. 1:320. 1985; Grierson & Long, Fl. Bhut. 1.3:632. 1987; Kanjilal *et al.*, Fl. Assam 2:131. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:520. 2002; Yadav & Sardesai, Fl. Kolh. Dist. 174. 2002.

Annual under-shrubs. Leaf rachis sparsely pubescent, with two subulate glands between the 2 lowest pairs of leaflets; leaflets 3 pairs, sub-sessile, obovate, apex obtuse, mucronate, base cuneate-rounded, pubescent on both the surface; stipules linear-lanceolate, persistent. Flowers yellow, in pairs on short axillary peduncles, crowded towards apex; pedicels pubescent. Calyx lobes elliptic-ovate, pubescent. Petals obovate,

prominently nerved. Stamens 7 fertile; 3 larger, 4 smaller; 3 reduced to staminodes. Pods slender, sub-tetragonous.

Fl. & Fr.: September-December.

Distribution: India: Almost throughout India.

Belize and El Salvador.

Specimen examined: AJNU 1323

Phanera Lour.

Lianas with tendrils. Leaves usually bilobed, sometimes entire and acute to retuse at apex; petioles with pulvinus at ends. Stipules deciduous. Flowers few to many in terminal, subaxillary to axillary, panicles or subumbels, zygomorphic, bisexual. Bracts and bracteoles deciduous. Hypanthium very short, turbinate or cylindrico-turbinate to long tubular. Calyx 5-merous, cup-shaped. Petals 5, free, subequal; claw well-developed. Fertile stamens 3; filaments free or shortly connate at base. Ovary 1 to many ovulate; style short or elongate; stigma capitate, peltate. Pods oblong to elliptic, dehiscent or indehiscent. Seeds with or without endosperm.

Phanera tenuiflora (Watt ex C.B. Clarke) de Wit in Reinwardtia 3: 490. 1956. *Bauhinia tenuiflora* Watt ex C.B. Clarke, J. Linn. Soc., Bot. 25: 18, t. 6. 1889; Kanjilal *et al.*, Fl. Assam 2: 146. 1938. *Phanera glauca* Benth. subsp. *tenuiflora* (Watt ex C.B. Clarke) A. Schmitz, Bull. Soc. Roy. Bot. Belgique 110: 14. 1977; Bandyop. in P. Singh & Bandyop. (eds.), Fasc. Fl. India 26: 52, t. 14. 2014. *Cheniella tenuiflora* (Watt. ex C.B. Clarke) R. Clark & Mackinder, Eur. J. Taxon. 360: 23. 2017.

Lianas with tendrils. Leaves ovate-orbicular, 4–9.4 × 4–8 cm, bifid, base shallowly cordate to truncate, glabrous to rarely glabrescent above, sparsely pubescent to glabrous beneath; petioles glabrescent to glabrous. Stipules linear pubescent. Racemes corymbose, terminal, subaxillary or leaf-opposed; rachis with scars of fallen pedicels. Hypanthium tubular, pubescent. Bracts linear, pubescent; bracteoles similar. Flowers white; petals broadly obovate, obtuse at apex, veined, glabrous inside, glabrescent outside, calyx 2 or 3-lobed. Fertile stamens 3; ovary glabrous; style, long, glabrous; stigma obliquely peltate. Pods oblong, acuminate at apex, flattened, glabrous, indehiscent.

Fl. & Fr.: April - march

Distribution: India: Almost throughout India.

Belize and El Salvador.

Specimen examined: AJNU 1172. **PL-19**

Saraca L.

Trees. Leaves pinnate, leaflets few, leathery; stipules 2, caducous; petiole robust, with glandular nodes. Inflorescence corymbose panicles axillary or terminal; involucre caducous; bract 1, smaller or larger than bracteoles; bracteoles 2, usually persistent. Flowers bisexual or unisexual, yellowish to deep red, with short pedicels. Calyx tubular; lobes 4, ovate-oblong, imbricate. Petals absent. Stamens 4-10; filaments free; anthers oblong or suborbicular, dorsifixed. Ovary compressed, oblong; style filiform; stigma terminal, capitate. Seeds 1-8, compressed, elliptic to ovoid.

Saraca asoca (Robx.) de Wilde, Blumea 15; 393. 1968. *Jonesia asoca* Roxb., Asiat. Res. 4: 365. 1785. *Saraca indica* auct. non L., 1767; Baker in Hook.f., Fl. Brit. India 2: 271. 1878; Kanjilal *et al.*, Fl. Assam 2: 136. 1938; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 92. 1938.

Medium sized trees; bark almost black, lenticellate. Leaves paripinnate, sessile-subsessile; rachis 10- 25 cm long, glabrous; stipules intrapetiolar, ovate-oblong, scarious, obtuse; leaflets oblong or oblong-lanceolate, 6-20 x 3-7 cm, base slightly unequal to rounded, acute or obtuse at apex, subcoriaceous, glabrous. Flowers orange- red, in sessile, corymbose, axillary panicles; corymbs 7-10 cm broad; bracteoles ascending, oblong-spathulate; sepals 4, oblong-obovate, subpetaloid; tube elongate; petals absent. Pods oblong, compressed, glabrous, coriaceous, 4-8-seeded. Seeds ellipsoid-oblong.

Fl. & Fr.: April-October.

Distribution: India: Assam, Karnataka, Kerala, Manipur, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Tamil Nadu and Tripura.
Bangladesh, Myanmar, Nepal and Sri Lanka.

Specimen examined: AJNU 1040

MIMOSACEAE R. Br.

Trees, shrubs or climbers. Leaves bipinnate. Flowers actinomorphic, small, in spikes or globose heads, bisexual or polygamous. Calyx tubular, teeth, short. Corolla free or united at base. Stamens 10 to many, free, filaments united at base. Fruit a legume.

Key to Genera

- 1a. Lianas with tendrils at leaf tips; flowers in elongated spikes *Entada*
- 1b. Trees or scandent shrubs; flowers in heads or racemes
 - 2a. Heads axillary, solitary on drooping peduncles *Parkia*
 - 2b. Heads fascicled or paniced
 - 3a. Stamens 10 or few *Mimosa*
 - 3b. Stamens more than 10 *Albizia*

Albizia Durazz Mag.

Unarmed shrubs or trees. Leaves evenly bipinnate, petiole and rachis with glands; stipules usually small, caducous. Flowers small in globose heads, arranged in axillary or terminal panicles. Calyx tubular or campanulate, obscurely 5-toothed. Corolla funnel shaped, 5-lobed. Stamens numerous, exserted, filaments connate into a tube at base, anthers small. Central flowers of heads slightly larger with much longer filament tube. Style long, stigma minute. Pods flat, oblong, indehiscent or dehiscent along both sutures, continuous inside.

Key to Species

- 1a. Pinnae 6-15 Pairs; flowers heads in panicles ... *A. chinensis*
- 1b. Pinnae 2-6 pairs:
 - 2a. Flower heads in corymbose racemes; flowers padicellate... *A. lebeck*
 - 2b. Flower heads in panicles; flowers sessile ... *A. procera*

Albizia chinensis (Osbeck) Merr., Amer. J. Bot. 3: 575. 1916; *Mimosa chinensis* Osb. Dag. Ostind. Res. 233. 1757; *M. stipulata* Roxb., Fl. Ind. 2: 549. 1832; *A. stipulata* (Roxb.) Boivin, Encycl. 19. 2: 33. 1838; Baker in Hook.f. Fl. Brit. Ind. 2: 300. 1878; Kanjilal *et al.*, Fl. As. 2: 167. 1938; Balakr., Fl. Jowai 1: 177. 1981; Grierson & Long, Fl. Bhut. 1.3: 646. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 530. 2002.

Trees, 20-30 m high, with spreading crown. Bark dark brown, horizontally wrinkled, lenticellate. Leaf rachis 15-30 cm long, with a large gland near the base; pinnae 7-20 pairs; leaflets 20-40 pairs, oblong-lanceolate, 0.5-1 cm long, apex obliquely acute, base obliquely truncate, glabrous above, pubescent beneath. Stipules ovate, base cordate. Flowers yellowish-white, in axillary and terminal paniced racemes of globose heads. Bracts stipule like, persistent, pubescent. Calyx tubular, tomentose. Corolla pubescent outside, ovate-lanceolate. Stamens numerous, much longer than corolla, connate at base. Pods elliptic-oblong, 10-16 cm long, flattened, glabrous, indehiscent.

Fl. & Fr.: April - August

Distribution: India: Almost throughout India.

Bangladesh, Borneo, Cambodia, China, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1311. **PL-16**

Albizia procera (Roxb.) Benth. in Hook. Lon. J. Bot. 3: 89. 1844; Baker in Hook. f., Fl. Brit. India 2: 299. 1878; Gamble Man, Ind. Timb. 305. 1902; Brandis, Ind. Trees 271. 1906; Kanjilal *et al.*, Fl. Assam 2: 163. 1938; Deb, Fl. Tripura 1: 131. 1981; Haridasan &

Rao, For. Fl. Meghalaya 1: 336. 1985. *Mimosa procera* Roxb., Pl. Corom. 2:12.t.121. 1798.

Trees, large. Bark smooth, peeling off in thin irregular flakes. Leaves rachis with a large gland near the base. Leaflets 6-12 pairs, obliquely oblong, obtuse. Flowers sessile, pale yellowish, in solitary or fascicled heads arranged in large terminal panicles. Pods reddish-brown.

Fl. &Fr.: August-December.

Distribution: India: Almost throughout India.

Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka.

Specimen examined: AJNU 1313

Albizia lebbeck (L.) Benth., London J. Bot. 3: 87. 1844; Baker in Hook.f. Fl. Brit. Ind. 2: 298. 1878; Kanjilal *et al.*, Fl. As. 2: 165. 1938; Grierson & Long, Fl. Bhut. 1.3: 644. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 531. 2002; *Mimosa lebbeck* L., Sp. Pl. 516. 1753.

Large trees, with spreading crown; bark grey-brown, irregularly fissured, branches lenticellate. Leaf rachis 7-15cm, with a large oblong gland at base; pinnae 2-4 pairs; leaflets 4-10 pairs, oblong-elliptic, 2-4 cm, apex obtuse, emarginate, base unequal, glabrous above, sparsely pubescent beneath. Flowers greenish-white, fragrant, in axillary or supra-axillary pedunculate heads, heads 15-30 flowered; solitary or 3-4 fascicled. Bracts linear, tomentose, caducous. Calyx funnel-shaped, pubescent, teeth short. Corolla funnel-shaped, lobed to middle. Stamens exerted, filaments greenish above, white at base. Pods oblong, flat, 15-30 cm; 5-12 seeded.

Fl. & Fr.: May - October

Distribution: India: Almost throughout India.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1312

Entada Adans.

Lianas or scandent shrubs; glands on rachilla absent; spikes usually slender, solitary, rarely paired. Flowers bisexual or polygamous, 5-merous; petals free; stamens 10, free; anthers de:iduously glandular; lomentum falcate or straight, margins usually persistent, breaking up into 1-seeded segments.

Entada rheedei Spreng, Grierson & Long, Fl. Bhut. 1.3:638. 1987; Singh in Singh *et al.*, Fl. Mizo. 1:537. 2002; Yadav & Sardesai, Fl. Kolh. Dist. 182. 2002. *Entada phaseoloides* (L.) Merr., Balakr., Fl. Jowai. 1:180. 1981; Polunin & Stainton, Flow. 1:338. 1985. *Entada scandens* auct. Non Benth., J.G. Baker in Hook. f., Fl. Brit. Ind. 2:300. 1878; Kanjilal *et al.*, Fl. As. 2:167. 1997.

Large woody climber. Leaves bipinnate; rachis usually ending with pair of tendrils; pinnae usually 2 pairs; leaflets 2-5 pairs, obovate-oblong or obovate-lanceolate, 2.5-7 x 1.5-3 cm, apex obtuse or shortly acuminate, base obliquely acute or cuneate, glabrous, petiolules 0.2-0.3 cm long; stipules small, bristle-like. Flowers pale greenish to pale yellowish, crowded on elongated peduncled axillary paniced spikes. Bracts minute, linear. Calyx campanulate, tomentose, obscurely 5-toothed. Petals 5, oblong lanceolate,

unequal, connate at base. Stamens 10, longer than the petals. Pods oblong-falcate, compressed, 30-90 x 7-10 cm, divided into 6-25 segments.

Fl. & Fr.: May- September.

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Tamil Nadu and Tripura.
Bangladesh, China, Laos, Myanmar and Nepal

Specimen examined: AJNU 1285. **PL-19**

Mimosa L.

Herbs or shrubs, climbers, usually armed. Leaves bipinnate or pinnae digitately arranged, often sensitive; stipules persistent. Flowers bisexual or polygamous, small, sessile in globose heads or spikes, solitary or fasciculate, axillary, pedunculate. Calyx campanulate, minutely toothed. Petals 4, connate at base. Stamens 4 or 8, free, exerted; anthers without glands. Pod compressed, 1 seeded in each segment.

Mimosa pudica L., Sp. Pl.: 518. 1753; Baker in Hook.f. Fl. Brit. Ind. 2: 291. 1878; Kanjilal *et al.*, Fl. As. 2: 152. 1938; Haridasan & Rao, For. Fl. Megh. 1: 340. 1985; Grierson & Long, Fl. Bhut. 1.3: 639. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 539. 2002.

Straggling prickly shrubs. Branchlets bristly hairy. Leaves sensitive, petiole deflexed, bristly hairy; pinnae digitately 4; leaflets 10-20 pairs, oblong, 0.5-1 cm, obliquely rounded at base, apex acute, sparsely hairy beneath, margin ciliate with bristles; stipules lanceolate, bristly. Flowers small, purplish-pink, in axillary pedunculate heads; peduncle 2-4 cm; heads 1-4, usually in pairs in each axil; bracts linear. Stamens 4,

exserted. Pods linear, oblong, 1.5-2.5 cm long, divided into 2-5 rounded segments, covered with soft bristled.

Fl. & Fr.: May – September

Distribution: India: Almost throughout India.

Widely distributed throughout North America.

Specimen examined: AJNU 1342 **PL-16**

Parkia R. Br.

Trees; peduncles usually axillary and solitary; heads globose or clavate; flowers 5-merous, usually bisexual, lower ones sterile with staminodes; stamens 10, anthers glandular at tip; pods linear, woody or compressed, seeds transverse.

Parkia timoriana (DC.) Merr., Singh in Singh et al., Fl. Mizo. 1:539.2002. *Parkia roxburghii* G. Don, J. G. Baker in Hook. f., Fl. Brit. Ind.2:289. 1878; Haridasan & Rao, Forest Fl. Megh. 1:340. 1985; Kanjilal *et al.*, Fl. As. 2:151. 1997 (Repr.).

Medium-large trees. Branches spreading, pubescent; branchlets lenticellate. Leaves bipinnate; leaf rachis, hairy, with a solitary gland between the lower pair of pinnae and the base; pinnae 8-30 pairs; leaflets 40-80 pairs, linear-oblong, falcately curved towards the apex, apex acute, base unequally truncate, glabrous, margin ciliate, midrib prominent. Flowers dull white or pale yellow, in dense turbinate or clavate long peduncled heads; peduncle 30-45 cm long. Bracts spatulate, silky pubescent. Calyx tube tubular glabrous; teeth short, pilose. Corolla tubular, lobed; lobes spreading. Stamens 1-. Exserted; filaments fused at the base and adnate to the corolla tube; stigma capitate. Pod flattened, slightly twisted,

Fl. & Fr.: October- March.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura and Madhya Pradesh (cultivated).

Bangladesh, Borneo, Malaysia, Myanmar and Thailand.

Specimen examined: AJNU 1347

ROSACEAE Juss.

Trees, shrubs or herbs. Leaves alternate, rarely opposite, simple or compound; stipules present; sometimes with thorns and prickles. Flowers solitary or often in fascicles, racemes, cymes, corymbs or panicles, regular, bisexual. Calyx-tube free or adnate to ovary; lobes usually 5, sometimes with as many outer epicalyx. Petals usually 5, free. Stamens numerous in one or many series; filaments free, incurved in bud. Ovary of one or more in each carpels, either hypogynous, perigynous or epigynous; styles simple, free, or sometime connate. Fruits various, achenes, berries or drupes, rarely a capsule.

Duchesnea Sm.

Perennial herbs. Stolons procumbent, long, filiform, bearing adventitious roots. Radical leaves several, stolon leaves alternate, long petiolate; stipules paired, persistent. Leaf blade 3-foliolate; leaflets dentate at margin. Inflorescence axillary, ebracteate, a solitary flower. Sepals 5, persistent; epicalyx segments 5. Petals 5, yellow, obovate. Stamens numerous; anthers subglobose. Carpels numerous, free, inserted on convex receptacle; style subterminal, deciduous; stigma entire. Fruits aggregate, fleshy. Seed reniform, smooth.

Duchesnea indica (Andrews) Focke in Engl. & Prantl., Nat. Pflanzenfam. III. 3: 33. 1888.
Fragaria indica Andrews, Bot. Rep. t. 479. 1807; Hook. f, Fl. Brit. India 2: 343. 1878;
Kanjilal *et al.*, Fl. Assam 2: 203. 1938; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 92.
1938. *Potentilla indica* (Andrews) Wolf, Synop., der Mitt. Fl. 6: 661. 1904; Dixit &
Panigr., Rosaceae India 4: 133. 1988.

Perennial prostrate silky herbs; stipules ovate to lanceolate. Leaves digitately 3-foliolate; leaflets obovate, 0.7-3.0 x 0.6-1.5 cm, base cuneate, obtuse at apex, crenate at margins; whitish pilose on both surfaces; petioles 4-6 cm long. Flowers yellow, 1–2.5 cm across, pilose or densely villous. Sepals ovate, apex acute; epicalyx segments obovate, longer than sepals, apex serrate. Petals rounded at apex. Stamens 20–30. Carpels numerous, free. Achenes black, small, oblong, across, resting on shiny red conical or subglobose receptacles.

Fl. & Fr.: March – August

Distribution: India: Arunachal Pradesh, Assam, Nagaland and Sikkim.

Afghanistan, China, Japan, Jawa, Korea, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1014. **PL-16**

HYDRANGEACEAE Dumort.

Small trees, shrubs, subshrubs or climbing shrubs. Leaves simple, opposite, subsessile to petiolate, exstipulate, margins more or less serrate, glabrous or stellate hairs.

Inflorescence terminal, a cyme, corymb or raceme. Bracts and bracteoles present. Flowers bisexual. Sepals 4 or 5, connate into a tube more or less adnate to ovary, lobes distinct. Petals 4 or 5, free. Stamens 12–30, filaments linear, subulate or dilated. Ovary 3–5-lobed, inferior to partially superior, styles 2–6. Fruit a many-seeded, loculicidal capsule or berry.

Dichroa Lour.

Shrubs or subshrubs. Leaves opposite. Inflorescence terminal, a corymbose cyme or panicle. Flowers bisexual. Calyx tube adnate to ovary. Petals 5-6, variously coloured. Stamens 4-10. Fruit a fleshy berry, 1- valved. Seeds ovoid, minute.

Dichroa febrifuga Lour. Fl. Cochinch. 1: 301. 1790; Cl., in Hook. f. Fl. Brit. Ind. 2: 406. 1878; Kanjilal *et al.*, Fl. Assam 2: 228.1938; Deb in Bull. Bot. Surv. Ind. 3: 327. 1961; Chauhan in Singh *et al.*, Fl. Manipur 1: 372. 2000.

Shrubs up to 3 tall. Branchlets, petioles and veins pubescent. Leaves 7-26 x 2-12 cm elliptic, obovate, elliptic-oblong or lanceolate, base cuneate, margin serrate, apex acute to acuminate. Inflorescence a corymbose panicle, 3-25 cm. Flower buds obovoid. Calyx lobes 4-6, broadly deltoid, apex acute. Petals reflexed at maturity, blue or white, oblong-elliptic. Stamens 10-20. Berry dark blue when mature.

Fl. & Fr.: June -December

Distribution: India: Arunachal Pradesh, Meghalaya, Mizoram; Bhutan, China, Indonesia, Japan, Philippines.

Specimen examines: AJNU 1423. **PL-17**

ITEACEAE J.G. Agardh.

Trees or shrubs. Leaves alternate, simple, pinnately nerved, margin dentate or crenate; stipules absent. Flowers in axillary fascicled racemes. Calyx united, funnel shaped, 5-lobed, persistent, fused to ovary. Petals 5, free or united at base, alternating with the calyx lobes, persistent. Stamens 5. Ovary of 2 carpels; style simple; stigma capitate. Fruit a conical-shaped capsule of 2 fused carpels, dehiscent along the fused margin at maturity.

Itea L.

Trees or shrubs. Leaves simple, alternate, stipulate. Inflorescences terminal or axillary, a raceme or racemose panicle, many flowered. Flowers bisexual or unisexual, small. Sepals tube adnate to base of ovary; lobes 5, persistent. Petals 5, valvate. Stamens 5. Fruit a capsule, conical to linear-oblong, apex cleft; seeds tailed.

Itea macrophylla Wall. In Roxb., Fl. Indica 2: 419. 1824; Cl. In Hook. f., Fl. Brit. India 2: 408. 1878; Gamble, Man. Ind. Timb. 329. 1902; Brandis, Ind. Trees 298. 1906; Kanjilal *et al.*, Fl. Assam 2:230. 1938; Balak, Fl. Jowai 1: 193. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 371. 1985.

Shrubs or small trees, 4-6 m high. Leaves elliptic-oblong to broadly ovate, base rounded or sub-acute, acuminate, glandular-serrate; lateral nerves 7-10 pairs. Inflorescence in racemes, 1-8 in each axil. Flowers white with pale pink tinge. Capsule ovate. Seeds caudate at both ends.

Fl. & Fr.: April- January.

Distribution: India (N.E.India); Indo-Malaya, Bangladesh, Borneo, China South-Central, China Southeast, East Himalaya, Hainan, Jawa, Laos, Myanmar, Philippines, Thailand, Vietnam.

Specimen examined: AJNU 1067. **PL-6**

RHIZOPHORACEAE Pers.

Trees or shrubs. Leaves simple, opposite, entire or serrulate near apex, coriaceous; stipules interpetiolar, deciduous. Flowers regular, bisexual, in dense axillary cymes. Calyx 5-8-lobed, tube adnate to ovary, persistent. Petals as many as sepals, usually 2-fid or laciniate. Stamens twice the number of petals. Ovary inferior; styles connate. Fruit subglobose, coriaceous; 1-seeded.

Carallia Roxb.

Description as of Rhizophoraceae.

Carallia brachiata (Lour.) Merr., Philipp. J. Sci. 15: 249. 1919; Singh in Singh *et al.*, Fl. Mizo. 1: 571. 2002; Balakr., Fl. Jowai 1: 196. 1981; *Diatoma brachiata* Lour. Fl. Cochinch. 296. 1790; *C. lucida* Roxb., Pl. Corom. 3: 8. 1811; Kanjilal *et al.*, Fl. As. 2: 241. 1938; *C. integerrima* DC., Prodr. 3: 33. 1828; Henslow in Hook.f., Fl. Brit. Ind. 2: 439. 1878.

Small to medium sized trees. Branches often with adventitious roots. Leaves oblong-obovate or broadly elliptic, 6-15 x 3-8 cm, base cuneate, apex acuminate or obtuse, margin entire or rarely serrate, coriaceous, glossy; petioles 0.5-1 cm; stipules lanceolate, deciduous. Flowers white-greenish, in axillary cymes, sessile. Calyx lobes triangular, thick, green. Petals 5-8, white, orbicular. Berries globose; 1-seeded.

Fl. & Fr.: March - May

Distribution: India (throughout), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Madagascar, W Australia

Specimen examined: AJNU 1011

COMBRETACEAE R. Br.

Trees or shrubs, often scandent. Leaves alternate or opposite. Flowers generally small, bisexual, bracteates, racemose or paniculate. Calyx tube adnate to the ovary, lobes 4-8, valvate. Petals 4-5 or absent. Stamens usually 2-5 or twice as many as calyx lobes. Ovary inferior, unilocular. Fruit leathery, drupaceous or coriaceous, angled or often winged and one seeded.

Terminalia L.

Large trees. Leaves alternate or sub opposite, entire or slightly crenate, glandular on petioles or midrib beneath. Inflorescence in paniced spikes or solitary; bracts narrow, caduceus. Flowers bisexual, bracteates. Calyx tube constricted, 5 lobed. Petals absent. Stamens 10, inserted on calyx tube. Ovules 2-3, pendulous. Fruits angular, entire or winged.

Keys to species

- 1a. Fruits 2 – winged, very small *T. myriocarpa*
- 1b. Fruits lacking wings, usually large sized
 - 2a. Drupes globose *T. bellirica*
 - 2b. Drupes ellipsoid *T. chebula*

Terminalia bellirica (Gaertn.) Roxb., PI. Corom. 2: 54. t. 198. 1805 (Sphalm: bellerica)
C.B. Clarke in Hook.f., Fl. Brit. India 2: 445. 1878; Kanjilal *et al.*, Fl. Assam 2: 243.
1938. *Myrobalanus bellirica* Gaertn., Fruct. 2; 90. t. 97. f. a-d. 1791.

Deciduous trees, 25-40 m high; trunk buttressed at base; young parts rusty tomentose. Leaves whorled at the end of branches, obovate to broadly elliptic, 5-15 x 6-10 cm, base obtusely cuneate, abruptly acuminate at apex, glabrous above, glaucous beneath; petioles 3-6 cm long, usually with the glands. Spikes simple, axillary from new shoots, puberulous, drooping, 6-12 cm long. Flowers yellowish, foetid, smelling; calyx hairy outside, woolly within; limb cup-shaped with 5 teeth. Drupes globose, grey, tomentose.

Fl. & Fr.: April-December

Distribution: India: Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1383

Terminalia chebula (Gaertn.) Retz., Obs. Bot. 5: 31. 1789; Cl. In Hook. f., Fl. Brit. India 2: 446. 1878; Gamble, Man. Ind. Timb. 338: 1902; Brandis, Ind. Trees 308. 1906; Kanjilal *et al.*, Fl. Assam 2: 244. 1938; Deb, Fl. Tripura 1: 385. 1981; Haridasan & Rao, For. Fl. Maghalaya 1: 384. 1985. *Myrobalanus chebula* Gaertn., Fruct. 2:91. t.97. 1791.

Trees, deciduous. Leaves alternate or sub opposite, 8-20 x 5-10 cm, elliptic or elliptic-oblong, acute. Petiole with 2 or more glands near the top. Spikes terminal or from upper axils on new shoots, often paniced or fascicled. Flowers minute, greenish yellow, with obnoxious smell. Drupe ovoid-ellipsoid, yellowish green when ripe, slightly ridged.

Fl. & Fr.: May- February.

Distribution: India: Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Nagaland, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam

Specimen examined: AJNU 1133

Terminalia myriocarpa Heurck. & Muell,- Arg. In Obs. Bot. 215. 1870; C. B. Clarke Hook. f., Fl. Brit. India 2: 448. 1878; Gamble, Man. Ind. Timb. 344. 1902; Brandis, Ind. Trees 312. 1906; Kanjilal *et al.*, Fl. Assam 2: 247. 1938; Deb, Fl. Tripura 1: 385. 1985. *Myrobalanus myriocarpa* Kuntze., Rev. Gen, Pl. 237. 1891.

Trees, evergreen, upto 40 m high, with pendulous branches. Inflorescence rusty pubescent. Leaves 10-20 x 3-7 cm, oblong- lanceolate or oblong-elliptic, acute or acuminate at apex, denticulate – entire margins, glabrous above and hairy beneath; petioles with 2 glands. Spikes in lax panicles, terminal or from upper leaf axils. Flowers yellow. Calyx glabrous, pubescent within. Drupes yellow, 3 cornered, with 2 lateral wings.

Fl. & Fr.: September-March.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttarakhand, West Bengal.

Bangladesh, China, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam

Specimen examined: AJNU 1134

HERNANDIACEAE Blume

Trees, shrubs or vines. Leaves alternate, petiolate, exstipulate; the blade entire to palmately lobed. Inflorescences usually axillary, much-branched, compound cymes. Flowers epigynous, perfect or unisexual; bracteoles present or not; tepals in two whorls, imbricate or valvate; stamens a single whorl of 3-5; filaments mostly dorsally or at the base provided with a pair of nectariferous glands; anthers 2-locular, dehiscing by valves. Ovary inferior, 1-locular; ovule 1, pendulous. Fruit one-seeded, lateral or apical wings.

Illigera Blume

Evergreen woody climbers. Leaves alternate, 3-foliolate; leaflets acuminate. Inflorescence terminal and axillary, many or few-flowered with bracts. Perianth segments in 2 rows; tepals oblong or narrowly elliptic. Stamens 5, epigynous; filaments each at base with 2 appendages. Stamens alternating with mostly 5 small interstaminal glands. Ovule pendulous; filaments straight; anthers ovoid. Fruit a samara; the nut with 2 longer and 2 shorter lateral membranous wings. Seeds solitary with membranous testa.

Illigera khasiana Cl. in Hook. f., Fl. Brit. India 2: 461, 1878; Gamble, Man. Ind. Timb. 350. 1902; Brandis, Ind. Trees 542. 1906; Kanjilal *et al.*, Fl. Assam 4: 103. 1940.

Lianas; branches striate. Leaves 3-foliolate; petiole 4-10 cm. Leaf blade olive-brown on both surfaces when dry, lanceolate, rarely lanceolate-elliptic, 7-15 × 3-7 cm, subcoriaceous, abaxially glabrous, adaxially glabrous except pilose on midvein, base obtuse to rounded, apex acuminate. Inflorescence a panicle up to 22 cm long, usually drooping. Flower 1-1.5 cm long, dull reddish-brown. Outer tepals 0.8-1.2 cm. Inner tepals 0.9-1.2 cm, adaxially densely white hairs. Stamens with filaments pubescent adaxially. Ovary glabrous. Fruit 7.5-10 cm across along wings; wings brown.

Fl. & Fr.: July - February

Distribution: India: Arunachal Pradesh, Assam, Meghalaya and Nagaland.

Bangladesh and Myanmar.

Specimen examined: AJNU 1199

MYRTACEAE Juss.

Trees or shrubs, evergreen. Stipules absent or small and caducous. Leaves opposite, margin usually entire. Inflorescences axillary or terminal, cymose 1- to many-flowered. Flowers bisexual, actinomorphic. Hypanthium usually adnate to ovary. Calyx lobes 4 or 5 or more, distinct or connate into a calyptra. Petals 4 or 5, sometimes absent, distinct or connate into a calyptra. Stamens usually numerous, in 1 to several whorls; filaments distinct or connate into 5 bundles opposite petals. Ovary inferior, very rarely superior, carpels 2 to more, placentation usually axile; ovules 1 to several per locule. Fruit a capsule, berry, drupaceous berry, or drupe.

Key to the genera

1a. Vegetative buds, young shoots and flower buds pubescent, seed coat firmly attached to the embryo and not the pericarp *Eugenia*

1b. Vegetative buds, young shoots and flower buds glabrous, seed coat firmly attached to the pericarp and not the embryo *Syzygium*

Eugenia L.

Usually, small tree or shrub with tomentose braches. Leaves petiolate, opposite, usually with an intramarginal vein. Inflorescence both in terminal and in the upper axils, with 1-3 bisexual flowers. Hypanthium short. Calyx lobes 4. Petals 4. Stamens numerous; anthers parallel. Ovary 2 – or 3- loculed; ovules many per locule. Fruits berry with persistent calyx.

Eugenia roxburghii DC., Prodr. 3: 271. 1828; *Eugenia bracteata* (Willd.) Raeusch. ex DC., Prodr. 3: 264. 1828, non Rich., 1792; *Eugenia fasciculata* Wal. Ex Blume, Mus. Bot. 1: 87.1850; *Eugenia bracteata* (Willd.) Raeusch. ex DC. var. *roxburghii* (DC.) Duthie in Hook.f., Fl. Brit. India 2: 502. 1879; *Eugenia bracteata*, Kanjilal *et al.*, Fl. Assam 2:282. 1938; *Eugenia rothii* Panigrahi, J. Econ. Taxon. Bot. 5: 994. 1984, nom. illeg. *Syzygium ruscifolium* (Willd.) Santapau & Wagh, Bull. Bot. Surv. India 5: 109. 1964.

Shrub, up to 2 m tall. Bark thin, pale- brown, almost white to light grey, finely fissured. Twigs, terete, young shoots, peduncles, bracts and bracteoles rusty pubescent, ovate or elliptic, base cuneate, apex acute or slightly acuminate. Inlorescence both

terminal and in the upper axils, with 1-3 flowers; Flowers white, shortly petiolate.

Hypanthial cup funnel –shaped. Sepals 4, oblong. Petals 4, ovate, pubescent outside, free, ovate oblong, 55- 100 dotted glands per petal. Ovary 2- locular. Fruits globose, red, crowned by the persistent calyx lobed.

Fl. & Fr.: May – July

Distribution: India: Assam, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Tamil Nadu and West Bengal.

Bangladesh, Cambodia, India, Myanmar, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1386

Syzygium P. Browne ex Gaertn.

Trees or shrubs. Leaves opposite or rarely whorled, petiolate to sessile. Inflorescences terminal, axillary or cauline usually paniculate or racemose. Flowers 4- 5 merous, sessile or pedicelled stipitate. Hypanthium broadly funnel shaped, clavate. Calyx lobes 4 or 5, usually short, caducous or persistent. Petals 4 or 5, distinct and caduceous. Stamens numerous, distinct; anthers minute, versatile, 2-celled, dehiscing longitudinally or by a short terminal slit; Ovary inferior, 2 or 3-loculed; ovules many per locule. Style linear. Fruit drupaceous, 1(or 2)-seeded.

Syzygium coarctatum (Blume) Byng, N.Snow & Peter G. Wilson , Phytotaxa 217: 105. 2015; *Jambosa coarctata* Blume, Mus. Bot. 1(7): 99.1850; *Syzygium megacarpum* (Craib) Rathakr. & N.C. Nair, J. Econ. Taxon. Bot. 4: 287. 1983; *Eugenia macrocarpa*

Roxb., Fl. Ind. 2: 497. 1832, non Cham. & Schltl., 1830; *Jambosa macrocarpa* (Roxb.)
Miq., Fl. Indiae Batavae 1: 417. 1855.

Trees upto 15 m tall. Twigs terete or angled. Bark grayish brown. Leaves 10- 30 x
5- 9 cm, oblong- lanceolate, oblong elliptic, acuminate, base cordate with intramarginal
nerves, glaucous beneath; cymes corymbose, few flowered, usually terminal. Flowers
sub- sessile, 4- 5 cm across, white, drooping. Hypanthium long, obconic. Calyx lobes 4,
obconic. Petal distinct, free, rounded. Stamens numerous. Style up to 5 cm. Fruit ovoid,
globose.

Fl. & Fr.: May – October.

Distribution: India: Assam, Meghalaya, Nagaland and Sikkim.

Bangladesh, Borneo, Cambodia, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1076. **PL-2**

LECYTHIDACEAE A. Rich.

Trees or shrubs, evergreen. Leaves alternate exstipulate. Flowers showy, bisexual,
actinomorphic or zygomorphic. Sepals lobes 4-6. Petals 4-6, free. Stamens many, united
at base into several whorl, anthers basifixed, 2-celled., ovary inferior or semi inferior, 2-6
loculed. Fruit indehiscent berry or capsule, crowned by persistent sepals lobes.

Careya Roxb.

Large trees. Leaves spirally arranged, glabrous, broadly obovate, margins serrate
or crenulate, decurrent onto petiole. Inflorescences in terminal or lateral racemes, upto 20
cm long, few flowered and erect. Flowers sessile. Petals 4, alternate with sepals. Stamens

numerous, inserted in 5-8 whorls, fused at base into short tube. Ovary inferior, 2-5 locular. Fruit ovoid – globose. Seeds numerous, embedded in pulp.

Careya arborea Roxb., Pl. Corom. 14.t. 218. 1811; Cl. In Hook. f., Fl. Brit. India 2: 511. 1879; Kanjilal *et al.*, Fl. Assam 2: 280. 1938; Deb, Fl. Tripura 1: 375. 1981; Chowdhery *et al.* in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1: 479, 1996; Bora & Kumar, Flo. Div. Assam 155. 2003.

Trees, deciduous, bark exfoliating in narrow flakes. Leaves ca. 15-30 x 7-16 cm, obovate, shortly acuminate, base narrowed, crenate dentate. Flowers pinkish white, in terminal spikes. Sepals campanulate, 4 lobed. Petals 4, imbricate. Stamens in several series. Ovary 4 celled. Fruit globose, crowned with persistent sepals.

Fl. & Fr.: March-August.

Distribution: India (throughout); Thailand, Veitnam.

Specimen: AJNU 1177

MELASTOMATACEAE Juss.

Shrubs or herbs, or sometimes lianas or small trees, sometimes epiphytic. Stem quadrangular, pubescent. Leaves opposite, decussate, sessile or petiolate, entire or inconspicuously denticulate. Stipules absent. Flowers bisexual, regular, in cymes, panicles or clustered, rarely solitary. Calyx tubular 3-5 lobed. Petals 2-5, free or connate at base. Stamens as many or more than petals, inserted with them on the edge of the calyx tube; filaments bent inwards in bud. Ovary inferior. Style simple. Fruit a berry or capsule.

Key to Genera

- | | |
|--|------------------|
| 1a. Leaves pinnutinerved | <i>Memecylon</i> |
| 1b. Leaves palmately nerved | |
| 2a. Filaments length equal | |
| 3a. Epiphytic erect herbs or under-shrubs; calyx pale pink | <i>Medinilla</i> |
| 3b. Erect herbs or shrubs; calyx green | <i>Osbeckia</i> |
| 2b. Filaments length unequal | <i>Oxyropa</i> |

Osbeckia L.

Herbs or shrubs, branches often 4-angled branches and pubescent. Leaves opposite or sometimes ternate, entire, 3-7 basal nerves. Flowers 4-5-merous, terminal in capitate cymes or in panicles. Calyx tube ovoid with stellate hairs or pectinate scales outside. Stamen 8 or 10, often beaked; connective not produced at base, slightly swollen or with two tubercles. Ovary inferior. Capsule enclosed by persistent calyx tube, opening by 4-5 pores from the free top.

Osbeckia nepalensis Hook. f., C. B. Clarke in Hook. f., Fl. Brit. Ind. 2:521. 1879; Balakr., Fl. Jowai. 1:205. 1981; Grierson & Long, Fl. Bhut. 2.1:295. 1991; Kanjilal *et al.*, Fl. Assam 2: 295. 1997 (Repr.); Polunin & Stainton, Flow. Hima. 146. 2008 (Repr.).

Shrubs. Stem with appressed hairs. Leaves ovate to oblong-lanceolate, 4.5-13 x 1.5-3.5 cm, apex acute, base cordate-rounded, pubescent on both the surface 5-basal nerves, margin entire; petioles villous pubescent. Flowers white in terminal compound corymbose cymes; pedicels hairy; bracts ovate, with dense villous hairs on the mid-rib,

margin ciliate. Calyx tube with appressed ciliate appendages; lobes 5, oblong-ovate, ciliate. Petals broadly obovate, ciliate at apex. Stamens 10. Capsule oblong, densely hairy, opening by pores at apex.

Fl. & Fr.: June-September.

Distribution: Arunachal Pradesh, Assam, Bihar, Manipur, Nagaland, Sikkim, Tripura, West Bengal

Bangladesh, Nepal, Myanmar, Thailand, Vietnam,

Specimen examined: AJNU 1121

Oxyspora DC.

Shrubs. Leaves opposite, margin denticulate; petiolate. Flowers in terminal lax cymose panicle, with 2 leaf-like bracts at the base. Calyx turbinate, shortly 4-toothed. Petals 4. Stamens 8, unequal in length; longer stamens anthers purple, connective not spurred at the base; shorter stamens anthers yellow, connective shortly spurred at the base. Ovary inferior, 4-celled. Fruit a capsule, 8-ribbed. Seeds numerous, small.

Oxyspora vagans (Roxb.) Wall., C. B. Clarke in Hook. f., Fl. Brit. Ind. 2:526. 1879; Balakr., Fl. Jowai. 1:203. 1981; Kanjilal *et al.*, Fl. Assam 2: 300. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:605. 2002.

Shrubs. Leaves opposite, ovate to elliptic-lanceolate, 7.5-11.6 x 4-9 cm, apex acuminate, base obtuse-rounded, glabrous above, sparsely pubescent beneath, margin obscurely dentate and sparsely ciliate; petioles covered with spreading hairs. Bracts linear lanceolate. Flowers purplish-red, in terminal panicles. Calyx tube cone-shaped, glandular pubescent, with short acute tooth. Petals triangular with a short acuminate apex. Stamens

8; connective of anthers spurred. Style linear longer than the stamens; stigma capitate. Capsules ellipsoid, 8-ribbed.

Fl. & Fr.: August-October.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya and Nagaland.

Bangladesh, China South-Central, Myanmar and Thailand.

Specimen examined: AJNU 1143. **PL-18**

Medinilla Gaudich.

Erect or scandent shrubs, terrestrial or sometimes epiphytic. Stems 4-angled. Leaves opposite, glabrous; petiolate or sessile. Flowers in terminal or lateral cymes. Calyx funnel-shaped; limb truncate or minutely toothed. Petals 4-5, rarely 6, inserted in the throat of calyx. Stamens twice as many as petals, equal; anthers spurred. Ovary inferior, 4-5-celled. Fruit a berry, with persistent calyx teeth at the apex. Seeds numerous.

Medinilla assamica (C. B. Clarke) C. Cheih, Acta Phytotax. Sin. 21:419. 1983. *Pseudodissochaeta assamica* (C.B. Clarke) Nayar, J. Bombay Nat. Hist. Soc. 65: 559. 1969. *Anplectrum assamicum* C. B. Clarke in Hook. f., Fl. Brit. India 2: 546. 1879. *Diplectria assamica* (C.B. Clarke) Kuntze, Rev. Gen. Pl. 1: 246. 1891.

Scrambling shrubs, upto 1-6 m high. Branches angular, later terete, glabrous. Leaves shortly petiolate or sessile; leaf blade elliptic-ovate, lanceolate-ovate, 10-22 x 3.7-12 cm, leathery, both surfaces, hairy, base oblique and cordate, margin entire or shallowly serrulate, apex acuminate. Inflorescence terminal, paniculate. Hypanthium cup-shaped, margin undulate. Calyx lobes inconspicuous, margin undulate. Petals 4, pink, ovate,

oblique, apex obtuse. Stamens 8, subequal. Ovary ovoid , 4- celled , apex truncate and entire. Berries globular, apex truncate.

Fl. & Fr.: August-November

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland.
Myanmar.

Specimen examined: AJNU 1363. **PL-18**

Memecylon L.

Evergreen glabrous shrubs or trees, terrestrial. Branchlets terete, 4-angled, glabrous. Leaves opposite, sessile or short petioled, coriaceous, penninerved. Flowers blue or white tetramerous in simple or paniced often umbelliform cymes. Bracteoles minute, present below flowers. Calyx campanulate, glabrous, shortly 4-lobed. Petals 4, clawed, glabrous, twisted in bud, bluish-white, white or pink. Stamens 8; filaments free, long. Ovary inferior, 1-celled, apex glabrous. Ovules usually 6-12, on a free central placenta. Fruit a more or less fleshy globose or ellipsoid.

Memecylon celastrinum Kurz. Pegu, Rep. App. Hoi. 53: 1875 & Forest Fl. Brit. Burma 1: 515. 1877; C.E.C. Fischer in Rec. Hot. Surv. India 12(2): 95. 1938. *M. grande* Relz. var. *horsfieldii* Miq. Fl. Ind., Bat. 1: 572, 1856; C. B. Clarke in Hook.f., Fl. Brit. India 2: 558. 1879; Kanjilal *et al.*. Fl. Assam 2: 307. 1938.

Small trees, 10-12 m tall. Leaves elliptic-lanceolate to ovate lanceolate, 6-14 x 4-5 cm, base acute or cuneate, acuminate at apex, glabrous on both surfaces, glossy above;

lateral nerves visible beneath. Flowers sky-blue, compressed, axillary peduncles; calyx white, bellshaped, white; petals ovate, 1-2 mm long. Fruit is berry, globular, glabrous, 1-seeded with short calyx limb.

Fl. & Fr.: April-November.

Distribution: India: Assam, Meghalaya, Nagaland and Tripura.

Bangladesh, Jawa, Myanmar and Sri Lanka.

Specimen examined: AJNU 1452. **PL-18**

LYTHRACEAE J. St.-Hil.

Herbs, or seldom shrubs or even trees. Leaves opposite, sometimes alternate, simple, generally entire. Flowers solitary or fascicled in the axils or usually in terminal racemes, spikes or panicles, bisexual, regular or irregular. Calyx tubular, 4-6 lobed, often persistent. Petals 4-6, inserted on the upper parts of calyx tube. Stamens many, inserted on the calyx tube. Stigma capitate, rarely 2-lobed. Fruit a capsule dehiscing by valve, usually enclosed by persistent calyx.

Cuphea Browne

Annual or biennials. Branchlets pubescent. Leaves opposite, decussate. Flowers solitary, in between the petioles, irregular. Calyx tubular with 6 unequally lobes, expanded at base into a short spur. Petals 6 inserted on calyx tube, upper two larger. Stamens 11- 12, borne within calyx tube in two rows, unequal, included. Capsule ellipsoid, membranous, enclosed in persistent calyx tube.

Cuphea carthagenensis (Jacq.) J.F.Macbr, Publ. Field. Mus. Nat. Hist. Chicago, Bot. ser. 8: 124. 1930; Naithani, Fl. Pl. Ind, Nep. & Bhutan 172. 1990. *Cuphea balsamona* Cham. & Schlecht, Linnaea 2: 363. 1827; Singh in Singh *et al.*, Fl. Mizo. 1:611. 2002

Erect annual herbs. Stems very short; branching from the base; branchlets bristly-pubescent. Leaves sessile, elliptic to obovate-lanceolate, 0.8- 2 x 0.2-0.5 cm, apex acute, base cuneate, margin entire, puberulus on both surfaces. Flowers purplish pink, solitary or in small leafy racemes in between the leaves. Calyx tubular up to 0.5 cm long, longitudinally ribbed with a short spur at base of posterior side; petals 6, upper two larger, oblong obovate. Stamens 11. Capsules enclosed by persistent calyx.

Fl. & Fr.: Throughout the year.

Distribution: India: throughout N.E. India; A South American species.

Specimen: AJNU 1467

SONNERTIACEA Engl. & Gilg

Trees or shrubs; young stems often quadrangular. Leaves opposite, often decussate, or whorled, simple, margin entire. Inflorescences cymes, racemes or panicles. Flowers axillary or terminal, mostly 4–6-merous, bisexual; pedicel usually 2-bracteolate; floral tube free; sepals valvate, persistent; petals often caducous; stamens either twice as many as sepals or numerous; anthers versatile; ovary 2–6- or multi-locular; placentation usually axillary. Fruit leathery, or berry-like. Seeds usually numerous.

Duabanga Buch-Ham.

Trees; panicles terminal, corymbose; calyx 6-8-lobed, thick, persistent; petals 5-8, crumpled, broad, obovate, deciduous; ovary adnate to the base of the calyx, 4-8-celled; stigma capitate; fruit a capsule; seeds tailed at both ends.

Duabanga grandiflora (Roxb. Ex DC.) Walp. Rep. 2: 114. 1843; Haridasan & Rao, For. Fl. Meghalaya 2: 799. 1987. *Lagerstroemia grandiflora* Roxb. Ex Dc., Mem. Spc. Hist. Nat. Genev. 32: 84. 1824. *Duabanga sonneratiodes* Franc. -Ham. In Trans. L. Soc. 17: 177. 1835; Cl. In Hook. f., Fl. Brit. India 2: 579. 1879; Gamble, Man. Ind. Timb. 376. 1902; Kanjilal *et al.*, Fl. Assam 2: 312. 1938.

Trees evergreen, tall, up to 30 m high with drooping branches. Bark grey, rough with vertical fissures. Leaves 13.5-28 x 6-12 cm, ovate-oblong or obovate-oblong, obtuse or acute, base cordate. Flowers white, petals 6, obovate, 2. Stamens numerous, white, surpassing petals. Fruits brown, capsules subglobose.

Fl. & Fr.: March-October.

Distribution: India (throughout); Eastern Himalayas to Myanmar.

Specimen examined: AJNU 1189

ONAGRACEAE Juss.

Herbs, rarely undrshrubs. Leaves opposite or spirally alternate, simple, entire or toothed. Flowers regular, bisexual, most often tetramerous, solitary in the axils of leaves or in leafy-bracteates or naked spikes or panicles. Sepals 2-5, valvate. Petals generally as many as sepals. Stamens as many as or twice as the petals. Carpels generally as many as the sepals; ovary inferior; ovules 1- numerous in each cell. Fruit a loculicidal capsule.

Ludwigia L.

Herbs slender, erect to prostrate and rooting at nodes. Leaves alternate, usually entire; stipules present; bracteoles 2, at or near base of ovary. Inflorescence in upper leaf axils or in spikes or clusters. Flowers actinomorphic. Sepals 4 or 5, green. Petals as many as sepals or absent, yellow or white, caducous. Stamens as many as sepals. Ovary with as many locules as sepals. Fruit an obovoid to cylindrical capsule. Seeds numerous.

Ludwigia octovalvis (Jacq.) Raven in Kew Bull. 15: 476. 1962; Deb & Dutta in J. Econ. Tax. Bot. 10(1): 38. 1987. *Oenothera octovalvis* Jacq., Enum. Syst. Pl. 19. 1760. *Jussiaea suffruticosa* L., Sp. Pl. 388. 1753.; C.B. Clarke in Hook.f, Fl. Brit. India 2: 587. 1879.

Herbs, erect. Stems angled. Leaves lanceolate or linear-lanceolate, 2-4 x 0.5-1 cm, base narrowed, apex acute or acuminate, sparsely hairy usually along the nerves beneath. Flowers solitary, axillary, tetramerous; calyx tube linear, wholly adnate to the ovary; sepals 4, ovate or lanceolate; petals 4, yellow, obovate; stamens 8. Capsules linear-cylindrical, thin walled, 8-ribbed, pubescent. Seeds reddish brown, grooved.

Fl. & Fr.: October-July.

Distribution: India (Throughout India); Warmer moist parts of the world.

Specimen: AJNU 1226. **PL-7**

PASSIFLORACEAE Juss.

Herbaceous or woody climbers with axillary tendrils. Leaves alternate, entire or palmately lobed, often with a glandular petiole; stipules small, caducous. Flowers bisexual or unisexual, regular, in axillary cymes. Bracteoles 3, forming an epicalyx. Sepals 5, connate into tube at base. Petals as many as sepals, imbricate. Extra staminal

corona, consisting of sterile filaments. Stamens 5; filaments united below and raised from an androgynophore. Ovary 1-celled; ovules numerous; styles 3, connate at base; stigma capitate. Fruit a capsule or berry.

Key to genera

- 1a. Flowers bisexual; fruit a berry ... *Passiflora*
- 1b. Flowers unisexual; fruit a capsule ... *Adenia*

Adenia Forssk.

Herbaceous or woody climbers; tendrils axillary. Leaves alternate, entire or palmately lobed, petiole with 2 glands at apex. Plant monoecious or dioecious. Flowers in axillary cymose, central flower replaced by a tendril. Sepals connate into a tube. Petals 5, free. Corona absent. Disk glands 5, linear, inserted near base. Male flowers, stamens 5; pistillode minute. Female flowers with staminodes; ovary superior on gynophore; ovules numerous. Fruit a 3-valved capsule; bright red when ripe.

Adenia trilobata (Roxb.) Engl., Bot. Jahrb. Syst. 14: 375. 1891; Balakr., Fl. Jowai 1: 209. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 623. 2002; Haridasan & Rao, Forest Fl. Megh. 1: 418. 1985; *Modecca trilobata* Roxb., Fl. Ind. 3: 133. 1832; Masters in Hook. f., Fl. Brit. Ind. 2: 602. 1879; Kanjilal *et al.*, Fl. As. 2: 323. 1938.

Large climbers, glabrous, base woody. Leaves palmately 3 or 5 lobed, lobes elliptic-lanceolate, 11-16 x 10-16 cm, base cordate or subtruncate, glabrous on both surfaces, margin distantly sinuate; petioles 5-8 cm long. Flowers in axillary cymes; peduncles terminating in a tendril. Male flowers: calyx campanulate, 5-lobed; petals 5,

obovate oblong; stamens 5. Female flowers: sepals and petals as in male. Capsule oblong; seeds many, covered with slimy aril.

Fl. & Fr.: May - September

Distribution: India: Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Sikkim and Tamil Nadu.

Bangladesh, Myanmar and Pakistan.

Specimen examined: AJNU 1434

Passiflora L.

Climbers. Leaves simple, alternate, entire or palmately lobed, petiole often glandular. Flowers bisexual in axillary cymes or solitary. Calyx tube campanulate, 5-lobed. Petals 5, free, inserted on the throat of the calyx. Corona of 1 or more whorls, filamentous. Stamens 5, anthers dorsifixed. Ovary on androgynophore, sessile or stipitate. Fruit a berry, indehiscent, pulp mucilaginous.

Passiflora foetida L., Sp. Pl. 2: 959. 1753; Kanjilal *et al.*, Fl. Assam 2: 322. 1938; Chowdhery *et al.*, in Hajra *et al.*, Mat. For the Fl. Arunachal Prad. 1:507. 1996; Bora & Kumar, Flo. Div. assam 161. 2003.

Herbaceous vines, with pungent smell. Leaves 3 lobed, lobes broadly ovate to oblong-ovate, acute, margins with glandular hairs, base cordate. Flowers solitary, axillary. Sepals ovate-lanceolate, awned. Petals white ca. 1.5 cm. Berry orange or orange-red, ovoid-globose.

Fl. & Fr.: March- November.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1227. **PL-11**

CUCURBITACEAE Juss.

Climbing herbs or shrubs, usually with tendrils; tendril solitary, spiral, simple or divided. Leaves alternate, simple, lobed or palmately divided. Flowers unisexual, monoecious or dioecious, solitary, axillary or in cymes, yellow or white, regular. Calyx tubular, lobes 5, imbricate. Petals 5, united in a tube or quite free, sometimes with fimbriate margin, valvate or imbricate in bud. Male flowers: stamens mostly 3, free or variously united. Female flowers: carpels 3, free or connate; stigmas often bifid. Fruit generally a berry or capsule; seeds usually many.

Key to Genera

- | | |
|---|--------------------|
| 1a. Stamens | <i>Thladiantha</i> |
| 1b. Stamens 3 | |
| 2a. Tendrils simple | |
| 3a. Plant subglabrous; flowers subumbellate | <i>Solena</i> |
| 3b. Plant bristly; flowers in sessile fascicles | <i>Cucumis</i> |
| 2b. Tendrils 2-3 or 2-5 fid | <i>Hodgsonia</i> |

Hodgsonia Hook. f. & Th.

An extensive woody climber; tendrils 2-3 fid. Leaves simple, palmately 3-5 lobed. Dioecious. Male flowers in racemes; calyx lobes fimbriate; stamens 3, exserted. Female flowers solitary; stigma 3, bifid, exserted. Fruit a large, sub-globose berry.

Hodgsonia marcocarpa (Blume) Cogniaux, Balakr., Fl. Jowai. 1:212. 1981; Grierson & Long, Fl. Bhut. 2.1:263. 1991; Singh in Singh *et al.*, Fl. Mizo. 1:629. 2002. *Hodgsonia heteroclita* Hook. f. & T., C. B. Clarke in Hook. f., Fl. Brit. Ind. 2:606. 1879; Kanjilal *et al.*, Fl. Assam 2: 326. 1997 (Repr.).

Stems angular, glabrous. Leaves coriaceous, 15-20 cm across, lobes entire, oblong, apiculate, base cordate, glabrous, lobed to the middle; petioles 4-7 cm long. Flowers large, tomentose. Male flowers in long pedunculate racemes; peduncles 10-25 cm long, bracteate; bracts oblong entire, deciduous; petals 5, connate at base; stamens 3. Female flowers pedunculate; peduncle, 3-5 cm long; stigmas 3, oblong, bifid. Berry reddish brown, 12 grooved, 7-12 x 10-15 cm; seeds in 3-6 pairs, flat, ellipsoid.

Fl. & Fr.: March-June.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Borneo, Cambodia, Malayasia, Myanmar, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1429. **PL-13**

Cucumis L.

Annual bristly climbing herbs; tendrils simple. Leaves simple, 3-7 lobed. Monoecious, flowers in axillary clusters. Male flowers: calyx campanulate, segments 5; corolla 5-lobed; stamens 3, free. Female flowers: ovary ovoid, hispid. Fruit a berry, globose or elongate, smooth or tubercled, indehiscent. Seeds ovoid, compressed.

Cucumis maderaspatana L., Sp. Pl. 1012. 1753; *Mukia scabrella* (L.f.) Arn. in Hook. J. Bot. 3: 276. 1841; *Mukia maderaspatana* (L.) M. Roem., Fam. Nat. Syn. Monogr. 2: 47. 1846; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 623. 1879; Balakr., Fl. Jowai 1: 211. 1981; Grierson & Long, Fl. Bhut. 2.1: 258. 1991.

Scabrid scandent herbs. Leaves simple, broadly ovate to subdeltoid, 4-9×3-8 cm, apex acute to short acuminate, base cordate, margin irregularly denticulate, hispid on both surface; petioles 1-4 cm. Male flowers fascicled; pedicels short; calyx campanulate, corolla yellow, lobes ovate, oblong, filaments short. Female flowers solitary or fascicled, subsessile. Berry globose, 1 cm across, smooth, turning dark red when ripened.

Fl. & Fr.: May-November

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Goa, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Nagaland, Rajasthan, Tamil Nadu and Tripura

Afghanistan, Africa, Cambodia, Cameroon, China, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1250

Solena Lour.

Climbing herbs; tendrils simple. Leaves simple, un-lobed, triangular or 3-5 lobed, often with glands at base beneath. Dioecious. Male flowers in sessile or stalked clusters; stamens 3. Female flowers solitary on a short peduncle. Fruit a berry with numerous elliptic glands.

Solena amplexicaulis (Lam.) Gandhi, Grierson & Long, Fl. Bhut. 2.1:257. 1991. *Zehneria umbellata* Thw., C. B. Clarke in Hook. f., Fl. Brit. Ind. 2:625. 1879. *Solena heterophylla* Lour., Balakr., Fl. Jowai. 1:211. 1981.

Leaves triangular 5-14 x 3.5-11 cm, apex acuminate, base cordate to hastate, glabrous, margin remotely toothed; petioles short, 1-1.5 cm long. Flowers dull white. Male flowers in corymbs; pedicels 0.5-1 cm long. Female flower pedunculate; peduncle 0.7-1 cm long; ovary ellipsoid, with scattered elliptic glands. Berry oblong, 4.5-6 cm long, reddish when ripe.

Fl. & Fr: July-October.

Distribution: India: Tamil Nadu, Karnataka, Kerala and Nagaland

Bangladesh, Myanmar and Pakistan.

Specimen examined: AJNU 1466

Thladiantha Bunge

Climbing herbs with tuberous roots; tendrils simple, rarely 2-fid. Leaves ovate or tripartite, denticulate, base deeply cordate. Flowers dioecious, yellow, large or small. Male peduncles in pair; one 1-flowered, without bracts; the other racemed with or without bracts; calyx tube campanulate, 5-lobed; corolla campanulate, 5-lobed, yellow; stamens 5. Female peduncles 1-flowered, without bracts; calyx and corolla same as male. Fruit a berry-like.

Thladiantha cordifolia (Blume) Cogn., Grierson & Long, Fl. Bhut. 2.1:251. 1991; Singh in Singh *et al.*, Fl. Mizo. 1:635. 2002; Polunin & Stainton, Flow. Hima. 151. 2008

(Repr.). *Thladiantha dubia* Bunge, C. B. Clarke in Hook. f., Fl. Brit. Ind. 2:631. 1879; Kanjilal *et al.*, Fl. Assam. 2: 329. 1997 (Repr.).

Large climber; tendrils simple. Leaves ovate, 8-12 x 6-8.5, apex acuminate, base deeply cordate, appressed scabrid above, with cystoliths tipped with sharp points, softly pubescent beneath, 5-basal nerved. Flowers golden yellow, 3-5 cm across. Male peduncle often pairs, one 1-flowered, without bracts, the other racemed, with prominent ovate serrated bracts. Female flowers solitary without bracts. Fruit oblong, 2.5-3 cm long.

Fl. & Fr.: July-September.

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Bangladesh, China, Laos, Malayasia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1085. **PL-13**

BEGONIACEAE C. A. Agardh

Succulent herbs with tuber or rhizome. Leaves radical or alternate, entire, toothed or lobed; stipules 2, free, deciduous. Flowers monoecious, in axillary and terminal peduncles, bracteate at base. Male flowers: perianth segments 4, petaloid, usually 2 outer larger and 2 inner smaller segments; Stamens numerous, filaments free or connate at base. Female flowers: perianth of 2-5 petal-like segments; ovary inferior, 2-4 celled, ovules numerous; styles 2-4, free or connate at the base. Fruit a capsule, often unequally branched, winged. Seeds minute, numerous.

Begonia L.

Description same as of the family.

Begonia roxburghii (Miq.) Dc., Prodr. 15(1): 398. 1864; Hook. f., Fl. Brit. India 2: 635. 1879; Kanjilal *et al.*, Fl. Assam 2: 333. 1938; Deb, Fl. Tripura 1: 269. 1981. *Diploclinium roxburghii* Miq., Fl. Ind. Bot. 1(1): 692. 1856. *B. malabarica* (non Lamk.) Roxb., Fl. Indica 3: 648. 1832.

Root-stock rhizomatous with fibrous roots. Stems erect, tall, with red spots. Leaves broadly obliquely ovate, 9-20 x 6-14 cm, apex acuminate, base obliquely cordate, glabrous except on nerves beneath, margin obscurely serrate; petiolate; stipules lanceolate, glabrous. Flowers slightly pinkish- white, in short axillary few flowered cymes. Bracts linear lanceolate, persistent. Male flowers: perianth segments 2 outer large, suborbicular concave; 2 inner narrower; stamens numerous. Female flowers: perianth segments 4-5; outer ones oblong concave; inner ones oblong-obovate. Capsule pendent, 4- angled, pale greenish with red spots.

Fl. & Fr.: June- October.

Distribution: India (E. Himalayas & N.E. region); Myanmar, Nepal.

Specimen examined: AJNU 1179

APIACEAE Lindl.

Herbs. Leaves basal or alternate, usually divided or dissected; petiole generally sheathing at the base. Flowers small, hermaphrodite or polygamous, in simple or compound umbels. Calyx lobes 5 or 0, tube fused to the ovary. Petals 5, epigynous, mostly unequal, often 2- fid with a median fold and inflexed apex, usually imbricate in

bud. Stamens 5, epigynous. Style 2; stigmas capitellate. Fruit of 2 indehiscent dorsal or laterally compressed carpels; pericarps usually marked by 5 longitudinal ridges.

Keys to genera

- | | |
|--------------------------------|--------------------|
| 1a. leaves and umbels compound | <i>Oenanthe</i> |
| 1b. Leaves and umbels simple | |
| 2a. Leaves spinous | <i>Erygium</i> |
| 2b. Leaves not spinous | |
| 3a. Mericarp 3-ribbed | <i>Hydrocotyle</i> |
| 3b. Mericarps 5- many ribbed | <i>Centella</i> |

Centella L.

Prostrate herbs, rooting at nodes. Leaves simple, sub-orbicular, reniform, entire or shallowly dentate, palmately veined, base deeply cordate, long petioled. Inflorescence umbels or subcapitate, axillary, densely clustered. Flowers small, bracts small, pedicels short. Calyx teeth small or obsolete. Petals small, entire. Fruit globose, laterally compressed.

Centella asiatica (L.) Urb., Fl. Bras. 11.1: 287. 1879; *Hydrocotyle asiatica* L. Sp. Pl. 234. 1753; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 669. 1879; Kanjilal *et al.*, Fl. As. 2: 340. 1938; Balakr., Fl. Jowai 1: 218. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 660. 2002.

Stems creeping, rooting at nodes. Leaves in rosettes, orbicular-reniform, crenate or lobulate, base cordate; petioles 1-15 cm. Flowers in umbels, solitary or 2-5 together in

axils; peduncles upto 5 cm. Petals red. Fruits laterally compressed, ribs 7-9, mericarps 0.3 cm long.

Fl. & Fr.: April-November

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1325

Eryngium Tourn. ex L.

Perennial herbs, strongly aromatic. Leaves simple, margin spinose, entire, lobed or dissected, leathery. Flowers densely crowded in simple umbels. Bracteoles lanceolate. Calyx teeth rigid, ovate to lanceolate, persistent. Petals ovate to oblong, apex incurved. Fruit globose to obovoid, covered with minute rounded scales, ribs obsolete.

Eryngium foetidum L., Sp. Pl. 1: 232. 1753; Kanjlal *et al.*, Fl. As., 2: 340. 1938; Singh in Singh *et al.*, Fl. Mizo. 1: 662. 2002; Grierson & Long, Fl. Bhut., 2.2: 447. 1999.

Glabrous erect perennial herbs, strongly aromatic. Leaves simple, oblanceolate, 5-12×1.2-4 cm, base cuneate to decurrent, apex obtuse, margin serrate. Bracts oblong-elliptic. Flowers in umbellate peduncled heads, white; bracts spinulose. Calyx teeth rigid, acute, 0.2cm long. Fruit ellipsoid.

Fl. & Fr.: April-December

Distribution: India:

Bolivia, Brazil, Colombia, Costa Rica, Cuba, Haiti, Mexico, Peru, Puerto Rico and Venezuela.

Specimen examined: AJNU 1402

Hydrocotyle Tourn.ex L.

Prostrate herbs. Stems usually rooting at nodes. Leaves simple, suborbicular in outline, usually lobed and base deeply cordate; petioles small, broadly ovate, stipules membranous. Umbels small and densely clustered, simple; bracts and bracteoles absent or minute. Calyx teeth minute or obsolete. Petals entire, small. Fruits orbicular, laterally compressed, glabrous.

Hydrocotyle javanica Thunb., *Hydrocotyle*: 17. 1798; Clarke in Hook.f., *Fl. Brit. Ind.* 2: 667. 1879; Kanjilal *et al.*, *Fl. As.* 2: 339. 1938; Balakr., *Fl. Jowai*, 1: 218. 1981.

Prostrate, perennial herbs; stems succulent, rooting at nodes. Leaves simple, rotund-cordate, reniform, 2.5 - 7.5 cm across, margin crenate, subentire or 7-8-lobed, glabrous; petioles 12-18 cm long, laxly pubescent; stipules broadly ovate. Umbels many-flowered, simple, terminal or leaf-opposed; bracts minute, scattered along the pedicels, ovate lanceolate; bracteoles numerous. Flowers small. Calyx teeth minute. Petals 5, entire, greenish-white, lanceolate-valvate. Fruits orbicular, broadly ovoid, reticulate-rugose, laterally compressed.

Fl. & Fr.: November - April

Distribution: India (throughout), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam

Specimen examined: AJNU 1448. **PL-10**

Oenanthe L.

Stoloniferous marshland herbs. Leaves pinnately divided, ultimate segments large or minute. Umbels compound; bracts few or absent, bracteoles several, linear. Calyx small. Petals obovate, emarginated. Fruit ellipsoid, glabrous, mericarps unequally ribbed.

Oenanthe javanica (Blume) DC., Prodr. 4: 138. 1840; *O.stolonifera* DC. Prodr. 4: 138. 1830; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 696. 1879; Kanjlal *et al.*, Fl. As., 2: 341. 1938; Balakr., Fl. Jowai 1: 220. 1981; Grierson & Long, Fl. Bhut., 2.2: 486. 1999.

Perennial, marshy, glabrous herbs. Leaves biternate or bipinnate; leaflets ovate to elliptic-lanceolate, shallowly serrate to pinnatifid. Umbels terminal or leaf-opposed, compound; peduncles 10-20 cm long, rays 4-20, 2-3 cm long. Flowers white; calyx teeth small, petals emarginate. Fruits ellipsoid, mericarps with 3 subconfluent ribs.

Fl. & Fr.: April-October

Distribution: India (throughout), Bangladesh, China, Jawa, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam.

Specimen examined: AJNU 1029. **PL-10**

TETRAMELACEAE Airy Shaw.

Trees deciduous, large, often buttressed, dioecious. Leaves alternate, petiolate; leaf blade simple, pubescent, margin entire or dentate. Inflorescences pendent spikes clustered at stem apices or axillary, solitary, simple spikes. Bracts deciduous. Male flowers: calyx lobes 4-8; petals absent or 6-8, erect, greenish; stamens 4-8; filaments elongate; anthers

basifixed, relatively short and ovoid. Female flowers: calyx lobes 4-8; petals and staminodes absent; ovary inferior, 1-loculed, with 4-8 parietal placentas; ovules numerous. Fruit a capsule. Seeds numerous, ovoid or fusiform, tiny.

Tetrameles R. Br.

Trees; leaves alternate, simple, exstipulate; inflorescence racemes or panicles, flowers dioecious; calyx tube short or adnate to ovary lobes in male or female respectively; petals absent; stamens inserted round the disc; ovary inferior, 1-celled; ovules many, placentation parietal; style simple or divided, as many as the placentas, persistent; fruit a capsule, dehiscent at the apex; seeds minute, ellipsoid, with reticulate testa.

Tetrameles nudiflora R. Br. in Benn., Pl. Jav. Rar. 79. t. 17. 1838; Cl. In Hook. f., Fl. Brit India 2: 657. 1879; Gamble, Man. Ind. Timb. 381. 1902; Brandis, Ind. Trees 346. 1906; Kanjilal *et al.*, Fl. Assam 2: 335. 1938; Haridasan & Rao, For. Fl. Meghalaya 1: 425. 1985.

Trees, large deciduous. Leaves orbicular or suborbicular, 7-14 x 5-20 cm, acuminate, base cordate or truncate, dentate glabrous above, pubescent beneath. Male flowers in lax panicles; petals white; stamens exserted. Female flower in spikes, in whorls of 3-8, sessile; styles exserted. Capsule obovoid, ribbed. Seeds numerous.

Fl. & Fr: March-July.

Distribution: India (Assam, Andaman, Meghalaya, Nagaland); Java, Myanmar.

Specimen examines: AJNU 1284

ARALIACEAE Juss.

Trees, shrubs, climbers, or perennial herbs, often stellate- hairy and sometimes strongly prickly. Leaves alternate, rarely opposite or whorled, often large and pinnately or palmately compound or dissected, sometimes palmately lobed; stipules adnate to the petioles. Bracts and bracteoles present. Flowers small, unisexual, in umbels or heads or racemes or spikes; often 5-merous. Calyx often much- reduced or obsolete. Petals mostly 5, valvate or sometimes imbricate. Ovary inferior, with as many locules as carpels; styles as many as the carpels. Fruit a drupe.

Key to the genera

- | | |
|--|---------------------|
| 1a. Leaves pinnate or decompose | <i>Heteropanax</i> |
| 1b. Leaves simple, palmate or digitate | |
| 2a. Stem, branches and petioles with thorns | <i>Trevesia</i> |
| 2b. Stem, branches and petioles without thorns | <i>Heptapleurum</i> |

Heptapleurum Gaertn.

Shrubs or trees, sometimes climbers or epiphytes, evergreen, unarmed. Leaves palmately compound, rarely unifoliolate, margins entire to serrate; stipules united within petiole. Inflorescence a terminal or pseudo-lateral panicle or compound raceme; flowers arranged in umbels, heads, or racemes; bracts pubescent, deciduous or persistent. Calyx rim entire or 5-toothed. Petals 5-11, valvate. Stamens 5-11. Ovary 5-11-carpellate. Fruit a drupe, globose or ovoid.

Key to Species

1a. Climbing, epiphytic shrub; leaflets entire *H. venulosum*

1b. Trees; leaflets pinnately lobed *H. hypoleucum*

Heptapleurum venulosum (Wight & Arn.) Seem., J. Bot. 3: 806. 1865; C. B. Cl. in Hook. f., Fl. Brit. Ind. 2: 729. 1879; Gamble, Man. Ind. Timb. 386. 1902; Brandis, Ind. Trees 348. 1906; Kanjilal *et al.*, Fl. Assam 2: 353. 1938. *Paratropia venulosa* W. & A. Prodr. 1: 377. 1834.

Large scandent or climbing shrubs. Bark grayish brown. Leaves 5-7 foliate; leaflets oblanceolate, oblanceolate- elliptic, obtuse or acuminate, base rounded, cuneate, obscurely 3- nerved, coriaceous, glabrous; petiolules swollen at both ends. Inflorescence tomentose, flowers yellowish- green to white; calyx truncate, obscurely lobed; petals free or connate; fruits fleshy, 4-6 mm across, yellowish in color.

Fl. & Fr: March - June

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, and West Bengal.

Bangladesh.

Specimen examined: AJNU 1447. **PL-13**

Heptapleurum hypoleucum Kurz, For. Fl. Brit. Burma 1: 539 1877 *Schefflera hypoleuca* (Kurz) Harms, in Engl. & Prantl., Pflanzenfam. 3(8): 38. 1894; C.E.C. Fischer in Rec. Bot. Surv. India 12: 99. 1938; C.B. Clarke in Hook. f., Fl. Brit. India 2: 728. 1879; Kanjilal *et al.*, Fl. Assam 2: 350. 1938.

Medium sized trees, up to 12 m high; bark brown-grey; young parts and inflorescence with deciduous, rusty stellate scurf. Leaves digitate, 5-7 foliate; petiole swollen at base; leaflets oblong or elliptic-ovate, 12-25 x 4- 10 cm, acute, serrate along margins, base rounded, under surface with deciduous stellate hairs. Panicles terminal or axillary, subcorymbose; bracts shortly ovate, acuminate. Flowers greenish white. Calyx truncate; petals 5, reflexed, oblong-acute, covered with dense white stellate wool outside. Fruits globose- subglobose.

Fl. & Fr.: October - April

Distribution: India: Arunachal Pradesh, Karnataka, Kerela, Nagaland and Tamil Nadu
Native to India.

Specimen examined: AJNU 1364

Heteropanax Seem

Small trees, unarmed. Leaves decompose; stipules inconspicuous; umbels in panicles; flowers polygamous; calyx tube subentire; ovary 2-celled; styles 2, spreading; fruit laterally compressed; seeds compressed.

Heteropanax fragrans (D. Don) Seem. Fl. Vit. 114. 1865; C. B. Cl. in Hook. f., Fl. Brit. India. 2: 734. 1879; Gamble, Man. Ind. Timb. 386. 1902; Brandis, Ind. Trees 352. 1906; Kanjilal *et al.*, Fl. Assam 2: 356. 1938; Balak. Fl. Jowai 1: 225. 1981. *Hedera fragrans* D. Don, Prodr. Fl. Nepal. 187. 1825.

Small soft-wooded tree. Bark soft, dark brownish- grey. Leaves tripinnate, 0.6- 1.4 m long, with a pair of leaflets at each node, nodes often swollen; leaflets 5- 12 x 3-5

cm, elliptic, elliptic- ovate or lanceolate, shortly acuminate, base narrowed, usually oblique, glabrous. Panicles up to 1 m long, rusty tomentose; flowers 6 mm across; pedicels enlarged in fruits; calyx truncate; petals 5, valvate. Stamens 5, exserted. Ovary 2- celled; styles 2, distinct, filiform. Fruits laterally compressed angular, ovoid.

Fl. & Fr.: June - December

Distribution: India: Assam, Nagaland, Odisha, Tripura, Andaman & Nicobar Islands, Bihar and West Bengal

Bangladesh, Cambodia, China, Hainan, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1118

Trevesia Vis.

Small trees or shrubs, prickly, glabrous or with stellate pubescent. Leaves spirally arranged, simple, palmately lobed; petioles long; stipules intrapetiolar. Flowers bisexual and unisexual, in umbels borne on large panicles; pedicels not jointed. Calyx minutely toothed. Petals 8-12, valvate. Stamens as many as petals. Ovary 8-12 celled; styles united. Fruit globose.

Trevesia palmata (Roxb.) Vis., C. B. Clarke in Hook. f., Fl Brit. Ind. 2:732. 1879; Balakr., Fl. Jowai. 1:224. 1981; Haridasan & Rao, Forest Fl. Megh. 1:442. 1985; Kanjilal *et al.*, Fl. Assam 2:363. 1997 (Repr.); Singh in Singh *et al.*, Fl. Mizo. 1:674. 2002; Polunin & Stainton, Flow. Hima. 162. 2008(Repr.).

Small trees, unbranched, armed with recurved prickles. Leaves clustered at the tip, orbicular-reniform, 25-50 cm across, palmately 3-9 lobed up to the middle, base truncate or sub-cordate; lobes oblong- elliptic, glabrous, margin serrate, often irregularly

lobed; petioles 14-42 cm long, sparsely prickles or unarmed. Flowers pale yellowish, umbels up to 30 flowered; panicles terminal, up to 45 cm long; pedicels 1.5-1.8 cm long. Calyx limb free, undulate or irregularly toothed, rusty pubescent outside. Petals fleshy, ovate, valvate. Fruits sub- globose to ovoid, about 1.5 x 1 cm, crowned by persistent styles.

Fl. & Fr.: February-June

Distribution: India: Arunachal Pradesh, Assam, Bihar, Maharashtra, Mizoram, Nagaland, Odisha, Tripura and West Bengal.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand and .Vietnam.

Specimen examined: AJNU 1032. **PL-14**

ALANGIACEAE DC.

Trees or shrubs, branching horizontally. Leaves alternate, distichous, simple, entire or lobed, pinnately or palmately nerved; stipules absent. Flowers regular, bisexual, in axillary cymes. Calyx 4-10 lobed. Petals 4-10, valvate, hairy within. Stamens as many as or about 2-4 times as the petals; filaments distinct or slightly connate at the base, sometimes adnate to the petals at the base. Ovary of 2 carpels; stigma capitate and entire or 2-4 lobed. Fruit a drupe, crowned by the persistent styles and disk.

Alangium Lam.

Description same as of the family.

Alangium chinensis (Lour.) Harms, Haridasan & Rao, Forest Fl. Megh. 1:446. 1985; Grierson & Long, Fl. Bhut. 2.1:332. 1991; Singh in Singh *et al.*, Fl. Mizo. 1:675. 2002. *Marlea begoniifolia* Roxb., C. B. Clarke in Hook. f., Fl Brit. Ind. 2:743. 1879. *Alangium begonifolium* Baillon., Kanjilal *et al.*, Fl. Assam 2:369. 1997(Repr.).

Trees. Leaves orbicular to broadly ovate-oblong, often with irregular pointed lobes 4-16 x 2.7-12 cm, apex acuminate, base truncate, dark green and glabrescent above, pale and hairy along the nerves beneath, margin entire, basal 3-7 nerves; petioles 1-3 cm long, hairy. Flowers white, in axillary dichotomously branched peduncled cymes. Calyx minutely toothed. Petals 6-8, strap-shaped, puberulus. Drupe ovoid, 1-1.4 cm long, when ripe becomes dark purple, obscurely ribbed.

Fl. & Fr.: May-September.

Distribution: India: Assam, Nagaland, Mizoram; Bangladesh, China, Cambodia, Kenya, Nepal, Thailand, Tibet, Vietnam, Zimbabwe.

Specimen examined: AJNU 1079. **PL-10**

CAPRIFOLIACEAE Juss.

Shrubs, small trees, seldom herbs. Leaves opposite, simple, rarely pinnately compound. Stipules present or absent. Flowers bisexual, regular or irregular, in various sorts of mostly cymose or mixed inflorescence, usually bracteolate. Calyx adnate to ovary, usually 5-lobed. Corolla gamopetalous, usually 5-lobed, imbricate in bud. Stamens 5, inserted on the corolla tube, alternating with the lobes. Ovary inferior. Stigma capitate. Fruit a drupe or a berry.

Sambucus L.

Small trees, shrubs or woody herbs. Leaves imparipinnate; leaflets opposite or alternate. Flowers regular, in large terminal corymbs; pedicel distinct. Bracts absent. Calyx 5-6-lobed. Corolla 5-6-lobed. Stamens 5-7, fused to corolla at base. Ovary 3-5 celled; each with 1 ovules. Fruit a berry, 3-5 seeded.

Sambucus javanica Blume, C. B Clarke in Hook. f., Fl Brit. Ind. 3:2. 1880; Balakr., Fl. Jowai. 1:228. 1981; Kanjilal *et al.*, Fl. Assam 3:1. 1997 (Repr.); Grierson & Long, Fl. Bhut. 2.3:1360. 2001.

Erect shrubs or trees. Leaves imparipinnate; leaflets 1-6 pairs, sessile or subsessile, oblong-lanceolate, 7.5-15 x 2-4.5 cm, apex acuminate, base cuneate or rarely oblique, glabrous above, sparsely pubescent on nerves beneath, margin serrate; stipules small. Flowers white, small, in terminal puberulus corymbs. Bracteoles minute. Berries ovoid, black.

Fl. & Fr.: April-November.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland and Sikkim.

Afghanistan, Bangladesh, China, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Philippines, Taiwan, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1083. **PL-16**

RUBIACEAE Juss.

Trees, shrubs or herbs, erect or scrambling, occasionally with thorns. Leaves simple, opposite or whorled, usually entire; stipules present. Inflorescence various in axillary or terminal, usually cymose. Flowers usually bisexual and regular. Sepals 4-5, connate at base, adnate to the ovary. Corolla tubular; lobes 4-5, spreading. Stamens 4-5, fused to corolla tube alternating with the lobes. Ovary inferior, usually 2-celled, with 1-many ovules; style simple or cleft; stigma various. Fruit a capsule, berry or drupe or schizocarp.

Key to the genera

- 1a. Flowers unisexual *Prismatomeris*
- 1b. Flowers bisexual
 - 2a. Flowers in globose heads; trees or large shrubs
 - 3a. Ovules solitary in each cell *Morinda*
 - 3b. Ovules many in each cell
 - 4a. Woody climbers *Uncaria*
 - 4b. Trees or erect shrubs
 - 5a. Corolla valvate in bud *Dioscospermum*
 - 5b. Corolla imbricate or twisted in bud
 - 6a. Branches horizontal; seeds not winged *Anthocephalus*
 - 6b. Branches not horizontal; seeds winged *Nauclea*
 - 2b. Flowers not in globose heads; if heads then undershrubs or herbs
 - 7a. ovules many in each cell

8a. Few flowers in petaloid sepals	<i>Mussaenda</i>
8b. Sepals not petaloid	
9a. Fruit capsule	
10a. Flowers tetramerous	<i>Hedyotis</i>
10b. Flowers pentamerous	
11a. Seeds obliquely oblong	<i>Silvianthus</i>
11b. Seeds not oblique	
12a. Trees or shrubs	<i>Hymenodictyon</i>
12b. Herbs	<i>Orphiorrhiza</i>
9b. Fruit berry	
13a. Seeds minute	<i>Mycetia</i>
13b. Seeds large	
14a. Fruits black or yellow when ripe	<i>Randia</i>
14b. Fruits blackish-purple when ripe	<i>Benkara</i>
7b. Ovules solitary in each cell	
15a. Seeds attached with the septum	
16a. Fruit drupaceous	<i>Geophila</i>
16b. Fruit capsule	<i>Spermacoce</i>
15b. seeds not attached with the septum	
17a. Corolla lobes valvate in bud	
18a. Bracts coriaceous	<i>Ixora</i>
18b. Bracts membranous	<i>Pavetta</i>
17b. Corolla lobes valvate in bud	

- 19a. Plants foetid
- 20a. Woody climbers *Paederia*
- 20b. Not climbers *Saprosma*
- 19b. Plants not foetid
- 21a. Stipules bifid *Chasalia*
- 21b. Stipules entire *Psychotria*

Anthocephalus A. Rich.

Trees; stipules caducous or deciduous; heads usually terminal, solitary; flowers 5-merous; corolla funnel-shaped; stamens at the throat of the corolla; ovary partially 4-celled: ovules many; fruit a fleshy, globose syncarp of many pyrenes.

Anthocephalus chinensis (Lam.) A. Rich, ex Walp. Repert. 2: 491. 1843. *Cephalanthus chinensis* Lamk. Encycl. 1: 678. 1785. *Anthocephalus cadamba* Roxb. Miq. Fl. Ind. Bot. 2: 135, 1856; Hook. f. Fl. Brit. Ind. 3: 23. 1880; Gamble, Man. Ind, Timb. 400 1902; Brandis, lad. Trees 397. 1906; Kanjilal *etal* Fl. Assam 3:18. 1939.

Large trees up to 35 m high, horizontal branches forming; bark smooth, blackish-brown or dark brown; leaves 14-24 X 7-14 cm, ovate, elliptic or broadly ovate-lanceolate, shortly acuminate or acute, base rounded, cuneate or obtuse, margin entire, glabrous; flowers greenish-yellow or orange-red; corolla lobes oblong.

Fl. & Fr.: December-October.

Distribution: India: Andhra Pradesh, Karnataka, Kerala, Maharashtra, Nagaland and Tamil Nadu.

Cambodia and Vietnam.

Specimen examined: AJNU 1315.

Benkara Adans.

Shrubs or small trees usually armed with thorns. Leaves opposite usually with domatia; stipules interpetiolar. Inflorescences terminal on lateral branches or short shoots, 1-flowered or 2- to several flowered and fasciculate to cymose, sessile to pedunculate. Flowers pedicellate, bisexual, monomorphic. Calyx limb 5-lobed. Corolla white to yellow, salverform, usually pubescent in throat; lobes 5, usually reflexed. Stamens 5, exserted; filaments short; anthers dorsifixed. Ovary 2-celled; stigma clavate to fusiform. Fruit black, baccate, fleshy to leathery, globose smooth; seeds many, angled or ellipsoid.

Benkara fasciculata (Roxb.) Ridsdale, Reinwardtia 12: 298.2008. *Randia fasciculata* DC. Prodr. 4: 386. 1830; Hook f., Fl. Brit. Ind. 3: 1880; Gamble, Man. Ind. Timb. 412. 1902; Brandis, Ind. Trees 383. 1906; Kanjilal *et al.*, Fl. Assam 3: 59. 1939.

Struggling shrubs with straight axillary spines. Petioles and underside of leaves slightly pubescent, glabrous 6-20 x 2.5-7 cm, elliptic lanceolate or ovate, base narrowed, cuneate, glabrous; nerves prominent; stipules narrow, lanceolate. Inflorescence a cymes, up to 8 cm across; flowers white, fragrant, 1.4-2.5 cm across; corolla lobes ovate, rotate, oblong. Berry 0.4-0.9 cm across, globose, purple.

Fl. & Fr. : April – December.

Distribution: India: Bihar, Nagaland, Odisha, Sikkim and West Bengal.

Bangladesh, Cambodia, Malaysia, Nepal, Philippines and Vietnam.

Specimen examined: AJNU 1371.

Chassalia Comm. ex Poir.

Shrubs or trees; leaves sometimes ternate; stipules intrapetiolar, usually bifid; inflorescence paniced, corymbose cymes, bracteate and bracteolate; flowers 5-merous, sessile; tubes usually curved; stamens included; ovary 2-celled; ovules I in each cell; drupe of 2 to 1-seeded pyrenes.

Chassalia curviflora (Wall.) Thwaites in Enum. Pl. Zeyl.: 150. 1859. *Psychotria ophioxylodes* Wallich in Roxb., Fl. Ind. 2: 167. 1824. *Chassalia curviflora* Wallich ex Kurz, For. Fl. Brit. Burma 2: 114. 1877; Kanjilal *et al.*, Fl. Assam 3: 86. 1939. *Chassalia ambigua* Wight & Arn., Prodr. 433. 1834; C.E.C. Fischer in Rec. Bot. Surv India 12(2): 100. 1938.

Shrubs or undershrubs, up to 2 m tall. Leaves obovate-oblongate, 10-18 x 2-5 cm, base cuneate, apex acuminate, margins recurved, midrib glabrous beneath; petioles 1-3 cm long; stipules ovate, bifid. Panicles 4-5 cm long, lax to dense-flowered; flowers pinkish-white; calyx short, 5-lobed; corolla tubular, curved, throat yellow; stamens included, in shorter stamens filaments 0.2-0.3 cm long, longer excluded. Fruits globose.

Fl. & Fr.: March-September.

Distribution: India: Meghalaya and Nagaland.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1206. **PL-10**

Discospermum Dalzell

Shrubs or small trees. Stipules interpetiolar, shortly sheathing, often with an apical awn. Leaves petiolate, opposite, decussate. Inflorescences axillary, paired at each node, many-flowered, strongly congested. Flowers 4-merous, hermaphrodite or unisexual, generally small; calyx varying from a short rim to a tube with large lobes; corolla white, saucer-shaped, lobes contorted in bud, spreading at anthesis, throat hairy; stamens inserted at top of corolla tube, exserted, filaments short; ovary 2-locular, each locule containing 3–15 ovules with axile placentation; style generally shortly exserted with bilobed stigma. Fruits relatively large, indehiscent, globose to ellipsoidal, mesocarp dry, leathery embedded in placental outgrowth. Seeds few to many, lenticular or discoid.

Discospermum abnorme (Korth.) S.J. Ali & Robbr., *Blumea* 35: 300.1991. *Gynopachisabnormis* Korth., *Ned. Kruid. Arch*2: 182. 1851. *Diplospora singularis* Korth., *Ned. Kruidk. Arch.* 2:201. 1851; Hook. f., *Fl. Brit. India* 3: 123. 1880; Gamble, *Man. Ind. Timb.* 418. 1902; Brandis, *Ind. Trees* 384. 1906.

Large trees 20-30 m high; crown dense, oval; bark greyish-brown, minutely fissured into rectangular pieces. Leaves lanceolate, oblong-lanceolate or oblong-elliptic, acuminate, base narrowed, cuneate, glabrous and shining above, pale beneath, yellowish when senescent; cymes dense, on fallen leaf axils; flowers greenish-yellow, 1.5-2 cm across; corolla lobes much longer than the tube; stamens oblong, linear. Berries 1.3-2 cm across, purplish-black when ripe, crowned by persistent calyx-limb.

Fl. & Fr.: April – December.

Distribution: India: Andaman & Nicobar Islands, Assam, Odisha, Meghalaya, Nagaland and Tripura.

Bangladesh, Borneo, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1365. **PL-10**

Geophila D. Don

Perennial herbs. Leaves opposite, usually broadly ovate to cordate and long petiolate; stipules persistent, interpetiolar. Inflorescences terminal or pseudoaxillary, cymose to capitate, few to several flowered, pedunculate, bracteate. Flowers sessile or subsessile, bisexual, Calyx limb 4-7-lobed. Corolla white, funnellform, pubescent inside; lobes 4-7. Stamens 4-7, inserted in corolla tube; anthers dorsifixed. Ovary 2-celled, ovules 1 in each cell; stigma 2-lobed, included or exserted. Fruit drupaceous, orange or red globose to ellipsoid, fleshy, with persistent calyx limb.

Geophila repens (L.) I.M. Jhonst., Sargentia 8: 281. 1949. *Geophila reniformis* D. Don, Prodr. Fl. Nepal. 136. 1825; Hooker f. in Fl. Brit. India 3: 178. 1872; Kanjilal *et al.*, Fl. Assam 3: 533. 1939. *Geophila diversifolia* DC., Prodr. 4: 537. 1830. *Psychotria herbacea* Willdenow in Roxb., Fl. India. 1: 533. 1832.

Perennial, prostrate, pubescent herbs. Stem pubescent, slender, up to 40 cm long, rooting at nodes. Leaves opposite, long petioled, orbicular-cordate, 2.6 -3.5 x 2.2- 3.4 cm, entire, rounded, base deeply cordate; petiole up to 6 cm long; stipules interpetiolar, ovate, obtuse. Inflorescence with 1-3 in umbelliform cymes. Flowers small, white; pedicel up to 5.4 cm long, bracts 1-2, subulate-lanceolate. Calyx teeth 5-7, slender, herbaceous, pubescent, persistent. Corolla white, elongate, funnel-shaped, glabrous, hairy inside;

lobes 4-7. Stamens 4-7; anthers linear. Ovary 2-celled; style slender; ovule 1. Drupe fleshy, globose, glossy up to 1.2 cm in diam., bright red-orange on ripening.

Fl. & Fr.: June – September.

Distribution:India: Assam, Kerala, Meghalaya, Nagaland and Tamil Nadu.

Argentina, Brazil, Colombia, Cuba, Mexico Paraguay, Peru, Puerto Rico and Venezuela.

Specimen examined: AJNU 1087.

Hedyotis L.

Shrubs, undershrubs or herbs, sometimes scandent or climbing. Leaves opposite, rarely ternate; stipules connate or free, conspicuous, furnished with bristles. Inflorescence terminal or axillary, pedunculate or sessile, lax or compact capitate cymes. Flowers small, 4-merous. Calyx ovoid; lobes 4, ovate or subulate. Corolla campanulate or tubular; lobes 4, often hairy either inside or outside. Stamens 4, inserted on the tube or throat. Fruit globose or ovoid, capsular, dehiscent or indehiscent. Seeds numerous.

Key to Species

1a. Fruits Indehiscent

H. costata

1b. Fruits dehiscent

H. scandens

Hedyotis scandens Roxb., Hook. f., Fl. Brit. Ind. 3:57. 1880; Balakr., Fl. Jowai. 1:244. 1981; Haridasan & Rao, Forest Fl. Megh. 2:475. 1987; Kanjilal *et al.*, Fl. Assam 3:37. 1997 (Repr); Grierson & Long, Fl. Bhut. 2.2:758. 1999; Singh in Singh *et al.*, Fl. Mizo.1:692. 2002.

Large climbing shrubs. Stems glabrous, often purplish; branches angled, pubescent towards the apex. Leaves elliptic to oblong-lanceolate, 7-16 x 1.6- 3 cm, apex acuminate, base cuneate, glabrous, margin entire; petioles 0.5-1 cm long. Flowers white, in axillary or terminal trichotomous paniculate cymes. Peduncles and pedicels densely pubescent. Calyx pubescent; tube short, funnel-shaped, about 0.2 cm long; lobes triangular, about 0.1 cm long. Corolla deeply lobed; lobes oblong-lanceolate, recurved, about 0.5 cm long, white hairy inside. Styles exerted, hairy, bifid. Capsule obovoid.

Fls. & Frts.: November-February.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and Tripura.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1338.

Hedyotis costata (Roxb.) Kurz in J. As. Soc. Bengal 45(2): 135. 1876 & 46(2): 135. 1877; Deb & Dutta in J. Econ. Tax. Bot. 10(1): 39. 1987. *Spermacoce costata* Roxb., Fl. Ind. 1: 376. 1820. *Hedyotis vestita* R. Br. ex G. Don, Gen. Syst. 3: 526. 1834; Hook .f, Fl. Brit. India 3: 58. 1880; C.E.C. Fischer in Rec. Bot. Surv. India 12(2): 101. 1938; Kanjilal *et al.*, Fl. Assam 3: 38. 1939.

Decumbent herbs; branches subterete or quadrangular, yellowish. Leaves elliptic-lanceolate, 3 -12 x 1 - 4 cm, apex acuminate, margins scabrid, yellowish green, villous; lateral nerves 5-7 pairs, stipules membranous, hispid, processes subulate. Flowers many in axillary cymes, shortly pedicelled; calyx hispid, tube ovoid, lobes subulate; corolla

lilac, bell-shaped, hairy within; lobes 4, oblong, hispid outside; stamens 4, inserted; ovary 2-locular; stigma bifid, papillose. Capsules globose, few seeded.

Fl. & Fr.: August-February.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Nagaland and West Bengal.

Bangladesh, Cambodia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1339.

Hymenodictyon Wall.

Trees or shrubs with bitter bark; stipules usually glandular, deciduous; racemes simple or paniced; flowers 5-merous; corolla tube slender; stamens inserted below the throat; ovules many; stigma capitate; fruit a loculicidal capsule; seeds winged all round.

Hymenodictyon excelsum Wall, Roxb Fl. Ind. 2 :149. 1824; Hook. f. Fl. Brit. Ind. 3: 35. 1880; Gamble, Man. Ind. Timb. 406. 1902; Brandis, Ind. Trees 371. 1906 Kanjilal *et al*, Fl. Assam3: 26. 1939.

Deciduous trees, 8-30 m high, horizontal branches; bark brownish-grey; leaves 12-20 x 4-11 cm, obovate or ovate, broadly oblong or elliptic, shortly acuminate, base cuneate, greyish tomentose beneath; panicles decurved or deflexed, ascending at tip; flowers white, fragrant, style much exserted, subpersistent; capsule 1,5-2.5 cm long. Fruit ellipsoid, reddish-brown when ripe.

Fl.& Fr: June-January.

Distribution:Distribution: India: Assam, Meghalaya, Nagaland and Odisha.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1231.

***Ixora* L.**

Shrubs. Leaves in opposite pairs. Stipules interpetiolar, usually connate. Flowers 4-merous, in terminal corymbose or paniculate cymes. Calyx campanulate or funnel-shaped; 4-lobed. Corolla salver-shaped or funnel-shaped, twisted in bud. Stamens 4, inserted at the mouth of corolla between lobes. Fruit a drupe; 1-2-seeded.

Ixora acuminata Roxb., Hook. f., Fl. Brit. Ind. 3:137. 1880; Haridasan & Rao, Forest Fl. Megh. 2:479. 1987; Kanjilal *et al.*, Fl. Assam 3:68. 1997 (Repr); Singh in Singh *et al.*, Fl. Mizo.1:695. 2002.

Shrubs. Leaves opposite, obovate-oblongate, 12-28 x 6-12 cm, cm long, apex acute-acuminate, base rounded or cordate or cuneate, glabrous, glaucous beneath, margin entire; stipules interpetiolar, connate, cuspidate; petiole sessile or up to 0.6 cm long. Flowers white, 4-merous, in terminal dense flowered, bracteate, corymbose cymes. Calyx pinkish, tube funnel-shaped, about 0.2 cm long; lobes unequal, ovate-lanceolate. Corolla tube long, slender, up to 4.5 cm long; lobes 4, obovate, spreading. Stamens 4, inserted at the mouth of corolla tube, spreading. Styles shortly exserted, bilobed, lobes pubescent. Fruits ellipsoid, red.

Fl. & Fr.: May-July.

Distibution: India: Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Bangladesh.

Specimen examined: AJNU 1290. **PL-11**

Morinda L.

Trees, erect or climbing shrubs. Leaves opposite. Stipule connate at base. Flowers bisexual, 4-7-merous, axillary or terminal in capitate on peduncle. Calyx tube short; limb entire or obscurely lobed. Corolla 4-7-lobed. Stamens 4-7, included. Fruit drupaceous with persistent calyces.

Morinda angustifolia Roxb., Hook. f., Fl. Brit. Ind. 3:156. 1880; Haridasan & Rao, Forest Fl. Megh. 2:488. 1987; Kanjilal *et al.*, Fl. Assam 3:79. 1997 (Repr); Grierson & Long, Fl. Bhut. 2.2:804. 1999; Singh in Singh *et al.*, Fl. Mizo.1:703. 2002.

Shrubs. Leaves oblanceolate, 10-20 x 2-6 cm, apex acuminate, base cuneate, glabrous above, puberulus beneath, margin entire, 7-13 pairs of lateral nerves, looped within the margin; stipules connate at base, broadly triangular, long acuminate with obtuse tip, up to 1.3 cm long; petioles 0.3-2 cm long. Bracts ovate, apex acuminate. Flowers white, fragrant, usually 5-merous, bisexual, in terminal and axillary pedunculate globose heads. Calyx truncate or obscurely toothed. Corolla glabrous; tube slender, cylindrical, up to 2 cm long; lobes 5, ovate-oblong, spreading. Drupes free, turbinate.

Fls. & Frts.: April-June.

Distribution: India: Assam, Jharkhand, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh, China, Laos, Myanmar, Nepal and Thailand

Specimen examined : AJNU 1216. **PL-11**

Mussaenda L.

Shrubs or undershrubs, rarely erect or climbing. Leaves opposite or 3-nately whorled, stipules solitary or in pairs between the petioles. Flowers pentamerous usually yellow, infrequently white or scarlet, in terminal cymes, rarely solitary. Calyx Lobes 5, calyx-tube oblong or turbinate, usually deciduous, one frequent large petioled white or coloured leaf. Corolla lobes 5, tubular, funnel-shaped above, tube usually silky, throat villous. Stamens 5, at the throat of the corolla or lower down. Fruit a berry, fleshy, many seeded.

Mussaenda glabra Vahl., Hook. f., Fl. Brit. Ind. 3:90. 1880; Balakr., Fl. Jowai. 1:237. 1981; Haridasan & Rao, Forest Fl. Megh. 2:491. 1987; Kanjilal *et al.*, Fl. Assam 3:44. 1997 (Repr); Grierson & Long, Fl. Bhut. 2.2:783. 1999; Singh in Singh *et al.*, Fl. Mizo.1:706. 2002.

Climbing shrubs. Stem puberulus, lenticellate. Leaves opposite, elliptic or oblong-lanceolate, 5.4-12.5 x 2.6-6 cm, apex acuminate, base acute-cuneate, coriaceous, glabrous or puberulus; petiole 0.5-1.2cm. Stipules interpetiolar in pairs. Flowers orange yellow, in terminal puberulus cymes. Bracts small subulate, pubescent, solitary. Calyx campanulate; teeth subulate, shorter than ovary; petaloid segments 7-7.6 x 4-6.2 cm, creamy white. Corolla pubescent; tube 1.6-2.5 cm; lobes very short acute. Berry globose, glabrous, lenticellate.

Fls. & Frts.: May-November.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Meghalaya, Nagaland, Mizoram, Nicobar Islands, Sikkim and West Bengal.

Bangladesh, Malaysia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1217.

Mycetia Reinw.

Erect or bushy shrubs. Leaves opposite; stipules membranous. Flowers in terminal, axillary or directly from the stem on paniculate cymes. Calyx tube short; 4-6-lobed. Corolla funnel-shaped; 4-6-lobed. Stamens 4-6, usually included. Fruit a berry subtended by persistent calyx.

Key to Species

- | | |
|----------------------------|----------------------|
| 1a. Undershrubs | <i>M. mukerjiana</i> |
| 1b. Shrubs | |
| 2a. Stem 4- angled, hollow | <i>M. nutans</i> |
| 2b. Stem not 4-angled | <i>M. longifolia</i> |

Mycetia longifolia (Wall.) O. Kuntze, Balakr., Fl. Jowai. 1:235. 1981; Haridasan & Rao, Forest Fl. Megh. 2:491. 1987; Kanjilal *et al.*, Fl. Assam 3:49. 1997 (Repr); Grierson & Long, Fl. Bhut. 2.2:784. 1999; Singh in Singh *et al.*, Fl. Mizo.1:706. 2002. *Adenosacme longifolia* (Wall.) Hook. f., Fl. Brit. Ind. 3:95. 1880.

Small shrubs. Stems greyish yellow, pubescent. Leaves elliptic-lanceolate, 8-20 x 2-6 cm, apex long acuminate, base cuneate, sparsely pilose pubescent above, densely villous beneath, margin entire; petioles 0.6-1.5 cm long, pubescent; stipules ovate-oblong or lanceolate, pubescent. Flowers yellow, in terminal trichotomous corymbose paniculate

cymes. Calyx tube globose; lobes ovate-triangular, small, persistent in fruit. Corolla tube campanulate, pubescent inside, 0.8-1.2 cm long; lobes triangular. Stamens 4-6, included; filaments very short, inserted towards the base of the corolla tube. Styles short; stigma bifid. Fruit is berry globose, white, 3-4 cm across, crowned with persistent calyx lobes.

Fls. & Frts.: July-September.

Distribution: India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram and Nagaland.

Bangladesh, China, Malaysia, Myanmar, Nepal, Tibet and Vietnam.

Specimen examined: AJNU 1142. **PL-11**

Mycetia mukerjiana Deb & Ratna Dutta, Indian Forester 91: 272. 1965; Singh in Singh *et al*, Fl. Mizo. 1: 707. 2002.

Undershrubs, stems terete, whitish. Leaves opposite, elliptic, oblong-lanceolate, 10-20 x 3-7 cm, base attenuate, apex acuminate, membranous, glabrous; petioles 1.5-3 cm long, stipules oblong, apex acute. Flowers in lower leaf axils, paniculate cymes, bracteate. Calyx lobes 5, persistent. Corolla yellow, tube about 1.3 cm long, lobes 5, ovate. Stamens 5. Fruit is berry cylindrical or ovoid, white.

Fl. & Fr.: July - November

Distribution: Distribution: India: Assam, Meghalaya, Mizoram and Nagaland. Bangladesh.

Specimen examined: AJNU 1218. **PL-11**

Mycetia nutans (R. Br. ex Kurz) Razafim. & B. Bremer, Taxon 64.2: 293.2015.

Myrioneuron nutans Kurz, For. Fl. Brit. Burma 2: 55. 1877; Hook. f. Fl. Brit. India 3 :

96. 1880; Gamble, Man. Ind. Timb. 410. 1902; Brandis, Ind. Trees 376. 1906; Kanjilal *et al.*, Fl. Assam 3: 50. 1939; Balak. Fl. Jowai 1: 237.1-981.

Shrubs, up to 2 m high. Stem 4-angled, hollow. Bark corky, pale yellow. Stipules ovate-lanceolate or linear, acuminate. Leaves obovate or obovate-suborbicular, 10- 26 x 6-14 cm, cuneate or acuminate at base, shortly acuminate, subcoriaceous. Flowers yellow, 4-6 mm across in terminal condensed corymbose cymes; bracteoles lanceolate. Calyx-lobes subulate or lanceolate, 6-7 x 1-5 mm, pubescent; corolla-tube tubular; lobes ovate, villous within. Fruits baccate, globose. Seeds triangular to ovoid, black.

Fl. & Fr.: October – March.

Distribution: India: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura.

Bangladesh, China and Tibet.

Specimen examined: AJNU 1453.

Ophiorrhiza L.

Erect or decumbent herbs, rarely undershrubs. Leaves simple, opposite, rarely alternate below, equal or unequal in each pair. Stipules various, often deciduous. Flowers in terminal and sometimes axillary, dichotomous cymes on a peduncle, often compact in flower but becoming branched and scorpioid in fruit. Calyx tube small; teeth 5, persistent. Corolla tubular or funnel-shaped; lobes 5, short. Stamens 5, inserted on the corolla tube. Fruit a capsule compressed, obcordate, girt in the middle by the calyx-tube.

Ophiorrhiza ruhosa (D. Don) Deb & Mondal, Yadav & Sardesai, Fl. Kolh. Dist.232. 2002. *Ophiorrhiza harrisiana* Heyne ex Hook. F., Fl. Brit. Ind. 3:78. 1880. *Ophiorrhiza prostrata* Don, Hook. f., Fl. Brit. India 3:78. 1880.

Erect herbs, up to 60 cm tall. Branches densely hirsute. Leaves opposite, unequal, ovate to elliptic-lanceolate, 5.5-15 x 2-6 cm, apex long acuminate, base cuneate-attenuate, sparsely pilose above, dense pubescent on nerves beneath, margin entire, petioles opposite pairs unequal in length, 0.2-1.5 cm long; stipules ovate-lanceolate with broad base, 0.3-0.4 cm long. Flowers pinkish to purplish white, in dense terminal cymes; peduncles and pedicels densely pubescent. Bracts small, linear-lanceolate, less than 0.2 cm long. Calyx-tube ovoid, pubescent, about 0.1 cm long, ribbed; teeth, small, triangular. Corolla campanulate, puberulous, 0.3-0.4 cm long, 5-angled; lobes short, keeled on the back. Capsules compressed, obcordate, pubescent, up to 0.3 cm wide

Fl. & Fr.: May-August.

Distribution: India: Andhra Pradesh, Bihar, Goa, Maharashtra, Nagaland, Nicobar Islands, Odisha, Sikkim, Tamil Nadu and West Bengal.

Bangladesh, Cambodia, China, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1400

Paederia L.

Climbing shrubs, foetid when bruised. Leaves opposite or rarely whorled; stipules intrapetiolar. Flowers 4-5-merous, in terminal or lateral, thyrsoïd or paniculate cymes.

Calyx tube reduced; lobes minute. Corolla funnel-shaped or campanulate; tube villous inside. Stamens 5, included. Fruit sub-globose or compressed.

Paederia foetida L., Mant. Pl. 1: 52. 1767; Hook.f. Fl. Brit. Ind. 3: 195. 1881; Kanjilal *et al.*, Fl. Assam 3: 77. 1939; Balakr., Fl. Jowai 1: 251. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 717. 2002.

Slender climbers, foetid when crushed. Leaves elliptic-ovate or ovate-lanceolate, 4-10 x 2-5 cm, base rounded or cordate, apex acuminate, glabrous; petioles 2-4 cm long. Flowers in axillary and terminal paniculate cymes. Calyx lobe small, triangular. Corolla tube grayish purple with reddish purple mouth, funnel-shaped, tube glandular hairy within. Fruit ellipsoid, compressed, reddish, pyrenes winged.

Fl. & Fr.: June - October

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh, Cambodia, China, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1178

Pavetta L.

Shrubs. Leaves in opposite pairs; stipules intrapetiolar, connate. Flowers in branches terminal trichotomously branched corymbose, sometimes in dense heads. Calyx tube funnel-shaped; minutely 4-toothed. Corolla tube slender, cylindrical; 4-lobed. Stamens 4, inserted at mouth of corolla tube, exserted. Fruit a drupe.

Pavetta indica L., Hook. f., Fl. Brit. Ind. 3:150. 1880; Haridasan & Rao, Forest Fl. Megh. 2:495. 1987; Kanjilal *et al.*, Fl. Assam 3:72. 1997 (Repr.). Polunin & Stainton, Flow. Hima. 174. 2008 (Repr.).

Shrubs or small trees. Leaves obovate-elliptic or oblanceolate, 8-20 x 4-6 cm, apex acuminate, base cuneate or obliquely rounded, glabrous above, puberulus beneath, margin entire; stipules broadly ovate; petioles 0.7-1-5 cm long. Bracts broadly ovate, acute. Flowers white, fragrant, in terminal shortly pedunculate corymbose panicles. Calyx pubescent; tube about 0.3 cm long; teeth 4, short, triangular. Corolla tube pubescent, 0.7-0.8 cm long; lobes 4, occasionally 5 lobes, puberulus, linear-oblong, spreading.. Stamens 4 inserted on the mouth of corolla tube, alternating with the lobes; filaments short; anthers exerted. Styles filiform, slender. Fruits globose, black, with 2 nutlets.

Fl. & Fr.: May-July.

Distribution: India: Andhra Pradesh, Karnataka, Kerala, Nagaland, Odisha, Tamil Nadu and Telangana.

Bangladesh and Sri Lanka.

Specimen examined: AJNU 1072. **PL-11**

Psychotria L.

Shrubs or small trees, rarely herbs, erect or climbing. Leaves opposite, rarely whorled; stipules intrapetiolar, broadly ovate, sometimes connate, often cleft and with axillary glandular hairs. Inflorescence in terminal or axillary cymes. Calyx tube short; teeth small, triangular. Corolla tube short, straight; lobes 5, spreading or recurved; throat

usually hairy. Stamens 5, inserted at the mouth or throat of the corolla, included or exserted. Fruit a small or oblong drupe with 2 pyrenes.

Psychotria erractica Hook. f., Fl. Brit. Ind. 3:168. 1880; Balakr., Fl. Jowai. 1:241. 1981; Haridasan & Rao, Forest Fl. Megh. 2:499. 1987; Kanjilal *et al.*, Fl. As. 3:84. 1997 (Repr.) ; Grierson & Long, Fl. Bhut. 2:2:806. 1999; Singh in Singh *et al.*, Fl. Mizo. 1:722. 2002.

Shrubs, up to 3 m tall. Stems glabrous. Leaves elliptic-obovate or elliptic-oblong, 4.5-18 x 2.3-8 cm, apex acute- acuminate, base cuneate, glabrous, margin entire; petioles 0.6-2.3 cm long ; stipules ovate, bifid. Flowers white, sessile in terminal or axillary on shortly peduncled trichotomous dense or lax-flowered bracteates cymes; peduncle 0.5-1 cm long. Bracts ovate-lanceolate, 0.2-0.3 cm long. Calyx tube short about 0.2 cm long; 5-toothed, triangular. Corolla tube short, cylindrical, about 0.5 cm long; lobes ovate, recurved. Fruit globose, reddish-yellow.

Fl. & Fr.: May- August.

Distribution: Distribution: India: Arunachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal.

Bangladesh, China, Nepal and Tibet.

Specimen examined: AJNU 1403.

Prismatomeris Thwaites

Shrubs or trees; stipules are cuspidate; flowers are axillary or terminal, fascicled, unisexual; corolla is short, tubular with a spreading limb; ovules are solitary in each cell; fruit baccate, 1-2-seeded.

Prismatomeris tetrandra (Roxb.) K. Schum. Engler & Praatl, Pflanzenfam 4(4): 138. 1891; Balak. Fl. Jowai 1: 239. 1981. *Coffea tetrandra* Roxb. Fl. Ind. 2: 193. 1824. Hook. f. Fl. Brit Ind. 3: 159. 1880; Gamble, Man. Ind Timb. 423 1902; Brandis, Ind. Trees 393. 1906; Kanjilal *et al*, Fl. Assam 3: 80. 1939.

Shrubs, upto 6 m high. Leaves elliptic-lanceolate, 6-12 x 2-5 cm, base cuneate, rounded, glabrous, apex acuminate, lateral nerves 6-9 pairs; petioles 0.5-1 cm long; stipules cuspidate. Inflorescence in axillary fasciculate cymes. Flowers unisexual; calyx cup-shaped, truncate; corolla white, fragrant, tube 1.8-2.5 cm long, lobes pubescent; anthers linear; stigma bifid. Fruits globose, purplish black.

Fl. & Fr.: May-January.

Distribution: Distribution: India: Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal. Bangladesh, Cambodia, China, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1108. **PL-11**

Nauclea L.

Stipules usually caducous; heads terminal, sessile or peduncled; bracts large, caducous; flowers 5-merous; corolla infundibuliform; stamens inserted on the throat of the corolla tube; ovules many in each cell; stigma globose; fruit of 2 dehiscent cocci.

Nauclea griffithii Hav. in J. Linn. Soc. 33: 51. 1897. Brandis, Ind. Trees 368. 1906; Kanjilal *et al.*, Fl. Assam 3: 19. 1939; *Adina griffithii* Hook. f., Fl. Brit. Ind. 3: 24. 1880; Gamble, Man. Ind. Timb. 402. 1902.

Big trees up to 35 m high; crown compact; bark grey or dark grey, warty; leaves 7-22 x 4-10 cm, obovate, oblanceolate or obovate-orbicular, base narrowed and cuneate, glabrous, shining on the abaxial surface; stipules obovate-oblong, reddish-green; flowers 1.5-2 cm long, white, pinkish-white; style exserted; capsule 4-gonous.

Fl. & Fr.: September-March.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

China and Myanmar.

Specimen examined: AJNU 1225.

Randia L

Shrubs or trees, often spinous; leaves often fascicled; stipules free or connate; inflorescence axillary or extra-axillary cymes or often flowers solitary; flowers sometimes dimorphic, 5-merous; corolla campanulate or funnel-shaped; stamens at the throat; ovary 2-celled; ovules many; stigma fusiform, entire or bifid; fruit a berry.

Randia spinosa (Thunb.) Poir. Encycl. Suppl. 2: 829. 1812. *G. dumetorum* Retz. Obs. Bot. 2: 14. 1781. *R. dumetorum* (Retz.) Lamk. Illus. 1(2): 227. 1792; FL Brit. Ind. 3: 110. 1880; Fl. Assam 3: 59. 1939.

Erect or straggling shrubs, 1 - 3 m; spines axillary, stout; leaves oblong orbovate, acute or cuneate at base, acute, 2 - 5 x 1.5 - 3 cm; petioles present; flowers subsessile, solitary or 1 -3 together on short lateral branches; corolla white or yellowish, 1 - 2 cm, hairy at throat. Fruits globose or ovoid, yellow.

Fl. & Fr.: Sept-April.

Distribution: India: Andhra Pradesh, Jammu, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Sikkim and Tamil Nadu.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Pakistan, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1089.

Silvianthus Hook.f.

Shrubs; stems hollow. Leaf margin shallowly dentate. Inflorescence a many flowered, dense, compact cymes. Flowers heterostylous. Corolla broadly funnelform, 4 or 5-lobed; lobes induplicate-valvate. Anthers dorsifixed near base, oblong. Disk ridged. Ovary with placentas at middle of septum; style prolonged; stigma oblong-fusiform. Fruit a 5-valved, slightly fleshy capsule. Seeds ovoid-oblong, longitudinally striate

Silvianthus bracteatus Hook. f. in Hooker, Icon. Pl. 11: 36. t. 1048. 1868; C.B. Clarke in Hook, f., Fl. Brit. India 3: 86. 1880; Kanjilal *et al.*, Fl. Assam 3: 45. 1939; Deb, Fl. Tripura 2: 90. 1983.

Shrubs up to 2 m high, branched. Leaves elliptic to ovate- elliptic, 8-23 x 2-12 cm, acuminate at base, acuminate, distantly toothed at margin; lateral nerves 7-9 pairs; petioles 1 -6 cm long. Flowers white, up to, 1.6 cm long in axillary cymes of 3-6 cm long;

peduncles 0.6-1.0 cm long; bracts oblong. Calyx-tube obconic; lobes elliptic to oblanceolate, 1.0-1.4 x 0.5-0.6 cm, foliaceous, green. Corolla tube yellowish-white, funnelform- campanulate, up to 1.2 cm, tomentose within. Fruits globose. Seeds truncate towards apex, black.

Fl. & Fr.: May – October.

Distribution: India: Assam, Nagaland and Manipur.

Bangladesh, China and Myanmar.

Specimen examined: AJNU 1031. **PL-11**

Spermacoce L.

Herbs. Leaves opposite or in false whorls; stipules connate with petioles forming a broad truncate tube, fimbriate, with marginal bristles. Flowers small or minute, solitary or terminal fascicles heads or cymes. Calyx tube reduced above hypanthium; 2-8-lobed. Corolla funnel- or salver-shaped; 4-lobed. Stamens 4, included or exerted. Fruit a 2-valves capsule.

Spermacoce hispida Spruce ex K. Schum., Fl. Bras. (Martius) 6. 6: 62. 1889. *Borreia hispida* (L.) K. Schum. In Engl. & Prantal., Nat. Pflanzfam. 4:144. 1891, non Spruce ex K. Schum. 1880. *Borreia articularis* (L.) Sivar. & Manilal, Int. Quart. J. Pl. Sci. Res. 2: 89. 89. 1975, nom. invali. id.

Prostrate herbs, annual or perennial, up to 40 cm tall. Stems subterete, glabrous to puberulent. Leaves sessile, oblong-elliptic, obovate, 10-35 x 5-16 cm, both surfaces scaberulous, base cuneate to obtuse, apex acute; stipules densely puberulent. Inflorescences axillary with 1-6 flowers per axil. Calyx puberulent, scaberulous,

ellipsoid; lobes 4, linear-lanceolate, ciliate. Corolla pink, purple, or white, funnellform. Capsules ellipsoid to subglobose, 2.6-5 × 2.4-3.3 mm, puberulent, black, elliptic to elliptic-oblong.

Fl. & Fr.: March - December

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Japan, Malaysia, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1319.

Spermacoce ocymoides Burm. f., Hook. f., Fl. Brit. Ind. 3:200. 1881; Singh in Singh *et al.*, Fl. Mizo.1:729. 2002. Yadav & Sardesai, Fl. Kolh. Dist. 234. 2002.

Erect weak herbs. Stems acutely 4-angles, often ciliate at the angles. Leaves sessile or shortly petioled, ovate-elliptic, 1-2.5 x 0.5-1 cm, apex acute, base cuneate, glabrous or scabrid, pubescent on nerves beneath, margin scabrid; stipules bristly. Flowers small, sessile, many flowered in dense axillary and terminal bracteate capitate cymes; bracteoles filiform. Calyx tube oblong-ovoid, glabrous; lobes 2, linear, unequal. Corolla white, as long as the calyx; lobes 4, triangular. Stamens 4. Capsule urn-shaped, 0.1 cm long, glabrous, with persistent calyx lobes. Seeds oblong, brown.

Fl. & Fr.: June-September.

Distribution: India: nearly throughout India; Indo-Malaya; Bangladesh.

Specimen examined: AJNU 1317.

Saprosma Blume

Shrubs or small trees; leaves often ternate or whorled; cymes axillary or terminal, solitary or fascicled, usually peduncled; flowers 4-5-merous; corolla campanulate or bellshaped, villous within; stamens inserted at the throat; ovules solitary in each cell; styles bifid; fruit a drupe of 1-2-pyrenes.

Saprosma ternatum Hook. f., Fl. Brit. India 3:193. 1881; Kanjilal *et al.*, Fl. Assam 3:88.1939 Hajra *et al.* (eds.), Mat. Fl Arunachal Pradesh 1: 611. 1996.

Trees, up to 8m tall. Branches pale or dark, bark greyish-brown. Leaves ternately whorled, coriaceous, elliptic-lanceolate, 6-9 x 2-4 cm, acute at base, acuminate at apices, stipules ca 1.5 cm long, lanceolate with needle like points. Flowers white in trichyomous or corymbosely fasciculate cymes; calyx glabrous, shortly campanulate, 4-6 toothed; corolla ca 1 cm long, pubescent, white, funnel shaped, 4-lobed; stamens as many as corolla lobes; ovary 2-celled. Fruits ellipsoid, black when ripe, crowned by the conical disc.

Fl. & Fr.: May- November

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Nagaland.

Bangladesh, China, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1074. **PL-11**

Uncaria Burch.

Climbing shrubs with recurved hooks; stipules sometimes bifid; heads solitary or paniced; bracts in pairs; flowers 5-merous; calyx fusiform; stamens adnate to the corolla

throat; anthers appendaged; ovules many in each cell; stigma capitate; fruit a septicidal capsule; seeds winged at both ends, usually 2 winged at one end.

Uncaria sessilifructus Roxb., Fl. Ind. 1:520. 1820; Hook. f., Fl. Brit India .3:30.1880; Kanjilal *et al.*, Fl. Assam .324. 1939; Hajra *et al.* (eds.), Mat. Fl. Arunachal Pradesh 1: 616. 1996.

Extensive climbers. Branchlets quadrangular. Leaves elliptic-ovate, elliptic-orbicular, 3.5-12.5 x 2-7 cm, rounded at base, abruptly acuminate at apices, margin entire, glabrous, shiny above, pale beneath. Petioles up to 1 cm long. Flowers white, 2.5-4 cm long slender pedunculate axillary heads; corolla 1.5 cm long, tubular with spreading limb. Fruiting heads 3-3.5 cm in diam. Capsules sessile, ellipsoid or club-shaped, 0.5 -1.3 cm long, tomentose, crowned by calyx lobes.

Fl. & Fr.: Sept-April.

Distribution: India: Assam, Bihar, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura and West Bengal.

Bangladesh, China, Laos, Myanmar, Nepal and Vietnam.

Specimen examined: AJNU 1034.

ASTERACEAE Bercht. & J. Presl

Herbs or shrubs, rarely trees. Leaves alternate, rarely opposite, simple or compound, exstipulate. Flowers sessile, in a dense head on common receptacle enclosed in an involucre of whorled calyx-like bracts. Flowers all tubular or the outer or all ligulate, all bisexual or the inner bisexual or male, the outer female or neuter, sometimes monoecious or dioecious. Calyx present in the form of pappus. Corolla tubular

or labiate and ligulate; lobes usually 5, valvate. Stamens usually 5, epipetalous; filaments short, free. Ovary unilocular; style simple, forking at end into 2 stigmas; ovules solitary, erect. Fruit an achene, dry, indehiscent.

Key to the genera

- 1a. Plants with milky fluid; florets with ligulate corolla *Sonchus*
- 1b. Plants without milky fluid; florets without ligulate corolla
 - 2a. Heads with true rays *Artemisia*
 - 3a. Receptacles with paleaceous bracts or bristles
 - 4a. Leaves usually opposite, pappus have scales
 - 5a. Leaves deeply divided or pinnatifid *Bidens*
 - 5b. Leaves simple or pinnately compound
 - 6a. Achenes of disc florets dorsally compressed or angular
 - 7a. Achenes with lacerated awn-like appendages or 2 *Synedrella*
 - 7b. Achenes with 8-20 fimbriate, ciliate or lacinate scales *Galinsoga*
 - 6b. Achenes of disc florets rounded or laterally compressed
 - 8a. Anther base sagittate *Eclipta*
 - 8b. Anther base entire, truncate or obtuse
 - 9a. Heads radial; involucre broadly ovoid *Blainvillea*

- 9b. Heads radiate-discoid; involucre campanulate *Acmella*
- 4b. Leaves usually alternate *Microglossa*
- 3b. Receptacles naked
- 10a. Involucral bracts 1-3 seriate; not imbricate
- 11a. Heads heterogamous *Senecio*
- 11b. Heads homogamous *Emilia*
- 10b. Involucral bracts many seriate; imbricate
- 12a. Leaves usually radical, upper alternate; heads radiate *Inula*
- 12b. Leaves alternate; heads disciform *Blumea*
- 2b. Heads without true rays
- 13a. Leaves and bracts spinose
- 14a. Herbs; leaves radical; heads glomerules *Elephantopus*
- 14b. Herbs, shrubs or trees; leaves alternate; heads corymbose *Vernonia*
- 13b. Leaves and bracts not spinose
- 15a. Twiners *Mikania*
- 15b. erect herbs
- 16a. Pappus comprising 4-5 scales *Ageratum*

16b. Pappus comprising 10 or more capillary hairs *Ageratina*

Acmella Rich. ex Pers.

Annual or perennial herbs. Stems 1-several from base, erect or decumbent. Leaves ovate or elliptic, opposite, petiolate. Capitula solitary or few on axillary or terminal peduncles, sometimes corymbose, radiate or discoid, paleate. Involucres 1-2-seriate; phyllaries narrowly ovate. Receptacles conical to elongate, paleae enfolding achenes. Ray flowers few or absent, female; ligules slightly longer than phyllaries, yellow or orange. Disc flowers bisexual; corollas yellow, tubular-campanulate, 4-5-lobed; style branches obtuse. Achenes obovoid, compressed, sometimes with pale ciliate border (cilia non-scabrid), disc achenes oblique; pappus absent or of 2 weak scabridulous bristles.

Key to Species

- | | |
|-------------------------------------|----------------------|
| 1a. Achenes ciliate; pappus absent | <i>A. clava</i> |
| 1b. Achenes ciliate; pappus present | <i>A. paniculata</i> |

Acmella calva (DC.) R.K. Jansen, Syst. Bot. Monog. 8: 41. 1985; *Spilanthes calva* DC. Wight, Contrib. Bot. Ind. 19. 1834; H.J. Chowdhery in Hajraet *al.*, Fl. Ind. 12: 409. 1995; *Spilanthes acmella sensu* Hook.f., Fl. Brit. Ind. 3: 307. 1881, *non*(L.) Murray, 1774. *Spilanthes acmella var. calva* (DC.) C.B. Clarke, Comp. Ind. 138. 1876.

Erect or decumbent herbs; stem terete, densely pubescent. Leaves opposite, elliptic or ovate-lanceolate, acute to obtuse at apex, irregularly serrate at margin, attenuate at base, pubescent beneath; petioles up to 1.5 cm long. Heads solitary, axillary or terminal, peduncles 5-8 cm long; involucre bracts 1-seriate, ovate, spreading, obliquely lanceolate, pubescent; floers yellow, ray flowers 1-seriate, female flowers many, corollas

4-5 toothed at apex. Achenes narrowly obovate, glabrous, light black, obliquely 3 angular, minutely glandular.

Fl. & Fr.: August-December.

Distribution: Almost throughout India.

Bangladesh, China, Myanmar, Nepal, Sri Lanka and Vietnam.

Specimen examined: AJNU 1399.

Acmella paniculata (Wall. ex DC.) R.K. Jansen, Syst. Bot. Monogr. 8: 67. 1985; *Spilanthespaniculata* Wall. ex DC., Prodr. 5: 625. 1836; *Spilanthes acmella* var. *paniculata* (Wall. ex DC.) C.B. Clarke, Comp. Ind. 138.1876; Hook.f., Fl. Brit. Ind. 3: 307. 1881.

Erect herbs. Leaves broadly ovate, apex acute or obtuse, margins undulate, attenuate at base, pubescent. Heads 7-9 mm broad, few in axillary or terminal panicles; involucre bracts 2-seriate, elliptic, acute to obtuse at apex, sparsely pubescent; flowers all bisexual, corolla, 5 lobes, densely pilose within. Achenes black, sparsely puberulous near apex, margins ciliate, ray-achenes 3 gonous, disc dorsally compressed, verrucose, pappus.

Fl. & Fr.: December-June.

Distribution: Almost throughout India.

Bangladesh, Borneo, Cambodia, China, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU1493.

Ageratina Spach

Herbs, shrubs or subshrubs. Leaves opposite, simple, subentire to coarsely serrate. Heads in corymbs, discoid. Involucres cylindrical to campanulate. Corolla tubular-campanulate. Style linear, exerted. Achenes oblong, 5-ribbed; pappus simple, white.

Key to the species

1a. Involucral bracts 1-2 seriate, equal in length 9. *A. riparia*

1b. Involucral bracts 1-many aeriata, outer smaller than the inner *A. adenophora*

Ageratina adenophora (Spreng.) R. M. King & H. Rob., *Phytologia* 19: 211. 1970; *Eupatorium adenophorum* Spreng., *Syst. Veg.* ed. 16, 3:420. 1826; Haridasan & Rao, *For. Fl. Megh.* 2: 522. 1987; Singh in Singh *et al.*, *Fl. Mizo.* 1: 770. 2002.

Herbs or undershrubs, much branched, up to 2 m tall. Stems puberulous. Leaves opposite, subsessile, ovate-triangular, or rhomboid, 2-8 x 0.5-4 cm, base cuneate, narrowed, apex acute-acuminate, margins dentate, pubescent on both the surfaces. Heads in dense axillary and terminal corymbs. Involucral bracts 3-seriate, outer oblong spatulate, with glandular hairs, inner oblong-lanceolate, or ovate. Flowers white. Achenes conspicuously 5-angled, black; pappus dull white.

Fl. & Fr.: February – June.

Distribution: Almost throughout India.

Throughout the Mexico region.

Specimen examined: AJNU 1336. **PL-15**

Ageratina riparia (Regel)R. M. King & H. Rob, *Phytologia* 19: 216. 1970; *Eupatorium riparium* Regel, *Gartenflora* 15: 324. 1866; Haridasan & Rao, *For. Fl. Megh.* 2: 523. 1987.

Perennial herbs; much branched from base, young parts pubescent. Leaves simple, elliptic-lanceolate, apex acuminate, base attenuate, margin dentate-serrate, glabrescent. Heads in dense corymbs; in leafy panicles. Florets white. Achenes minute; pappus white.

Fl. & Fr.: March – June.

Distribution: India: Assam, Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Tripura and Uttarakhand.

Throughout the Mexico region.

Specimen examined: AJNU 1337.

Ageratum L.

Annual herbs, hairy. Leaves simple, opposite, toothed. Heads in terminal clusters, of corymbose or paniced, discoid; involucral bracts few-many seriate. Receptacle naked. Corolla tubular; limb 5-lobed. Anthers appendaged. Fruit achenes, 5-angled.

Ageratum conyzoides L., *Hook. f., Fl Brit. Ind.* 3:243. 1881; Balakr., *Fl. Jowai.* 1:258. 1981; Haridasan & Rao, *Forest Fl. Megh.* 2:516. 1987; Grierson & Long, *Fl. Bhut.* 2.3:1627. 2001; Singh in Singh *et al.*, *Fl. Mizo.*1:743. 2002.

Erect herbs. Leaves ovate to ovate-rhomboid, triangulate, 2.2-11 x 1-5 cm, apex acute, base subacute, pilose above, margin crenate-serrate. Heads in dense terminal

corymbs; involucral bracts 1-2 seriate; florets bluish or purplish white. Achenes 4-5-angled; pappus 5-awned.

Fl. & Fr.: September-April.

Distribution: Throughout India

Native to Mexico.

Specimen examined: AJNU 1310

Artemisia L.

Aromatic herbs or under-shrubs. Leaves alternate, entire serrate or 1-3-pinnatisect. Heads solitary or fascicled, racemose or paniced, never corymbose; involucral bracts 2-3 seriate, outer shorter. Receptacle flat or concave, naked or hirsute. Anthers sagittate. Achenes faintly striate.

Artemisia nilagirica (Clarke) Pamp., Balakr., Fl. Jowai. 1:261. 1981; Haridasan& Rao, Forest Fl. Megh. 2:518. 1987. *Artemisia vulgaris* L., Hook. f., Fl. Brit. Ind. 3:325. 1881; Kanjilal *et al.*, Fl. Assam 3:119. 1997(Repr.).

A tall, strong scented, pubescent or tomentose under-shrubs. Lower leaves subsessile, lobed, lacinate or deeply pinnatisect with stipule-like lobes at the base, 3.5-10 x 1-4.2 cm, pubescent above, white tomentose beneath; upper leaves smaller, 3-lobed or entire, lanceolate. Heads ovoid or sub-globose clustered in broad or narrow panicles. Flowers white; involucral bracts few seriate. Achene minute; pappus absent.

Fl. & Fr.: October-February.

Distribution: India (throughout), Bhutan, Indo – Malaya.

Specimen examined: AJNU1494.

Bidens L.

Annual or perennial herbs or undershrubs. Leaves usually cauline, opposite, petiolate or sessile, simple, compound or 1-3-pinnate. Heads radiate. Involucral bracts many seriate, outer smaller. Ray florets usually neuter, sometimes female and sterile; petals yellow or white. Disk florets bisexual, fertile; petals usually yellow. Achenes compressed or 3 or 4 angled.

Key to Species

1a. Leaves 3-5 partite or undivided; outer involucral bracts narrowly spatulate

B. pilosa

1b. Leaves pinnate or bipinnate; outer involucral bracts linear or linear-lanceolate

2a. Leaves pinnate; leaflets deltoid-ovate

B. biternata

2b. Leaves bipinnate; leaflets lanceolate

B. bipinnata

Bidens bipinnata L., Singh in Singh *et al.*, Fl. Mizo.1:747. 2002; *Bidens pilosa* var. *bipinnata* Hook. f., Fl. Brit. Ind. 3:309. 1881; Grierson & Long, Fl. Bhut. 2.3:1620. 2001.

Erect, glabrous or sparsely pilose, annual herbs. Stems obscurely striated. Leaves usually bipinnate, 3.5-18 cm long; primary leaflets usually 5, ovate-lanceolate, acuminate, margin serrulate. Heads solitary on long axillary peduncles; involucral bracts with scarious margin; florets white. Achenes linear, crowned with few filamentous awns

Fl. & Fr.: Throughout the year.

Distribution: India (throughout).

Throughout the world.

Specimen examined: AJNU 1401.

Bidens biternata (Lour.) Merr. & Sherff, Bot. Gaz. 88: 293. 1929; Grierson & Long, Fl. Bhut. 2.3:1517. 2001.

Erect undershrub; stems glabrous, sparsely pilose at nodes. Leaves usually bipinnate, petiolate; primary leaflets usually 5, ovate or triangular in outline, sparsely pilose on both surfaces. Capitula radiate. Outer phyllaries oblong, spatulate, ciliate; inner phyllaries broadly oblong. Corolla yellow. Ray flowers 3-5, ligules elliptic to obovate, entire to 3-dentate. Achenes linear, sparsely setose above.

Fl. & Fr.: August – November.

Distribution: India (throughout).

Throughout the world.

Specimen examined: AJNU 1495.

Bidens pilosa L. var. **minor** (Bl.) Sherff. In Field Mus. Nat. Hist. (Chicago) Bot. ser. 16: 421. 1937; Balakr., Fl. Jowai 1: 257. 1981; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 372. 1995; Haridasan & Rao, For. Fl. Megh. 2: 519. 1987.

Erect, glabrous-pubescent annual herbs or undershrubs. Stems 15-100 cm, with finely striate, angulate branches. Leaves opposite, petioled, trifoliate, lobes broadly ovate-lanceolate or elliptic, 1.5- 7.5 x 0.5-2 cm, apex acute, base obtuse, margins crenate, surface glabrous or puberulous. Heads solitary, on long, unequal peduncles. Involucral bracts 1-seriate, ligulate-spatulate. Ray florets white. Disc-florets yellowish brown. Achenes linear; pappus stout, with recurved hooks.

Fl. & Fr.: August – December.

Distribution: India (throughout).

Throughout the world.

Specimen examined: AJNU 1316.

Blainvillea Cass.

Herbs, annual, erect or prostrate-decumbent; stems branched, glabrous or pubescent. Leaves opposite or alternate, ovate or elliptic, margin serrate. Inflorescence capitula axillary or terminal; peduncles slender, elongate. Heads yellow, white or purplish, radiate to discoid, globose to elongate-conical. Involucral bracts 1-2 seriate, lanceolate. Oblong to ovate, obtuse or sometimes mucronulate. Ray florets female, 1- or 2-seriate, lamina light yellow, yellow, or rarely white, short or very short, apex 2-4-dentate. Disk florets tubular, limbs 5-dentate. Anther tails obtuse, entire or inconspicuously auriculate. Achenes glabrous or pubescent, apex truncate, of female florets 3-ribbed, dorsally compressed, of bisexual florets 3- 4 ribbed, or laterally compressed; pappus 2-5, unequal, spine like, base connate.

Blainvillea acmella (L.) Phillipson in Blumea 6: 350. 1950; Chowdhery in Hajra et al., Fl. India 12: 377. 1995. *Verbesina acmella* L. Sp. Pl. 901. 1753. *Blainvillea latifolia* (L. f.) DC. ex Wight, Contrib. Bot. Ind. 71. 1834; Hook.f, Fl. Brit. India 3: 305. 1881.

Rigid, scabrous, annual herbs, 30-60 (-120) cm high; branches opposite to alternate, terete. Leaves opposite or distally alternate, petioled, ovate to lanceolate or rhomboid-ovate, 5-9 x 4-5 cm, base cuneate, acute-acuminate at apex, margins crenate-

serrate, sparsely hairy. Heads peduncled, axillary and terminal, up to 1 cm across, radiate-subdisciform. Involucral bracts 2-3-seriate; outer ovate; inner oblong. Flowers pale yellow. Achenes cuneate-truncate, dorsally compressed, 3-4-angled; pappus of 2-5, unequal bristles.

Fl. & Fr.: September-February.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Himachal Pradesh, Kerala, Jammu & Kashmir, Meghalaya, Nagaland, Sikkim and Tamil Nadu. Cambodia, China, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1261. **PL-15**

Blumea DC.

Annual or perennial herbs or shrubs, pubescent, generally strong fragrant. Leaves alternate, simple, generally serrate, denticulate or lobed, pubescent. Heads terminal and sometimes axillary panicles; involucral bracts multi-seriate. Receptacle flat, naked or pubescent. Flowers yellowish, rarely purple or white. Achenes minutely ribbed; pappus 1-seriate, white.

Blumea laciniata DC., Hook. f., Fl. Brit. Ind. 3:264. 1881; Balakr., Fl. Jowai.1:275. 1981; Singh in Singh *et al.*, Fl. Mizo.1:752. 2002.

Erect herbs, pubescent or laxly tomentose. Leaves radical and cauline, membranous, 4- 28 x 1-18 cm, margin sharply incised-lyrate, villous pubescent, base narrowed into petioled; upper ones smaller, almost sessile; lower ones petioled. Heads in

dense terminal panicles; involucre bracts few seriate, villous pubescent; florets yellow.
Achenes 8-10 ribbed; pappus white.

Fl. & Fr.: March-August.

Distribution: India (throughout), South East Asia.

Specimen examined: AJNU 1496.

Cyanthillium Blume

Herbs, shrubs, or trees, sometimes climbing; indumentum of simple or T-shaped hairs and sessile globose glands. Leaves alternate, petiolate or subsessile, margin entire, serrate, or dentate, pinnately veined. Synflorescence terminal or axillary, paniculate, densely clustered to laxly corymbose, sometimes racemelike, or reduced to solitary capitulum. Involucre bowl-shaped to narrowly cylindrical; phyllaries imbricate, to 6-seriate, apex obtuse, acute, or acuminate into spinescent or threadlike tip, outer phyllaries shorter, inner occasionally caducous. Receptacle flat, naked or sometimes shortly hairy. Florets (1-)3-100+; corolla pink, purplish, narrowly tubular with campanulate limb; lobes 5. Anthers hastate, obtusely auricled. Style branches subulate, puberulent. Achenes cylindrical or obconical, mostly often 4- or 5-ribbed or angled, glabrous or shortly hairy, apex truncate. Pappus usually double, outer pappus of short bristles or narrow scales, inner pappus of many plumose bristles, deciduous or persistent, often colored

Cyanthillium cinereum (L.) H. Rob., Proc. Biol. Soc. Washington 103(1):252. 1990.

Vernonia cinerea (L.) Less. In Linnaea 4: 291.1829; Hook. f., Fl. Brit. India 3: 233. 1881;

C.E. C. Fischer in Rec. Bot. Surv. India 12: 106. 1938; Uniyal in Hajra *et al.*, Fl. India

13: 367. 1995. *Conyza cinerea* L. Sp. Pl. 862. 1753.

Annual or perennial heads, erect, up to 90 cm high. Stem terete, ribbed, grayish pubescent, glandular. Leaves various, obtuse or acute, repand-serrate, up to 8.7 x 3.7 cm, glabrous, petioled or subsessile. Head in terminal corymbose panicles 4-6 mm across, 18-25 flowered. Involucral bracts 4- seriate, lanceolate with few glands; outer up to 1.6 mm long; inner up to 4.6 mm long. Achenes terete, up to 1.6 mm long, silky, ribbed. Pappus hairs white, biseriate.

Fl. & Fr.: March – September.

Distribution: India: Assam, Arunachal Pradesh, Karnataka, Lakshadweep, Meghalaya, Mizorum, Manipur, Nagaland, Tripura and Tamil Nadu.

Almost throughout the world.

Specimen examined: AJNU 1468. **PL-15**

Eclipta L.

Annual or perennial herbs, erect, branched, strigose. Leaves opposite, toothed. Capitula terminal on stems and branches or axillary; involucre campanulate; phyllaries imbricate, up to 2-seriate; receptacle flat or convex. Ray florets bisexual, mostly fertile, lamina minutely 2-lobed, white to yellowish. Disk florets bisexual, corolla tubular, greenish white to yellowish, 4- or rarely 5-lobed; anthers entire at base; style, mammillate at apex. Achenes thick, maturing and falling rapidly, those of ray florets 3-angled, those of disk florets compressed, 4-angled; pappus absent.

Eclipta prostrata (L.) L., Grierson & Long, Fl. Bhut. 2.3:1623. 2001; Singh in Singh *et al.*, Fl. Mizo.1:766. 2002; *Eclipta alba* Hassk., Hook. f., Fl. Brit. Ind. 3:304. 1881;

Kanjilal *et al.*, Fl. Assam 3:117. 1997(Repr.).

A diffuse or erect, strigose herbs. Leaves, ovate, oblong-lanceolate, 1.4-5.2 x 0.3-1 cm, margin undulate or distantly crenate, acuminate, hairy. Heads subglobose, solitary or 2-3 in axillary or terminal on long peduncles cymes; involucral bracts leafy; florets white. Achenes, narrow, warty, minutely pubescent at apex.

Fls. & Frts.: April-November.

Distribution: Throughout India.

Throughout the world.

Specimen examined: AJNU 1015.

Elephantopus L.

Rigid herbs. Leaves alternate. Heads discoid, few flowered, usually 4 in terminal glomerules, subtended leafy-like bracts; involucral bracts 8-10, stiff, flat, alternate. Receptacles naked. Corolla tubular, limb unequally 4-5-lobed. Achenes sub-compressed, 10-ribbed, pubescent.

Elephantopus scaber L., Hook. f., Fl. Brit. Ind. 3:242. 1881; Balakr., Fl. Jowai. 1:262. 1981; Kanjilal *et al.*, Fl. Assam 3:107. 1997(Repr.); Grierson & Long, Fl. Bhut. 2.3:1489. 2001.

A hard, scabrous, dichotomously branched herbs. Basal leaves obovate-oblong, 5-28 x 1-7.5 cm, apex rounded or broadly acute, base cuneate-attenuate, sparsely hirsute above, pubescent beneath, margin crenate-serrate; cauline leaves shorter, ovate or oblong; base semi-amplexicaul. Heads solitary, glomerate, terminal on long peduncles in dense clusters, each clusters enclosed by 3 cordate leafy bracts; involucral

bracts in 2 series, pungent; florets purplish; corolla tubular, limb 4-5 lobes. Achenes truncate; pappus of 5 bristles, dilated at base.

Fl. & Fr.: October-January.

Distribution: Throughout India.

Bangladesh, Cambodia, China,, East Himalaya, Laos, Madagascar, Myanmar, Nepal, Sri Lanka, Taiwan, Tanzania, Thailand, Vietnam and Zimbabwe.

Specimen examined: AJNU 1251. **PL-15**

Emilia Cass.

Annual or perennial herbs. Leaves radical, alternate, entire toothed or lyrate-pinnatifid. Heads borne on long peduncles, solitary or few-flowered corymbs. Involucral bracts uni-seriate, equal, free; receptacle convex, naked. Flowers all bisexual, fertile. Corolla tubular, limb 5-lobed. Achenes sub-compressed, angled, ribbed, glabrous.

Emilia sonchifolia DC., Hook. f., Fl. Brit. Ind. 3:336. 1881; Balakr., Fl. Jowai. 1:269. 1981; Kanjilal *et al.*, Fl. Assam 3:120. 1997(Repr.); Grierson & Long, Fl. Bhut. 2.3:1598. 2001; Singh in Singh *et al.*, Fl. Mizo.1:769. 2002.

Erect, weak, puberulus, annual herbs. Leaves radical and alternate; upper leaves oblong-lanceolate, 4-14 x 1-7 cm, shallowly dentate, auricled; lower leaves long petioled. Heads small in lax corymbs; involucral bracts uni-seriate, connate at base. Florets purplish yellow. Achenes small, 5- ribbed; pappus white.

Fl. & Fr.: February-May.

Distribution: Almost throughout India.

Bangladesh, Cambodia, Cameroon, China Hainan, Japan, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Philippines, Sri Lanka, Sumatera, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1333.

Galinsoga Ruiz & Pav.

Annual herbs. Leaves opposite, entire or toothed, 3-nerved at base. Heads small, radiate, paleate, in cymose clusters on peduncles; involucre bracts 1-2-seriate. Receptacle conical, pales slender, serrate. Achenes angled, pappus of a few scarios, entire awned or fimbriate scales; ray achenes compressed, pappus absent.

Galinsoga parviflora Cav., Hook. f., Fl. Brit. Ind. 3:311. 1881; Balakr., Fl. Jowai. 1:258. 1981; Haridasan & Rao, Forest Fl. Megh. 2:530. 1987; Grierson & Long, Fl. Bhut. 2.3:1624. 2001; Singh in Singh *et al.*, Fl. Mizo.1:772. 2002.

Weak herbs. Young parts pubescent. Leaves ovate, elliptic-lanceolate, 2-5.8 x 1.4-4 cm, apex acute or acuminate, base attenuate or rounded, margin shallowly crenate, hairy. Heads solitary, axillary and terminal on long peduncles; involucre bracts ovate, striate. Ray florets white. Disk florets pale yellow. Achenes ovate, angled; pappus scaly.

Fl. & Fr.: April-October.

Distribution: India (throughout), Bhutan, China, Nepal, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1257.

Inula L.

Herbs, rarely shrubs. Leaves simple, radical, alternate. Heads few in terminal corymbs, sometimes solitary axillary on long peduncles, radiate; involucre bracts many-seriate. Receptacle convex, naked. Achenes sub-terete, usually ribbed; pappus bristles 1-2-seriate.

Inula cappa DC., Hook. f., Fl. Brit. Ind. 3:295. 1881; Balakr., Fl. Jowai. 1:259. 1981; Haridasan & Rao, Forest Fl. Megh. 2:523. 1987; Kanjilal *et al.*, Fl. Assam 3:116. 1997(Repr.); Grierson & Long, Fl. Bhut. 2.3:1489. 2001; Singh in Singh *et al.*, Fl. Mizo. 1:766. 2002.

Stout, under-shrubs. Branches covered with brown silky villous or woolly. Leaves shortly petioled, oblong-lanceolate, 7-16 x 2.4-4.2 cm, acuminate, margin distantly cuspidate serrate, upper surface pubescent with adpressed rough hairs, beneath with silky villous or tomentose; base sub-acute or rounded. Heads in much branched terminal and axillary corymbs; involucre bracts multi-seriate; florets yellow. Achenes minute, ribbed; pappus dull white.

Fl. & Fr.: September-January.

Distribution: India (throughout), E & W Himalaya; China, Nepal, Myanmar, Thailand, Vietnam

Specimen examined: AJNU 1497.

Microglossa DC.

Erect or scandent shrubs. Leaves alternate. Heads small, in terminal corymbs or panicled; involucre multi-seriate, imbricate. Receptacle flat, naked or nearly so. Achenes angled; pappus simple, many, 1-2-seriate.

Microglossa pyrifolia (Lamk.) O. Kuntze, Grierson & Long, Fl. Bhut. 2.3:1546. 2001; Singh in Singh *et al.*, Fl. Mizo.1:782. 2002. *Microglossa volubilis* DC., Hook. f., Fl. Brit. Ind. 3:257. 1881; Kanjilal *et al.*, Fl. Assam 3:109. 1997 (Repr.).

A trailing Shrub; branches ribbed. Leaves alternate, ovate, elliptic-lanceolate, 5.4-7.2 x 2.3-3.6 cm, apex acute, base obtuse-rounded, petioles short, margin entire or slightly serrate, glabrous above, pubescent beneath. Heads yellow, peduncled, clustered on the branches of corymbs; involucre bracts outer shorter. Achenes 4-angled; pappus reddish.

Fls. & Frts.: December-April.

Distribution: India (NE India), Bangladesh, China, Nepal, Myanmar, Malaysia, Thailand, Vietnam; Africa.

Specimen examined: AJNU 1335.

Mikania Willd.

Twining perennial herbs. Leaves opposite, simple, 3-nerved. Heads small, discoid, in axillary or terminal spiked raceme or panicled corymbose; involucre bracts 4, with a smaller outer one. Receptacle narrow, naked. Corollas all equal, regular, tubular, limb 5-lobed. Achenes compressed, 5-angled; pappus bristly, 1-2-seriate.

Mikania micrantha Kunth., Balakr., FL. Jowai. 1:257. 1981; Haridasan & Rao, Forest Fl. Megh. 2:524. 1987; Grierson & Long, Fl. Bhut. 2.3:1625. 2001; Singh in Singh *et al.*, Fl. Mizo.1:782. 2002; *Mikania scandens* Willd., Hook. f., Fl. Brit. Ind. 3:244. 1881.

Glabrous, slender twiner. Leaves triangular- ovate, acuminate, 5-8 x 2-6 cm, apex acute, base cordate, margin distinctly crenate or undulate dentate, long petioled; base cordate or hastate. Heads in terminal and axillary corymbose panicles; involucre bracts oblong-lanceolate; florets creamy white. Achenes truncate, glabrous, glandular; pappus reddish.

Fls. & Frts.: October-April.

Distribution: India (NE India), China, Nepal, Myanmar.

Specimen examined: AJNU 1380.

Senecio L.

Erect herbs, shrubs or trees, occasionally climbers. Leaves simple, alternate, serrate or variously divided; radical leaves usually absent at flowering. Heads in simple or compound corymbs; involucre bracts 1-2 seriate. Receptacle flat, naked. Florets yellow; corolla tubular, 4-5 lobed. Achenes ribbed; pappus whitish, with apically hooked hairs.

Senecio scandens Buch.-Ham ex D. Don., Hook. f., Fl. Brit. Ind. 3:352. 1881; Balakr., Fl. Jowai. 1:267. 1981; Haridasan & Rao, Forest Fl. Megh. 2:526. 1987; Kanjilal *et al.*, Fl. Assam 3:122. 1997(Repr.). Grierson & Long, Fl. Bhut. 2.3:1593. 2001.

A large scandent shrub; branches ribbed, flexuose. Leaves ovate-lanceolate, hastate, apex acuminate, base truncate or slightly cordate, glabrous on both the surfaces,

margin crenate-serrulate; petiole auricled at base. Heads in terminal divaricate corymbs; involucre bracts linear-oblong. Flowers numerous; ligules 6-8. Achenes 4-ribbed; pappus white.

Fl. & Fr.: November-February.

Distribution: India (NE India), China, Nepal, Myanmar.

Specimen examined: AJNU 1498.

Sonchus L.

Herbs, annual, biennial, or perennial. Stem erect. Leaves pinnate to undivided. Synflorescence corymbiform or paniculiform. Capitula with usually 70-300 florets. Involucre campanulate to broadly campanulate. Phyllaries green, glabrous; outer phyllaries in several series, gradually longer centripetally, imbricate with longest 1/2- 3/4 as long as inner ones; inner phyllaries 8-15, equal in length. Receptacle naked. Florets yellow. Achene brownish, ovoid to ellipsoid, compressed, narrowed toward both ends, with (4 or) 5 main ribs. Pappus white, caducous or persistent with caducous inner bristles.

Sonchus asper (L.) Hill. Herb. Brit. 1: 47. 1769; Hook. f., Fl. Brit. India 3: 414. 1881.

Sonchus oleraceus var. *asper* L., Sp. Pl. 794. 1753.

Annual herbs, stems 15- 80 cm high, erect, glabrous. Leaves variable in shape, lanceolate, ovate-oblong, 6-25 x 1.4 -8 cm; cauline, pinnatifid, spinous toothed with rounded auricle at base. Inflorescence heads, 1-1.9 cm, erect; peduncle flat, glabrous. Involucre bracts in many series; outermost lanceolate, 5-8 x 1.6 -2 mm; innermost lanceolate or oblong-lanceolate, 9- 13 x 2- 2.6 mm. Ligules yellow. Achenes 3-5 mm long, compressed, 3- ribbed.

Fl. & Fr.: April – September.

Distribution: Almost throughout India.

Almost throughout the world.

Specimen examined: AJNU 1428.

Synedrella Gaertn.

Annual herbs. Leaves opposite. Heads small, axillary, sessile or on short peduncles, radiate, paleate; involucre bracts few, outer foliaceous, inner like the pales. Receptacle convex, paleae flat. Ray achenes dorsally compressed, 2-winged, smooth; disc achenes compressed, not winged; pappus of 2 stiff awns.

Synedrella nodiflora Gaertner, Hook. f., Fl. Brit. Ind. 3:308. 1881; Grierson & Long, Fl. Bhut. 2.3:1607. 2001; Singh in Singh *et al.*, Fl. Mizo.1:793. 2002.

Erect herbs. Stems dichotomously branched, pubescent. Leaves ovate-elliptic, 3.2-8.6 x 1-5.2 cm, apex acute, base narrowed into a short petiole, opposite, pubescent on both surface, more densely beneath, margin crenate-serrate. Heads sessile, solitary and axillary; involucre bracts linear-lanceolate. Florets yellow. Achenes oblong-lanceolate.

Fl. & Fr.: September-February.

Distribution: India (NE India), China, Nepal, Myanmar.

Specimen examined: AJNU 1515.

CAMPANULACEAE Juss,

Herbs or shrubs, erect or climbing, often with latex. Leaves simple, alternate or opposite, stipules absent. Flowers bisexual, actinomorphic or zygomorphic, 5-merous,

axillary or terminal, solitary, racemose or paniculate. Bracts small. Calyx 4-5 lobed, fused to ovary, persistent. Corolla tubular or campanulate, 4-5 lobed, lobes valvate in bud. Stamens 5, filaments free, anthers free or connate. Ovary usually inferior, 2-5 locular. Fruit a capsule or a fleshy berry.

Codonopsis Wall.

Perennial shrubs, often with tubers, usually foul smelling. Stems erect or twining. Leaves alternate or opposite. Flowers solitary, terminal or axillary. Calyx tube adnate to ovary, 4-6 lobed. Corolla 4-6 lobed, tubular or campanulate. Stamens 5, often broadened at base. Ovary 3 locular, stigma 3-fid. Fruit with persistent calyx. Capsule dehiscent by 3 valves.

Codonopsis javanica (Blume) Hook. f. & Th., Ill. Himal. Pl. t. 16B. 1855; Balakr. Fl. Jowai 1: 279. 1981; *Campanumoea javanica* Blume, Bijdr. Fl. Ned. Ind.: 726. 1826; C. B. Clarke in Hook. f., Fl. Brit. Ind. 3: 435. 1881; Grierson & Long, Fl. Bhut. 2.3:1386. 2001; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 55. 2008; Haridasan & Rao, Forest Fl. Megh. 2:532. 1987.

Twining shrub. Leaves opposite, ovate to oblong-ovate, 4-8×2-5 cm, base cordate, apex obtuse to acute, margin shallowly crenate, glabrous, petioles 3-6 cm long. Flowers solitary, on axils of leaves, peduncle 1-5 cm long. Calyx lobes oblong-lanceolate, adnate only to base of ovary. Corolla greenish-white-yellowish with purple streaks, campanulate, lobes ovate, triangular, 2-2.5 cm long. Stamens 5, free, filaments long. Ovary truncate. Capsule subglobose, purple black at maturity.

Fl. & Fr.: May – November

Distribution: India (E. Himalaya, N.E India), Bangladesh, Bhutan, Myanmar, China, Thailand, Vietnam, Japan, Taiwan

Specimen examined: AJNU 1110

MYRSINACEAE R. Br.

Trees, shrubs or woody climbers. Leaves simple, alternate, dotted with glands; stipules absent. Flowers regular, bisexual or unisexual, in cymes, racemes or umbels. Sepals 4-6, usually 5, free or often united at the base and gland dotted. Petals 3-7, usually 5, united at the base or free and gland dotted. Stamens as many as and opposite to the corolla lobes, free or adnate to corolla tube. Ovary superior or semi-superior. Fruit a fleshy drupe or a berry.

Ardisia Gaertn.

Shrubs or trees. Leaves entire or crenate, usually gland dotted. Flowers bisexual in terminal or axillary panicles or peduncled umbels. Bracts small, deciduous. Calyx segments 5, persistent, enlarged in fruit. Corolla lobes 5, apex not emarginate, twisted to the right in bud. Stamens as many as and opposite to the corolla lobes. Filaments short, anthers free. Fruit a drupe subtended by persistent calyx. Seeds solitary.

Key to Species

- 1a. Flowers in corymbs; fruits blackish when ripe. *A. solanaceae*
- 1b. Flowers in lax umbels; fruits reddish when ripe. *A. thomsonii*

Ardisia solanacea Roxb., Pl. Corom. 1: 27. 1795; Haridasan & Rao, For. Fl. Meghalaya 2: 554. 1987. *A. humilis* auct. Nom. Vahl., Symb. Bot. 3:40. 1794; Cl. in Hook. f., Fl. Brit. India 3:529. 1882; Gamble, Man. Ind. Timb. 441. 1902; Brandis, Ind. Trees 418. 1906; Kanjilal *et al.*, Fl. Assam 3: 175. 1939.

Shrubs upto 6 m tall, glabrous. Leaves elliptic or oblanceolate, 8-20 x 2-8 cm, acute, base cuneate or narrowed, entire. Flowers in axillary subumbellate racemes. Sepals broadly ovate to reniform. Petals pink. Fruit purplish red or blackish, subglobose.

Fl. & Fr.: February-November.

Distribution: India: Assam, Nagaland, Kerala and Odisha.

Burma, China

Specimen examined: AJNU 1304. **PL-18**

Ardisia thomsonii (Clarke) Mez in Engler, Pflanzenr. 9: 133. 1902. *A. khasiana* var. *thomsonii* Clarke in Fl. Brit. Ind. 3: 527. 1882; Fl. As. 3: 177. 1939.

Shrubs upto 2 m; leaves 7-13 x 4-7 cm obovate to oblanceolate, cuneate at base, acute; lateral nerves 12-14 pairs; petioles present. Inflorescences axillary or in axils of fallen leaves, simple umbels or condensed corymbs; peduncles 2-3 cm. Flowers corolla pale yellow, punctate. Fruits depressed-globose, red.

Fl. & Fr.: May – January.

Distribution: India: Arunachal Pradesh, Assam, Mizoram, Nagaland and Sikkim.

Bangladesh and Bhutan.

Specimen examined: AJNU 1436

EBENACEAE Gurke

Trees or shrubs. Leaves simple, alternate, rarely subopposite, exstipulate, entire, and usually coriaceous. Flowers usually dioecous, regular, axillary, solitary or in cymes, usually bracteates; pedicels articulate. Calyx 4-5 lobed, united, persistent. Corolla tubular at base 4-5 lobed. Male flowers with stamens 2-3 times as many as the corolla lobes, filaments free or united in pairs. Female flowers with staminodes or absent. Fruit a fleshy berry.

Diospyros L.

Trees or shrubs; terminal buds absent. Branchlets apex sometimes forming spines. Leaves alternate, usually minutely gland dotted. Flowers dioecious or polygamous, 4-5 merous. Male flowers in axillary cymes, rarely solitary. Stamens 4 to many, often in pairs forming 2 series; ovary rudimentary. Female flowers usually solitary, axillary. Calyx usually 3-5 lobed, sometimes truncate. Corolla urceolate, or tubular, 3-5 lobed. Berry fleshy, globose, usually with an enlarged persistent calyx. Seeds many, often laterally compressed.

Key to species

1a. Calyx lobes imbricate or contorted

Diospyros variegata

1b. Calyx lobes valvate

Diospyros lanceifolia

Diospyros lanceaefolia Roxb., Clarke in Hook. f., Fl. Brit. Ind. 3:562. 1882; Kanjilal *et al.*, Fl. Assam 3:203. 1997(Repr.); (as '*lancifolia*') Balakr., Fl. Jowai. 1:296. 1981; Haridasan & Rao, Forest Fl. Megh. 2:571. 1987.

Trees, 10-15 m tall. Leaves oblong to elliptic- lanceolate, apex acuminate, base rounded, 6-17 x 2.5-6 cm, coriaceous, entire, glabrous; petiole grooved above, 1-1.2 cm long. Male flowers usually clustered in axillary cymes on short peduncle. Female flowers pale yellowish white, solitary. Calyx 4-lobed, margin reflexed. Corolla fleshy, lobes spreading. Berries subglobose or ovoid, sericeous, supported by persistent enlarged calyx with reflexed margin lobes.

Fl. - Fr.: July-October

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Mizoram, Tripura and West Bengal.

Bangladesh, Borneo, Malaysia, Myanmar, Nepal, Philippines and Thailand.

Specimen examined: AJNU 1374. **PL-18**

Diospyros variegata Kurz in J. Asiat. Soc. Bengal 40(2): 73. t. 11. 1871; C. B. Clarke in Hook, f., Fl. Brit. India 3: 557. 1882; Kanjilal *et al.*, Fl. Assam 3: 205. 1939; V. Singh, Monogr. Indian Diospyros: 243. 2005.

Trees, up to 20 m high. Leaves elliptic-oblong or oblong to lanceolate, 8-20 x 6-11 cm, base cuneate, apex acuminate, margins entire, coriaceous. Male flowers yellowish-white, axillary panicles; calyx pubescent outside, 4 -lobed; corolla urceolate, glabrous on both sides; lobes 4, ovate; stamens 16, unequal. Female flowers shortly pedicelled, axillary, pubescent; calyx lobes 4, imbricate or contorted; corolla lobes elliptic; ovary globose, densely hairy. Fruits solitary, subglobose.

Fl. & Fr.: April-December.

Distribution: India: Assam, Meghalaya, Mizoram and Nagaland.

Bangladesh, Cambodia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1471

STYRACACEAE DC. & Spreng.

Trees or shrubs. Leaves simple, alternate, stipules absent. Flowers in terminal racemes or axillary fascicles, regular, bisexual. Calyx 4-5-lobed, campanulate. Corolla 4-7-lobed, free or united into a tube at base. Stamens 8-10 or many, adnate to the petals, filaments free or united. Ovary superior or inferior; 3-5-celled; stigma small or capitate. Fruit a capsule with persistent calyx.

Styrax L.

Trees and shrubs. Leaves alternate, elliptic-lanceolate. Flowers in lax axillary and terminal racemes, or subsolitary axillary. Calyx 5-toothed, campanulate, free or adnate to the base of ovary. Corolla 5-lobes, elliptic-oblong. Stamens 10, filaments short. Fruit globose or ellipsoid.

Styrax serrulatus Roxb., Fl. Ind., ed. 2, 2: 415. 1832; *Styrax serrulatum* Roxb., Clarke in Hook.f., Fl. Brit. Ind. 3: 588. 1882; Kanjilal *et al.*, Fl. As. 3: 219. 1939; Balakr., Fl. Jowai 1: 300. 1981; Sinha in Sinha *et al.*, Fl. Mizo. 2: 44. 2012.

Trees, upto 15 m tall. Leaves alternate, ovate to elliptic-lanceolate, 3-11 x 2-5 cm, apex acuminate, base rounded, margin serrulate, glabrous above, pubescent along nerves beneath. Flowers in axillary peduncled fascicles, short racemes or panicles. Calyx 5-toothed. Corolla lobes 5, pubescent outside, glabrous inside. Stamens 10. Capsule ellipsoid or ovoid, with persistent copular calyx.

Fl. & Fr.: March - September

Distibution: India (throughout), Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

Specimen examined: AJNU 1283. **PL-8**

OLEACEAE Hoffmanns. & Link

Trees, erect or scandent shrubs. Leaves opposite, rarely alternate, simple, trifoliolate or pinnate, entire or toothed; stipules absent. Flowers bisexual, rarely unisexual, regular, 2-6 merous, in trichotomous terminal or axillary cymes or panicles. Sepals usually 4. Petals usually 4, united into a tube, imbricate in bud. Stamens 2-4, attached to the corolla tube. Ovary superior, free, 2-celled; style simple; stigma simple or bifid. Fruit a berry, drupe, capsule or nut.

Key to Genera

- | | |
|--|------------------|
| 1a. Corolla segments imbricate or contorted in bud | <i>Jasminum</i> |
| 1b. Corolla segments induplicate or valvate in bud | <i>Myxopyrum</i> |

Jasminum L.

Scandent or erect shrubs. Leaves usually opposite or alternate, simple trifoliolate or imparipinnate; petioles usually articulated. Flowers mostly fragrant, in terminal or axillary dichotomous or trichotomous cymes, umbels or panicles. Bracts small, linear or ovate. Sepals 4-9, fused into a funnel-shaped tube; limb with long teeth or truncate. Corolla salver shaped; tube narrow; lobes 4-10, imbricate in bud. Stamens 2, included in the corolla tube; filaments short; stigma bifid. Berry lobed or paired.

Key to the species

- 1a. Leaves compound *J. azoricum*
- 1b. Leaves simple
 - 2a. Calyx glabrous
 - 3a. Leaves with glands in the axils of lateral leaves *J. subglandulosum*
 - 3b. Leaves eglandular *J. laurifolium*
 - 2b. Calyx hairy
 - 4a. Branchlets sparsely pubescent *J. sambac*
 - 4b. Branchlets densely pubescent *J. elongatum*

Jasminum azoricum L., Sp. Pl. 7. 1753. *J. flexile* Vahl, Symb. Bot. 3: 1. 1794; C. B. Clarke in Hook, f., Fl. Brit. India 3; 601. 1882; Kanjilal *et al.*, Fl. Assam 3; 231. 1939. *J. flexile* Vahl var. *hookeriana* C. B. Clarke in Hook, f., Fl. Brit. India 3: 601. 1882; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 110. 1938.

Shrubs, scandent; bark greyish-white; stems obscurely striate. Leaves compound, opposite, usually trifoliate, glabrous, subcoriaceous; leaflets ovate-lanceolate, 5-10 x 1.5-4 cm, base rounded or truncate, apex acuminate, margins entire, glabrous or glabrescent beneath; petioles and petiolules channelled; petioles 2-3 cm long. Inflorescence in lax terminal or axillary, 8-12 cm long, 10-20 flowered panicles; calyx lobes 5, shallowly triangular; corolla white, fragrant; tube lobes 6, elliptic. Fruit is drupe, ellipsoid, purple black when ripe.

Fl. & Fr.: September-April.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh Assam, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh.

China, Myanmar, Sri Lanka and Thailand.

Specimen examined: AJNU 1430

Jasminum elongatum (P.J.Bergius) Willd., Sp. Pl. ed. 4. 1: 37. 1797; Sinha in Singh *et al.*, Fl. Mizo. 2: 65. 2012; *J. undulatum* Ker Gawl., Bot. Reg. 6: t. 436. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3:592. 1882; Grierson & Long, Fl. Bhut. 2.2:590. 1999; Kanjilal *et al.*, Fl. As. 3: 225. 1939.

Scandent climbing shrubs. Young stems covered in dense pubescence. Leaves opposite, simple, ovate-lanceolate, 3-6 x 1.5-2.5, base subcordate or rounded, apex acute or acuminate, margins entire, glabrescent except pubescent midrib; petioles 0.3-0.6 cm. Inflorescence axillary, in capitate, hairy cymes. Flowers white, fragrant. Calyx lobes filiform, hairy. Corolla tube 1-2.5 cm long, 5-lobed, ovate, 1-1.5 cm. Fruit globose or ellipsoid, usually paired.

Fl. & Fr.: June - November

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Odisha, Sikkim and West Bengal.

Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1103

Jasminum laurifolium Roxb.ex Hornem., Hort. Bot. Hafn. 112. 1819; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3:597. 1882; Grierson & Long, Fl. Bhut. 2.2:587. 1999; Kanjilal *et al.*, Fl. As. 3: 229. 1939; Sinha in Singh *et al.*, Fl. Mizo. 2: 66. 2012.

Scandent shrubs. Stem terete, glabrous. Leaves simple, opposite, elliptic-lanceolate, 3-12×1.5-2.5 cm, apex acuminate, base obtuse to attenuate, 3-nerved. Inflorescence terminal or axillary on long peduncle 3-5 flowered lax cymes. Flowers white with red tube, buds dark red. Calyx 5-7 toothed, linear or filiform, 0.2-0.4 cm. Corolla tube 1.5-1.8cm, lobes 9-12, linear lanceolate. Berry globose, black.

Fl. & Fr.: March - July

Distribution: India: Assam, Manipur, Meghalaya and Nagaland.

Bangladesh, China, Myanmar, Nepal, Thailand and Tibet.

Specimen examined: AJNU 1451. **PL-6**

Jasminum sambac (L.) Ait. Hort. Kew. 1:8. 1789; C.B. Clarke in Hook. f., Fl. Brit. Ind. 3: 591.1882; Kanjilal *et al.*, Fl. Assam 3: 225. 1939. *Nyctanthes sambac* L. Sp. Pl. 6. 1753.

Erect or scandent shrubs, up to 4 m. Branchlets terete, sparsely pubescent. Leaves opposite, simple; petiole articulate, pubescent. Leaf blade orbicular to elliptic or obovate, 4-12 x 2-8 cm, papery, glabrous, base subcordate. Flowers white, very fragrant, axillary, solitary or in 3- flowered cymes; pedicelate. Calyx glabrous or sparsely pubescent; lobes 8-9, linear. Corolla white; tube lobes oblong to suborbicular. Berry purple-black, globose, enclosed by calyx lobes.

Fl. & Fr.: May – August

Distribution: Native to India.

Specimen examined: AJNU 1376

Jasminum subglandulosum Kurz in J. Bot. 13: 329. 1875; C. B. Clarke in Hook, f., Fl. Brit. India 3: 600. 1882; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 110. 1938; Kanjilal *et al.*, Fl. Assam 3: 230. 1939.

Shrubs, evergreen, scandent, 2-5 m long; branches terete, glabrous. Leaves simple, opposite, elliptic or oblong lanceolate, 10-20 x 4-8 cm. base obtuse, apex obtusely acuminate, margins entire, thin coriaceous, glossy, glabrous; nerves conspicuous on both sides with a gland in axils; petioles geniculate. Inflorescence of lax pedunculate cymes; bracts minute, subulate; pedicels thickened upwards; calyx minutely blunt-toothed, glabrous; tube turbinate; corolla white; tube lobes obovate-oblong. Fruit is drupe, ellipsoid, orange-red.

Fl. & Fr.: September-March.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam,

Meghalaya and Nagaland.

Bangladesh, China, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1095

Myxopyrum Blume

Shrubs scandent. Branchlets 4-angled. Leaves opposite, simple, petiolate. Leaf blade entire or serrate, prominently 3-veined, glabrous. Inflorescences axillary panicles,

many flowered. Flowers small, bisexual. Calyx 4-lobed. Corolla yellow or pink, urceolate; lobes 4, valvate in bud. Stamens 2; anthers dehiscing longitudinally. Ovules 2 in each locule, ascending. Stigma subsessile, minute, 2-cleft. Fruit a berry, subglobose. Seeds with fleshy endosperm.

Myxopyrum smilacifolium (Wall.) Bl. Mus. Bot. Lugd. Bat. 1: 320. 1850; Cl. in Hk. f. FL Brit. Ind. 3: 618. 1882; Gamble, Man Ind. Timb. 476. 1902; Brandis, Ind. Tre.es 452. 1906; Kanjilal et al., FL Assam 3: 243. 1939; Balak. FL Jowai 1: 304. 1981. *Chionanthus smilacifolia* Wall, in Roxb. Fl. Ind. 1: 108. 1820.

Large climbers or scandent shrubs; branches 4-angled. Leaves 10-15 x 3.5-6 cm, broadly elliptic-ovate, oblong-lanceolate, acute, base cuneate or rounded, glabrous; panicles up to 10 cm long. Flowers yellow, minute, up to 0.2 cm across. Fruits 0.6-0.8 cm across, sub globose, 1-seeded.

Fl. & Fr: April-December.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Kerala, Manipur, Mizoram, Nagaland, Sikkim and Tamil Nadu.

Bangladesh, Cambodia, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1028. **PL-7**

APOCYNACEAE Juss.

Trees, shrubs, climbers or herbs, with latex. Leaves simple, opposite or whorled. Flowers bisexual, actinomorphic, in terminal, pseudoaxillary or axillary cymes. Sepals 4-

5 lobed. Petals 5 lobed. Stamens 4-5, epipetalous in petals tube. Ovary superior, 1-celled.
Fruits follicle, capsule, drupe or berry.

Key to genera

1a. Erect trees or shrubs:

2a. Leaves whorled, usually 5-9 at each node *Rauvolfia*

2b. Leaves opposite:

3a. Leaves tomentose or pubescent, at least along nerves; flowers greenish
white,

yellow or bright red. *Wrightia*

3b. Leaves glabrous; flowers pure white; petals tube slender, long:

4a. Trees *Holarrhena*

4b. Shrubs

Tabernamontana

1b. Climbers:

5a. Anthers more or less exerted *Vallaris*

5b. Anthers included

6a. Flowers very large

7a. Leaves 13-30 x 9-21 cm, base rounded to truncate *Chonemorpha*

7b. Leaves 36-25 x 3-15 cm, base acute; follicles 6-15cm long *Beaumontia*

6b. Flowers small or medium sized

8a. Corolla white

Aganosma

8b. Corolla pink

Urceola

Aganosma (Blume) G. Don

Evergreen woody climbers. Leaves opposite. Inflorescence terminal or axillary in tomentose cymes. Flowers salverform, corolla lobes overlapping to right. Calyx segments 5, divided nearly to base, lanceolate, with subulate glands at the base. Corolla tube cylindrical, lobes linear-lanceolate. Stamens at the base of the throat, inserted; anthers sagittate, adnate to the stigma. Disc 5 lobed, cup shaped. Carpels 2, ovules numerous; style short. Fruit a pair of cylindrical follicles, long and slender. Seeds flattened with apical coma.

Aganosma gracilis Hook. f., Gen. Hist. 4: 77. 1837; Hook. f., Fl. Brit. Ind. 3: 665. 1882; Kanjilal *et al.*, Fl. Assam. 3: 269. 1939.

Climbing shrub. Stems slender. Leaves elliptic-acuminate, membranous, glabrous; lateral nerves 6-10 on either half, slender, arching. Inflorescence terminal corymbose cymes. Flowers white, glabrescent; pedicels slender, long. Calyx-segments 1.5 in. long, linear-hoary. Corolla tube 7- 8 in. long; lobes 1.5 in. long, oblique-ob lanceolate.

Flr. & Fr.: April-June.

Distribution: India: Meghalaya, Nagaland and Sikkim.

Native to Eastern Himalaya.

Specimen examined: AJNU 1152. **PL-5**

Aganosma cymosa (Roxb.) G. Don, Gen. Hist. 4; 77. 1838; Hook, f., Fl. Brit. India 3: 665. 1882; Kanjilal *et al.*, Fl. Assam 3: 269. 1939; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 44. 1987. *Echites cymosa* Roxb., Fl. Ind., ed. 2,2: 16. 1832.

Climbers, stout, pale brownish tomentose. Leaves opposite, elliptic- lanceolate or elliptic-oblong, 5-8 x 3-5 cm, base acute or cuneate, apex acute or finely acuminate, margins entire, glabrous; petioles 0.6-1.3 cm long. Flowers in dense terminal tomentose cymes; bracts and bracteoles narrowly elliptic. Calyx 5 -fid, divided nearly to the base, 0.5-1.3 cm long. Corolla white, salver-shaped, 5 -lobed, lobes ovate, acuminate; stamens included, anthers sagittate, spurred at base. Ovary pubescent. Follicles², cylindrical, up to 9 cm long. Seeds flattened, glabrous, crowned with a deciduous silky coma.

Fl. & Fr.: May – November.

Distribution: India: Assam, Maharashtra, Nagaland, Tamil Nadu, Kerala and Karnataka.

Bangladesh, Cambodia, China, Sri Lanka, Thailand, Vietnam.

Specimen examined: AJNU 1286.

Beaumontia Wall.

Lianas with latex. Leaves opposite. Inflorescences in terminal or axillary cymes. Flowers large, fragrant. Sepals lobes leafy, large. Petals white. Stamens inserted at distal narrow portion of petals tube. Ovules many in each locule. Fruit follicles, hard.

Beaumontia grandiflora Wall. in Tent., Fl. Nepal. 15, t. 7. 1824; Hk. f., Fl. Brit. India 3: 660. 1882; Gamble, Man. Ind. Timb. 488. 1902; Brandis, Ind. Trees 463. 1906; Kanjilal *et al.*, Fl. Assam 3: 263. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 607. 1987. *Echites grandiflora* Roxb., Fl. Ind. 2: 14. 1824.

Lianas, large. Leaves 5.5-30 x 3.0-15 cm, obovate or elliptic. Inflorescences 3-19-flowered. Sepals pale green. Petals white, creamy, or pale yellow, base pale green; lobes triangular to ovate. Stamens white. Ovary tomentose. Fruit ellipsoid

Fl. & Fr.: February-May.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Bangladesh, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1294. **PL-5**

Chonemorpha G. Don.

Lianas. Leaves opposite, broadly elliptic-orbicular. Flowers salver-shaped, white, in terminal, lax, corymbose cymes. Sepals glandular. Petals tube cylindrical. Stamens inserted towards base of petals tube. Ovary bicarpellary. Follicles woody.

Chonemorpha fragrans (Moon.) Alst. In Ann. Roy. Bot. Gdn. Perad. 11: 203. 1929; Haridasan & Rao, For. Fl. Meghalaya 2: 601. 1987. *Echites fragrans* moon., Cat. Pl. Ceylon 20. 1824. *E. macrophylla* (Roxb.) D. Don. Gen. Syst. 4: 76. 1837; Hook. F., Fl. Brit. India 3: 661. 1882; Gamble, Man. Ind. Timb. 488. 1902; Brandis, Ind. Trees 463. 1906; Kajilal *et al.* Fl. Assam 3: 265. 1939.

Lianas, leaves 12-30 x 8.5-22 cm, apiculate, ovate-orbicular or obovate-elliptic, rounded or shortly acuminate. Cymes terminal. Flowers white, fragrant, to 10 cm across. Petals tube narrow, lobes spreading, base constricted. Follicles diverging. Seeds beaked.

Fl. & Fr.: April-December.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1156.

Holarrhena R. Br.

Shrubs or trees. Leaves opposite. Flowers in terminal or axillary Cymes. Calyx glandular inside at base; glands alternating with lobes. Corolla salver-shaped, base inflated; lobes twisting to right. Stamens inserted near base of corolla tube. Disc absent. Follicles in pairs, cylindric. Seeds numerous, with coma at one end.

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don, Grierson & Long, Fl. Bhut. 2.2:671. 1999; Yadav&Sardesai, Fl. Kolh. Dist. 276. 2002; Giriet *al.*, Mater. Fl. Aruna. Pradesh. 2:154. 2008. *Holarrhena antidysenterica* Wall. Hook. f., Fl. Brit. Ind. 4:644.

1882; Haridasan & Rao, Forest Fl. Megh. 2:602. 1987; Kanjila *et al.*, Fl. Assam 3:254. 1997(Repr.); Balakr., Fl. Jowai. 2:310. 1983.

Small trees. Branchlets lenticellate. Leaves elliptic-oblong to ovate-lanceolate, 7-16 x 3.5-8 cm, apex acute-acuminate, base obtuse or rounded, pubescent on both the surfaces, margin entire; petioles short, about 0.4 cm long, flowers white, in terminal lax corymbose cymes. Sepals linear-lanceolate, 0.3-0.6 cm long, pubescent. Corolla pubescent; tube about 1 cm long; lobes oblong-obovate, about 1.5 cm long. Stamens included. Follicles linear, 20-32 × 0.3-1.2 cm, with dotted white lenticels.

Fl. & Fr: April-December.

Distribution: India: Andhra Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. Bangladesh, Cambodia, China, Kenya, Laos, Mozambique, Myanmar, Nepal, Pakistan, Tanzania, Thailand, Vietnam and Zimbabwe.

Specimen examined: AJNU 1066. **PL-5**

Rauvolfia L.

Shrubs with latex. Leaves whorled, rarely opposite, with glands. Cymes terminal or axillary. Sepals glandular. Petals pink, white, yellow, green, or pink, rarely with a red tube, villous inside. Ovaries 2. Drupes 2.

Rauvolfia serpentina (L.) Benth. ex Kurz., Forest Fl. Burma 2: 171. 1877; Hook. f., Fl. Brit. India 3: 632. 1882. 1906; Kanjila *et al.*, Fl. Assam 3: 251. 1939; Haridasan & Rao.

For. Fl. Meghalaya 2: 606. 1987; Bora & Kumar, Flo. Div. Assam 214. 2003. *Ophioxylon serpentinum* L., Sp. Pl. 2: 1043. 1753.

Shrubs, erect. Leaves in whorl of 3-5, elliptic or obovate, 6.5-17 2-9 cm, acuminate or obtuse, base cuneate. Inflorescence cymose. Sepals 5, red or reddish. Petals white. Stamens 5. Drupes ellipsoid, purple when ripe.

Fl. & Fr.: April - October.

Distribution:India: Assam, Meghalaya, Arunachal Pradesh, Nagaland, Mizoram, Sikkim, West Bengal, Tamil Nadu, Bihar, Andhra Pradesh, Karnataka. Bangladesh, Cambodia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.

Specimen examined: AJNU 1486. **PL-5**

Tabernaemontana L.

Shrubs or small trees with latex white. Leaves opposite. Flowers in corymbose or umbellate cymes, often solitary. Sepals glandular. Petals lobes sharply imbricate to the left. Ovaries 2. Ovules numerous. Follicles 2. Seeds with a red or orange fleshy aril; coma absent.

Tabernaemontana divaricata (L.) R. Br. ex Roem. & Schults., Syst. 4: 427. 1819. Balak, Fl. Jowai 2:311. 1983; Haridasan& Rao, For. Fl. Meghalaya 2: 606. 1987. *Nerium divaricatum* L., Sp. Pl. 112. 1753. *Tabernaemontanacoronaria* (Jacq.) Willd. Enum. Hort. Bertol 275. 1809; Kanjilal *et al.*, Fl. Assam 3: 255. 1939.

Shrubs. Leaves elliptic-lanceolate, ovate-lanceolate, 3-16 x 1-6cm, acuminate, base cuneate. Flowers in dichotomous cymes, 1-8 flowered. Sepals ciliate. Petals white. Follicles obliquely and narrowly ellipsoid.

Fl. & Fr.: April-October.

Distribution:India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Haryana, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1238. **PL-6**

Urceola Roxb.

Lianas. Branches terete; hirsute or glabrous. Leaves opposite. Inflorescence of axillary or in terminal cymes forming a panicle. Sepals ovate. Corolla lobes valvate or overlapping to the right in bud; lobes symmetrical or with a projection to the right as viewed from the inside. Stamens completely included; inserted near the base of the corolla tube; filaments short; anthers narrowly triangular, base sagittate; ovules numerous; stamens adnate to the pistil head. Disk annular or 5- dentate; glabrous. Ovary of 2 separate carpels united into a common style; ovules numerous; ovary pubescent on top; style very short. Fruit narrowly elliptic, brownish pubescent with a terminal white coma.

Urceola rosea (Hook. & Arn.) D.J. Middleton, *Novon* 4: 151. 1994; Middleton, *Kew Bull.* 49: 765. 1994; Middleton, *Blumea* 41: 107. 1996; Li *et al.*, *Fl. China* 16: 184. 1995; *Ecdysanthera pedunculosa* Miq., *Fl. Ind. Bat. Suppl.*: 557. 1861; *Parameria pedunculosa* (Miq.) Fern-Vill., *Nov. App.*: 130. 1880.

Lianas, up to 15 m. Stem brown, lenticels absent. Leaves broadly elliptic, papery to subcoriaceous, 3-4 -8.9 x 1.7 – 3.8 cm, apex acuminate, base cuneate; secondary veins 3-6 pairs. Inflorescence up to 19 cm long, many flowered. Calyx ovate, 1- 1.8 x 0.5 – 1.1 mm, apex acute. Corolla pinkish white; tube 1.3 – 2 mm long; lobes 1.5 – 2.6 mm long, symmetrical, ovate, papillose outside. Stamens with anthers 1.5- 1.6 x 0.3-0.4 mm. Disk annular. Ovary 0.5 – 0.8 mm long. Fruits linear, up to 17 cm long, densely lenticellate.

Fl. & Fr.: May- July.

Distribution: India: Arunachal Pradesh, Assam and Nagaland.

Cambodia, China, Hainan, Laos, Malaysia, , Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1090. **PL-6**

Vallaris Burm. f.

Usually twining; cymes dichotomous or fascicled, axillary or extra-axillary; corolla lobes imbricating to the right; anthers conniving and adnate to the stigma, spurred and glandular; follicles spreading at length.

Vallaris solanacea (Roth) O. Ktze. Rev. Gen. 2: 147. 1891. *Peltanthera solanacea* Roth, Nov. PL Sp. 132. 1821. *V. heynei* Spreng. Syst. 1: 635; 1825; Fl. Brit. Ind. 3: 650. 1882; Fl. As. 3: 256. 1939.

Erect or scandent shrubs; leaves oblong to elliptic-lanceolate, obtuse or acute at base, acuminate, 4 -1 0x1 .5-4.0 cm; lateral nerves 6 -9 pairs; cymes lax, axillary, dichotomous; pedicels 5-10 mm; corolla white, 1.3-1.8 cm across, pubescent; lobes ovate, rounded

Fl. & Fr.: March – October.

Distribution:India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Punjab, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.
Bangladesh, Cambodia, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1043. **PL-6**

Wrightia R. Br.

Trees or shrubs with latex. Leaves opposite, petiolate; glands axillary. Cymes terminal or subterminal. Sepals with glands inside. Petals lobes overlapping to left. Anthers base spurred. Ovaries 2. Ovules numerous in each locule. Follicles 2, connate or divaricate.

Wrightia arborea (Dennst.) Mabblerly, in Taxon 26: 533. 1977. *Periploca arborea* Dennst. Schlüssel 13, 23, 25. 1818. *Wrightia tomentosa* Roem. &Schults. Syst. 4: 414. 1819. Hook. f., Fl. Brit. India 3: 653. 1882; Gamble, Man. Ind. Timb. 487. 1902; Brandis, Ind. Trees 461. 1906; Kanjilal et al., Fl. Assam 3: 258. 1939; Haridasan & Rao, For. Fl. Meghalaya 2: 611. 1987.

Middle sized trees up to 13 m high; crown lax; bark grey or greyish-brown; leaves 7-20 x 2-6 cm, elliptic-oblong, elliptic, elliptic-oblong, acuminate, base cuneate, smooth, hairy beneath. Inflorescence corymbs 4-12 cm across. Flowers 2-3 cm across, white or whitish-green, turning yellowish; anthers exserted; fruits 18-25 cm long, elliptic, spindle-shaped, densely white lenticellate, drooping.

Fl. & Fr.: April-October.

Distribution: India: Andhra Pradesh, Bihar, Karnataka, Kerala, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1200. **PL-6**

Wrightia coccinea (Roxb.) Simson Bot. Mag. t. 2696 1826; Hook. f., Fl. Brit, Ind. 3: 654. 1882; Gamble, Man. Ind. Timb. 486. 1902; Brandis, Ind. Trees 461. 1906; Kanjilal *et al.*, Fl. Assam 3 : 259. 1939; Balak. Fl. Jowai 2: 308. 1983.

Middle sized trees, up to 18 m high; crown lax; bark whitish, slightly rough; leaves 6-20 x 3-7 cm, oblong-lanceolate, acuminate or caudate, base cuneate. Inflorescence cymes corymbose, 4-6 cm across, terminal. Flowers 3-4 cm across, with deep red corona; follicles 20-30 cm long, drooping, shallowly 2-lobed, densely white lenticellate. Fruits spindle shaped.

Fl. & Fr.: June – September.

Distribution: India: Arunachal Pradesh, Assam, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Bangladesh, China, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1155. **PL-6**

ASCLEPIADACEAE R. Br.

Erect herbs or shrubs mostly climbing with milky juice. Leaves simple, entire, opposite rarely alternate; stipules minute or absent. Inflorescence cymose, often umbellate. Flowers pentamerous. Calyx fused and deeply divided almost to base. Corolla fused with lobes contorted or valvate. Stamens 5, anthers cohering or connate, pollen grains as a rule united into waxy masses; corona coralline or stamina. Carpels 2, distinct. Fruits of 2 follicles.

Key to Genera

1a. Leaves thick and fleshy; epiphytes

2a. Corolla urceolate; coronal scales membranous *Dischidia*

2b. Corolla rotate; coronal lobes stellately spreading *Hoya*

1b. Leaves normal or membranous; climbers *Myriopterion*

Dischidia R. Br.

Epiphytic herbs. Stems and branches fleshy, usually climbing by adventitious roots. Leaves opposite or partly in whorls of 3 or 4, fleshy. Inflorescences extra-axillary, small; rachis often producing umbel-like groups of flowers. Flowers very small. Calyx with 5 basal glands. Corolla white, red, or violet, ovoid to urceolate, fleshy; lobes valvate, short. Corona lobes 5, slender, apex entire, notched. Anthers erect, pollinia 2 per pollinarium. Follicles lanceolate or cylindric.

Dischidia bengalensis Colebr., Trans. Linn. Soc. London 12: 357. 1818; Hook. f., Fl. Brit. Ind. 4: 50. 1883; Kanjila *et al.*, Fl. Assam 3: 299. 1939. *Dischidia cuneifolia* Wall. in Pl. As. Rar. 2: 36. 1831.

Glabrous twining shrubs. Latex milky- white. Leaves opposite, decussate, subsessile, 2.5- 4.8 x 0.7- 1.5 cm, elliptic or oblong, acute at apex, fleshy, glabrous. Petiole terete, 205 mm long. Inflorescence axillary in clusters; pedicel filiform, glabrous. Calyx 5-lobed, divided up to the base, oblong, apex acute, glabrous. Corolla urceolate, hairy, 5- lobed, triangular, apex acute, fleshy. Corona stamina, uniseriate, 5-lobed, filiform. Stamens 5.

Fl. & Fr.: September – April

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal.

Bangladesh, Borneo, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1208. **PL-17**

Hoya R. Br.

Lianas, epiphytic, often twining or climbing by adventitious roots. Leaves opposite, fleshy, or membranous. Inflorescences extra-axillary or sometimes terminal, umbel-like flowers. Calyx small, with basal glands. Corolla fleshy, rotate, reflexed, often densely hairy. Corona lobes 5, depressed, adnate vertically to gynostegium. Stamens short connate; pollinia 2 per pollinarium, oblong, erect. Stigma head discoid, rounded. Follicles often solitary, cylindrical.

Hoya verticillata (Vahl) G. Don, Gen. Hist. 4: 128. 1837; Hook. f., Fl. Brit. India 4: 62. 1883; Veldkamp & B. Hansen in Blumea 41: 441. 1996. *Sperlingia verticillata* Vahl in Naturhist.- Selsk. 6. 113. 1810. *Asclepias parasitica* Roxb., Fl. India. 2: 42. 1832. *Hoya parasitica* Wall. ex Wight, Contr. Bot. India 37. 1834; Hook. f., Fl. Brit. India 4: 57. 1883; C. E.C. Fisch. In Rec. Bot. Surv. India 12(2): 1938; Kanjilal *et al.*, Fl. Assam 3: 305. 1939; A.P. Jagtap & N.P. Singh in Fasc. Fl. India 24: 114. 1999.

Epiphytic shrubs. Leaves opposite, decussate, elliptic, oblong-elliptic or lanceolate, 14- 19 x 3.6- 5 cm, base rounded, apex acute or acuminate, fleshy, glabrous, 3-nerved; petioles thick. Inflorescence in axillary umbellate cymes; flowers white with purplish pink; peduncles stout, glabrous; pedicels glabrous. Calyx 5-lobed; lobes oblong, obtuse, glabrous. Corolla rotate; lobes 5, ovate, glabrous. Corona staminal, uniseriate, 5-lobed. Follicles usually single, linear, glabrous.

Fl. & Fr.: July-December

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Madhya Pradesh, Meghalaya, Manipur, Mizoram, Nagaland, Odisha, Tripura and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1270

Hoya globulosa Hook.f. in Gard. Chron. 2: 732. F. 1882; Hook. f., Fl. Brit. India 4: 60. 1883; Kanjilal *et al.*, Fl. Assam 3: 307. 1939; Prain, Bengal Pl. 2: 519.1963 (Repr. Ed.) ; Deb, Fl. Tripura State 2: 33. 1983. A.P. Jagtap & N.P. Singh in Fasc. Fl. India 24: 100. 1999.

Epiphytic shrubs, branches woody. Latex milky-white. Leaves opposite, decussate, lamina 6.5 – 20.4 x 3.8 – 7.9 cm, elliptic or oblong, cuspidate, rounded at base, margin recurved and sparsely hairy, glabrous above, hairy beneath, glossy. Inflorescence in axillary and terminal cymes; peduncles long, terete, hairy. Calyx 5-lobed, orbicular, margin ciliate. Corolla rotate, 5-lobed, ovate, apex acute. Corona staminal, uniseriate, 5-lobed. Stamens 5. Follicles usually 1, linear, glabrous, tapering towards apex.

Fl. & Fr.: March – June

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jammu & Kashmir, Nagaland, Sikkim, Tripura and West Bengal.

Bangladesh, China, Laos and Vietnam.

Specimen examined: AJNU 1372

Myriopteron Griff.

Twining herbs or shrubs. Flowers in axillary trichotomously branched paniculate cymes, sessile or peduncle. Calyx 5-lobed, with glands at the base. Corolla rotate, lobes overlapping to the right. Corona coralline, 5 filiform lobes. Stamens inserted at the base of corona; filaments fused at base into a ring; anthers with appendages fused at apex, adnate to stigma. Pollen mass paired in each cell. Stigma convex, bi-lobed, 5-angled. Follicles often paired, divaricate, terete, smooth.

Myriopteron extensum (Wight) K. Schum., Engl. & Prantl. Nat. Pflanzenfam. 4.2: 215. 1895; *M. paniculatum* Griff. Calcutta J. Nat. Hist. 4: 385. 1844; Hook.f. Fl. Brit. Ind. 4: 11. 1883; Kanjilal *et al.*, Fl. As. 3: 279. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:172. 2008; Haridasan & Rao, For. Fl. Megh. 2: 621. 1987.

Climbing shrub, branches slender. Leaves suborbicular-oblong, ovate-orbicular, apex abruptly acuminate, base rounded or broadly cuneate, glabrous above, pubescent beneath; petioles upto 4 cm long. Inflorescence a paniculate cymes. Flowers small, white. Calyx small, ovate, 5-lobed. Corolla lobes lanceolate, glabrous, rotate. Corona lobes glabrous. Follicles straight with longitudinal wings.

Fl. & Fr.: July-December

Distribution: India (throughout), China, Myanmar, Thailand, Vietnam

Specimen examined: AJNU 1096. **PL-17**

BUDDLEJACEAE Wilhem

Shrubs or trees, seldom herbs, sometimes climbing. Stem often with stellate hairs. Leaves simple opposite or less often whorled, rarely alternate, entire to more often toothed or lobed. Flowers bisexual, regular, in terminal or axillary, often spike-like panicles. Calyx and corolla mostly of 4-5 merous. Stamens 4, inserted within corolla tube. Ovary superior. Fruit a capsule.

Buddleja L.

Discreption same as of the family

Buddleja asiatica Lour., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:82.1883; Balakr., Fl. Jowai. 2:321. 1983; Kanjilal *et al.*, Fl. Assam 3:312. 1997 (Repr.); Grierson & Long, Fl. Bhut. 2.3:1081. 2001; Yadav & Sardesai, Fl. Kolh. Dist. 293. 2002; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:177. 2008.

Shrubs. Branches tomentose. Leaves opposite, narrowly lanceolate, 6-14 x 0.7-1.7 cm, apex acuminate, base cuneate, narrowed into a short petiole, dark green above, densely grey or white tomentose beneath, margin undulate crenate. Flowers small, white, odorous, in a terminal and axillary dense paniculate spike. Calyx stellate tomentose, lobes triangular. Corolla stellate pubescent, lobes short, orbicular. Stamens inserted inside the corolla tube in between the lobes. Stigma capitate. Capsule ovoid, flattened.

Fl. & Fr.: February-April.

Distribution: India: (throughout), Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Thailand, Vietnam

Specimen examined: AJNU 1044. **PL-17**

BORAGINACEAE Juss.

Herbs, less often lianas, shrubs, or trees, usually with cystoliths or hispid hairs. Leaves simple, alternate; stipules absent. Flowers bisexual, rarely polygamous, regular, in dichotomous or scorpioid cymose, rarely solitary, axillary. Calyx usually cylindrical or connate at base; 5-lobed, mostly persistent, often accrescent in fruit. Corolla generally salver-form; tube often with hairy appendages at the throat; limb usually 5-lobed; lobes imbricate. Stamens inserted on corolla tube. Ovary superior, of 2 fused carpels; 2-celled, with 2 ovules each. Fruit 1-4 seeded drupes or nutlets, smooth or sometimes decorated with wings, prickles or hairs.

Key to Genera

1a. Annual herbs; inflorescence terminal dichotomous scorpioid cymose spike; style not twice bifid *Heliotropium*

1b. Trees; inflorescence not dichotomous scorpioid cymose; style twice bifid *Cordia*

Cordia L.

Trees or shrub, sometimes sub-scandent, often with cystoliths. Leaves alternate, rarely subopposite, stalked, unusually entire, sometimes indistinctly crenate. Inflorescences terminal or axillary, paniced to corymbose, with scorpioid branches. Calyx campanulate or tubular, accrescent in fruit; segments short, irregular or obscure. Corolla tubular or funnel-shaped; lobes usually 4-8, white, recurved, imbricate. Stamens 4-8, usually hairy at the base; anthers exerted. Ovary 4-celled; style twice 2-partite; stigma capitate or clavate. Fruit drupaceous, ovoid or ellipsoidal, 1-4-celled.

Cordia grandis Roxb., Fl. Ind. 2: 325. 1824; C. B. Clarke in Hook, f., Fl. Brit. India 4: 137. 1883; Kanjilal *et al.*, Fl. Assam 3: 331. 1939.

Trees, up to 14 m high, with a spreading crown; bark light grey. Leaves orbicular or broadly ovate, 5-14 x 4-14 cm, base cuneate or truncate, apex obtuse or acuminate, margins entire, surface conspicuous with whitish cystoliths, tomentose beneath, 3-5 - nerved; petioles slender, up to 8 cm long. Inflorescence many flowered, pedunculate, in paniculate cymes. Calyx campanulate, lobes 4, not distinctly ribbed, accrescent in fruit. Corolla white. Drupes ellipsoid, up to 1.2 cm long.

Fl. & Fr.: December - April

Distribution: India: Assam, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Uttarakhand and West Bengal.

Bangladesh, Myanmar, Nepal and Vietnam.

Specimen examined: AJNU 1111

Heliotropium Tourn. ex L.

Herbs annual or perennial, pubescent or strigose. Leaves alternate, sessile or petiolate. Cymes terminal, unilateral, scorpioid, bracteate. Calyx 5-parted. Corolla white or light bluish purple, cylindric, strigose outside, glabrous; limb 5-parted; lobes orbicular, margin with folds or undulate. Filaments extremely short; anthers included. Ovary divided into 4 lobes; ovules 4. Fruit nutlet like dry drupes, dividing into 4 1-seeded mericarps. Seeds straight or curved.

Key to the Species

- | | |
|--|------------------------|
| 1a. Drupe unlobed; pyrenes 2, 2- seeded | <i>H. viridiflorum</i> |
| 1b. Drupe deeply 2-lobed; pyrenes 4, 1- seeded | <i>H. indicum</i> |

Heliotropium indicum L., Sp. Pl. 130. 1753; C. B. Clarke in Hook, f., Fl. Brit. India 4: 152. 1883; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 114. 1938.

Herbs, erect, up to 1 m high. Stems branched above middle. Leaves alternate, ovate to broadly lanceolate, 2.3-5 x 1.2-2.7 cm, base cuneate, apex acute, margins undulate, surface rugose above, pilose beneath. Inflorescence leaf opposed, dichotomously branched, in cymes. Flowers white or bluish purple. Calyx lobes 5, linear. Corolla tube short; lobes small, round, crenate. Stamens 5. Ovary 4-celled; stigma conical. Fruits ovoid, strongly ribbed, with 2 deep apical lobes.

Fl. & Fr.: April - October

Distribution: India: Almost throughout India.

Argentina Northeast, Argentina Bolivia, Brazil, Paraguay and Peru.

Specimen examined: AJNU 1065

Heliotropium viridiflorum Lehm. *Tournefortia Montana* Lour. var. *griffithii* (C. B.

Clarke) Johnston in J. Am. Arbor. 32: 117. 1953. *Tournefortia roxburghii* C. B. Clarke in Hook, f., Fl. Brit. India 4: 146. 1883; Kanjilal *et al.*, Fl. Assam 3: 336. 1939.

Tournefortia candollei C. B. Clarke in Hook, f., Fl. Brit. India 4: 146. 1883; C. E. C.

Fisch. in Rec. Bot. Surv. India 12(2): 114. 1938; Kanjilal *et al.*, Fl. Assam 3: 336. 1939.

Scrambling shrubs; branches hairy. Leaves alternate, oblong or ovate lanceolate, 4-10 x 2-6 cm, base narrowed, apex acuminate, densely hairy beneath. Inflorescence terminal, dichotomous, in scorpioid cymose spikes. Flowers fragrant, white. Calyx lobes ovate, shortly hairy, mainly on margin. Corolla tube pale green, cylindric, narrowed towards base, hairy outside. Stamens included; ovary 4-celled. Fruits sessile, unlobed, ovoid, with two pyrenes.

Fl. & Fr.: May - September

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland,

Sikkim and Tripura

Bangladesh and Myanmar.

Specimen examined: AJNU 1445. **PL-2**

CONVOLVULACEAE Juss.

Herbs or shrubs, often twining, very rarely trees. Leaves alternate, entire, lobed or pinnatisect, stipules absent. Inflorescence terminal or axillary, simple or compound cymose. Flowers often showy, regular and with involucre of bracts. Sepals 5, usually free. Petals 5, usually fused into a funnel-shaped corolla with 5 shallow lobes. Stamens 5. Ovary superior, of usually 2 fused carpels. Fruits a capsule, splitting into 2 valves, but sometimes a fleshy berry.

Key to the genera

- 1a. Prostrate herbs *Evolvulus*
- 1b. Climbing or erect shrubs or herbs
 - 2a. Fruit indehiscent, pericarp fleshy *Argyreia*
 - 2b. Fruit thin walled, opening by valves or irregularly dehiscent
 - 3a. Outer sepals persistent falling off with fruit, ovary 1-loculed *Porana*
 - 3b. Outer sepals deciduous or if present not falling off with fruit;
Ovary 2 or 4-loculed
 - 4a. Pollen grains spinulose *Ipomoea*
 - 4b. Pollen grains smooth *Merremia*

Argyreia Lour.

Shrubs, often large twiners or scramblers, stems woody and hairy. Leaves alternate, usually cordate at base, petiolate. Inflorescence axillary, seldom terminal, in cymes or capitate; bracts persistent or caducous. Sepals persistent, sub equal. Corolla campanulate or infundibular, limb shortly lobed, pubescent. Stamens inserted near base

of corolla, included or exserted. Ovary 2 or 4 loculed, 4 ovuled; stigma 2, globose. Fruit an indehiscent berry.

Argyreia capitata (Vahl) Arn. ex Choisy, Conv. Or. 41. 1834; *Convolvulus capitatus* Vahl, Symb. Bot. 3: 28. 1794; *Lettsomia strigosa* Roxb. Fl. Ind. 2: 80. 1824; C.B. Clarke in Hook.f. Fl. Brit. Ind. 4: 193. 1883; Kanjilal *et al.*, Fl. As. 3: 345. 1939; Balakr., Fl. Jowai 2: 328. 1983; Haridasan & Rao, For. Fl. Megh. 2: 636. 1985.

Large climbers, with dense brownish hairs. Leaves ovate-lanceolate, 7-15×4-9 cm, base cordate, apex shortly acuminate, densely hairy on both surface, margin entire, lateral nerves 12-16 pairs. Inflorescence capitate cymes on long peduncles,. Bracts ovate, persistent, hairy. Calyx segments densely hairy. Corolla purple with darker throat, tube bristly outside. Stamens included, anthers oblong. Stigma globose. Fruit a capsule.

Fl. & Fr.: September-March

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Maharashtra, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, West Bengal. Laos, Myanmar, Sri Lanka, Thailand, Vietnam.

Specimen examined: AJNU 1137

Argyreia splendens (Homem.) Sweet, Hort. Brit., ed. 1. 289. 1826; Kanjilal *et al.*, Fl. Assam 3:343.1939; B.K. Sinha & N. Odyuo, Phytotaxonomy 10: 10. 2010. *Convolvulus splendens* Homem., Hort. Hafn. suppl. 123. 1819.

Lianas; stems terete; young parts grey tomentose. Leaves elliptic-oblong, 10-20 x 5-10 cm, base rounded, apex acute or acuminate, glabrous above, adpressed shining silky

beneath. Inflorescence in terminal corymbs; bracts ovate, silvery sericeous outside; calyx deciduous; corolla 4-8, campanulate. white or pinkish with purplish centre; stamens included, filaments villous basally; anthers oblong; ovary glabrous; stigma capitate, 2 - lobed. Fruit is berry globose, 3 - seeded.

Fl. & Fr.: July-October.

Distribution: India: Assam, Meghalaya, Nagaland, Tripura and West Bengal. Bangladesh, China and Myanmar.

Specimen examined: AJNU 1055

Evolvulus L.

Herbs, subshrubs, or shrubs; stem never twining. Leaves petiolate or sessile; leaf blade entire. Inflorescence axillary cymes, solitary or several in terminal spikes; peduncles and pedicels usually present, tiny. Sepals free, subequal. Corolla rotate funnelform, or salverform, limb entire to 5-lobed; stamens included or exerted; pollen globose, not spiny. Disc copular or absent. Ovary glabrous or pilose, 2-loculed; ovules 2 per locule. Styles 2, filiform, free or united basally; stigma 4, filiform, terete. Fruit a dehiscent capsule, usually 4-valved.

Evolvulus nummularis (L.) L., Sp. Pl. ed. 2, 1: 391. 1762. *Convovvulus nummularis* L., Sp. Pl. 1: 157. 1753. *Volvulopsis nummularia* (L.) Roberty, Candollea 14: 28. 1952.

Perennial prostrate herbs, rooting at nodes, 20-45 cm, slender, villous. Leaves distichous; lamina suborbicular, 1.4-1.8 x 1.2- 1.4 cm, underside appressed pilose, base cordate to rounded, apex rounded or emarginated; lateral veins 2 to 3 pairs; petiole 2-5

mm. Flowers solitary or paired; peduncle up to 2 mm; pedicel 2.4- 3 mm, densely villous; sepals oblong, ovate, 3-5 x 2-3 mm, persistent, pilose outside, margin ciliate; corolla broadly campanulate, up to 5 mm, white, 5 lobed; stamens inserted at the middle of the corolla tube, filaments up to 1.6 mm, glabrous, anther oblong; ovary globose, style linear, stigma capitate. Capsule ovoid.

Fl. & Fr.: April-November

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal. Almost throughout the world.

Specimen examined: AJNU 1465. **PL-3**

Ipomoea L.

Twining or prostrate herbs or shrubs, rarely erect. Leaves alternate, simple, entire or lobed, cordate, sometimes palmately compound. Inflorescences mostly in axillary cymes, 1- many flowered. Calyx segments 5, equal or unequal, enlarged in fruit. Corolla infundibular or campanulate, entire or slightly lobed, limb plicate. Stamens 5, included or exerted. Ovary usually 2 loculed, rarely 4, ovules 4, stigma 2-lobed. Capsule globose or ovoid, usually 4-valved.

Key to the species

1a. Bracts large, boat-shaped

I. involucrata

1b. Bracts small, subulate

I. purpurea

Ipomoea involucrata Beauv., Kanjilal *et al.*, Fl. Assam 3:348. 1997 (Repr.). *Ipomea pileata* Roxb., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:203.1883.

Annual twining or trailing herbs. Stems slender, patently hairy. Leaves ovate-orbicular, 3-5 x 2.5-3.5 cm, apex acuminate, base deeply cordate, sparsely villous on both the surface; 3-5 basal nerves; petioles 5-7 cm long, patently hairy. Inflorescence capitate, with 4-5 flowers enclosed in a perfoliate boat-shaped involucre consisting of connate bracts on a long peduncle. Bracts covered with patently brown hairs. Flowers light purple, about 2 cm long. Calyx lobes elliptic, unequal, very hairy. Corolla tubular or linear cylindrical. Stigma bifid. Fruits globose.

Fl. & Fr.: October-December.

Distribution: Almost throughout India.

Ethiopia, Kenya, Madagascar, Mozambique and Tanzania.

Specimen examined: AJNU 1437

Ipomoea purpurea (L.) Roth, Bot. Abh.27. 1787; C.B. Clarke in Hook.f. Fl. Brit. Ind. 4: 193. 1883; Kanjilal *et al.*, Fl. As. 3: 346. 1939; Haridasan & Rao, For. Fl. Megh. 2: 642. 1985; *Convolvulus purpurea* L. Sp. Pl. ed. 2: 219. 1762; Grierson & Long, Fl. Bhut. 2.2: 848. 1999.

Annual twining herbs. Stem covered with appressed and retrorse hairs. Leaves broadly ovate to suborbicular, 4-10x2-9 cm, base cordate, apex shortly acuminate, entire but occasionally 3-lobed, shortly pubescent on both sides. Inflorescence in axillary, 1-5 flowered cymes on long peduncles. Sepals unequal, with spreading hairs at base. Corolla

purplish pink, infundibular, tube whitish, glabrous. Stamens and style included. Capsule globose.

Fl. & Fr.: July-February

Distribution: India, Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

Specimen examined: AJNU 1440

Merremia Dennstedt ex Endlicher

Twining or prostrate, herbs or shrubs. Leaves alternate, simple or palmately lobed or compound. Flowers axillary, solitary or in few flowered cymes, peduncles long; bracts small. Sepals 5, subequal, persistent, often enlarged in fruit. Corolla infundibular or campanulate, limb slightly 5-lobed, mid-petal bands with or without darker longitudinal veins. Stamens included, often unequal, anthers straight or twisted. Ovary 2 or 4 loculed, ovules 4. Style filiform, stigma 2-globular. Fruit a capsule, dehiscent by 4-valves.

Key to Species

- | | |
|--|--------------------|
| 1a. Leaves usually entire, oblong; flowers white | <i>M.umbellata</i> |
| 1b. Leaves palmately lobed; flowers yellow | <i>M.vitifolia</i> |

Merremia umbellata (L.) Hallier f., Engl. Bot. Jahrb. 16: 552. 1893; *Ipomoea cymosa* (Desr.) R. & S. Syst. 4: 241. 1819; C.B. Clarke in Hook.f. Fl. Brit. Ind. 4: 211. 1883; Kanjilal *et al.*, Fl. As. 3: 356. 1939; Haridasan & Rao, For. Fl. Megh. 2: 643. 1985; Grierson & Long, Fl. Bhut. 2.2: 853. 1999; *Convolvulus umbellatus* L. Sp. Pl. 155. 1753.

Scandent twining perennial. Stem angular or terete, sometimes rooting at nodes, hairy or glabrous, young parts with milky latex. Leaves oblong-lanceolate or oblong-elliptic, 4-11×2-7 cm, apex acute, base shallowly cordate to truncate, pubescent on both sides, margin entire. Flowers in axillary subumbellate cymes, 1-12 flowered. Calyx lobes unequal, elliptic to orbicular, aristate. Corolla white with a creamish yellow tinge, infundibular, slightly lobed. Capsule globose, glabrous. Seeds densely hairy.

Fl. & Fr.: February-August

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Daman & Diu, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Tripura and West Bengal

Argentina Bolivia, Brazil Cameroon, Colombia, Costa Rica, Cuba, Guinea, Mexico , Panamá, Venezuela, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1025. **PL-3**

Merremia vitifolia (Burm. f.) Hallier f., Bot. Jahrb. 16: 552. 1893; C.B. Clarke in Hook.f. Fl. Brit. Ind. 4: 213. 1883; Kanjilal *et al.*, Fl. As. 3: 357. 1939; *Convolvulus vitifolius* Burm.f. Fl. Ind. 45.t. 18.f.1. 1768; *Ipomoea vitifolia* (Burm.f.) Bl., Bijdr. 709. 1826; Haridasan & Rao, For. Fl. Megh. 2: 643. 1985; Grierson & Long, Fl. Bhut. 2.2: 852. 1999.

Large twiners, hairy. Leaves orbicular, palmately 5-7 lobed, 5-10×4-8 cm, lobes broadly triangular to lanceolate, base deeply cordate, apex acute to acuminate, densely

hairy on both surface when young. Flowers in axillary cymes, 1-7 flowered, peduncles and pedicels hairy. Calyx lobes oblong or ovate-oblong, outer 2 hairy outside, inner ones glabrous, persistent, enlarged in fruit. Corolla yellow, infundibular, glabrous outside, mid-petal bands with 5 distinct dark bands. Anthers spirally twisted. Capsule subglobose; seeds black.

Fl. & Fr.: February-August

Distribution: India: Almost throughout India, (except NW dry zone).

Bangladesh, Borneo, Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1049. **PL-3**

Porana Burm.f.

Herbaceous or woody climbers. Leaves simple, ovate, entire, petiolate, palmately veined. Flowers in axillary or terminal cymes or panicles; bracts leaf-like, small or absent. Sepals 5, free, outer 3 greatly enlarged in fruit, inner 2 slightly so. Corolla regular, infundibular, limb 5-lobed or sub-entire. Stamens 5, included or exerted, adnate to corolla. Ovary 1-loculed and 4 ovules, stigma 2-globose. Fruit a capsule, 1-seeded, indehiscent or opening by valves.

Porana spectabilis Kurz in J. Bot. 11. 136. 1873; Kanjilal *et al.*. Fl. Assam 3: 353. 1939; B.K. Sinha & N. Odyuo, Phytotaxonomy 10: 15. 2010.

Climbing shrubs. Leaves 5-10 x 4 -7 cm, ovate-oblong, base rounded or scarcely cordate, apex acute-mucronate, subcoriaceous, puberulous woolly beneath; petioles 2-2.5 cm long, pubescent. Inflorescence in axillary racemes; calyx lobes linear-oblong, fulvous tomentose; corolla funnel -shaped, white; limb 5 -angular; stamens included; stigma subcapitate. Capsules subglobose, with accrescent calyx in fruit; 3 fruiting calyx lobes enlarged, other 2 suppressed, blunt, distinctly 5 -nerved at base; seed 1.

Fl. & Fr.: October-December

Distribution: India: Andaman & Nicobar Islands, Manipur, Meghalaya and Nagaland. Laos, Myanmar and Thailand

Specimen examined: AJNU 1188

CUSCUTACEAE Dum.

Parasitic herbs. Stem thread like, chlorophyllless twining by haustoria like structure. Leaves much reduced, alternate, spiral, membranous. Flowers small, regular, (3-) 5 merous. Perianth with distinct calyx and corolla; 6 or 10 in 2 whorled. Calyx 3- 5; in 1 whorled, gamopetalous, valvate, regular, white or pink. Stamens 5, inserted on the throat of the corolla tube, oppositisephalous, anthers dehiscence by longitudinal slits. Ovary 2 locular, style 2, free or particularly joined, placentation basal. Fruit fleshy or non-fleshy dehiscent capsule.

CUSCUTA L.

Herbs parasitic, yellow or reddish. Stems twining, filiform, obtaining nourishment from hosts by haustoria. Leaves much reduced. Flowers sessile or short pedicellate,

mostly in globular, spicate, racemose, 4- or 5-merous. Calyx gamosepalous, deeply lobed, or sometimes free. Corolla white, pinkish, or cream colored, urceolate, tubular, globose inside with fimbriate membranous scales. Stamens as many as corolla lobes, inserted on corolla above scales, alternating with corolla lobes. Ovary 2-loculed; ovules 2 per locule. Capsule ovoid or globose, dry or fleshy, circumscissile or opening irregularly.

Cuscuta cassyoides Nees, *Linnaea* 20.2: 196. 1847. *Cuscuta reflexa* Roxb., *Pl. Coromandel*. 2: 3. t. 104. 1799; C. B Clarke in Hook. f., *Fl. Brit. India* 4: 225. 1883; Kanjilal *et al.*, *Fl. Assam* 3: 362. 1939; Deb & R.M. Dutta in *J. Econ. Taxon. Bot.* 10(1): 45. 1987.

Leafless, twining parasite; stems filiform, yellowish green. Flowers solitary or fascicled in racemes, sessile; calyx cupular, lobes 5, orbicular, obtuse, overlapping. Corolla white or creamish, campanulate. 6-10 mm long; lobes 5, ovate to ovate triangular, fimbriate, spreading or reflexed; tube twice as long as lobes. Stamens 5; filaments short, inserted. Capsules globose-conical, circumsessile near base.

Fl. & Fr.: October–December

Distribution: Almost throughout India.

Ethiopia, Kenya, Madagascar, Mozambique and Tanzania.

Specimen examined: AJNU 1440. **PL-3**

SOLANACEAE Juss.

Herbs, shrubs, lianas or small trees. Leaves simple, alternate, sometimes in alternate pairs, rarely clustered, entire, lobed or pinnately compound or trifoliate. Flowers usually 5-merous, regular, rarely irregular, in axillary or extra-axillary cymes,

sometimes solitary or clustered. Calyx campanulate or tubular, often enlarged in fruit, persistent. Corolla sympetalous, rotate to tubular; lobes plicate or valvate in bud. Stamens attached to the corolla-tube, usually as many as and alternate with the lobes, but sometimes only 4 or even only 2 of them fertile. Ovary superior, 2-celled, sometimes 3-5 celled. Fruit a berry or capsule.

Key to the genera

- 1a. Calyx enlarged in fruit, enclosing the fruit: *Physalis*
- 1b. Calyx not enlarged in fruit, not enclosing the fruit: *Solanun*

Physalis L.

Herbs, pubescent with simple hairs. Leaves alternate, entire, sinuate or shortly lobed. Flowers solitary, axillary, nodding. Calyx campanulate, 5-lobed, greatly enlarged in fruit. Corolla broadly campanulate, 5-lobed. Stamens 5, inserted near the base of the corolla; anthers shorter than filaments. Ovary 2-celled; stigma obscurely 2-lobed. Fruit a berry enclosed within persistent calyx.

Physalis divaricata D. Don, Grierson & Long, Fl. Bhut. 2.3:1045. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:204. 2008. *Physalis minima* L., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:238.1883.

Stems diffusely branched. Leaves ovate to ovate-elliptic, 2-6 x 1-2.5 cm, apex acute-shortly acuminate, base cuneate or obscurely cordate, sparsely pubescent, margin sinuate or scarcely lobed; petioles about 3 cm long. Flowers yellow, without basal spots, solitary. Calyx campanulate at flowering, 0.3-0.4 cm long, in fruiting globose-ovoid, 10-

ribbed, 1.5-2.5 cm long, pubescent; lobes lanceolate. Corolla up to 0.7 cm long, pubescent; lobes broadly acute. Berry globose, orange, about 1 cm across.

Fl. & Fr.: March-June.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1254

Solanum L.

Herbs, shrubs or small trees, sometimes climbing, unarmed or armed with prickles or spines, usually with stellate hairs. Leaves simple or lobed. Flowers regular, in cymes or racemes, often extra-axillary. Calyx campanulate, 5-lobed. Corolla tubular with short tube, rotate; limb 5-lobed. Stamens 5, attached near the corolla throat. Fruit a berry.

Key to the species

- | | |
|---|------------------------|
| 1a. Plant unarmed; leaves entire | <i>S. erianthum</i> |
| 1b. Plant armed; leaves lobed or angled | |
| 2a. Leaves hirsute and prickly on both surfaces | |
| 3a. Flowers white | <i>S. torvum</i> |
| 3b. Flowers greenish-yellow or greenish-white | <i>S. myriacanthum</i> |
| 2b. Leaves pubescent on one surface | <i>S. violaceum</i> |

Solanum erianthum D. Don, Prodr. 96. 1825. *S. verbascifolium* non Linn. 1753; CL in Hk. f. Fl. Brit. Ind. 4: 253- 1883; Gamble, Man. Ind. Timb. 508. 1902; Brandis, Ind. Trees 489. 1906; Kanjilal *et al.*, Fl. Assam 3: 367. 1939.

Small trees up to 8 m high; leaves 9-20 x 4-8 cm, ovate, ovate to lanceolate, acute, base rounded or truncate, stellately woolly on both surfaces, densely hairy beneath; cymes terminal, paniced, 5-15 cm across; flowers white, 1-1.3 cm across; berries large, yellow when ripe.

Fl. & Fr.: Nearly throughout the year

Distribution: India: Almost throughout India.

Bahamas, Colombia, Costa Rica, Cuba, Dominican Republic, Florida and Mexico Texas.

Specimen examined: AJNU 1058

Solanum torvum Swartz., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:234.1883; Haridasan & Rao, Forest Fl. Megh. 2:648. 1987; Kanjilal *et al.*, Fl. Assam 3:369. 1997 (Repr.); Grierson & Long, Fl. Bhut. 2.3:1055. 2001. Yadav & Sardesai, Fl. Kolh. Dist. 321. 2002; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:208. 2008.

Erect shrub, sparingly armed. Stems and branches densely stellate pubescent. Prickles usually present on stems. Leaves broadly ovate or elliptic, 6-17 x 3-12 cm, apex acute or sub-obtuse, base obtuse or cordate, often asymmetric, densely stellate pubescent on both the surfaces, margin entire, irregularly sinuate or lobed; petioles 1-3 cm, densely stellate, pubescent. Flowers white, in extra-axillary racemes. Calyx stellate pubescent, 0.3-0.4 cm long; lobes lanceolate. Corolla stellate pubescent outside, up to 1.6 cm long; lobes ovate-triangular. Berry globose, green turning yellow and orange when ripe, about 0.7 cm across.

Fl. & Fr.: April-December.

Distribution: India: Almost throughout India.

Bahamas, Brazil, Colombia, Costa Rica, Haiti, Mexico, Panamá, Puerto Rico and Venezuela.

Specimen examined: AJNU 1075

Solanum myriacanthum Dunal, Hist. Solan. 218, t. 19. 1813 et DC., Prodr. 13: 243. 1852. *Solanum khasianum* Cl. in Hook. f., Fl. Brit. India 4: 234. 1883; Brandis, Ind. Trees 490. 1906; Kanjilal *et al.*, Fl. Assam 3: 371. 1939.

Spiny undershrubs, up to 3 m high. Bark grey, hirsute with recurved prickles; young parts hirsute. Leaves 5-16 x 5-9 cm, broadly ovate, ovate-orbicular in outline, variously shallowly lobed and angled, acute, base truncate, cuneate or subcordate, hirsute on both surfaces, long straight spiny along main nerves and petiole. Flowers in lateral cymes, greenish-white or greenish-yellow, 1.4-2.6 cm across. Berries up to 3 cm in diam, bright yellow when ripe.

Fl. & Fr.: July - March

Distribution: India: Almost throughout India.

Costa Rica, Honduras and Mexico

Specimen examined: AJNU 1246

Solanum violaceum Ortega, Nov. Rar. Pl. Descr. Dec.: 56. 1798. *Solanum indicum* sensu Burm. f., Fl. India: 56. 1768, non L., 1753. *Solanum pubescens* Kurz ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 231. 1883.

Undershrubs up to 2 m high. Stems unarmed, woolly-tomentose. Leaves ovate, irregularly lobed, 2-5 lobes on each side, 5.6-12.5 x 2-5 cm, base truncate, apex obtuse,

densely stellate pubescent beneath. Flowers sub-terminal, in rusty pubescent, racemose cymes; peduncles 2-2.6 cm long. Calyx campanulate, pubescent, teeth oblong-lanceolate, appressed. Corolla blue with white margin, deeply lobed; lobes oblong-lanceolate, acute; anthers oblong-linear, up to 6 mm long. Berries globose, up to 1 cm across, glabrous, orange-yellow in color.

Fl. & Fr.: August – December.

Distribution: Distribution: India: Almost throughout India.

Bangladesh, China, Laos, Myanmar, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam and Yemen.

Specimen examined: AJNU 1356

SCROPHULARIACEAE Juss.

Mostly herbs, very rarely shrubs or trees, autotrophic, hemiparasitic or parasitic. Leaves alternate or opposite or whorled, simple, lobed or pinnately dissected. Inflorescence a thyrses, raceme or spike or sometimes solitary. Flowers bisexual, mostly irregular. Calyx mostly deeply divided into 4-5 lobed. Corolla sympetalous 4-5 lobed, bilabiate or not, sometimes spurred or saccate. Stamens usually 4, didynamous, with extra staminodes or absent, rarely 2 or 5, attached to corolla tube and alternating with lobes. Discs annular, copular or glandular. Ovary superior, 2 celled; style simple or bilobed; stigma capitate or bifid. Fruit usually a capsule, rarely a berry or schizocarp. Seeds numerous.

Key to the genera

- | | |
|-------------------------------------|---------------------|
| 1a. Fertile stamens 2 | <i>Picria</i> |
| 1b. Stamens 4-5 | |
| 2a. Corolla mainly or wholly yellow | <i>Lindenbergia</i> |
| 2b. Corolla mainly or wholly white | <i>Torenia</i> |

Picria Lour.

Herbs, creeping or diffuse. Leaves opposite, petiolate. Flowers in terminal or axillary racemes; bracts small. Pedicel slender, apex dilated. Bracteoles absent. Calyx divided to base into 4 spreading segments; lower and upper lobes large and further enlarged in fruit, base cordate, margin entire; upper lobe often apically shallowly 2-lobed; lateral lobes narrow. Corolla limb 2-lipped; lower lip longer than upper lip, spreading, 3-lobed; upper lip base wide, apex emarginate. Stamens 4; anterior pair often reduced to clavate staminodes; posterior pair inserted at base of corolla lobes; anthers coherent, locules distinct, divaricate. Stigma 2-lamellate. Capsule included in calyx, septicidal, valves separating from wide placental axis. Seeds numerous.

Picria felterrae Lour. Fl. Cochinch. 393. 1790. *Curanga amara* Juss. in Ann. Mus. Hist. Nat. 9:319.1807; Hook, f., Fl. Bnt. India 4. 275.1884, Kanjilal *et al.*, Fl. Assam 3: 379. 1939; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 46. 1987.

Herbs, annual, straggling, up to 35 cm high; stems glabrous. Leaves opposite, ovate, 2-4 x 1-2.5 cm, base cuneate, apex obtuse, margins crenate, membranous, sparsely pubescent above, puberulent beneath; lateral nerves 5-6 pairs. Inflorescence terminal or

pseudo-axillary, in 4-8 flowered racemes; calyx pale green, flattened in 2 series, lobes 4; upper and lower lobes much larger ovate blunt; lateral lobe slightly shorter, narrow, enlarged in fruit; corolla white, upper lip notched; lower one 3-fid, 2-3 x 4-5 mm; stamens 2; anthers yellow. Capsules orbicular, compressed, septicidal, enveloped in enlarged calyx. Seeds rugose.

Fl. & Fr.: April-July

Distribution: India: Assam, Nagaland, Tripura and West Bengal.

Bangladesh, China, Laos, Malaysia, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1305

Torenia L.

Terrestrial herbs. Stems prostrate, then erect, quadrangular or ridged, sometimes rooting at nodes. Leaves opposite, entire, crenate or serrate. Flowers in axillary or terminal umbels or racemes; pedicels ebracteolate. Calyx bilabiate, often deeply cleft, 3-5 lobed, winged, keeled or plaited. Corolla bilabiate; tube cylindrical, somewhat curved; upper lip emarginate or bifid; lower lip larger, spreading, 3-lobed. Stamens 4, didynamous; 2 upper inserted just below the corolla tube mouth, with longer sometimes appendaged filaments; 2 lower inserted at throat, with short never appendaged filaments; anthers touching or cohering in pairs. Styles slender; stigma 2-lamellate. Fruits linear-oblong septicidal capsule, enclosed within calyx.

Key to Species

- 1a. Calyx 2-lobed, divided upto the middle; corolla lobes dark purple *T.diffusa*
1b. Calyx 5-lobed, divided upto the base; corolla lobes violet, lower with 3
deep purple tips *T.violacea*

Torenia diffusa D. Don, Prodr. Fl. Nep. 86. 1825; Balakr., Fl. Jowai 2: 338. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 188. 2012; *T. vagans* Roxb., Hook.f., Fl. Brit. Ind. 4: 277. 1884.

Erect or decumbent herbs, 20-30 cm high. Stems quadrangular, rooting at nodes, diffusely branched at base. Leaves ovate-lanceolate, 1-3 x 0.5-2 cm, base cuneate, apex acute or sub-acute, margins serrate, puberulous above, sparsely pilose beneath. Flowers axillary, often solitary, pedicels 1-1.5 cm long. Calyx glabrous, divided up to middle into 2 lobes, narrowly winged. Corolla funnel shaped, tube pale purplish, lobes rounded or sub-orbicular, dark purple. Capsule linear, acute.

Fl. & Fr.: May - October

Distribution: India: Nagaland, Uttarakhand and Uttar Pradesh.

Bangladesh, Cambodia, China, Laos, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1267

Torenia violacea (Blanco) Pennell, Balakr. Fl. Jowai. 2:338. 1983; Grierson & Long, Fl. Bhut. 2.3:1120. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:220. 2008. *Torenia peduncularis* Roxb., Hook. f., Fl. Brit. Ind. 4:277. 1884.

Erect or decumbent annual herbs. Stems diffusely branched, sharply quadrangular, sparsely hairy on angles. Leaves ovate or ovoid-oblong, 1.2-3.8 x 0.8-2 cm, apex acute or sub-acute, base obtuse-truncate, sparsely puberulus above, paler glabrous beneath, except pubescent on nerves, margin crenate-serrate; petioles 0.3-1 cm long. Flowers solitary and axillary in upper axils, or 2-4 in a terminal sub-umbel; pedicels 1-2.5 cm long, longer in fruit. Calyx ovate-ovoid, 1-1.5 cm long in flower, up to 2 cm long in fruit, 5-toothed, 5-winged, apex acuminate, base acute decurrent. Corolla 1.8-2.8 cm long; tube purplish white; lobes violet. Capsule narrowly ellipsoid-lanceolate, 1.2-1.5 cm long.

Fl. & Fr.: August-November.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Jharkhand, Meghalaya, Nagaland, Odisha, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1393

Lindenbergia Lehm.

Annual or perennial herbs, or scandent small shrubs. Stems erect or procumbent, much branched, hairy, rooting from lower nodes. Leaves opposite or upper alternate. Flowers in terminal spikes or racemes or solitary, axillary; bracts leaf-like. Calyx campanulate, divided up to the middle into 5-lobes. Corolla tubular, bilabiate; lower lip apex 3-lobed, larger than upper lip; upper lip apex truncate, sub-emarginate, or 2-lobed.

Stamens 4, didynamous, included, inserted on corolla tube towards the base. Ovary hairy or glabrous. Stigma simple. Fruit a loculicidal 2-grooved capsule, generally enclosed by persistent calyx. Seeds numerous, minute.

Linderbergia philippensis (Cham.) Benth. in DC., Prodr. 10: 377. 1846; Hook, f., Fl. Brit. India 4: 261. 1884; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 116.1938; Kanjilal *et al.*, Fl. Assam 3:378.1939. *Stemodia philippensis* Cham, in Linnaea 3: 5. 1828.

Herbs, perennial, erect, 50-90 cm high; stems woody below, terete, much branched from the base to apex, pubescent. Leaves elliptic or elliptic-ovate, 3-6 x 2-3 cm, base attenuate, apex acuminate, margins dentate; petioles 0.5- 1 cm long. Flowers sessile in rigid, densely flowered, 5-8 cm long, terminal racemes; bracts lanceolate, sharply acute; calyx lobes ovate-lanceolate, acuminate, pilose on both surfaces; corolla tube glabrous or sparsely pubescent on both sides; posterior lips, glabrous, abruptly curved, minutely bilobed at apex; anterior lip obovate, widened upwards, apex 3 -lobed; stamens 4. didynamous. inserted, anthers subglobose; ovary ovoid, glabrous; styles hairy at base. Capsules ovoid pilose; seeds ellipsoid.

Fl. & Fr.: April-June.

Distribution: India: Assam, Manipur, Meghalaya and Nagaland.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1367

OROBANCHACEAE Vent.

Herbs, annual or perennial parasites. Stems unbranched or sometimes branched. Leaves scaly. Inflorescences racemose, spicate, or subcapitate. Flowers bisexual, bracteates, with or without bracteoles. Sepals 4-5-lobed. Petals bilabiate, upper lip 2-lobed; lower lip 3-lobed. Stamens 4, didynamous. Ovary superior. Fruit capsular.

Key to genera.

- | | |
|--|------------------|
| 1a. Flowers solitary, sepals spathe-like, entire | <i>Aeginetia</i> |
| 1b. Flowers in distinct inflorescences, sepals not spathe-like | <i>Orobanche</i> |

Aeginetia L.

Herbs, fleshy. Stems short. Flowers large, solitary at stem apex. Bractlets absent. Pedicel very long, erect. Sepals. Spathe-like, apex acute or obtuse-rounded. Petals tubular or campanulate, lobes subrounded. Ovary usually 1-locular. Capsule dehiscent by 2 valves.

Aeginetia indica L., Sp. Pl. 632. 1753; Roxb., Fl. Indica 3: 30. 1832; Hook. f., Fl. Brit. India 4: 320. 1884; Kanjilal et al., Fl. Assam 3: 385. 1939.

Root parasites. Leaves absent. Scapes simple or in cluster 15-40 cm long, dark purplish to pinkish. Bracts a few at the base. Flowers solitary, purple, arcuate. Sepals spatheaceous, split in front upto the base.

Fl. & Fr.: July-November.

Distribution: India (throughout); China, Japan, Myanmar.

Specimen examined: AJNU 1291. **PL-2**

Orobanche L.

Herbs annual or biennial, usually tomentose or glandular pubescent. Leaves spirally or imbricately arranged, ovate-lanceolate or lanceolate. Flowers many, in spicate or racemose inflorescences; bract 1; bractlets 2 or absent. Pedicel short or absent. Calyx campanulate, apex 4-lobed, occasionally 5- or 6-toothed. Corolla bilabiate, curved; upper lip entire, emarginate, or 2-lobed; lower lip 3-lobed, shorter to longer than upper lip. Stamens 4, didynamous, included; filaments base pubescent. Ovary 1-locular; parietal placentas 4; ovules numerous. Style elongated; stigma inflated, peltate, or 2-4-lobed. Capsule ovoid-globose or ellipsoid, dehiscent by 2 valves. Seeds numerous, minute, ellipsoid or subglobose.

Orobanche aegyptiaca Pers., Syn. Pl. 2: 181. 1806; *Orobanche indica* Buch.- Ham. ex Roxb., Fl. Ind. ed. 2, 3: 27. 1832, non Spreng., 1825; *Orobanche ramosa* Sensus Hook. f. Fl. Brit. Ind. 4: 326. 1884, non L., 1753; *Orobanche pushpitoi* M.R. Almeida; Fl. Maharashtra 3B : 428. 2001.

Herbs annual, 10-50 cm tall, pubescent. Stems branched above middle. Leaves ovate-lanceolate, 7-12 x 2-6 mm, along with bracts, bractlets, calyx, and corolla densely glandular pubescent abaxially. Inflorescences spicate, 7-19 cm; bract lanceolate, 5-12 x 3-6 mm. Flowers subsessile. Calyx campanulate, 1-1.6 cm, 4- or 5-lobed; lobes linear-lanceolate, 4-8 mm. Corolla bluish purple, 2- 3.8 cm, white villous at margin. Pistil 2.3-2.8 cm long; ovary ellipsoid. Style glandular pubescent; stigma 2-lobed. Capsule oblong, 0.9-1.3 cm long.

Fl. & Fr.: March – April.

Distribution: India: Jammu & Kashmir, Maharashtra, Nagaland, Punjab, Rajasthan, Uttar Pradesh and West Bengal.

Afghanistan, Bangladesh, Bulgaria, Cyprus, Iran, Iraq, Kazakhstan, Morocco, Nepal, Pakistan, South Tunisia, Turkey, Turkmenistan, Uzbekistan and Xinjiang.

Specimen examined: AJNU 1054. **PL-2**

GESNERIACEAE Dumort.

Herbs or shrubs, sometimes epiphytic. Leaves simple, opposite alternate or whorled or solitary, fleshy or coriaceous, entire or toothed, without stipules. Flowers bisexual, irregular, arranged in spikes or bracteates racemes. Sepals 5 fused at the base. Corolla tubular, with 5 often obliquely placed lobes, often 2-lipped. Stamens 2 or 4, often cohering in pairs on corolla tube. Ovary superior. Fruit often a capsule with many seeds.

- | | |
|-------------------------------|----------------------|
| 1a. Fertile stamens 2 | <i>Henckelia</i> |
| 1b. Fertile stamens 4 | |
| 2a. Fruits indehiscent, pulpy | <i>Rhynchotherum</i> |
| 2b. Fruits dehiscent | <i>Stauranthera</i> |

Henckelia Spreng.

Herbs, stemless or with simple or branched stem. Leaves opposite, rarely alternate, unequal. Flowers in axillary few flowered cymes or solitary. Calyx 5-lobed. Corolla funnel shaped; limb bilipped, 5-lobed, subequal. Stamen 2, included; staminodes 3. Ovary linear 1-loculed, seldom 2-loculed. Capsule long, linear, loculicidally 2-valved.

Henckelia pumila (D. Don) A. Dietr., Sp. Pl. 1: 574. 1831; *Chirita pumila* D. Don, Prodr. Fl. Nepal.: 90. 1825; C. B. Clarke in Hook. f. Fl. Brit. Ind. 4: 357. 1884; Balakr. Fl. Jowai 2: 347. 1983; Grierson & Long, Fl. Bhut. 2. 3: 1317. 2001; Sinha in Singh *et al.*, Fl. Mizo. 2: 205. 2012.

Erect herbs, upto 30 cm tall. Stem base decumbent, rooting. Leaves opposite, often unequal, elliptic-oblong to lanceolate, 6-15 x 2.5-6 cm, apex acute, base oblique, pubescent on both surface, margin serrate; petioles 0.5-2.5 cm long, pubescent. Inflorescence 1-3 flowered, in axillary cymes, mostly in axils of upper leaves. Calyx tubular, deeply divided, with dense white hairs, lobes narrow lanceolate. Corolla tubular, funnel shaped, glandular pubescent outside, tube white with purple around the mouth, inside with yellow streaks. Stamens 2, fused to the corolla tube; filament short. Stigma bifid. Capsules linear, upto 12 cm long.

Fl. & Fr.: July - October

Distibution: Northeast India, East and West Himalaya, Bhutan, China, Myanmar, Nepal, Tailand, Vietnam

Specimen examined: AJNU 1446. **PL-3**

Henckelia anachoreta (Hance) D.J. Middleton & Mich. Möller, Taxon 60 : 774. 2011.

Chirita anachoreta Hance, Ann. Sci. Nat., Bot., sér. 5 5: 231. 1866. *Didymocarpus anachoretus* (Hance) H. Lev., Comp. Rend. Assoc. Franc. 34:427. 1906.

Annual herbs. Stems erect, glabrous or pubescent. Leaves opposite, lanceolate , ovate elliptic, 4 - 13 × 2 - 8.5 cm, cuneate margin denticulate , apex acute to acuminate, base oblique; lateral veins 6 – 10 on each side of midrib. Petiole 0.6-7 cm long.

Inflorescence a 3- 5 flowered cymes. Peduncle 3-8 cm, glabrous to sparsely pubescent. Bracts 2, free, 4 – 8 mm long, lanceolate to ovate, apex acute. Pedicel 1-3 cm long, glabrous to sparsely pubescent. Calyx 5-lobed, triangular, margin entire, apex acuminate. Corolla white to yellow with yellow or purple markings, 3 – 7 cm long, outside glabrous to sparsely pubescent, inside glabrous; filaments 1 – 1.3 cm long, glabrous to sparsely pubescent. Ovary 1.6 – 2.6 cm long; style glabrous; stigma 2-lobed. Capsule 7.7 – 13 cm long, glabrous.

Fl. & Fr.: May – September

Distribution: India: Arunachal Pradesh and Nagaland.

China, Laos, Myanmar, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1360. **PL-3**

Rhynchotechum Blume

Shrubs or undershrubs. Leaves opposite, rarely alternate. Flowers in axillary cymes. Calyx deeply 5-lobed. Corolla campanulate, bilipped, upper lip smaller than lower; limb 5-lobed. Stamens 4, inserted near base of tube; satminode 1. Fruit a globose berry.

Rhynchotechum ellipticum A. DC., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:373. 1884; Balakr. Fl. Jowai. 2:344. 1983; Grierson & Long, Fl. Bhut. 2.3:1326. 2001; Kanjilal *et al.*, Fl. Assam 3:399. 1997 (Repr.); Giri *et al.*, Mater. Fl. Aruna.Pradesh. 2:234. 2008.

Shrubs, up to 2 m tall. Branchlets pubescent. Leaves opposite or alternate, obovate, 10-20 x 3-6 cm, apex acuminate, base cuneate, glabrous above, sparsely tomentose, glaucous beneath, margin sharply serrate above, entire towards the base;

petioles 1.5-3 cm long. Flowers in trichotomously paniculate cymes on tomentose peduncles, at lower axils or on leafless lower nodes; peduncle up to 4.5 cm long. bracts. Bracts narrow, lanceolate, 1 cm long, tomentose. Calyx cleft almost up to the base; lobes oblong with obtuse apex. Corolla white, campanulate, bilabiate; lobes 5, unequal. Stamens 4, adnate to the base of corolla. Berry globose, white.

Fl. & Fr.: August-October.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Bangladesh, Cambodia, China, Hainan, Laos, Myanmar, Nepal, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1458. **PL-4**

Stauroanthera Benth.

Herbs, perennial. Leaves few, along stem, alternate or opposite and strongly unequal; leaf blade glabrescous to pubescent, base strongly oblique, cuneate to rounded. Inflorescences lax, terminal, few to many flowered cymes; bracts 2, opposite. Calyx actinomorphic, 5-lobed; lobes equal. Corolla white, blue, or purple, zygomorphic, inside glabrous; tube campanulate, spurred or saccate at base; limb indistinctly 2-lipped; adaxial lip 2-lobed. Stamens 4, adnate to corolla tube near base, included; anthers basifixed, dehiscing longitudinally. Disc absent. Ovary subglobose, 1-locule. Stigma 1, terminal, broadly funnelform, undivided. Capsule straight in relation to pedicel, depressed-globose, shorter than calyx, dehiscing transversely or irregularly. Seeds unappendaged.

Stauroanthera umbrosa (Griff.) C. B. Clarke, Commelyn. & Cyrtandr. Bengal, t. 89. 1874 & in Hook, f., Fl. Brit. India 4: 371. 1884; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 118. 1938. *Cynanthus umbrosus* Griff, in Not. Pl. Asiat. 4: 154. 1854.

Herbs, 10-35 cm high; stems succulent, pubescent. Leaves alternate, falcate, elliptic, up to 20 x 7 cm, apex acuminate, margins obscurely crenate, glabrate above, brown pubescent at least on the nerves beneath. Inflorescence lax, in sub racemose, dusky pubescent cymes; peduncles 2-4 cm long; calyx divided half way down; lobes triangular; corolla white with blue marks, yellow near the base within; stamens 4, inserted on corolla tube. Ovary pubescent. Capsules depressed globose.

Fl. & Fr.: July – September

Distribution: India: Arunachal Pradesh, Meghalaya and Nagaland.

Bangladesh, China, Hainan, Jawa, Malaysia, Myanmar and Vietnam.

Specimen examined: AJNU 1183. **PL-4**

BIGNONIACEAE Juss.

Trees, shrubs or climbers, rarely herbs. Leaves opposite, alternate or whorled, simple or pinnately compound, rarely palmately compound, stipules absent. Flowers bisexual, zygomorphic, large, in axillary or terminal racemes or panicles, sometimes solitary, rarely flowers borne on old wood. Calyx tubular, truncate, 2-5 lobed. Corolla funnelform, usually bilipped, lobes 5, imbricate. Fertile stamens 4, didynamous, sometimes reduced to 2, others replaced by staminodes. Ovary superior, 2-celled, ovules numerous. Style filiform, stigma bifid. Fruit an elongated capsule, dehiscent loculicidally or septicidally. Seeds flat with large membranous wing.

Key to Genera

- 1a. Lianas; Leaves trifoliate *Nyctocalos*

- 1b. Trees; Leaves pinnate
 - 2a. Leaves 1 pinnate
 - 3a. Septum of capsule terete; seeds sunk in crevices of septum *Stereospermum*
 - 3b. Septum of capsule flat; seeds compressed with a membranous wing on each side
Fernandoa
 - 2b. Leaves 2-3 pinnate *Oroxylum*

Fernandoa Welw. ex Seem

Trees. Leaves 1-pinnately compound; leaflets 2- 6 pairs. Inflorescences cymose, terminal or axillary, pubescent. Calyx tubular or campanulate, usually 2-5-lobed. Corolla funnelform or campanulate; lobes 5, subrounded, sinuate or crenate. Stamens 4, didynamous; anthers 2-celled, slightly divergent, included; staminodes small. Disc annular, occasionally dentate. Ovary terete, glabrous or pubescent, 2-locular; ovules numerous, in 2 rows. Capsule 4-angular; valves thin leathery; septum thick, smooth, vertical with fruiting valve. Seeds in 2 rows, numerous, nearly square, narrowly membranous winged at both ends.

Fernandoa adenophylla (G Don) Steenis in Blumea 23: 135. 1976. *Bignonia*

adenophylla G. Don, Gen. Hist. 4: 221. 1838. *Heterophragma adenophyllum* Seem, ex

Benth. & Hook, f., Gen. Pl. 2: 1047. 1876; C. B. Clarke in Hook, f., Fl. Brit. India 4: 381. 1884. *Haplophragma adenophyllum* (DC.) D. Don in Bull. Soc. Bot. France, ser. 5, 72: 890. 1925; Kanjilal et al., Fl. Assam 3: 402. 1939. Ziron (Lushai).

Trees, deciduous, 10-20 m high. Leaves opposite, unipinnate; leaflets elliptic, 10-25 x 5-15 cm, apex acute, margins entire, glabrous above, pubescent beneath; lateral nerves 6-7 pairs, prominent on lower surface. Inflorescence dense, terminal, tomentose, in panicles; calyx campanulate, irregularly toothed, rusty tomentose; corolla yellowish-brown, densely rusty tomentose outside; lobes 5, subequal; stamens 4, didynamous; anthers linear, oblong, divergent; ovary sessile, many seriate; stigma cylindrical, ribbed, bilobed. Capsules twisted, loculicidally 2-valved. Seeds compressed, with a membranous wing on either side.

Fl. & Fr.: January-September.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Delhi, Haryana, Jharkhand, Maharashtra, Meghalaya, Nagaland, Punjab, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1114. **PL-2**

Nyctocalos Teijsm. & Binn.

Vines, without tendrils. Leaves opposite, 1-pinnately compound; leaflets 3-5, entire. Inflorescences racemose, terminal. Calyx campanulate, apex subtruncate; teeth 5, short acute. Corolla white, tube very long, narrowly cylindrical, slightly bilabiate; lobes

ovate-rounded, subequal, patent. Stamens 4 and didynamous or 5; anthers divergent, ellipsoid. Disc cushion like. Ovary short terete; ovules in several rows. Style filiform. Capsule dehiscent septicidally, long ellipsoid. Seeds numerous, compressed, rounded, transparent winged.

Nyctocalos cuspidata (Blume) Miq. in Ann. Mus. Lugd. -Bat. 3; 249, t 8B. 1867. *Tecoma cuspidata* Blume in Rumphia 4; 35. 1849. *Nyctocalos thomsonii* Hook. f. in Bot. Mag. 93: t. 5678. 1867; C. B. Clarke in Hook, f., Fl. Brit. India 4: 377. 1884; Kanjilal *et al.*, Fl. Assam 3: 402. 1939; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 46. 1987.

Lianas, glabrous. Leaves opposite, 3 -foliolate, petioles 8-10 cm long, leaflets broadly elliptic, 5-10 x 2-4 cm, apex caudate acuminate, margins entire. Inflorescence in terminal, long peduncled racemes; calyx 5 -toothed, linear; corolla white, 5-8 cm long; tube 15-17 cm long; mouth ca 6 cm across; lobes 5; stamens 4, didynamous, attached near the top of corolla tube: anthers yellow, included; stigma tongue -shaped, subcapitate. Capsules oblong, whitish yellow, ca 15 x 5 cm, septicidally 2 -valved; valves leathery. Seeds thinly discoid, surrounded by a hyaline, entire wing except base.

Fl. & Fr.: July-September

Distribution: India: Assam, Meghalaya, Mizoram, Nagaland and Tripura.

Bangladesh, Sulawesi, Thailand and Vietnam

Specimen examined: AJNU 1264. **PL-3**

Oroxylum Vent.

A small tree with few branches. Bark soft, brown, corky outside. Leaves opposite, 2 or 3 pinnately compound, leaflets ovate, entire. Calyx campanulate, leathery, truncate.

Corolla tubular, ventricose, creamy white or purplish, lobes unequal. Stamens 5, fertile, unequal. Capsule large, long lanceolate, compressed, woody. Seeds flat, orbicular, surrounded by a transparent broad wing.

Oroxylum indicum (L.) Kurz, For. Fl. Burma 2: 237. 1877; Kanjilal *et al.*, Fl. As. 3: 401. 1939; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 378. 1884; *Bignonia indica* L., Sp. Pl. 625. 1753; Balakr. Fl. Jowai 2: 348. 1983; Haridasan & Rao, For. Fl. Megh. 2: 656. 1987; Grierson & Long, Fl. Bhut. 2.3: 1241. 2001.

Small tree, branches few or unbranched. Bark grey, corky. Leaves 2-4 pinnately compound, borne near stem apex; leaflets ovate, acuminate, base usually oblique, or subcordate, entire. Flowers usually open after sunset, large, in terminal racemes, fetid smell. Calyx scarcely toothed, coriaceous. Corolla tubular, fleshy, tube reddish purple outside, yellow inside, lobes creamy, margins crenate and irregularly lacinulate. Stamens 5, fertile, tomentose at base. Ovary compressed, ovules numerous. Capsule woody, 40-70 cm long, margin convex. Seeds rounded, surrounded by a papery wing.

Fl. & Fr.: June-February

Distribution: India (throughout), Bangladesh, Bhutan, Cambodia, China, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

Specimen examined: AJNU 1454. **PL-3**

Stereospermum Cham.

Trees. Leaves opposite, imparipinnate; leaflets entire, elliptic-lanceolate. Flowers in lax terminal or axillary panicle. Calyx campanulate, truncate and unequally lobed.

Corolla tubular-ventricose, bilabiate, 5-lobed, subequal, rounded or lacerate. Stamens 4, didynamous, included. Ovary sessile, ovules numerous. Fruit a capsule, terete, slender, dehiscent loculicidally; septum thick, corky. Seeds flat, winged at both ends.

Stereospermum tetragonum DC., *Biblioth. Univer. Gene.* 17: 124. 1838; *S. colais* (Buch.-Ham. ex Dillwyn) Mabb. *Tax.* 27: 553. 1978; Grierson & Long, *Fl. Bhut.* 2.3: 1240. 2001; Giri *et al.*, *Mater. Fl. Aruna. Pradesh* 2: 237. 2008.

Trees, 15-25 m tall. Leaves pinnate, 25-40 cm long; leaflets elliptic, caudate acuminate, glabrous or pubescent, margin entire, petiolules 1 cm. Flowers many in terminal glabrous or pubescent pedunculate panicles; bracts deciduous. Calyx campanulate, glabrous or pubescent. Corolla white with purplish or crimson markings, slightly curved; bilabiate, upper lip 2-lobed, lower lip 3-lobed, glabrous outside, tomentose within. Stigma 2 lobed. Capsule terete, 4 angled, 30-60 cm long, twisted when matured. Seeds ovoid, winged.

Fl. & Fr.: May-December

Distribution: India (throughout), Bhutan, China, Malaya, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

Specimen examined: AJNU 1255

ACANTHACEAE Juss.

Herbs or shrubs, rarely climbers, usually swollen at nodes. Leaves opposite, rarely alternate, exstipulate. Flowers rarely solitary or in axillary whorls, usually in cymes

racemes or spike with bracts and bracteoles, bisexual, often zygomorphic. Calyx 4-5 lobed. Corolla 2-lipped or subequally 5-lobed. Stamens 4, didynamous, rarely 2. Capsule loculicidal, valves often elastically recurved.

Key to the genera

- | | |
|--|----------------------|
| 1a. Climbing plant | <i>Thunbergia</i> |
| 1b. Herbs or shrubs, not climbing; | |
| 2a. Calyx 4-partite or lobes; plants often spiny | |
| 3a. Leaves with spiny margins | <i>Acanthus</i> |
| 3b. Leaves not spiny | |
| 4a. plants armed | <i>Barleria</i> |
| 4b. Plants unarmed | <i>Nelsonia</i> |
| 2b. Calyx 5-partite or lobed | |
| 5a. Fertile stamens 4 | |
| 6a. Corolla distinctly 2-lipped | <i>Lepidagathis</i> |
| 6b. Corolla subequally 5-lobed | |
| 7a. Bracteoles absent | <i>Phaulopsis</i> |
| 7b. Bracteoles present | <i>Strobilanthes</i> |
| 5b. Fertile stamens 2 | |
| 8a. Corolla subequally 5-lobed | <i>Eranthemum</i> |
| 8b. Corolla distinctly 2-lipped | |
| 9a. Bracts prominent, oblong, ovate or elliptic | <i>Justicia</i> |
| 9b. Bracts small, in conspicuous or linear | <i>Phlogacanthus</i> |

Acanthus L.

Herbs or shrubs. Leaves simple or pinnatifid. Flowers in terminal or axillary spikes. Calyx 4-lobed, 2 outer larger than the 2 inner. Corolla tube ovoid; limb with lower lip 3-lobed, upper lip absent. Stamens 4, included.

Acanthus leucostachyus Wall., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:480. 1884; Kanjilal *et al.*, Fl. Assam 3:440. 1997(Repr.); Balakr., Fl. Jowai. 2:351. 1983; Grierson & Long, Fl. Bhut. 2.3:1280. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:239. 2008.

Shrubs, with decumbent stem woolly. Leaves elliptic-oblong, spinous serrate, glabrous above, slightly pubescent along the nerves, whitened beneath; base cuneate. Flowers white, usually in terminal hairy spikes. Calyx softly hairy, 2 larger lobes oblong, 1.4-1.8 cm long, obtuse, 2 inner lobes linear-lanceolate, about 1.3 cm long. Corolla 2-2.4 cm long, pubescent. Capsule ellipsoid, 1-1.4 cm long, compressed, glabrous.

Fl. & Fr.: November-May.

Distribution: India: Assam, Manipur, Meghalaya, Nagaland, Tripura and West Bengal. China, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1097. **PL- 1**

Barleria L.

Shrubs or perennial herbs, with cystoliths, usually spiny. Leaves opposite, petiolate. Inflorescences axillary cymes, terminal spikes, or flowers solitary; bracts present or absent; bracteoles 2. Calyx deeply 4-lobed; outer 2 lobes larger; inner 2 lobes smaller. Corolla funnel-shaped, usually large; limb 5-lobed; lobes subequal. Stamens 2 or

4 and didynamous; anthers 2-thealous; staminodes 1 or 3. Ovary with 2 ovules per locule; stigma 2-cleft or entire. Capsule substipitate, ovoid, 2-4-seeded.

Barleria cristata L. Sp. Pl. 636. 1753; C. B. Clarke in Hook. f., Fl. Brit. India 4:488. 1884; C.E.C. Fisch. In Rec. Bot. Surv. India 12(2): 119. 1938; Kanjilal *et al.*, Fl. Assam 3: 446. 1939.

Sub shrubs to 3 m tall. Stems terete, covered with soft hairs. Leaves oblanceolate, 2-2.7 x 1- 1.7 cm, base and apex acute, margin entire. Inflorescences in terminal and axillary short spikes; bracts absent; bracteoles variable, linear to linear-lanceolate, 2.3-6.2 × 0.4-1.6 cm, 3-7-veined, base cuneate, margin usually spiny, apex acuminate. Outer calyx lobes ovate to narrowly elliptic, 1.3-2.6 × 0.6-1.4 cm, pilose, reticulately veined, margin spiny, apex mucronate; inner calyx lobes lanceolate, 6-13 mm, 1-veined, margin scarious. Corolla purplish blue, 4.6-6.7 cm, outside pilose; tube basally narrowly cylindrical then gradually widened; lobes oblong-elliptic, up to 1.6 cm, equal. Stamens 4, didynamous; filaments pilose; staminode 1, filament sparsely pilose. Ovary oblong-ellipsoid, glabrous; stigma inflated. Capsule 1.3-1.7 cm, glabrous, 4-seeded.

Fl. & Fr.: September – February.

Distribution: India: Throughout the country.

Bangladesh, Cambodia, China, Laos, Malaya, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1397. **PL-1**

Eranthemum L.

Shrubs or erect herbs with cystoliths. Leaves petiolate, margin entire or crenate. Inflorescences terminal or rarely axillary, spikes, lax, forming a panicle; bracts sometimes colored; bracteoles small, narrow. Calyx 5-lobed, narrow, subequal. Corolla subsalverform, tube basally cylindrical, long, slender; limb 5-lobed; lobes obovate, subequal. Stamens 2, inserted below throat; anthers 2-therous; muticous. Ovary with 2 ovules per locule; style filiform, glabrous or pubescent; stigma 2-lobed, lobes unequal. Capsule with a solid stalk at base, clavate, 4-seeded.

Eranthemum pulchellum Andrews, Bot. Repos.2: 88.1798. *Justicia nervosum* (Vahl). R.Br.Prodr.1:477.1810; Kanjilal *et al.*, Fl. Assam 3: 438. 1939. *Daedalacanthus nervosus* (Vahl) T. Anders. in J. Linn. Soc. Bot. 9: 487. 1867;C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 418. 1884; Gamble, Man. Ind. Timb. 518. 1902; Brandis, Ind. Trees 499.1906.

Undershrubs up to 3 m tall. Branches quadrangular, young parts puberulos. Leaves 8- 26 x 5- 16 cm, ovate, ovate- elliptic, ovate- lanceolate, acute or acuminate, base cuneate, narrowed; lateral nerves prominent below, sub parallel. Inflorescence paniced, 10- 22 cm across; flowers 2.4- 3 cm long; capsules 1- 1.6 cm long.

Fl. & Fr.: March – May.

Distribution: India: Andhra Pradesh, Bihar, Jammu and Kashmir, Madhya Pradesh, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttarakhand and West Bengal.

China, Laos, Myanmar, Nepal, Pakistan, Thailand and Vietnam.

Specimen examined: AJNU 1003.

Justicia L.

Herbs or shrubs. Leaves entire. Flowers sessile or sub-sessile in spike or panicles. Bracts conspicuous. Calyx 5 lobed, sometimes 4. Corolla 2-lipped, tube short, upper lip uneven; lower lip 3-lobed. Stamens 2. Capsule clavate.

Key to the species

- 1a. Herb or shrub rooting at nodes *J. procumbens*
- 1b. Herb or shrubs not rooting at nodes
 - 2a. Flowers in dense, bracteate pedunculate spikes *J. adhatoda*
 - 2b. Flowers in pairs along rachis, in solitary or panicle spikes *J. vasculosa*

Justicia adhatoda L., Sp. Pl. 15. 1753; Roxb., Fl. Ind. ed. 2, 126. 1832. *Adhatoda zeylanica* Medik., Hist. & Commentat. Acad. Elect. Sci. Theod. Palat. 6: 393. 1790. *Adhatoda vasica* Nees in Wall., Pl. Asiat. Rar. 3: 103. 1832; C.B. Clarke in Hook. f., Fl. Brit. India 4: 540. 1885; C.E.C. Fisch. in Rec. Bot. Surv. India 12(2): 1938; Kanjilal *et al.*, Fl. Assam 3: 455. 1929.

Perennial shrubs up to 2 m tall. Stem subquadrangular. Leaves ovate-lanceolate, 9-20 x 4-8 cm, base acute, apex acuminate or acute, margins entire or undulate, glabrous; petioles 1-4 cm long. Inflorescence in axillary and terminal spikes, 4-9 cm long; peduncles 5-8 cm long; bracts foliaceous, elliptic-ovate to ovate, 1-2.7 cm long, 3-nerved from the base, ciliate; bracteoles linear-lanceolate, 1-1.4 cm long; calyx 5-lobed; lobes lanceolate, 7-10 mm long, 3-nerved from base, pubescent; corolla broadly tubular; tube up to 1.6 cm long, bent with violet veins; upper lip curved, notched at apex; lower

lip white with purple lines and dots in throat; stamens 2; filaments hairy at base; anthers not exerted. Capsules clavate, 2-4 cm long, dark brown.

Fl. & Fr.: September- November.

Distribution: India: Almost throughout the country.

Bangladesh, Nepal, Pakistan and Thailand.

Specimen examined: AJNU1492.

Justicia procumbens L., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:539, 1885; Kanjilal *et al.*, Fl. Assam 3:455. 1997 (Repr.); Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:245. 2008.

Diffuse, much branched, hairy herb. Leaves ovate-elliptic, hairy. Flowers purple in dense hairy, cylindric spike, sometimes slightly interrupted at the base. Bracts linear, hispid on both surfaces. Calyx about 0.5 cm long, 5-lobe, lobes ovate-lanceolate. Corolla about 1cm long, glabrous; lip hairy, lower lip bent downwards, slightly lobed. Stamens included. Capsule ellipsoid.

Fl. & Fr.: September-November.

Distribution: India: Throughout the country.

Australia.

Specimen examined: AJNU 1369.

Justicia vasculosa Wall., C.B. Clarke in Hook. f., Fl. Brit. Ind. 4:533. 1885; Kanjilal *et al.*, Fl. Assam 3:454. 1997(Repr.); Grierson & Long, Fl. Bhut. 2.3:1288.2001. Giri *et al.*, Mater. Fl. Arun. Pradesh. 2:245. 2008.

Perennial herbs. Leaves ovate, acute, narrowed at both ends, entire or wavy margin, slightly pubescent on the midrib beneath. Flowers pale yellowish with purple in solitary, opposite in simple or paniculate spikes. Bracts lanceolate. Calyx 5-lobed, pubescent, lobes lanceolate, about 0.4 cm long. Corolla about 1.2 cm long, pubescent, lower lip bending downwards. Stamens included. Capsule ellipsoid, glabrous.

Fl. & Fr.: February- May.

Distribution: India: Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal.
Bangladesh, Laos, Malayasia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1105. PL-1

Nelsonia R. Br.

Pubescent herbs without cystoliths. Leaves opposite, shortly petiolate, pinnately veined, margin entire. Inflorescences axillary or terminal spikes; bracts overlapping. Flowers spirally arranged, sessile, subtended by a bract; bracteoles absent. Calyx 4-lobed, unequal. Corolla tube slender; limb 2-lipped; lower lip 3-lobed, upper lip 2-lobed. Stamens 2, included; filaments basally pubescent; anthers 2-theous; staminodes absent. Ovary with 8-28 ovules in 2-4 rows per locule; stigma usually unequally 2-lobed. Capsule conical.

Nelsonia canescens (Lam.) Spreng., Syst. Veg., ed. 16, 1: 42. 1824; *Justicia canescens* Lam., Tabl. Encyl. 1: 41. 1791; *Nelsonia campestris* R. Br., Prodr. Fl. Nov. Holland.: 481. 1810; *Justicia vestita* Schult., Mant. 1:145. 1822; *Nelsonia campestris* var. *vestita* (Schult.) C. B. Clarke in Hook. f., Fl. Brit. India 4: 394. 1884.

Herbs 10-25 cm tall, creeping, prostrate, or decumbent. Stems subterete, villous, often rooting at nodes. Petiole 0.2-3.5 cm, villous. Leaf blade elliptic to ovate, 1-2.3 × 0.5-1.3cm but basal ones sometimes 7-13 × 3.4-6 cm, both surfaces villous, secondary veins 3-6 on each side of midvein, base cuneate, margin entire. Spikes 1.6-5 cm; bracts elliptic, 6-7.7 × 3-6 mm, 5-8-veined. Calyx abaxial lobe 2 × 0.7 mm, apex 2-lobed; adaxial lobe 3 × 1 mm; lateral lobes 2 × 0.6 mm. Corolla bluish purple or white; tube cylindrical, contracted near midpoint. Stamens inserted at base of throat. Ovary glabrous; ovules 4-8 per locule. Capsule 8-18-seeded.

Fl. & Fr.: April – June

Distribution: India: Andaman , Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Tripura, Uttar Pradesh and West Bengal.

Andaman, Bangladesh, Cambodia, China, Philippines, Thailand, Uganda and Vietnam.

Specimen examined: AJNU 1107. **PL-1**

Lepidagathis Willd.

Herbs or undershrubs. Leaves entire or serrate. Flowers sessile, in terminal or axillary dense capitate heads, usually one-sided, often fascicled. Bracts scarious. Calyx

deeply, unequally 5-lobed. Corolla usually small, 2-lipped, lower lip 3-lobed. Stamens 4, included. Capsule oblong-ellipsoid, 2-4 seeded.

Lepidagathis incurve D. Don, Kanjilal *et al.*, Fl. Assam 3:451. 1997(Repr.); Grierson & Long, Fl. Bhut. 2.3:1286. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:246. 2008.

Lepidagathis hyaline Nees., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:521. 1885.

Perennial herbs. Leaves minutely viscid pubescent; lower leaves ovate and rounded at base; upper leaves larger, elliptic, and acuminate at both ends. Flowers white with purple streaks in dense, axillary and terminal spikes. Calyx 6-8 cm, long, lobes linear-lanceolate, ciliate. Corolla about 1.2 cm long, glabrous. Capsule glabrous, 4-seeded.

Fl. & Fr.: February-September.

Distribution: India: Assam, Bihar, Goa, Karnataka, Kerala, Maharashtra, Manipur, Nagaland, Punjab, Rajasthan, Sikkim and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaya, Myanmar, Nagaland, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1005.

Phaulopsis Willd.

Small, prostrate hairy herbs. Leaves opposite, entire or obscurely toothed. Flowers in dense, one-sided terminal spikes. Bracts orbicular, closely imbricate, usually each bearing 3 flowers. Calyx 5-lobed, one lobe ovate, much larger than the other 4 linear lobes. Corolla small, tubular with 5 unequal lobes. Stamens 4, didynamous. Capsule clavate, 4 seeded.

Phaulopsis imbricata (Forssk.) sweet, Grierson & long, Fl. Bhut. 2.3:1275. 2001;Giri *et al.*, Mater. Fl. Aruna.Pradesh. 2:247. 2008; *Phaulopsis parviflora* Willd., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:417.1884.

Herb. Stems rooting at nodes. Leaves unequal, ovate, crenate, and acuminate at both ends, pubescent. Flowers white in densely hairy spikes; bracts orbicular or reniform membranous. Calyx about 0.6 cm long, pubescent, lobes linear. Corolla about 0.8 cm long, pubescent. Capsule about 0.6 cm long, hairy at tip.

Fl. & Fr.: April- July.

Distribution: India: Andaman, Andhra Pradesh, Assam, Chhattisgarh, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal. Angola, Africa, Botswana, Kenya, Madagascar, Malawi, Mauritania, Saudi Arabia, Swaziland and Tanzania.

Specimen examined: AJNU 1398.

Phlogacanthus Nees

Undershrubs with cystoliths. Leaves petiolate, opposite, leaf blade large, margin entire or obscurely crenate. Inflorescences in terminal thyrses or axillary cymes, pedunculate; bracts small; bracteoles small or absent. Calyx deeply 5-lobed; lobes equal to unequal. Corolla tubular, slightly curved; limb subequally 5-lobed; lower lip 3-lobed; upper lip 2-cleft. Stamens 2, inserted at middle or basal portion of tube; anthers 2-theous; staminodes 2, small. Ovary usually glabrous. Capsule linear, 4-angled.

Phlogacanthus thyrsoformis (Roxb. ex Hardw.) Mabb. in Manilal, Bot. & Hist. Hort. Malab.: 83.1980. *Justicia thyrsoformis* Roxb. ex Hardw. In Asiat. Res. 6: 349. 1799. *Phlogacanthus thyrsoflorus* (Roxb.) Nees in Wall., Pl. Asiat. Rar, 3: 99. 1832; C. B. Clarke in Hook. f. Fl. Brit. India 4: 512.1884; Kanjilal *et al.*, Fl. Assam 3: 443. 1939.

Shrubs up to 2-3 m high; stem erect, long, glabrous. Leaves oblanceolate or elliptic lanceolate, 9-14.5 x 2.5 – 4.3 cm, base cuneate, acute, apex acute to acuminate, margins entire; lateral nerves 10-12 pairs; petioles 14- 30 mm long. Inflorescence terminal, 10- 26 cm long, pubescent; bracts linear ,6- 8 mm long. Calyx densely pubescent, 5- lobed, up to 6 mm long; lobes linear, subulate, pubescent. Corolla orange brown, up to 2 cm long, tubular, 2 –lipped; upper lip spreading ; lower lip deflexed. Stamens 2, exserted,4- 6 mm long, glabrous. Ovary glabrous. Capsule oblanceolate, dialated at tip.

Fl. & Fr.: March – June.

Distribution: India: Arunachal Pradesh, Bihar, Maharashtra, Nagaland, Sikkim and West Bengal.

Bangladesh, China, India, Myanmar, Nepal and Thailand.

Specimen examined: AJNU 1007.

Thunbergia Retz.

Large climbing shrubs. Leaves petiolate, ovate or elliptic, usually cordate or hastate, entire or sinuate lobed. Flowers solitary or paired in leaf axils or in racemes with leaf-like bract at the base of each pedicel; bracteoles paired large enclosing calyx and corolla when

young. Calyx small, toothed or obscure. Corolla large; tube ventricose, lobes 5, twisted to the left in bud. Stamens 4, didynamous near the base of the corolla tube. Capsule globose with conspicuous, woody beak.

Key to the species

- | | |
|---|-----------------------|
| 1a. Flowers orange red; pendulous racemes | <i>T. coccinea</i> |
| 1b. Flowers bluish-white; racemes not pendulous | |
| 2a. Woody climber, calyx an entire ring | <i>T. grandiflora</i> |
| 2b. Herbaceous climber, calyx toothed | <i>T. fragrans</i> |

Thunbergia coccinea D. Don, C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:393. 1884; Kanjilal *et al.*, Fl. Assam 3:411. 1997 (Repr.); Haridasan & Rao, Forest Fl. Megh. 2:669 1987; Grierson & Long, Fl. Bhut. 2.3:1248. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:258. 2008.

Large climbing shrubs, with long pendent branches. Leaves lanceolate, elliptic, acuminate, remotely toothed, glabrous, plamately 3-5 nerved; base rounded or shallowly cordate. Flowers orange red, fascicled at the nodes of elongated pendent racemes; bracteoles falcate, dark red. Calyx a minute rim. Corolla 2.5-3.5 cm long, lobes reflexed. Capsule glabrous.

Fl. & Fr.: September-March.

Distribution: India: Throughout the country.

Bangladesh, China Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1145. **PL-1**

Thunbergia fragrans Roxb., Pl. Coromandel 1(3): 47, t. 67. 1796; C. B. Clarke in Hook. f., Fl. Brit. India 4:390. 1884.

Twining herbs up to 3 m, usually glabrous. Stem glabrous or pubescent. Leaves narrowly ovate, 4.6 – 12 x 2-4 cm, base sagitate, apex acute to acuminate, margin entire or sinuate, palmately veined, glabrous or pilose. Flowers solitary, arising from the leaf axils; pedicel 3- 4.9 cm, hairy, bracteole green, oblong to ovate, 2-4 x 0.8 – 1.4 cm, apex acute, pubescent , ciliate on the margin. Calyx 12- 17 toothed rim. Corolla tube cylindrical, lobes obovate; filaments unequal. Capsules glabrous or pubescent.

Fl. & Fr.: October – February.

Distribution: India: Throughout the country.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1370.

Thunbergia grandiflora Roxb., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:392. 1884; Kanjilal *et al.*, Fl. Assam. 3:410. 1997(Repr.); Haridasan& Rao, Forest Fl. Megh. 2:670. 1987; Grierson & Long, Fl. Bhut. 2.3:1248. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:258. 2008.

Large scrambling shrubs. Leaves ovate- triangular, rarely suborbicular, sub-entire, shallowly lobed, scaberulous above, pubescent beneath, palmately 5-7 nerved; base cordate or shortly cuneate. Flowers bluish-white, large, axillary from the uppermost leaves or in dense flowered racemes; bracteoles conspicuous, falcate, and pale green. Calyx entire. Corolla 6-7.5 cm long, tube broad, glabrous, lobes spreading. Capsule thinly pubescent with 4-quetrous beak.

Fl. & Fr.: October-March.

Distribution: India: Mainly confined to the North eastern parts of India.

Bangladesh, Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1127. **PL-1**

Strobilanthes Blume

Herbs or undershrubs. Stems and branches usually 4-angled, often sulcate, basally becoming woody. Leaves opposite, petiolate or sessile; leaf blade usually with cystoliths, margin dentate, serrate, crenate, undulate, or entire. Inflorescences axillary or terminal, bracteate heads, spikes; floral bracts usually persistent or caducous; bracteoles 2 per pedicel. Calyx usually 5-lobed to base, commonly accrescent in fruit. Corolla nearly always bluish, rarely white, yellow, or pink, tubular or funnel-shaped; limb 5-lobed; lobes usually ovate, equal or subequal, spreading, contorted in bud. Stamens usually 4 and didynamous, basally monadelphous; anthers included or exerted, 2-theous. Ovary oblong to obovoid, 2-locular; style filiform, long, slender, simple. Capsule oblong to narrowly obovoid.

Strobilanthes paniculiformis J.R.I. Wood, Kew Bull. 61(1): 10. 2006.

Perennial anisophyllous herbs, woody below. Stem glabrous, up to 25 cm long. Leaves petiolate, unequal in each pair; leaf blade 5-12.5 x 1- 4.6 cm, narrowly oblong-elliptic, acuminate, margin serrate, lacking prominent cystoliths. Inflorescence a terminal panicle; bracts prominent, paired, leaf- like, lanceolate, glabrous. Flower heads few – flowered; calyx 5-lobed, glandular- pilose, purplish, lobes linear-oblong, up to 7 mm long; corolla 3.5- 4 cm long ,pubescent outside, glabrous within,bluish purple, 5-lobed, ovate, rounded; fertile stamens 4, didynamous, included; filaments recurved; anthers rounded, glabrous. Capsule oblong, 4- seeded.

Fl. & Fr.: May – November.

Distribution: India: Arunachal Pradesh and Nagaland.

Myanmar.

Specimen examined: AJNU 1461. PL-1

VERBENACEAE J. St.-Hil.

Herbs, shrubs or trees. Stem often quadrangular. Leaves opposite or occasionally whorled, rarely alternate, simple or sometimes pinnately or palmately compound. Inflorescence in heads, racemes, cymes, corymbs or panicles. Flowers irregular or rarely regular, bisexual. Calyx tubular at base, 4-5, rarely 6-8 toothed, sometimes irregular. Corolla tubular below, salveform, funnel- shaped or 2-lipped, 4-6 lobed. Stamens 4, didynamous, rarely 2; filaments attached to the corolla tube alternate with lobes; anthers included or exserted. Ovary superior. Fruit a drupe or a capsule.

Key to the genera

1b. Climbers; Stamens 5	<i>Sphenodesme</i>
1a. Shrubs, under shrubs or trees; stamens exerted	
2a. Inflorescence terminal	
3a. Corolla tube short or long; limb bilabiate	<i>Premna</i>
3b. Corolla with long slender tube; limb not bilabiate	<i>Clerodendrum</i>
2b. Inflorescence axillary or axillary and terminal	
4a. Corolla lobes equal; stamens equal	<i>Callicarpa</i>
4b. Corolla lobes unequal; stamens unequal	
5a. Calyx saucer-shaped, unlobed	<i>Holmskioldia</i>
5b. Calyx campanulate, lobed	<i>Gmelina</i>

Callicarpa L.

Trees or shrubs; branchlets stellately tomentose. Leaves opposite, rarely whorled. Flowers small in lax axillary dichotomous cymes, shorter than the leaves, usually glandular. Calyx shortly campanulate, entire or minutely 4-lobed. Corolla campanulate or tubular; lobes 4, spreading. Stamens 4, anther, exerted. Ovary 2-celled; style slender; stigma slightly bifid. Fruit a globose drupe, subtended by persistent calyx.

Callicarpa arborea Roxb., Fl. Ind. 1: 405. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 567. 1885; Kanjilal *et al.*, Fl. As. 3: 463. 1939; Balakr., Fl. Jowai 2: 366. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 259. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 280. 2012.

Trees, upto 15 m tall. Branchlets 4-angled, stellately tomentose. Leaves elliptic-lanceolate or ovate-lanceolate, 9-30 x 4-15 cm, base cuneate, apex acuminate, margins entire, glabrescent above, stellate-tomentose beneath; petioles 3-5 cm long, stellate-tomentose. Inflorescence dichotomously branched in axillary and supra-axillary cymes; peduncles 3-5 cm long. Corolla purple, 4-lobed, reflexed. Stamens 4, exserted. Drupe globose, purple.

Fl. & Fr.: March - December

Distribution: India, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam

Specimen examined: AJNU 1396. **PL-8**

Clerodendrum L.

Shrubs or trees, sometimes sprawling. Leaves opposite or whorled, simple or sometimes lobed. Inflorescence in terminal or axillary cymes or panicles. Flowers irregular, bisexual. Calyx campanulate, truncate or 5-toothed. Corolla with long slender corolla tube and 5 subequal, spreading lobes. Stamens 4, didynamous, exserted; filament filiform. Stigma shortly bifid. Fruit a fleshy drupe, separating into 4 nutlets.

Key to the species

- 1a. Leaves hastate or deeply cordate; corolla tube more than 8 cm long *C. hastatum*
- 1a. Leaves otherwise; corolla tube less than 5 cm long
 - 2a. Leaves narrow, oblanceolate; inflorescence drooping *C. laevifolium*
 - 2b. Leaves broad, ovate; inflorescence otherwise *C. informatum*

Clerodendrum viscosum Vent., Haridasan & Rao, Forest Fl. Megh. 2:678. 1987; Balakr., Fl. Jowai. 2:369. 1983; Grierson & long, Fl. Bhut., 2.2:934. 1999; Yadav & Sardesai, Fl. Kolh. Dist. 372. 2002; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:265. 2008; Polunin & Stainton, Flow. Hima., 316. 2008 (Repr.). *Clerodendron infortunatum auct. non* L., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:594. 1885; ; Kanjilal *et al.*, Fl. Assam. 3:487. 1997 (Repr.).

Shrubs, up to 2 m tall. Stem and branches quadrangular villous. Leaves broadly ovate, 7-18 cm x 5-14 cm, apex acute, base truncate or rounded, villous on both the surface, margin sharply serrate, 3-basal nerves; petioles 1-12 cm long, villous. Inflorescence in terminal, tomentose, corymbose panicles. Flowers white with pinkish red at the mouth of corolla tube. Calyx pinkish pale green, villous, gland dotted, divided nearly to the base; lobes narrowly ovate, 0.8-1.1 cm long. Corolla tube 1.5-1.7 cm long, villous; lobes obovate, 0.8-1 cm long, pubescent. Stamens far exserted; anthers purple. Drupe subglobose, black, shining.

Fl. & Fr.: March-July.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Nagaland and Tamil Nadu

Bangladesh, China, Laos, Myanmar, Nepal, Philippines, Sri Lanka and Thailand.

Specimen examined: AJNU 1053. **PL-9**

Clerodendrum hastatum (Roxb.) Lindl. in Bot. Reg. t. 1307. 1844; Cl. in Hook. f. Fl. Brit. Ind. 4: 595. 1895; Brandis, Ind. Trees 508. 1906; Kanjilal *et al.*, Fl. Assam 3: 493. 1939; Balak. Fl. Jowai 2: 370. 1983. *Siphonanthus hastata* Roxb. Fl. Ind.: 67. 1832.

Shrubs, upto 5 m high; bark brown or dark brown. Leaves 10-20 x 5-15 cm, broadly ovate, usually 3-5-lobed, acuminate, base cordate, scabrous or tomentose. Inflorescence corymbs terminal, 8-15 cm across. Flowers white or pinkish-white. Fruit is a drupe, purplish-black, 1-1.5 cm across, supported by accrescent, red calyx.

Fl. & Fr.: May-November.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya and Nagaland. Bangladesh.

Specimen examined: AJNU 1268. **PL-8**

Clerodendrum laevifolium Blume, Bijdr. Fl. Ned. Ind.: 808. 1826; *C. nutans* Wall, ex D. Don, Prodr. Fl. Nepal.: 103. 1825; *C. wallichii* Merr., J. Arn. Arbor. 33: 220. 1952; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 591. 1885; Kanjilal *et al.*, Fl. As. 3: 491. 1939; Balakr., Fl. Jowai 2: 369. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 290. 2012.

Shrubs, upto 3 m tall. Stems quadrangular, glabrous, nodes hairy. Leaves opposite, decussate, oblong-lanceolate or oblanceolate, 6-20 x 2-4 cm, apex acuminate, base cuneate, margin entire or undulate, glabrous; petioles 0.4-1.7 cm long. Inflorescence in terminal lax pendulous, panicles; bracts linear-lanceolate, acuminate; pedicels 1-2 cm long. Calyx ovate, divided nearly to base, acute, greenish white. Corolla white, tube narrow, lobes obovate, obtuse, glabrous. Stamens 4, far exserted. Drupe globose, dark purple.

Fl. & Fr.: August - November

Distribution: India, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam

Specimen examined: AJNU 1013. **PL- 9**

Holmskioldia Retz.

Shrubs. Leaves opposite, simple. Flowers in axillary and terminal racemes. Calyx showy, broadly saucer-shaped, unlobed. Corolla narrowly funnel-shaped, curved; limb 5-lobed, lower lip longer. Stamens 4, in 2 pairs; anthers exserted. Ovary 4-celled; styles equalling stamens; stigma shortly bifid. Fruit a drupe, 4-lobed, separating when ripe into 1-seeded parts subtended by enlarged showy calyx.

Holmskioldia sanguinea Retz., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:596. 1885; Haridasan & Rao, Forest Fl. Megh. 2:680. 1987; Balakr., Fl. Jowai. 2:371. 1983; Grierson & long, Fl. Bhut., 2.2:935. 1999; Kanjilal *et al.*, Fl. As. 3:493. 1997 (Repr.); Yadav & Sardesai, Fl. Kolh. Dist. 372. 2002; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:266. 2008; Polunin & Stainton, Flow. Hima., 318. 2008 (Repr.).

Straggling woody shrubs, up to 5 m tall. Branches quadrangular, sparsely pubescent, pendent. Leaves opposite, simple, ovate, 4-12 x 2-7 cm, apex acuminate, base truncate or rounded, pubescent on midrib and minute yellowish gland dotted, pubescent on nerves and gland dotted beneath, margin entire; petioles 1-3 cm long, pubescent. Inflorescence in axillary cymes. Flowers scarlet-red. Calyx broad cup-shaped, 2-2.5 cm across, bright crimson, puberulus. Corolla tube about 2 cm long, slightly curved, glandular pubescent; limb oblique, unequally 5-lobed. Stamens 4, didynamous, shortly

exserted. Stigma bifid. Drupe obovoid, deeply 4-lobed at apex, subtended by persistent calyx.

Fl. & Fr.: October-February.

Distribution: India (NE India), E & W Himalayas, Myanmar, Nepal

Specimen examined: AJNU 1139. **PL-9**

Gmelina L.

Trees or shrubs. Leaves opposite, with gland at the base, margin entire. Flowers bisexual, in terminal and axillary racemiform panicles. Calyx funnel-shaped; limb shortly 5-toothed. Corolla shortly tubular at base; limb oblique, 5-lobed with enlarged lower lobe forming a lip, other lobes shorter, reflexed. Stamens 4, in 2 pairs; anthers exserted. Ovary 4-celled; style slender; stigma unequally 2-lobed or unlobed. Fruit a fleshy drupe, subtended by persistent calyx.

Gmelina arborea Roxb., C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:581. 1885; Haridasan & Rao, Forest Fl. Megh. 2:679. 1987; Grierson & Long, Fl. Bhut., 2.2:928. 1999; Kanjilal *et al.*, Fl. Assam 3:466. 1997 (Repr.); Yadav & Sardesai, Fl. Kolh. Dist. 372. 2002; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:266. 2008.

Trees, up to 25 m tall. Branches spreading; branchlets puberulous, quadrangular. Leaves opposite, simple, broadly ovate-triangular, 7-18 x 6.5-16 cm, apex shortly acuminate, base truncate or shallowly cordate, often abduptly cuneate and with 2 large glands at the base just above the tip of petioles, glabrous above, softly tomentose pubescent beneath, margin entire, 4-6 lateral nerves above the 3 basal ones; petioles 2.5-

10 cm, puberulus. Flowers yellow, in terminal erect softly tomentose paniculate cymes. Bracts linear-lanceolate. Calyx softly tomentose; tube funnel-shaped, about 0.5 cm long; teeth 5, acute, very short less than 0.1 cm long. Corolla pubescent; tube short, slender below, ventricose upwards; limb oblique with 5 unequal lobes; upper lip longer, obovate; other lobes shorter, rounded. Stamens 4, didynamous, subexserted. Style slender; stigma unequally bifid, curved at the apex. Drupe obovate, subtended by persistent calyx.

Fl. & Fr.: March-May.

Distribution: India, Bhutan, China, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

Specimen examined: AJNU 1101. **PL-9**

Premna L.

Trees, shrubs, or sub-shrubs, erect or rarely climbing. Leaves opposite, margin entire or 3-5-crenate. Flowers small, in terminal spike-like thyrses or panicles, cymes, paniculate corymbs. Calyx campanulate or funnel-shaped, truncate, 2-5 dentate, teeth equal, sometimes bi-lipped. Corolla tubular, tube short; limb bilabiate, 4-5-lobed. Stamens 4, often didynamous, shorter than corolla or sometimes slightly exserted. Ovary 2-4-celled; ovules 1-2 in each cell; style capillary; stigma bifid. Fruit a small drupe, 1-4 seeded.

Premna pinguis C. B. Clarke in Hook. f., Fl. Brit. Ind. 4:579. 1885; Haridasan & Rao, Forest Fl. Megh. 2:685. 1987; Kanjilal *et al.*, Fl. Assam 3:477. 1997 (Repr.).

Small shrubs or undershrubs, up to 3 m tall. Leaves ovate-oblong or broadly orbicular, 6-15 x 2.5-8 cm, apex acuminate, base truncate-rounded or sub-cordate, pubescent on the nerves above, pubescent beneath, margin sharply serrate, 3-5 basal nerves; petioles 1-3 cm long, pubescent. Bracts linear-lanceolate, up to 0.7 cm long, pubescent. Inflorescence in terminal corymbs, 1.8-5 cm across, pubescent. Flowers pale greenish white. Calyx funnel-shaped, shortly 5-toothed, glandular pubescent; tube about 0.1 cm long. Corolla pubescent sub-equally 5-lobed; tube about 0.2 cm long; lobes oblong, nearly 0.2 cm long. Stamens exserted. Drupes obovoid, reddish-brown.

Fl. & Fr.: April-July.

Distribution: India (NE India), Bangladesh, Jawa, Myanmar,

Specimen examined: AJNU 1262. **PL-9**

Sphenodesme Jack

Shrubs, climbing. Leaves opposite, short petiolate, margin entire. Inflorescences is capitate cymes, 3-7 flowered, subtended by a whorl of 5 or 6 prominent involucre bracts. Calyx funnelform, 5-dentate. Corolla tube usually short, cylindric; lobes 5 or 6, narrowly lanceolate to ovate-oblong; stamens 5-7. Ovary 2-locular; ovules 2 per locule, pendulous from apex of a placenta bearing axis. Stigma 2-cleft. Fruit indehiscent, obovoid to globose, included or nearly included in calyx, 1 or 2 seeded.

Sphenodesme pentandra Jack. var. *wallichiana* (Schauer) Munir in Gard. Bull. Sing. 21: 360. 1966. *S. pentandra* (non Jack, 1820) Clarke in Fl. Brit. Ind. 4: 602. 1885; Fl. As. 3: 496. 1939. *S. wallichiana* Schauer in DC. Prodr. 11: 622. 1847.

Large woody climbers. Leaves elliptic-oblong to lanceolate, rounded at base, acute or acuminate, 4 - 16 x 3 - 5 cm. Inflorescences axillary or terminal, panicles of 3 – 5 flowered heads; involucre bracts 6, foliaceous accrescent, oblong-ob lanceolate. Flower purple. Fruit is drupe, globose, subtended by up to 2.5 cm long scarious bracts.

Fl. & Fr.: November-May.

Distribution: India: Andaman & Nicobar Islands, Assam, Manipur, Meghalaya, Nagaland, Tamil Nadu and West Bengal.

Bangladesh, Borneo, Cambodia, China, Hainan, Laos, Malayasia, Myanmar, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1059. **PL-9**

LAMIACEAE Martinov

Herbs, shrubs or subshrubs, often aromatic. Stems usually quadrangular. Leaves simple or occasionally pinnately compound, opposite or rarely whorled; stipules absent. Inflorescence compact cymes, axillary, verticillasters, 2-many flowered, subtended by leaves or bracts. Flowers bisexual, zygomorphic, mostly bracteate. Calyx persistent, 5-lobed, bilabiate to regular or oblique. Corolla gamopetalous, usually zygomorphic, 4-5-lobed, usually bilabiate. Stamens epipetalous, 4, didynamous, or only 2 perfect. Ovary superior, 4-lobed; stigma usually bifid. Fruit usually of 4 dry nutlets.

Key to genera

- | | |
|------------------------------------|--------------------|
| 1a. Stamens declinate | <i>Orthosiphon</i> |
| 1b. Stamens straight or descending | |
| 2a. Calyx teeth equal | <i>Leucas</i> |

2b. Calyx subequal

Gomphostemma

Gomphostemma Wall.

Perennial herbs or under-shrubs, roots sometimes with tubers. Stem stellately pubescent. Leaves simple, opposite. Inflorescence axillary, few-many flowered in spikes. Calyx tubular, 5-toothed. Corolla bilabiate, tube long, slender, upper lip entire or emarginated, lower lip broadly 3-lobed. Stamens 4, anterior pair longer, included or exerted. Nutlets drupaceous, glabrous or pubescent.

Gomphostemma ovatum Benth. in. Wall. Pl. As. Rar. 2; 12. 1931; Fl. Brit. Ind. 4: 699. 1885. Herbs, 15-30 cm high. Leaves ovate-elliptic or oblong, acute to obtuse at base, subacute, serrate, 6 -1 2 x 4 -10 cm; lateral nerves 4-5 pairs; petioles 2-5 cm; verticillasters axillary, clustered; bracts ovate, obtuse, crenate; calyx 10 mm; teeth 3 -4 mm; corolla yellow or orange, 3- 4 cm; nutlets sub globose, brown.

Fl. & Fr.: May - September

Distribution: India (South & N.E. region); Myanmar, Malaysia, Thailand.

Specimen examined: AJNU 1091. **PL-12**

Leucas R. Br.

Herbs or subshrubs. Leaves sessile or shortly petiolate, entire or serrate. Inflorescences of few to many flowered verticillasters, crowded or widely spaced. Bracts ovate-lanceolate to subulate. Calyx tubular, 10-nerved, straight or curved, 8-10 toothed. Corolla bilabiate, upper lip entire, densely hirsute on outside; lower lip 3-lobed, longer than upper lip. Stamens 4. Style bifid. Nutlets oblong, trigonous.

Leucas aspera (Willd.) Link, Enum. Hort. Berol. Alt. 2:113. 1822. *Phlomis aspera* Willd., Enum. Pl. 621. 1809.

Herbs to 40 cm tall. Stems hispid. Leaves 3-6 x 0.8-1.5 cm, linear or oblong-linear, strigose on veins beneath, base cuneate-decurrent, margin sparsely crenate, apex obtuse. Verticillasters globose, many flowered, densely hispid; bracts linear, as long as sepals, margin hispid ciliate. Sepals tubular, apex spinescent. Petals white, slightly longer than sepals tube. Nutlets brown, oblong, triquetrous.

Fl. & Fr.: Throughout the year.

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Malaysias, Mauritius, Myanmar, Nepal, Pakistan, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1341

Orthosiphon Benth.

Plants perennial herbs or subshrubs. Leaves dentate. Verticillasters 4-6 flowered, separate, in long thyrses; bracts shorter than pedicels, circular to oblate, margin entire. Calyx tubular bilipped; upper lip ovate to oblate, scarious, decurrent into tube, margin reflexed; lower lip 4-toothed, teeth awned to needlelike, anterior teeth longer than lateral ones; fruiting calyx enlarged. Corolla white or reddish to purple, 2-lipped; tube exserted, straight or incurved, obconical; upper lip 3- or 4-lobed; lower lip entire, concave. Stamens 4, anterior 2 longer, declined, included or slightly exserted; filaments separate;

anthers 1-locellate. Style globose, apex entire or 2-cleft. Disc produced, fingerlike in front. Nutlets ovoid or subglobose, minutely tuberculate, glabrous.

Orthosiphon aristatus (Blume) Miq., Fl. Ned. Ind. 2: 943. 1858; Kanjilal et al, Fl. Assam 3: 502. 1939; Mukh. in Rec. Bot. Surv. India 14(1): 26. 1940. *Ocimum aristatum* Blume, Bijdr. 14: 833. 1826. *Orthosiphon stamineus* Benth. in Wall., Pl. Asiat. Rar. 2: 15. 1830; Hook, f., Fl. Brit. India 4: 615. 1885; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 125. 1938.

Herbs, erect, 30-60 cm high; stems sparsely hairy. Leaves ovate, 3-5.5 x 2-2.5 cm, base cuneate, apex acuminate, margins coarsely toothed; young leaves puberulous on both surfaces; petioles 1-1.5 cm long. Verticillasters laxly flowered, in terminal, 10-15 cm long racemes; fruiting calyx campanulate; upper lip broad, orbicular; the two lower lips teeth subulate; corolla purple, 1.2-1.5 cm long; tube slender, puberulous outside; stamens long, exserted; filaments 2-5 cm long, deep purple. Nutlets oblong, compressed, rugulose.

Fl. & Fr.: August-November.

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Assam, Bihar, Kerala, Manipur, Mizoram, Nagaland, Tamil Nadu and West Bengal.

Bangladesh, China, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1102. **PL-13**

PLANTAGINACEAE Juss.

Scapigerous herbs, glabrous or hairy. Leaves usually all radical, alternate, rarely cauline and alternate or opposite, simple, entire, dentate, 3-5 parallel veins; petioles broadly channelled often sheathing at base. Flowers bisexual, regular, 4-merous, mostly in pedunculate bracteate spikes or heads. Calyx 4-lobed, free or connate, persistent. Corolla scarious, sympetalous, tubular, 4-lobed. Stamens as many as and alternate with the corolla lobes, attached to the corolla-tube, long exserted. Ovary superior, 2-celled; styles filiform; stigma 2-lobed. Fruit a capsule, an achene or small nut enclosed in the persistent calyx.

Plantago L.

Characters same as of the family.

Plantago erosa Wall., Balakr., Fl. Jowai. 2:384. 1983; Kanjilal *et al.*, Fl. As. 3:531. 1997 (Repr.); Grierson & long, Fl. Bhut., 2.3:1342. 2001; Yadav & Sardesai, Fl. Kolh. 387. 2002; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:299. 2008. *Plantago major* L., Hook. f., Fl. Brit. Ind. 4:667. 1885.

Herbs with erect, stout rootstock. Leaves radical, ovate-oblong to obovate, 3-9 x 1-5 cm, apex acute to sub-acute, base cuneate-attenuate, sub-glabrous to puberulous, margin sinuate-dentate above, often coarsely dentate below or bearing 1-3 pairs of oblong lobes towards base, 3-7 basal nerved; petioles up to 10 cm long. Spikes 2-16 cm long; peduncle ribbed, up to 22 cm long. Flowers white, sub-sessile. Sepals ovate-elliptic, 0.2-0.3 cm long. Corolla glabrous, about as long as the sepals; lobes ovate, reflexed. Capsule ovoid.

Fl. & Fr : April-September.

Distribution: India: Almost throughout India.

Widely distributed throughout the world.

Specimen examined: AJNU 1350

AMARANTHACEAE Juss.

Herbs, shrubs or rarely climbers. Leaves opposite or alternate, simple, entire, stipules absent. Flowers bisexual sometimes unisexual, usually in terminal and axillary simple or paniced spikes, cymes or clusters; bracts papery, bracteoles 2. Perianth segments 3-5, free or connate, papery or hyaline. Stamens 3-5, opposite perianth segments. Filaments free or connate. Ovary superior, 1-celled. Fruit a capsule or utricle, rarely a berry.

Amaranthus L.

Annual erect herbs. Leaves alternate, long petiolate. Flowers unisexual, axillary or terminal, densely clustered into spikes, usually males above, females below. Bracts small. Perianth segments 3-5, free. Stamens 3-5, filaments free. Style short, stigma usually 3-lobed. Utricles globose, laterally compressed. Seeds black or brown, globose.

Key to species

1a. Plant with spines, stamens 3

A. spinosus

1b. Plant without spines, stamens 5

A. viridis.

Amaranthus L.

Annual erect herbs. Leaves alternate, long petiolate. Flowers unisexual, axillary or terminal, densely clustered into spikes, usually males above, females below. Bracts small. Perianth segments 3-5, free. Stamens 3-5, filaments free. Style short, stigma usually 3-lobed. Utricles globose, laterally compressed. Seeds black or brown, globose.

Amaranthus spinosus L., Sp. Pl. 2: 991. 1753; Hook. f., Fl. Brit. India 4: 718. 1885; Kanjilal et al., Fl. Assam 4:8. 1940; A. S. Chauhan in Hajra, Contrib. Fl. Namdapha 253. 1996; Bora & Kumar, Flo. Div. Assam 276. 2003.

Herbs, spinous. Leaves entire, 1.5-10 x 1-3.5 cm, ovate-rhombic or ovate-lanceolate, obtuse, base cuneate. Flowers in terminal or axillary spikes. Tepals green, 5. Utricles ovoid. Seeds subglobose.

Fl. & Fr.: Throughout the year.

Distribution: India (throughout); Tropical regions.

Specimen examined: AJNU 1314

Amaranthus viridis L., Sp. Pl., ed. 2.2: 1405. 1763; Hook.f., Fl. Brit. Ind. 4: 720. 1885; *A. fasciatus* Roxb., Fl. Ind. 3: 609. 1832; Grierson & Long, Fl. Bhut. 1.2: 224. 1984; Giri et al., Mater. Fl. Aruna. Pradesh 2:303. 2008; Balakr., Fl. Jowai 2: 385. 1983.

Erect herb, glabrous. Leaves alternate, ovate, ovate-elliptic, base cuneate or obtuse, apex notched or acute, margin entire or undulate; petiole 3-6 cm long. Flowers green, clustered in axillary or terminal paniculate spikes. Tepals oblong or lanceolate. Stamens 3. Stigmas 2-3. Utricles globose, slightly compressed.

Fl. & Fr.: June-October

Distribution: India (throughout) tropical regions.

Specimen examined: AJNU 1405

POLYGONACEAE Juss.

Herbs, shrubs or climbers. Stems straight, grooved or prickly, nodes often swollen. Leaves alternate, rarely opposite, simple, stipules often united around stem forming a sheath (ocrea). Flowers bisexual or unisexual, small, in terminal or axillary racemes, panicles or clusters. Perianth segments 3-6, usually connate at base, often enlarged in fruit. Stamens 3-9, filaments free or united at base. Ovary superior, unilocular; styles 2-3. Fruit a trigonous or flattened achene.

Persicaria Mill.

Herbs or subshrubs, annual or perennial. Stem sometimes bearing short recurved spines. Leaves ovate, elliptic or lanceolate. Flowers in spikes, or capitate heads. Perianth 4-5-partite. Stamens 5-8. Styles 2-3. Achenes compressed, trigonous or convex.

Persicaria capitata (Buch.-Ham. ex D. Don) H. Gross, Bot. Jahrb. Syst. 49: 277. 1913; Sinha in Singh *et al.*, Fl. Mizo. 2: 374. 2012; *Polygonum capitatum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 73. 1825; Hook. f., Fl. Brit Ind. 5: 44. 1886; Kanjilal *et al.*, Fl. As. 4: 18. 1940.

Creeping herbs, with woody rootstock. Stem much branched, rooting at nodes. Leaves ovate-elliptic, 3-5 x 2-3 cm, base cuneate, apex acute or subacute, margins entire, V-shaped blotched in the middle, sparsely hairy on both surfaces; petioles short, with

small auricle at base, ocrea brown, tubular. Flowers pinkish, in dense peduncled capitate head, peduncles glandular hairy. Perianth 5-lobed. Stamens 8. Achenes trigonous, black, enclosed by persistent perianth.

Fl. & Fr.: June - November

Distribution: India (throughout), E&W Himalaya, Bangladesh, China, Mongolia, Japan, Nepal, Philippines, Taiwan, Thailand, Vietnam

Specimen examined: AJNU 1351. **PL-18**

ARISTOLOCHIACEAE Juss.

Herbs, shrubs, rarely lianas or trees. Leaves alternate, simple, margin entire usually pinnately veined, sometimes palmately 3-5-veined, rarely 3-5-lobed. Inflorescences terminal or axillary, racemes, cymes, or corymbs, or flowers solitary. Flowers bisexual, zygomorphic or actinomorphic. Perianth usually with 1 petaloid whorl mostly connate into distinct tube, cylindric to campanulate; limb urceolate, cylindric, or ligulate, 1-3-lobed; lobes valvate. Stamens 6-12 in 1 or 2 series; anthers free or filaments and anthers to the style column to form gynostemium. Ovary inferior to superior, 6-loculed. Fruit a fleshy or dry capsule.

Aristolochia L.

Shrubs or herbs, climbing, rarely erect. Roots often tuberous. Leaves alternate, veins pinnate or palmately 3-7 from base, margin entire or 3-7-lobed. Flowers axillary, sometimes produced from old woody stems, solitary or fasciculate. Calyx lobes fused to form a utricle; limb ligulate; lobes 1-3. Stamens 6 in 1 series to form gynostemium;

filaments absent. Ovary inferior, 6-angled; carpels connate. Fruit dry capsules, cylindrical, 6-valved.

Aristolochia saccata Wall. Pl. As. Rar. 2: 2. t. 103. 1830; Hook. f. Fl. Brit. Ind. 5: 76. 1886; Brandis, Ind. Trees 522, 716. 1906; Kanjilal *et al*, Fl. Assam 4: 30. 1940.

Lianas; branchlets with deflexed hairs. Leaves 14-28 x 4-8 cm, oblong-lanceolate, linear - oblong, gradually tapering, base cordate, hairy along nerves above, brown adpressed silky beneath. Inflorescences cymes branched, up to 5 cm long. Flowers whitish or yellowish-white with reddish-streaks; capsules as in the previous species.

Fl. & Fr.: August-March.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim and West Bengal.

Bangladesh, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1186. **PL-8**

PIPERACEAE Giseke

Herbs or shrubs, often climbing, swollen at the nodes. Leaves simple, alternate, opposite or whorled, usually palmately nerved at base, rarely pinnately nerved. Stipules absent or adnate to the petiole. Flowers small, unisexual or bisexual, in terminal or axillary catkin-like spikes or spikes umbellate, subtended by a peltate bract; perianth absent. Fruit a drupe.

Key to Species

1a. Climber; Prophylls linear-lanceolate

P. pedicellatum

1b. Shrub; Prophylls linear

P. tumidonodosum

Piper pedicellatum C. DC., J. Bot. 4: 164. 1866; Long, Fl. Bhutan 1: 349. 1984; Gilbert & Xia, Novon 9: 193. 1999; Gajurel *et al.*, Piper species (Piperaceae) of North East India (Arunachal Pradesh), 46. f. 3.5. 2008. *Piper nigramentum* C. DC., Fedde Reper. 13: 299. 1914. *Piper clarkei* C. DC., Candollea 1: 186. 1923 *et* 2: 192. 1925; Kanjilal *et al.*, Fl. Assam 4: 38. 1940.

Shrubs or climber, glabrous, drying blackish with branches having swollen nodes. Prophylls linear-lanceolate. Leaves petiolate, drying blackish above, pale beneath, ovate or ovate-elliptic, 9–17 × 3–8 cm, asymmetric sided, base obliquely rounded, apex long acuminate; Male spikes to 14 cm long, slender, long peduncled, peduncles up to 2.3 cm, glabrous; bracts orbicular long pedicelled; stamens 2. Female spikes slender long peduncled, peduncles up to 2 cm, spike up to 7.5 cm, bracts peltate orbicular. Fruits compactly arranged, globose, black, style obscure.

Fl. & Fr.: August - December

Distribution: India: Arunachal Pradesh, Nagaland, Sikkim and West Bengal.

Bhutan and China.

Specimen examined: AJNU 1124

Piper tumidonodosum P.K. Mukh., Phytotaxa 289(2): 189. 2016. *Piper lonchites* auct. non Roem. &Schult.,Miq. Syst. Piperac. 331. 1844 *nom. illegt.*; Miq. Syst. Piperac. 331. 1843 *et* Illustr. Piperac. 56. t. 57. 1844; Hook. f., Fl. Brit. India 5: 90. 1886; Gajurel *et al.* Piper species of North-East India (Arunachal Pradesh) , 36.f. 3.1. 2008.

An erect shrub. Branches glabrous, drying brownish, nodes swollen. Prophylls linear. Leaves glabrous, pellucid dotted, membranous, ovate-lanceolate or elliptic-lanceolate, 7 × 3 cm, base obliquely slightly unequal, narrowed or narrowed on the shorter side and sub rounded on the longer side, shortly petioled, sheathing at base. Spikes slender, male spikes upto 1.2 cm, female spike *c.* 2.5 cm; bracts peltate, subsessile, glabrous; rachis hirsute. Stamens 3, stigma 3–4.

Fl. & Fr.: August – December

Distribution: India: Arunachal Pradesh, Manipur, Mizoram and Nagaland.
Myanmar and Malaya.

Specimen examined: AJNU 1123. **PL-7**

SAURURACEAE F. Voigt

Perennial herbs, aromatic, stoloniferous. Leaves alternate, entire, palmately nerved, stipules present. Flowers in dense terminal and leaf opposed spikes, subtended by a whorl of showy bracts, regular, bisexual. Perianth absent. Stamens 3-6, filaments adnate to base of ovary. Ovary superior, 1-celled; styles recurved. Fruit a capsule.

Houttuynia Thunb.

Description as for Saururaceae.

Houttuynia cordata Thunb., Kongl. Vetensk. Acad. Nya Handl. 4: 149. 1783; Hook.f., Fl. Brit. Ind. 5: 78. 1886; Kanjilal *et al.*, Fl. As. 4: 31. 1940; Balakr., Fl. Jowai 2: 397. 1981; Grierson & Long, Fl. Bhut. 1. 2: 341. 1984; Sinha in Singh *et al.*, Fl. Mizo. 2: 400. 2012.

Herbs, perennial, creeping rootstock. Stem membranous, angular. Leaves broadly ovate, 3-8 x 2-6 cm, base cordate, apex acuminate, margins entire, glabrous above, glandular beneath, palmately nerved; petioles 1-4 cm. Flowers minute in dense flowered spikes, subtended by an involucre bracts of 4-6, white, petaloid, partially connate at base; perianth absent. Stamens 3, adnate to ovary. Stigmas recurved. Fruit subglobose.

Fl. & Fr.: April - August

Distribution: India (NE India), E&W Himalaya, Bhutan, China, Japan, Korea, Myanmar, Nepal, Taiwan, Thailand, Vietnam

Specimen examined: AJNU 1213. **PL-16**

CHLORANTHACEAE R. Br. Ex Lindl.

Perennial herbs, shrubs or small trees. Leaves simple, pinnately veined, margin dentate. Flowers small, bisexual or unisexual, arranged in spikes, capitula, or panicles. Stamens 1-3. Ovary 1-loculed; ovule 1. Pendulous. Drupes globose or obovoid.

Chloranthus Swartz

Subshrubs. Leaves opposite, serrate, stipules tiny. Inflorescences in spikes or branched, arranged in panicles, terminal or axillary. Flowers unisexual. Stamens 1-3. Ovary 1-loculed, ovule 1, pendulous. Drupes globose or obovoid.

Chloranthus elatior R. Br. In Bot. Mag. T. 2190. 1820. *C. officinalis* Bl., Enum. Pl. Jav. 79. 1827; Hook. f., Fl. Brit. India 5: 100. 1886; Kanjilal *et al.*, Fl. Assam 4: 40. 1940.

Undershrubs, 1-4 m high. Stems glabrous, glossy. Leaves elliptic or elliptic lanceolate, 7.6 – 12.5 x 2.4- 5.9 cm, base narrowed, apex acuminate, margins distantly

serrate, glandular; lateral nerves 5- 9 pairs; petioles 0.6 – 0.9 cm long. Flowers minute, bisexual, white, in terminal simple spikes and paniced, up to 12 cm long; bracts sheathing; stamens 3, basally connate; ovary naked; stigma subsessile, truncate. Berries small, white, 4-7 mm across.

Fl. & Fr.: June-December.

Distribution: India (N.E. hills and S. India); Indo-Malaya.

Specimen examined: AJNU 1147

MYRISTICACEAE R. Br.

Evergreen trees with red juice coming out from bark once injured. Leaves simple, alternate, entire, exstipulate, with pinnate veins. Inflorescences axillary, paniculate, racemose, capitate, or cymose; flowers fascicled in various racemose or cluster. Plants monoecious or dioecious. Flowers small, unisexual. Perianth gamophyllous; lobes 3-5, valvate. Stamens 2-4; filaments connate into a column; anthers 2-locular, extrorse, dehiscent longitudinally. Ovary superior, sessile, 1-locular, Fruit with leathery-fleshy pericarp dehiscent into 2 valves. Seed 1, large, arillate.

Key to Genera

- 1a. Flowers in many-flowered panicles; aril entire. *Horsfieldia*
- 1b. Flowers in dense short racemes or fascicles; aril shortly incised at apex. *Knema*

Horsfieldia Willd.

Usually trees. Leaves papery or leathery, often glabrous. Inflorescence monoecious or dioecious. Male inflorescence often compound paniculate; flowers often aggregated into clusters; bracts caducous; bracteole absent. Flowers pedicellate, sometimes shortly so, small. Perianth lobes 3-5; anthers connate abaxially into globose or clavate sessile or stipitate synandrium sometimes concave at apex. Ovary ovoid, glabrous or hairy; style absent. Pericarp often rather thick, glabrous or glabrescent. Aril entire, rarely lacerate at apex.

Horsfieldia amygdalina (Wall.) Warb. Monogr. Myristic. in Nov. Act. Nat. Cur. 68: 310. 1897. *Myristica amygdalina* Wall. Pl. As. Rar. 1: 79- to. 90. 1830; Fl. Brit. Ind. 5: 106. 1886; Fl. As. 4: 43. 1940.

Trees, 10-20 m. Leaves elliptic to oblanceolate, cuneate at base, obtuse to acute, 9-23x2-8 cm; lateral nerves 8-15 pairs; petioles 1.5-2 cm; male flowers yellow, in 8-12 cm long much-branched panicles; female flowers in short few-flowered panicles; fruits ellipsoid, obscurely trigonous; aril thin, fleshy, yellowish. Seeds oblong.

Fl. & Fr.: November to May

Distribution: India: Andaman & Nicobar Islands, Assam, Meghalaya, Mizoram, Nagaland and Tripura.

Bangladesh, Cambodia, China, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1278

Knema Lour.

Evergreen trees. Leaf blade with rusty indumentums. Inflorescences short, unbranched on older leaf axils. Flowers densely racemose or subumbellate; bracts caducous; bracteoles inserted on pedicels. Plants dioecious. Male flowers large, subglobose with long pedicels; Perianth with 3-4 tepals. Fruit often with dense tomentum. Aril entire or lacerate at apex.

Knema linifolia (Roxb.) Warb., Monog. Myrist.: 558, t. 24, figs. 1–3 1897. *Myristica linifolia* Roxb., Fl. India 3: 847. 1832; Kanjilal *et al.* Fl. Assam 4: 44.1940. *Myristica longifolia* Wall. ex Blume, Rumphia 1: 188. 1835; Hook. f., Fl. Brit. India 5: 110. 1886.

Trees, up to 25 m high. Bark wrinkled and fissured, young parts rusty-brown tomentose. Leaves elliptic to oblong, oblong to lanceolate, 20-50 x 6-12 cm, base attenuate to cordate, apex acute, shining above, glaucous beneath, mid-rib raised on both surfaces; lateral nerves 22- 40 pairs, raised above; petioles 1-2 cm long, glabrous. Inflorescence sessile, both axillary and from the axils of fallen leaves, 2-10 flowered in male; 1-6-flowered in female; male flowers pinkish red, 6-9 mm across, inside yellowish; female flowers 5.5- 10 mm across. Fruits 1- 3 per infrutescence, 3.3–3.9 cm long, ellipsoid, annular at base, blunt to pointed at apex, puberulous to glabrous.

Fl. & Fr.: September-June.

Distribution: India: Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Bangladesh, China and Myanmar.

Specimen examined: AJNU 1362

LAURACEAE Juss.

Trees or shrubs, often aromatic. Leaves alternate, sometimes opposite, usually crowded at the ends of branches, entire, sometimes shallowly lobed near apex, pinnately nerved or strongly 3-nerved, stipules absent. Flowers in axillary or lateral panicles, racemes or umbels, unisexual or bisexual, regular. Perianth segments usually 6, free, in 2 whorls. Stamens in 2-4 series on the perianth tube, in whorls of 3; in female flowers stamens reduced to staminodes. Ovary superior, 1-celled. Fruit a drupe or berry, usually borne on enlarged remains of perianth.

Litsea Lam.

Trees or shrubs. Leaves alternate, rarely opposite or sub-opposite, pinnately veined. Flowers unisexual. Umbels solitary or clustered in leaf axils; involucre bracts 4-6. Perianth segments 6, in 2 whorls of 3. Male flowers: fertile stamens 9-12. Female flowers: staminodes as many as stamens of male flowers. Fruit ovoid, borne on enlarged perianth tube.

Litsea cubeba (Lour.) Pers., Syn. Pl. 2: 4. 1806; *Laurus cubeba* Lour., Fl. Cochinch. 1: 252.1790; *Litsea citrata* Blume, Bijdr. 11: 565. 1826; Hook. f., Fl. Brit. Ind. 5: 155. 1886; Kanjilal *et al.*, Fl. As. 4: 81.1940; *L. kingii* Hook, f., Fl. Brit. Ind. 5: 156. 1886.

Trees, deciduous, 3-10 m tall. Branches drooping. Leaves alternate, lanceolate to ovate-lanceolate, 5-14 x 1.5-3 cm, base cuneate, apex acuminate, glabrous; petioles 0.8-1.5 cm long. Flowers pale yellow, solitary or in short umbellate corymbs. Fruits globose, borne on 1-2 cm long pedicels.

Fl. & Fr.: January - July

Distribution: India (NE India), E & W Himalaya, China, Myanmar, Nepal, Southeast Asia

Specimen examined: AJNU 129. **PL-19**

PROTEACEAE Juss.

Trees or shrubs. Leaves alternate, rarely opposite or whorled, simple. Inflorescences axillary, ramiflorous, cauliflorous, or terminal; bracts subtending flower pairs usually small. Flowers bisexual or rarely unisexual and dioecious, actinomorphic or zygomorphic. Perianth segments (3 or)4(or 5), valvate, usually tubular in bud; limb short. Stamens 4, opposite perianth segments; filaments usually adnate to perianth and not distinct; anthers basifixed, usually 2-loculed, longitudinally dehiscent, connective often prolonged. Ovary superior, 1-loculed, sessile or stipitate; ovules 1 or 2, pendulous. Style terminal, simple, often apically clavate; stigma terminal or lateral, mostly small. Fruit a follicle, achene, or drupe. Seeds 1 or 2, sometimes winged; embryo usually straight.

Helicia Lour.

Small trees. Leaves alternate, rarely opposite or whorled, petiolate or sessile, simple, margin entire or serrate. Inflorescence axillary, a many-flowered raceme. Flowers many, bisexual; flower bracts caducous, rarely persistent. Perianth tube straight, slender, segments free. Stamens sessile, attached slightly below limb; anthers oblong. Ovary sessile; ovules 2, inserted at base of locule. Style slender; stigma terminal. Fruit usually indehiscent drupe; pericarp mostly thick and leathery. Seeds 1 or 2, globose.

Helicia robusta (Roxb.) R. Br. ex Blume, Ann. Sci. Nat., Bot., ser 2, 1: 220. 1834; Hook, f., Fl. Brit. India 5: 191. 1886; Kanjilal *et al.*, Fl. Assam 4: 106. 1940; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 51. 1987. *Roupala robusta* Roxb., Fl. Ind. 1: 366. 1820.

Trees, up to 16 m high; crown spreading. Leaves alternate, sessile to subsessile, oblanceolate, 10-24.3 x 6-12 cm, base narrowed, rounded or cuneate, apex obtuse, margins coarsely serrate, coriaceous, glabrous; lateral nerves 7-11 pairs, prominent beneath; petioles up to 6 mm long in subsessile leaves. Racemes 10-22 cm long, glabrous; flowers greenish-yellow, 1.4-2 cm long. Fruits obliquely globose, 2-3 cm across, ribbed when dry, beaked.

Fl. Fr.: June – July

Distribution: India: Assam and Nagaland.

Bangladesh, Borneo, Cambodia, Myanmar, Philippines, Thailand, Vietnam.

Specimen examined: AJNU 1499. **PL-16**

THYMELAEACEAE Juss.

Shrubs or trees, rarely herbs. Leaves alternate, simple, entire, stipules absent. Flowers in terminal or axillary umbellate or globose head, regular, bisexual. Perianth tubular or campanulate, 4-5-lobed. Stamens as many as or twice as many as the perianth lobes. Disk annular, copular or of scales. Ovary superior, 1-2-celled; stigma capitate. Fruit a capsule, drupe or nut.

Linostoma Wall. ex Endl.

Erect or scandent shrub. Leaves simple, opposite, coriaceous, glabrous on both sides. Inflorescence in few-flowered umbellets on a long peduncles furnished with 2 (occasionally up to 4) discoloured floral leaves. Flowers bisexual. Perianth bell-shaped, persistent or deciduous. Stamens 10, almost in a single series and alternating with the perianth scales. Ovary sessile, 1-celled, with a solitary pendulous ovule; style capillary, with a capitate stigma. Nut dry, oval or ovate, appressed hairy and glabrescent, surrounded by the fragile very thin perianth and usually crowned with its limb. Seeds solitary, with a thin pericarp.

Linostoma decandrum (Roxb.) Wall. ex Endl., Gen. 331. 1837; Kurz, Forest Fl. Burma 2: 334. 1877; Hook.f., Fl. Brit. India 5: 198. 1886; Brandis, Indian Trees 545. 1906; Kanjilal *et al.*, Fl. Assam 4: 111. 1940.

Climbing shrubs, up to 12m. Branchlets terete, lenticelled, glabrous. Leaves simple, opposite, elliptic to oblong-elliptic or oblong-lanceolate, 3–9.5 × 1–4.5 cm, obtuse to acute or shortly acuminate at apex, entire along margin, cuneate to rounded at base, coriaceous, glabrous on both. Petiole canaliculate, glabrous. Inflorescence terminal, umbelliform, 2–3 flowered. Bracts foliar, opposite, entire, rounded, chartaceous, white, glabrous. Flowers small, light greenish-pink. Calyx tube fusiform, reddish, lobes 5, linear, greenish, reflexed. Petals 10, white, clavate. Stamens exserted, 15–16; filaments slender, white; anthers yellow. Ovary ellipsoidal, densely hairy; style filiform, long; stigma capitate. Fruits ovoid-ellipsoid, silky-villous.

Fl. & Fr.: October – January.

Distribution: India: Assam, Manipur, Mizoram, Nagaland, Tripura and West Bengal.
Bangladesh, Cambodia, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1141. **PL-8**

ELAEAGNACEAE Juss.

Trees or Scandent shrubs, with silvery or brown scales. Leaves usually coriaceous, alternate or opposite, entire, exstipulate. Flowers small, bisexual, solitary or in clusters or racemes. Perianth tubular, 2-4 cleft. Fruits indehiscent, enclosed in the perianth tube.

Elaeagnus L.

Shrubs. Leaves alternate, entire. Flowers clustered on short axillary shoots, bisexual, occasionally solitary. Calyx fused into a tube, limb 4-lobed, tube constricted above the ovary and breaking at constriction as fruit develops. Stamens 4, inserted in mouth of calyx tube, alternate with lobes. Style linear, not exerted. Fruit a globose or ellipsoid drupe, rarely longitudinally winged; stone usually 8-ribbed.

Elaeagnus conferta Roxb., Fl. Indica ed. Carey & Wall. 1: 460. 1820; Haridasan & Rao, For. Fl. Meghalaya 2: 752. 1987. *E. latifolia* Hk. f., Fl. Brit. India 5: 202. 1886; Brandis, Ind. Trees 547. 1906; Kanjilal et al., Fl. Assam 4: 114. 1940.

Shrubs, scandent, often spiny. Leaves 5-12 x 2-6 cm, obovate-elliptic, oblanceolate-elliptic, acuminate, base narrowed, cuneate, silvery beneath. Fascicles silvery grey. Flowers pale yellow, in axillary cluster. Stamens 4. Fruits ovoid-ellipsoid.

Fl. & Fr.: November-May.

Distribution: India: Throughout India.

Nepal, China, Myanmar, Malaysia.

Specimen examined: AJNU 1331. **PL-18**

LORANTHACEAE Juss.

Parasitic evergreen shrubs. Leaves usually opposite, sometimes alternate, entire, coriaceous, stipules absent, sometimes leaves absent. Flowers uni- or bisexual, bracteate, arranged in racemed spicate or fascicled. Calyx adnate to ovary, limb reduced or absent. Petals 4-8 free or united into a tube. Stamens 3-6, equal to and opposite the corolla-lobes, epipetalous. Fruits a 1-seeded berry or drupe.

Key to the genera

- | | |
|---|---------------------|
| 1a. Corolla choripetalous; petals completely free | <i>Helixanthera</i> |
| 1b. Corolla sympetalous; petals fused | |
| 2a. Bracts conspicuous | <i>Tolypanthus</i> |
| 2b. Bracts small or inconspicuous | <i>Scurrula</i> |

Helixanthera Lour.

Leaves elliptic to ovate-lanceolate. Flowers shortly pedicellate in racemes or spikes, each with a single bract. Calyx forms a low rim on ovary. Corolla linear, divided up to the base into 4-7 lobes. Anther basifixed. Style slender, capitate.

Helixanthera parasitica Lour., Balakr., Fl. Jowai. 2:414. 1983; Grierson & Long, Fl. Bhut. 1.1:146. 1983; Haridasan & Rao, Forest. Fl. Megh. 2:756. 1987; Kanjilal *et al.*, Fl. Assam. 4:120. 1997 (Repr.); Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:354. 2008; *Loranthus pentapetalus* Roxb., Hook. f., Fl. Brit. Ind. 5:206. 1886.

Large much branching shrubs. Leaves ovate-lanceolate, to sub- orbicular, 4-12 x 1.5-3 cm, apex acuminate, base cuneate, glabrous, margin entire; petioles up to 1 cm long. Flowers bright red, in axillary long racemes, up to 14 cm long. Corolla inflated and strongly 5-angled at the base; 5-lobes, lobes linear, reflexed. Stamens 5. Fruits obovoid-ellipsoid.

Fl. & Fr.: April-July.

Distribution: India: Assam, Meghalaya and Nagaland.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1463. **PL-7**

Tolypanthus Blume

Leaves ovate, opposite. Flowers in solitary or fascicled, sessile clusters; each cluster of 3-4 flowers almost enclosed inside by involucre of 3-4, large ovate, bracts; bracts united at the base. Calyx 4-toothed on ovary. Corolla tube straight, divided up to the middle into 5 linear lobes, apex reflexed. Fruit oblong with truncate apex, pubescent.

Tolypanthus involucratus (Roxb.) Blume, Grierson & Long, Fl. Bhut. 1.1:148; 1983. Kanjilal *et al.*, Fl. Assam 4:126. 1997 (Repr.); Haridasan & Rao, Forest. Fl. Megh.

2:761. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:356. 2008; *Loranthus involucratus* Roxb., Hook. f., Fl. Brit. Ind. 5: 218. 1886.

Bushy shrubs; branches lenticellate, young parts tomentose. Leaves sub-coriaceous, opposite and alternate, ovate to elliptic-lanceolate, obtuse or sub-acute, glabrous or slightly puberulus along the veins beneath; base rounded or shallowly cordate. Flowers in clusters, solitary or fascicled of 4 in one involucre of 4 large leafy bracts as long and much wider than the flower. Fruits truncate, pubescent.

Fl. & Fr.: February-August.

Distribution: India: Assam, Manipur, Meghalaya, Nagaland, Sikkim and Tripura. Bangladesh, Myanmar and Nepal.

Specimen examined: AJNU 1077. **PL-7**

Scurrula L.

Shrubs, usually covered with stellate hairs in young parts. Leaves opposite, sessile or petiolate, tomentose, glabrous when old. Inflorescences centrifugal pseudoracemes or compound dichasia; flower buds ellipsoid-clavate to spatulate. Flowers bracteate, ebracteolate, zygomorphic, sympetalous, 4-merous. Petals 4, united, curved; tube terete; lobes 4, spoon-shaped. Stamens 4, erect; filaments terete, adnate to the corolla; anthers variable, basifixed, isothecate, anisothecate, circumthecate, elevatilobate, with or without sterile apex. Ovary clavate or obconical, usually strongly attenuating towards base; smooth or rugose; style tetragonous, equal to petals; stigma conical, capitate. Fruits tubercled, hairy or glabrous.

Scurrula gracilifolia (Roxb. ex Schult.f.) Danser in Blumea 2: 47. 1936. *Loranthus gracilifolius* Roxb. ex Schult.f., Syst. Veg., ed. 15 bis, 7(1): 99. 1829. *Loranthus graciliflorus* DC., Prodr. 4: 300. 1830. *Loranthus scurrula* var. *graciliflorus* (DC.) Kurz, Forest Fl. Burma 2: 319. 1877; Hook .f., Fl. Brit. India 5: 209. 1886.

Branches and leaves covered with brown, stellate hairs when young, glabrous when old. Leaves opposite, narrowly elliptic-ovate, oblong-lanceolate, attenuating towards both ends, shortly decurrent at base, subacute at apex, 7 - 9 x 1.6 - 4 cm, subcoriaceous; lateral nerves 5 - 8 pairs; Inflorescences compound dichasia, 3-5-flowered, terete, flower buds long cylindric, hairy. Flowers 2 -2.8 cm long, red or reddish brown. Petals 4, united, dark brown outside; lobes linear lanceolate, reflexed. Stamens erect or slightly recurved; anthers oblong. Ovary clavate; style 4-merous; stigma elliptic-ovate. Fruits pyriform, densely rugose, covered with short hairs.

Fl. & Fr.: August – February

Distribution: India: Arunachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Nagaland, Odisha, Tamil Nadu, Uttar Pradesh and West Bengal.
Bangladesh, Myanmar, Nepal, Sri Lanka and Vietnam.

Specimen examined: AJNU 1125. **PL-7**

BALANOPHORACEAE Rich.

Fleshy herbs with tuberous rootstocks, lacking chlorophyll, parasitic on roots of other trees, monoecious or dioecious. Stem stout, short, erect, naked or bearing scales, with a terminal club-shaped flower head. Flowers minute, numerous. Male flowers perianth 0 or 3-8-lobed, regular or irregular, stamens 3-many, united into a column.

Female flowers perianth absent or shortly 2-lipped, adnate to ovary. Fruit a small nut-like achene.

Balanophora J.R.Forst. & G. Forst.

Glabrous fleshy herbs with waxy rootstock. Stems bearing scale leaves. Flowers minute, monoecious or dioecious. Male flowers, perianth 3-5-lobed, stamens many united into an ovoid, globose column. Female flowers perianth absent, ovary ellipsoid, bearing a single slender style.

Balanophora dioica R. Br. ex Royle, Ill. Bot. Himal. Mts. 330. 1836; Hook.f., Fl. Brit. Ind. 5: 237. 1886; Kanjilal *et al.*, Fl. As. 4: 132. 1940; Balakr., Fl. Jowai 2: 416. 1983.

Fleshy root parasitic herbs, rootstock tuberous, rhizome simple or branched. Shoots red-purple or yellowish, stout, covered with sessile scale like leaves, glabrous. Inflorescence fleshy, club shaped. Bracts reddish, linear-lanceolate, surrounding flowers. Male heads ovoid. Female heads ellipsoid. Fruit minute, drupaceous.

Fl. & Fr.: October - February

Distribution: India (throughout), Bhutan, China, Myanmar, Nepal, Tibet

Specimen examined: AJNU 1395

EUPHORBIACEAE Juss.

Trees, shrubs or herbs, often with milky sap, indumentum of simple or stellate hairs. Leaves simple or palmate, alternate, opposite or whorled, stipulate. Flowers unisexual, small, regular, solitary or in clusters, spikes, racemes, panicles or cymes, or in cup like cyathia. Perianth

with 3-6 segments. Stamens 1-many, free or united. Ovary superior, styles 2-4, free or united, simple or bifid. Fruit a capsule or a drupe.

Key to Genera

1a. Ovary with a single ovule per locule

2a. Inflorescences composed of cyathia, consisting of much reduced 1-stamened male floret surrounding a solitary naked female floret enclosed within gland-bearing involucre
Euphorbia

2b. Inflorescences not as above

3a. Lianas or plants straggling
Pachystylidium

3b. Herbs, shrubs or trees

4a. Petals present at least in male flowers

5a. Inflorescences born on old woods
Otodes

5b. Inflorescences terminal or axillary

6a. Indumentum of bifid or simple hairs; leaves often palmately lobed

Jatropha

6b. Indumentum distinctly stellate and/or lepidote; leaves unlobed

7a. Stamens up to 25; filaments inflexed at apex in bud
Croton

7b. Stamens ca 75; filaments erect in bud
Sumbaviopsis

4b. Petals absent

8a. Inflorescences opposite to the leaves (sympodial growth); leaves with translucent dots when seen against light. *Suregada*

8b. Inflorescences axillary or terminal, never opposite to the leaves; leaves not with such translucent dots

9a. Anthers 4-loculed *Macaranga*

9b. Anthers 2-loculed

10a. Stamens inserted on a central receptacle, intermixed with glands or scales with a tuft of hairs; anther-thecae diverging, attached basally to the connective; seeds completely covered by fleshy aril. *Claoxylon*

10b. Stamens not intermixed with glands, scales and hairs; anther-thecae not diverging; seeds arillate not completely covering the seeds.

11a. Sepals imbricate; indumentum simple *Baliospermum*

11b. Sepals valvate; indumentum stellate *Mallotus*

1b. Ovary with two ovules per locule

12a. Leaves digitatelytrifoliolate *Bischofia*

12b. Leaves simple, not compound

13a. Inflorescences spicate or racemose or racemiform, more than 1 cm long

- 14a. Filaments of stamens inserted in cavities on disc; carpel solitary; fruit indehiscent. *Antidesma*
- 14b. Filaments of stamens not inserted in cavities on disc; male disc intrastaminal or extrastaminal; carpels 2, 3 or 4; fruits dehiscent.
- 15a. Male flowers in catkin-like spikes; female flowers in clusters; disc absent in male flowers; stamens 2; fruits dry capsular; seeds without aril. *Aprosa*
- 15b. Male flowers in racemes, often fascicled on old trunks; disc present in male flowers; stamens 3-10; fruits fleshy berries; seeds with aril. *Baccurea*
- 13b. Inflorescences fasciculate or glomerulate or flowers solitary
- 16a. Fruits drupaceous *Drypetes*
- 16b. Fruits capsular
- 17a. Petals present
- 18a. Lateral nerves of leaves distant; anther thecae separate. *Actephila*
- 18b. Lateral nerves of leaves closely parallel; anther thecae united. *Bridelia*
- 17b. Petals absent
- 19a. Sepals free *Phyllanthus*
- 19b. Sepals variously connate *Breynia*

Actephila Blume

Trees or shrubs; leaves entire: flowers monoecious or dioecious, in fascicles: perianth 10-12. inner series petaloid, smaller; disc 5-lobed or absent; ovary 3-celled; ovules 2 in each cell.

Actephila excelsa (Dalz) Muell. - Arg. in *Linnaea* 32: 78. 1865: Hook. f. *Fl. Brit. Ind.* 5: 282. 1887: Gamble, *Man. Ind. Timb.* 598. 1902: Brandis, *Ind. Trees* 561. 1906: Kanjilal *et al.* *Fl. Assam* 5: 148 1940; Balak. *F1 Jowai* 2: 420. 1983. *Anemospermum excelsum* Dalz, in Hook. *Kew. J. Bot.* 3: 228. 1851.

Shrubs or small trees, 2-5 m high, with grey bark and pubescent twigs. Leaves alternate, elliptic, ovate-oblong or oblanceolate, 7-12.2 x 1.8-3.7 cm, base cuneate, apex acuminate, margins entire, glabrous; lateral nerves 6-12 pairs; petioles ca 2 cm long; stipules broadly triangular, deciduous. Flowers in axillary clusters. Male flowers: short pedicellate; calyx 5-lobed; lobes broadly ovate to oblong, obtuse; corolla lobes 5, small; disc 5-lobed; stamens 3-6, Ristillade 3-lobed. Capsules depressed-globose, subtrigonous, Seeds trigonous.

Fl. & Fr.: September-January.

Distribution: India: Andaman & Nicobar Islands, Karnataka, Kerala, Maharashtra, Nagaland and Tamil Nadu

Bangladesh, Borneo, China, Malayasia, Myanmar, Philippines, Sri Lanka, Sulawesi,

Specimen examined: AJNU 1470.

Antidesma L.

Trees or shrubs. Leaves alternate, without glands, pinnately nerved, margin entire, stipules present, small. Dioecious. Flowers in slender racemes or spikes, often branched. Male flowers: calyx cup shaped, 3-5-lobed, petals absent, disc present; stamens 2-5, free; pistillode usually present. Female flowers: calyx as in males, ovary ovoid, 1-celled, 2 ovules in each cell; stigmas 2, bifid. Fruit a compressed ellipsoid drupe with persistent terminal or sub-terminal stigma.

Antidesma velutimosum Blume, Bide. 17: 1125. 1827; Hook, f., FI. Brit. India 5: 356. 1887; N.P. Balakt. & Chaluab., Family Euphorb. India 307. 2007. *A. carburshi* Wall, ex Tul. in Ann. Sci. Nat., Bot., ser. 3, 15:234. 1851: Hook, f., FI. Brit. India 5: 357. 1887: C. E. C. Fisch. in Rec. Bot. Suv. India 12(2): 130. 1938; Kanjilal *et al.*, FI. Assam 4: 166. 1940. *Stilage tomentosa* Roxb. FI. Ind. ed. 2, 3: 757. 1832.

Shrubs, usually unbranched, ca 3 m high; young branches densely rusty villous. Leaves elliptic or elliptic-oblong, 13-19 × 6-10 cm, base rounded, apex acuminate, upper surface glabrous, hairy beneath on nerves. Flowers in spikes, 4-15 cm long. Male flowers sessile; calyx 3-4 -lobed; lobes rounded; stamens 3-4; disc glabrous; pistillode subglobose. Female flowers: calyx 3-4 -lobed; ovary tomentose or pubescent; stigma sublateral. Fruits ovoid-ellipsoid, 5-6mm long, bright red.

Fl. & Fr.: April-October.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya, Mizoram and Nagaland.

Bangladesh, Borneo, Laos, Malaysia, Myanmar, Sumatra and Thailand.

Specimen examined: AJNU 1202.

Aporosa Blume

Trees. Leaves alternate, pinnately nerved, base often oblique, margin entire or minutely serrulate; stipules minute; petioles with 2 glands at the apex. Dioecious. Flowers in axillary, solitary or clustered spikes or racemes; male inflorescence longer than female. Male flowers: sepals 3-6, petals absent, stamens 3-12, free, inserted around disc. Female flowers: sepals 3-6, disc present or absent, ovary 2-3 celled, 2 ovules in each cell; styles 2-3, short or absent, stigmas fleshy. Fruit a drupe, dehiscing irregularly: 1-2-seeded.

Aporosa octandra (Buch. - Ham. ex D. Don) Vickery, Grierson & Long, Fl. Bhut. 1.3:785. 1987; Giri et al., Mater. Fl. Aruna, Pradesh. 2:363. 2008. *Aporosa roxburghii* Baill., Hook. f., Fl. Brit. Ind. 5:347. 1887: Kanjilal *et al.*, Fl. Assam 4:162. 1997 (Repr.). *Aporosa dioica* (Rexh.) Muell-Arg., Balala., Fl. Jowai. 2:422. 1983.

Trees, up to 12 m tall. Branches glabrous. Leaves elliptic- oblong lanceolate, 5.5-9 x 1.5-3cm, apex obtuse or blunt acuminate, base cuneate, margin sinuately toothed or obscurely crenate. Styles glabrous: 5-8 pairs or lateral nerves: petioles 0.4-0.6 cm long; stipules ovate, 0.5-0.6 cm, deciduous. Flowers in axillary spikes or clusters. Male spikes often in clusters of 1-4 in each axil, 1.5-3 cm long. Female spikes often solitary, axillary, shorter than male spikes, up to 1 cm long. Capsule ovoid-oblong.

Fl. & Fr.: May-July.

Distribution: India: Andaman & Nicobar Islands, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand and West Bengal. Bangladesh, Borneo, Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Philippines, Sulawesi, Thailand and Vietnam.

Specimen examined: AJNU 1159. **PL-14**

Baccurea Lour.

Trees; flowers dioecious or monoecious in simple or compound spiciform racemes, bracteate; sepals 4-6; stamens 4-8, free: pistillode pubescent, ovary 2-5-celled; ovules 2 in each cell; seeds arillate.

Baccaurea ramiflora Lour., FI. Cochinch. 661. 1790: N. P. Balakr. & Chakrab., Family Euphorb. India 313. 2007. *Pierardia sapida* Roxb, FI. Ind., ed. 2.2:254.1832. *Baccaurea sapida* Mull. Arg. in DC., Prodt, 15(2.2): 459. 1866; Hook, f. FI. Brit. India 5: 371. 1887: C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 130.1938: Kanjilal *et al.*. FI. Assam 4: 161. 1940. *Baccurea wravi* King ex Hook, f., FI. Brit. India 5: 374 1887.

Trees, 8-15 m high, young parts hairy; bark dark grey with vertical lenticels. Leaves elliptic-oblong or elliptic-lanceolate, 10-20 x 4-10 cm, base cuneate, apex acuminate; lateral nerves 5-10 pairs. Inflorescence in racemed panicles, 4-8 cm long, on trunks and old leafless portions of branches. Male flowers subsessile, solitary or grouped on very small branches; calyx 4-lobed; stamens 4-8; pistillode 3-lobed, pubescent. Female flowers yellow in simple racemes, calyx yellow tomentose; ovary tomentose, with two ovules in each cell; stigma peltate, fimbriate. Capsules ellipsoid, yellowish-brown; seeds suborbicular, embedded in pink pulp.

Fl. & Fr.: March-July.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal.

Bangladesh, Cambodia, China, Malayasia, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1196. PL-14

Baliospermum Blume

Shrubs or subshrubs. Leaves simple, alternate, create or serrate, with 2 glands at the base, long Petioled. Flowers monoecious or dioecious, clustered in racemes or panicles. Male flowers: sepals 4-6, petals absent, stamens 10-30, free. Female flowers sepals 5-6, often accrescent, ovary 3, celled, style long, bifid. Fruit a capsule of 3-valved.

Baliospermum solanifolium (Burm.) Suresh in Nicolson et al., Interpr. Rheede's Hort. Malab, (Regnum Veg. 119) 106. 1988. *Croton solanifolius* Burm., Fl. Malab, 6. 1769. *Jatropha Montana* Willd.. Sp. Pl. ed. 4, 4: 563. 1805. *Baliospermum axillare* Blume. Bijdt. Fl. Ned. Ind. 604. 1826:Hook.,f., Fl. Brit. India 5: 461. 1887. *Baliospermum montanum* (Willd.) Mill,Are. in DC. Prodr, 15(2): 1125 1866; Govaerts *et al.*, World Check. & Bibl. Euphorbiaceae 1: 243. 2001. *Baliospermum razianum* Kesh Murthy &Yogan. Apud Kesh. Murthy *et al.* in Curr. Sci. 56(10): 486. 1987.

Shrubs up to 2 m high. Leaves elliptic to oblong, cordate or truncate at base, distantlydenticulate to crenate-dentate along margins, caudate-acuminate at apex, 5 - 20 x3 - 12 cm with the upper leaves usually much smaller, thinly tomentose to sparsely pilose on nerves or glabrous styles beneath; petioles sparsely puberulous. Inflorescences thyriform, borne on main leafy branches, sparsely appressedpilose. Male flowers sepals 5, orbicular; disc shortly cupular; stamen filaments stout; anthers reniform or orbicular. Female flowers sepals 5, deltoid; disc cupular; ovary subglobose, tomentellous; styles 3, bifid,

inconspicuous; stigma prominent, bifid. Fruits subglobose to obovoid, strongly 3-lobed, appressed pubescent to glabrous. Seeds oblong to ovoid.

F1. & Fr.: January. – December.

Distribution: India: (throughout India):

Pakistan, Sri Lanka, Bhutan, Nepal, Bangladesh, Myanmar, China, Thailand, Cambodia, Laos,

Vietnam, Malaysia, Borneo, Sumatra, Java, Celebes, Moluccas and Lesser Sunda Islands.

Specimen examined: AJNU 1037.

Bischofia Blume

Large trees. Leaves alternate, usually crowded at stem apex, palmately 3-foliolate; stipules caducous; petiole long; leaflet margin crenulate-serrate. flowers axillary or lateral panicles or racemose, produced with young leaves pendent, each bract subtends 1 flower. Male flowers: pedicel articulated at base; sepals 5, free; petals and disk absent; stamens 5, free, inserted at bases of sepals; Ristillode present. Female flowers: pedicel articulated at middle; sepals free: petals and disk absent; staminodes sometimes present. Ovary 3 celled, 2 ovules in each cell; styles 3-4, entire. Fruits a small globosebaccate, indehiscent; 3-6 Seeded.

Bischofia javaniça Blume, in Hook. f., Fl. Brit. Ind. 5:345. 1887: Kanjilal *et al.*, Fl. Assam 4:141. 1997(Repr.): Yadav & Sardesai. Fl. Kolh., 424. 2002: Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:365. 2008.

Large deciduous trees, up to 30 m tall, spreading crown. Leaves alternate, 3-foliolate: leaflets elliptic or ovate-oblong, 6-9 × 5-7 cm, glabrous, margin create: 6-8 pairs of lateral

nerves. Flowers green, in axillary and lateral pedunculatepaniculate racemes. Male flowers shortly pedicelate: corolla lobes 5; stamens 5. Female flowers pedicelled (longer than male); styles linear, entire. Fruits globose, brown when ripe. Seeds 3-4, smooth, shining, brown, trigonous.

Fl. & Fr.: May- August.

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, Mizoram, Nagaland, Odisha, Karnataka, Kerala, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Bangladesh, Cambodia, China, Malayasia, Myanmar, Philippines, Sulawesi, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1240.

Breynia J.R. Forst. & G. Forst

Scandent shrubs or trees, monoecious, evergreen, glabrous or rarely pubescent. Leaves alternate or distichous, entire and sometimes revolute along margins, penninerved; petioles short; stipules short. Male inflorescences usually in the lower leaf-axils, fascicled, few-flowered. Flowers: pedicellate; calyx obconical, turbinate, 6-fid at apex; petals and disc absent; stamens 3; anthers adnate to the column, linear, 2-loculed, longitudinally dehiscent. Female inflorescences usually in the upper leaf-axils, solitary or in pairs. Flowers: pedicellate, calyx obconical, cupular deeply 6-lobed, often accrescent in fruit; ovary 3-locular; styles 3, bifid. Fruits capsular, somewhat fleshy, 3-locular, unlobed, red when ripe, tardily dehiscent.

Breynia lanceolata (Hook.f.) Welzen & Pruesapanapud Welzen *et al.* in Blumea 59(2): 92. 2014. *Sauropus lanceolatus* Hook. f., Fl. Brit. India 5: 333. 1887; Pax&K.Hoffm. in Engl., Pflanzenr. IV.147.xv (Heft 81): 218. 1922; Kanjilal *et al.*, Fl. Assam 4: 173. 1940.

Scandent shrubs or climbers, up to 30 cm long, greenish to brown, quadrangular to terete. Leaves ovate, oblong to lanceolate, 5.6–12× 2–7 cm, truncate, rounded, obtuse or acute at base, acuminate or caudate-acuminate at apex, chartaceous, dark green, yellowish-green or brown above when dry, paler and often glaucescent beneath; lateral nerves 5–8 per side; petioles present; stipules triangular-subulate, up to 1 mm long. Flowers not seen. Capsules subglobose, 10–14 mm in diam.; fruiting pedicels long; segments 6, spatulate-obovate.

Fl. & Fr.: March - April

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh and Nagaland. Borneo, Cambodia, Malayasia, Myanmar, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1204.

Bridelia Willd.

Shrubs or trees, sometimes climbing. Leaves alternate, distichous, entire with parallel lateral nerves; stipules early deciduous. Flowers small, monoecious or dioecious. 5-merous, sessile or nearly so, in axillary clusters or short spikes. Male flowers: calyx deeply 5-lobed, persistent; petals 5, small, alternating with calyx lobes; stamens 5, filaments fused below into a column; pistillode present. Female flowers same as males, except with disc subtending ovary; styles 2, free.

Key to Species

1a. Scandent or climbing shrub

B. stipularis

1b. Trees or erect shrubs

2a. Fruit unlobed

B. assamica

2b. Fruit bilobed

B. sikkimensis

Bridelia assamica Hook f., Fl. Brit. India 5: 269. 1887: Jabl, in Engl. Pflanzenr, IV.147.VIII

(Heft 65): 85. 1915: Kanjilal, *et al.*, Fl. Assam 4: 145. 1940.

Shrubs or trees, 3 - 6 m high. Leaves narrowly to broadly elliptic to obovate-elliptic or oblong-oblongate, acute to subacute or at base, entire or often shallowly and irregularly crenulate along margins, caudate or acuminate at apex, 10 - 30 x 4 - 14 cm, glabrous above, Styles sparsely pilose on nerves or rarely glabrous beneath; lateral nerves 10 - 18 pairs, terminating directly at the margins into the marginal veins. Inflorescences borne on the main leafy branches; bracts broadly ovate. Flowers greenish yellow. Fruits sessile, broadly ovoid to ellipsoid, unlobed, smooth, 1-locular, black or dark grey when dry; sepals triangular-acuminate, glabrous; seed with a longitudinal groove.

Fr. & Fr.: Oct. - March.

Distribution: India: Arunachal Pradesh, Assam and Nagaland;

Bangladesh.

Specimen examined: AJNU 1205. **PL-14**

Bridelia scandens (Rexh.) Willd. Giri et al., Mater. Fl. Aruna. Pradesh. 2:367. 2008. *Bridelia stipularis* (L.) B1. Hook. f., Fl. Brit. Ind. 5:270. 1887: Balaky., Fl. Jowai. 2:419.1983: Kanjilal et al. Fl. Assam 4:147. 1997 (Repr.)

Large scandent shrubs. Branchlets brownish tomentose, pendent. Leaves elliptic-ablongte obovate, 6-15 × 3-9 cm, apex abuse, often mucronate, base rounded, glabrous above, tomentose beneath; 9-13 pairs of lateral nerves; petioles 0.5-1 cm; stipules triangular with acuminate apex, 0.4-1 cm. Flowers in axillary clusters, spicate or pinacled. Calyx lobes triangular, spreading. Drupeoblong, purple black when ripe, seated on an enlarged persistent calyx, 2-seeded.

Fl. & Fr.: October-March.

Distribution: India: Throughout India.

Bangladesh, Cambodia, China, Malayasia, Myanmar, Nepal, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1002.

Bridelia sikkimensis Gehum. in Engl., Bot. Jalrb. Syst. 41, Beibl. 95: 34. 1908: Kanjilal et al., Fl. Assam 4: 147. 1940; D.CLong in Grierson &D.CLong, Fl. Bhutan 1(3): 768. 1987, p. p. excl. syn. *B. sikkimensis* var. *minuta* Gelum. 1. c. 34. 1908. *B. cuneata* Gehum., I. c. 34. 1908; Kanjilal et al., 1. c. 146. 1940. *B. montana sensu* Hook f., Fl. Brit. India 5: 269. 1887.

Shrubs or small trees, up to 5 m high. Leaves obovate-elliptic, rounded, obtuse or acute at base, entire, apiculate to acuminate or caudate at apex, 6 - 22 x 3 - 12 cm, coriaceous, often glaucous beneath; lateral nerves 7 - 15 pairs, branching near margins and forming loops with

the superadiacents. Inflorescences arising on main leafy branches, unisexual, the females few-flowered. Male flowers petals spatulate or oblong; disc disciform, flat; anthers ellipsoid; pistillode small. Female flowers sepals triangular to ovate-triangular; petals spatulate, obovate or suborbicular; inner disc cupular, almost enclosing the ovary; ovary subglobose, glabrous, 2-locular; styles connate below into a column, shortly to deeply bifid above. Fruits oblong to ellipsoid, slightly bilobed

F1.& Fr.: May – November

Distribution: India: Arunachal Pradesh, Meghalaya, Nagaland, Sikkim and West Bengal. Bangladesh, China and Nepal.

Specimen examined: AJNU 1480. **PL-14**

***Claoxylon* A. Juss.**

Trees or shrubs, dioecious or monoecious. Leaves alternate, lower ones rarely opposite, often pellucid-dotted, penninerved, usually long-petioled; stipules small or minute. Flowers small, in axillary or racemes, solitary or 2 together. Male flowers 1 - many fascicled in each bract; calyx subglobose, closed in bud, splitting into 3 or 4 valvate segments; petals and disc absent; stamens many, free, inserted on or around a central flat, convex or elevated receptacle: filaments free. short: anthers erect; pistillode absent. Female flowers solitary in each bract; sepals 3, shortly connate at base; disc absent; staminodes absent; ovary 2 -4 loculed; ovule solitary in each locule; styles same number as ovary-locules, coarsely papillose inside. often plumose: stigmas short, divided into fringed segments. Fruits schizocarpic, capsules, 2 or 3 locular, deeply or shallowly lobed, fleshy or coriaceous; seeds subglobose, with a fleshy outer and hard crustaceous inner layer.

Claoxylon longipetiolatum Kurz in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42(2): 244. 1873 & Forest Fl. Brit. Burma 2: 396. 1877: Hook, f. Fl. Brit. India 5: 413. 1887: Susila & N.P. Balakr. In Rheedeia 5(2): 124. F.4.1995

Shrubs or trees, 5 - 10 m high. Leaves broadly elliptic, oblong-ovate to oblong-lanceolate, styles acute, obtuse, rounded or subcordate at base, acuminate to cuspidate at apex, crenate and toothed with glands along margins, 20 - 40 x 9 - 18 cm, chartaceous, glabrous or pilose above, softly pubescent on nerves beneath; lateral nerves 6 - 10 pairs; petioles 4 - 12 cm long. Male flowers clustered in filiform 10 - 20 cm long spikes; bracts subulate: flowers 4 - 6 mm across: sepals 3, ovate to lanceolate; stamens 35 - 60: filaments 0.5 - 2 mm long; anthers parallel, globose. Female flowers not seen. Fruits deeply 3-lobed, covered with soft hirsute prickles.

F1. & Fr.: February – December

Distribution: India: Frequent in clearing and open places, chiefly along tropical forests. West Bengal, Meghalaya, Nagaland and Andaman & Nicobar Islands.
Bangladesh and Myanmar.

Specimen examined: AJNU 1012. **PL-14**

Croton L.

Trees or shrubs, rarely herbs. Leaves alternate, rarely opposite or whorled, with 2-glands at the base, pinnately or palmately nerved, margin often serrate and glandular; stipules minute or absent. base, pinnately or palmately nerved, margin often serrate and glandular; stipules minute or absent. Flowers usually monoecious, solitary or clustered in terminal or axillary, simple or branched racemes. Male flowers: calyx 5-lobed, petals 5-6, stamens 10-12, free; disc of 4-6 glands opposite the calyx lobes. Female flowers: petals smaller than the calyx

lobes; disc annular or of 4-6 glands; style slender, 2-4 cleft. Fruit a capsule, sub-equally 6- or 3 valves.

Croton caudatus Geiseler, Hook. f., Fl. Brit. Ind. 5:388. 1887; Balaky., Fl. Jowai, 2:428. 1983; Grierson & Long, Fl. Bhut. 1.3:793. 1987; Kanjilal *et al.*, Fl. Assam 4:194. 1997 (Repr.): Giri *et al.*, Mater. Fl. Aruna, Pradesh. 2:368. 2008.

Large scandent shrubs, up to 15 m tall. Branchlets stellately tomentose. Leaves ovate, 5.5-16 x 2.5-8 cm, apex acuminate, base cordate or subcordate, stellately pubescent both the surface, more densely beneath, margin irregularly serrate-dentate, glandular at the tips; 3-basal nerves at the base; 2-basal glands, stalked; petioles 2-5 cm, stellately tomentose; stipules pinnatisect into filiform segments about 1 cm long. Inflorescences in terminal raceme, stellately pubescent 10-25 cm flowers in dense fascicles along rachis. Male flowers: petals as long as sepals, stamens numerous female flowers: petals small, style bifid. Fruits subtrigonous, rusty pubescent.

F1. & Fr.: April-July.

Distribution: India: Arunachal Pradesh, Assam, Karnataka, Kerala, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu and West Bengal.

Bangladesh, Cambodia, China, Malayasia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Sulawesi, Thailand and Vietnam.

Specimen examined: AJNU 1063. **PL-14**

Drypetes Vahl

Large evergreen trees or shrubs. Leaves alternate, simple, entire or denticulate along margins, mostly unequal-sided at base, glabrous, penninerved with prominent,

short-petioled; stipules small, caducous. Inflorescences axillary or cauliflorous, fascicled. Male flowers: sepals free, imbricate; petals absent; stamens 3 - 50, free; anthers 2-loculed, basifixed, extrorse or introrse; disc central, pubescent or glabrous, flat or with variously raised or crenate or lobulate margins, the lobes rarely produced outward embracing the bases of filaments. Female flowers: sepals same as in male but usually larger; petals absent; ovary 1 or 2 locular; 2 in each locule; styles obsolete; stigmas mostly flabellate or sometimes circular. Fruits drupaceous, indehiscent, occasionally somewhat flattened with solitary seeds in each locule.

Drypetes assamica (Hook, f.) Pax & K. Hoffm. in Engl. Pflanzenr. IV. 147. 15(heft 81): 241.

1922; Kanjilal et al, Fl. Assam 4: 179. 1940; N.P. Balala. & Chakrab., Family Euphorb. India 329. 2007. *Cyclostemon assamicus* Hook, f., Fl. Brit. India 5: 342. 1887: C. E. C. Fisch. in Rec.Bot. Sury, India 12(2): 130. 1938.

Trees, evergreen, 10-18 m high, much branched; bark ash in colour, smooth. Leaves elliptic-oblong or elliptic-lanceolate, 7-15 × 3-7 cm, base acute, apex acute to acuminate, margins distantly serrulate, coriaceous, glossy above, pale beneath; lateral nerves 8-12 pairs. Flowers dioecious, fascicled. Male flowers: calyx lobes 4, imbricate; stamens 8-12, on the margin of depressed disc; filaments free. Female flowers: solitary, axillary on pedicels; calyx lobes 5 mm long, ciliate; ovary 2-celled, rusty-tomentose; stigma sessile. Drupes globose, rusty-tomentose.

Fl. & Fr.: October-April.

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttar Pradesh and West Bengal. Bangladesh, Cambodia, Myanmar and Thailand.

Specimen examined: AJNU 1479.

Euphorbia L.

Herbs, shrubs or trees, with milky juice; stem sometimes succulent. Leaves alternate or opposite, usually entire. Flowers monoecious, solitary, clustered or umbellate cyathia, each cyathium is composed of a cup like involucre, each cup contain a single central female flower surrounded by several minute male flowers. Female flowers pedicellate, ovary 3-celled, styles 3. Male flower reduced to a single stamen. Fruit a capsule, 3-valved.

Euphorbia hirta L. Sp. Pl. 454. 1753; Hook.f., Fl. Brit. Ind. 5: 250. 1887; Kanjilal *et al.*, Fl. Assam 4: 141. 1940; Balakr., Fl. Jowai 2: 419. 1983; Grierson & Long, Fl. Bhut. 1: 3. 766. 1987.

Erect or decumbent annual herbs, 15-50 cm, densely pubescent. Leaves opposite, ovate-lanceolate or elliptic lanceolate, 2-4×1-1.5 cm, apex acute to subobtusate, base rounded at one side, cuneate at the other, margin serrate. Cyathia axillary, clustered in globose head, subsessile. Capsule globose, minutely pubescent.

Fl. & Fr.: January – December

Distribution: Cosmopolitan

Specimen examined: AJNU 1378.

Jatropha L.

Trees, shrubs or herbs. Stems with latex. Stipules present, entire or setiform. Leaves alternate, unlobed or palmately lobed, usually with glands at apex of petiole; venation palmate or pinnate. Flowers monoecious or dioecious in paniculate dichasia. Male flowers: sepals 5, imbricate, slightly connate at base; petals 5, imbricate, free, sometimes coherent or connate at base; disk glands 5, free or connate into ring; stamens 8-12, sometimes more, in 2-6 series; filaments at least partly connate; pistillode filamentous or absent. Female flowers: sepals 5 or 6, free, imbricate, usually persistent in fruits. Ovary 2- or 3(or 4 or 5)-locular; ovules 1 per locule; styles unlobed or bifid. Fruits capsular, drupaceous or dry. Seeds 2-4, ellipsoidal to spherical.

Jatropha glandulifera Roxb., Fl. Ind., ed. Carey 3: 688. 1832; Hook.f., Fl. Brit. India 5: 382. 1887.

Undershrubs, up to 2 m high. Stem stout, branched, glabrous, and marked by prominent leaf scars. Leaves orbicular in outline, deeply palmately 3 - 5-lobed, truncate or subcordate at base, 8 -14 cm, glabrous beneath; petioles 5- 15 cm long. Inflorescences axillary, corymbose cymes; peduncle 8 - 14 cm long; Male flowers ; calyx up to 2 mm long; lobes oblanceolate, glabrous; stamens 5 + 3; anthers oblong. Female flowers lobes lanceolate; petals free, oblonglanceolate; ovary oblong-ovoid, glabrous; styles 3, connate; stigma club-shaped. Fruits oblong-ovoid or subglobose, 3-lobed, glabrous, rugulose, with persistent sepals.

Fl. & Fr.: January – December.

Distribution: India: Andhra Pradesh, Karnataka, Kerala, Nagaland and Tamil Nadu.

Bangladesh, Myanmar and Sri Lanka.

Specimen examined: AJNU 1340.

Macaranga Thouars

Trees. Leaves alternate, leaf blade undivided or lobed, base with glands; palmately 5-13nerved, sometimes pinnately nerved, often peltate at base, minutely gland-dotted beneath; stipules small or large, often caducous. Dioecious. Flowers in axillary racemes or panicles. Male flowers minute, clustered in axil of bract; calyx 2-4-lobed; petals absent; stamens 2-20, free. Female flowers few in axil of bract, unisexual, rarely bisexual; calyx 2-4-lobed; petals absent; ovary 1-3-celled; styles 1-3, simple. Fruit a capsule, simple or deeply 2-3-lobed, smooth or spiny, often glandular scaly.

Key to Species

1a. Branchlets rusty-tomentose to glabrescent: male inflorescence with horizontal branches: stamens more than 10; ovary 2-celled. *M. denticulata*

1b. Branchlets otherwise, glaucous; male inflorescence with zig-zag branches; stamens 3-8; ovary 1-celled. *M. indica*

Macaranga denticulata (Blume) Muell. Arg., Hook. f., Fl. Brit. Ind. 5:446. 1887; Balak., Fl. Jowai. 2:431. 1983; Grierson & Long, Fl. Bhut. 1.3:804. 1987; Kanjilal *et al.*, Fl. Assam 4:218. 1997 (Repr.): Giri *et al.*, Mater. Fl. Aruna, Pradesh. 2:376. 2008.

Trees, up to 10 m tall. Branches ridged. Leaves broadly ovate- deltoid, 18-26 × 12-20 cm, apex shortly acuminate, base peltate, truncate or rounded, densely gland-dotted beneath, marginsinuate- denticulate; 9-11 basal nerves; 9-13 pairs of lateral nerves; petioles 5-20 cm long. Inflorescence in axillary panicles. Flowers yellow. Male flower small, sessile: sepals 2-3, stamens 6-30. Female flowers on short pedicels; sepals 3-4. Capsules subglobose didynamous, blackish, glandular.

F1. & Fr.: March-July.

Distribution: India, Bangladesh. Bhutan, China, Laos. Malaya, Myanmar, Nepal, Sumatra. Thailand.

Specimen examined: AJNU 1300. **PL-14**

Macaranga indica Wight, Icon. Pl. Ind. Orient. 5: 23. t. 1883. 1852, Hook, f., Fl. Brit. India 5:446. 1887: Kanjilal, *et al*, Fl. Assam 4: 218. 1940; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 54. 1987: N. P. Balakr. & Chakrab., Family Euphorb. India 141. 2007.

Trees, 15-20 m high; bark smooth, greyish; branchlets glaucous. Leaves usually peltate. sometimes ovate or orbicular, 12-32 × 12-25 cm, base rounded, apex acuminate, margins dentate, glabrous or sparsely pubescent beneath, often with 2 glands near petioles; lateral nerves 3-11 pairs; petioles inserted 3-6 cm above base; stipules ovate, ca 15 mm long, recurved. Male inflorescence Styles axillary, subpyramidal, of 10-14 cm long panicles having rusty tomentose zig-zag shortly jointed branches; bracts linear-spathulate, 5-7 mm long, with a conspicuous discoid apical gland; flowers: calyx lobes 2-3, ovate; stamens 3-8. Female inflorescence 5-7 cm long, shortly peduncled panicles; bracts 1 to few flowered, linear with an apical gland; flowers: calyx lobes 4; ovary 1-celled. Subglobose:

stigma spurred, densely clothed with orbicular waxy glands. Capsules globose densely pubescent.

Fl. & Fr.: May-December

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal. Bangladesh, Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Sri Lanka, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1301

Mallotus Lour.

Trees or shrubs. Leaves alternate or subopposite, entire or 3-lobed, palmately 3-9 veined, sometimes peltate at base, with discoid glands near base, stipules minute. Flowers dioecious, in terminal or axillary, simple or branches racemes or spikes. Male flowers: sepals 3-4, petals absent, stamens 25-50, free. Female flowers: petals 3-6, ovary 2-3-celled, style 2-3, simple, papillose or entire. Capsule glandular, smooth or bristly.

Mallotus philippensis (Lam.) Muell. Arg. *Linnaea* 34: 196. 1865; Hook.f., *Fl. Brit. Ind.* 5: 442. 1887; Brandis, *Ind. Trees* 590, 717, 720.1906; Kanjilal *et al.*, *Fl. As.* 4: 216. 1940; Haridasan & Rao, *For. Fl. Megh.* 2: 796. 1987. Grierson & Long, *Fl. Bhut.* 1: 3. 802. 1987.

Small or medium sized tree, young branches rusty tomentose. Leaves coriaceous, ovate-lanceolate or ovate-oblong, 5-18×2.5-9 cm, acuminate, base cuneate or rounded, 3-nerved at base, margin subentire, puberulous beneath with red glands. Flowers dioecious,

in terminal spikes, paniculate, sessile or subsessile. Male flowers clustered, very shortly pedicelled, stamens numerous. Female flowers not clustered, subsessile, ovary tomentose with crimson glands, styles 3, plumose. Capsules covered densely with crimson powder. Seeds subglobose.

Fl. & Fr.: September - April

Distribution: India, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam and N Australia.

Specimen examined: AJNU 1120. **PL-15**

Mallotus ferrugineus (Roxb.) Mull. Arg. in DC., Prodr. 15(2): 982. 1866; N. P. Balakr. & Chakrab., Family Euphorb. India 146. 2007. *Rottlera ferruginea* Roxb., FI. Ind., ed. 2, 3: 828. 1832. *Rottleratetracocca* Roxb., FI. Ind., ed. 2, 3: 826. 1832. *Mallotus tetracoccus* (Roxb.) Kurz in J. Asiat Soc. Bengal 41(2): 245. 1873; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 54. 1987. *Mallotus albus* sensu Mull. Arg. in Linnaea 34: 188. 1865; Hook, f., FI. Brit. India 5: 429. 1887; Kanjilal *et al.*, FI. Assam 4: 213. 1940, non *Rottlera alba* Roxb. ex Jack, 1820.

Shrubs or trees, 4-10 m high; bark greyish-white, with tomentose branches. Leaves broadly ovate or sub orbicular, 8.5-20 x 5-16 cm, base narrowly peltate or truncate, apex obtuse or bluntly acuminate, margins entire or sinuate-denticulate, whitish or rusty-tomentose beneath, 3-5 -nerved at base; lateral nerves 3-6 pairs; petioles 5-8 cm long. Flowers dioecious, in axillary and terminal pyramidal panicles. Male flowers: clustered along rachis;

calyx lobes 4;. Female flowers; solitary on short pedicels; calyx lobes 4-5. Ovary densely stellate hairy; styles 4-5, papillose. Capsules ovoid, up to 1.2 cm across, tomentose, 4-lobed.

Fl. & Fr.: May –September.

Distribution: India: Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Tamil Nadu and West Bengal.
Bangladesh, China, Myanmar, Nepal, Sri Lanka, Thailand and Tibet.

Specimen examined: AJNU 1385.

Ostodes Blume

Shrubs or trees. Leaves alternate, 3-nerved at base, 2 glands at base, stipule caducous. Inflorescence axillary or subterminal, in lax panicles or racemes in axils of fallen leaves. Male flowers: sepals 5, petals 5-6, stamens 8-35, free. Female flowers: sepals as in male, ovary 3-celled, styles 3, bifid. Capsule subglobose, 6-ribbed, 3-seeded.

Ostodes paniculata Blume, Bijdr. Fl. Ned. Ind. 12:620. 1826; Hook.f., Fl. Brit. Ind. 5: 400. 1887; Brandis, Ind. Trees 580, 717, 720.1906; Kanjilal *et al.*, Fl. As. 4: 197. 1940; Haridasan & Rao, For. Fl. Megh. 2: 797. 1987. Grierson & Long, Fl. Bhut. 1: 3. 795. 1987.

Trees, upto 15 m tall, bark grey or dark brown. Leaves often clustered at the end of branches, ovate, ovate-elliptic, 11-26×5-11 cm, apex acuminate, base rounded or broadly cuneate, margin distantly serrate, lateral nerves 7-8. Male panicles 15-30 cm long, pendulous, sepals 3, petals 4-5, pinkish white, stamens 20-35. Female panicles

shorter than male, sepals and petals as in male; disk annular, ovary tomentose, styles 3, bifid. Capsule subglobose, 3-lobed.

Fl. & Fr.: March – September.

Distribution: India, Bhutan, China, Malaysia, Myanmar, Nepal and Vietnam.

Specimen examined: AJNU 1280. **PL-15**

Pachystylidium Pax & K. Hoffm.

Shrubs, twining or climbing, monoecious; indumentum of simple and stinging hairs. Leaves alternate; stipules conspicuous, persistent; leaf blade simple, palmately 3-veined. Inflorescences terminal, unbranched, bisexual, male flowers distal, female flowers proximal. Male flowers: calyx lobes 4(-6), valvate; petals absent; disk annular, sometimes obscure; stamens 2 or 3; anthers subsessile, locules distinct; pistillode absent. Female flowers: sepals 6(-8), spreading; ovary 3-locular, hispid with stinging hairs; ovules 1 per locule; styles 3, mostly connate. Fruit a capsule, 3-locular, with stinging hairs.

Pachystylidium hirsutum (Blume) Pax & K. Hoffm. in Engl., Pflanzenr. IV.147.ix - xi (heft 68): 108. 1919; S. Panda & A.P. Das in Rheedia 7: 60. 1997. *Tragia hirsuta* Blume, Bijdr. Fl. Ned.Ind. 630. 1826. *Tragia gagei* Haines in J. Proc. Asiat. Soc. Bengal, 1919, n. s. 15: 317. 1920.

Subshrubs, twining, up to 4 m tall, hirsute, with stinging hairs. Stems slender. Leaf blade ovate or elliptic, 5-12 × 3-8 cm, thickly papery, sparsely hirsute, base shallowly to moderately cordate, margin serrate, apex abruptly acuminate. Inflorescence

1-9 cm, hirsute and puberulent, peduncle 0.5-3 cm, with many male and female flowers. Male flowers: pedicel 1.4-2.3 mm; calyx lobes ovate, up to 1 mm; anther up to 0.4 mm. Female flowers: pedicel up to 1 mm; sepals lanceolate, elliptic, or ovate, 1.4-2.4 mm, sparsely pubescent; ovary densely hirsute; styles connate into a column. Fruiting pedicel 3-6 mm; fruiting sepals persistent, reflexed. Capsule up to 1 cm in diam., drying dark brown.

Fl. & Fr.: March - December

Distribution: India : Andhra Pradesh, Bihar, Madhya Pradesh, Nagaland and Odisha. Bangladesh, Cambodia, China, Philippines, Sulawesi, Thailand and Vietnam

Examined specimen: AJNU 1161. **PL-15**

Phyllanthus L.

Trees shrubs or herbs. Leaves alternate, entire, distichous. Flowers monoecious, minute, in axillary clusters or solitary. Male flowers: sepals 4-6; petals absent; stamens 3, filaments free or connate. Female flowers: larger than male flowers, sepals 5-6; petals absent; styles free or connate, bifid. Fruit a capsule, with three thin or crustaceous 2-valves cocci.

Key to species

1a. Trees, 4-10 m high; fruit a drupe

P. emblica

1b. Herbs or shrubs, up to 3 m high; fruit a capsule

2a. Annual herbs

- 3a. Calyx lobes 4 or 5 *P. fraternus*
- 3b. Calyx lobes 6 *P. urinaria*
- 2b. Perennial Shrubs *P. sikkimensis*

Phyllanthus emblica, L., Hook. f., Fl. Brit. Ind. 5:289. 1887; Balaky., Fl. Jowai. 2:426. 1983; Grierson & Long, Fl. Bhut. 1.3:772. 1987; Giri et al., Mater. Fl. Aruna. Pradesh. 2:380. 2008. *Emblica officinalis* Goertu., Kaniilal *et al.*, Fl. Assam 4:159. 1997 (Repy.).

Trees, up to 15 m tall. Branches tomentose. Leaves pinnately arranged on the branchlets, small, linear- oblong, 0.2- 0.9 x 0.1- 0.2 cm, subsesile, paler beneath, glabrous; lateral nerves absent; stipules triangular, 0.1- 0.2 cm long, deciduous. Flowers yellowish, in axillary clusters at the base of the leaflets on the lower portion of the branchlets. Male flowers: sepals 6; stamens 3, filaments connate into short column; disc devoid of glands. Female flowers: sepals 6; styles bifid. Drupes globose, fleshy.

Fl. & Fr.: March-June.

Distribution: India: Almost all parts of India.

Bangladesh, Cambodia, China, Laos, Myanmar, Pakistan, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1295.

Phyllanthus fraternus G. L. Webster in Contr. Gray Herb. 176: 53. 1955; N. P. Balakr. & Chakrab., Family Euphorb. India 387. 2007. *P. niruri* auct. pi., non L., 1753: Hook, f., Fl. Brit. India 5: 298. 1887.

Herbs, annual, erect, up to 40 cm high; branchlets scabridulous on the angles. Leaves oblong-elliptic, 5-14 x 2-5 mm, base and apex obtuse; stipules ca 1 mm long, lanceolate. Flowers yellowish. Male flowers: calyx lobes 5, ovate-rounded; stamens 3, connate; disc glands 4-5, suborbicular. Female flowers: solitary; calyx lobes 5, oblong-spathulate; styles free, 2-lobed. Capsules depressed-globose, smooth; seeds 3-angled, light brown with longitudinal ribs on the back.

Fl. & Fr.: January-December.

Distribution: India: Andhra Pradesh, Bihar, Delhi, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Nepal and Pakistan.

Specimen examined: AJNU 1348.

Phyllanthus sikkimensis Mull. Arg. in Linnaea 32: 48. 1863; N. P. Balakr. & Chakrab., Family Euphorb. India 374. 2007. *Phyllanthus hamiltonians* Mull. Arg. in Linnaea 34: 75. 1865; Hook, f., Fl. Brit. India 5: 304. 1887; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 130. 1938. *Reidia hamiltoniana* (Mull. Arg.) A. M. Cowan & Cowan, Trees N. Bengal 117. 1929; Kaniilal *et al.*, Fl. Assam 4: 156. 1940.

Shrubs, 1-2 m high; branchlets puberulous, slender, purplish-brown. Leaves elliptic or broadly ovate, 1.2-2.7 x 0.5-1.3 cm, apex obtuse or acute, membranous, glaucous beneath; lateral nerves 5-7 pairs. Male flowers small, long pedicelled in axillary fascicles; calyx lobes 4, pubescent; stamens 4, filaments connate into stout column; disc glands 4, deeply lobed. Female flowers axillary and terminal, ca 2.5 cm long racemes; calyx lobes 6, toothed; ovary 4-celled; styles 4, erect. Fruits globose and tubercled.

Fl. & Fr.: April-May.

Distribution: India: Assam, Nagaland and Sikkim.

Bangladesh, Malayasia, Myanmar, Nepal and Thailand.

Specimen examined: AJNU 1162

Phyllanthus urinaria L., Sp. Pl. 982. 1753: Hook, f., Fl. Brit. India 5: 293. 1887: Kaniilal *et al.* Fl. Assam 4: 155. 1940; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 54. 1987; N. P. Balakr. & Chakrab., Family Euphorb. India 389. 2007. *P. urinaria* var. *hookeri* (Mill. Arg.) Hook, f., Fl. Brit. India 5: 294. 1887; Kanjilal *et al.*, Fl. Assam 4: 155. 1940.

Herbs, annual, erect or procumbent. 40-60 cm high. Leaves oblong to obovate. 7-13 × 2-6 mm, base subequally rounded, apex obtuse-mucronate, white hispidulous along margins; lateral nerves faint above, prominent beneath; petioles ca 8 mm long; stipules ovate-deltoid, ca 8 mm long; Fascicles axillary, unisexual; bracts linear, ca 1 mm long, scarious, acute. Male flowers calyx lobes 6, oblong-obovate; stamens 3, filaments connate; disc glands 6. Female flowers solitary; calyx lobes 6, oblong; styles connate at base.

Capsules depressed-globose, verrucose, brown dark brown. Seeds, 3 - angled, greyish-brown, with 12-15 transverse ribs.

Fl. & Fr.: July-November.

Distribution: India: Imperfectly known taxa.

Throughout Tropical and sub tropical regions of Asia and N. Australia.

Specimen examined: AJNU 1394.

Sumbaviopsis J.J.Sm.

Trees or large shrubs, monoecious, evergreen, with dense lepidote hairs. Leaves spirally arranged, simple, white tomentose beneath, long-petiolate, entire or distantly dentate; stipules triangular, hairy, caducous. Inflorescences axillary or terminal, bracteatespiciform racemes; rachis densely hairy. Male flowers: in fascicles of 3 - 5, in axils of bracts; calyx 3 - 5-partite; lobes valvate; petals 4, 5 or 10, short, imbricate or valvate; disc absent, obsolete and dentate; stamens 70 to numerous, arranged on convex hairy receptacle; filaments free, erect; anthers oblong, basi-dorsifixed, longitudinally dehiscent; pistillode absent. Female flowers: solitary in each cluster of male flowers; calyx 5 - 6- partite; lobes shortly imbricate; petals absent or rudimentary; disc small, annular; ovary 3-loculed; ovule one in each locule; styles 3, connate at base, entire or slightly bifid. Fruits 3- loculed capsule; seeds usually 3, subglobose, angular.

Sumbaviopsis albicans (Blume) J.J.Sm. in Meded. Dept. Landb. Ned.-Indie 10: 357.

1910. *Doryxylon albicans* (Blume) N.P.Balakr. in Bull. Bot. Surv. India 9: 58, ff. 1 - 7.

1967 (1968). *Adisca albicans* Blume, Bijdr. Fl. Ned. Ind. 611. 1826.

Sumbaviamacrophylla Mull.Arg. in Flora 47: 482. 1864 & in DC., Prodr. 15(2): 727. 1866;
Kanjilal *et al.*, Fl. Assam 4: 199. 1940.

Trees, up to 18 m tall. Leaves elliptic, oblongovate or lanceolate, narrowly subpeltate, rounded or obtuse and biglandular at base, entire, undulate or distantly dentate along margins, obtuse, acute at apex, 7 - 45 x 4 - 15 cm, coriaceous, glabrous and shiny above, densely velvety white tomentose beneath; lateral nerves 7 - 14 pairs; petioles 2 - 9 cm long. Male inflorescences up to 15 cm long, female inflorescences up to 35 cm long. Male flowers: in fascicles of 3 - 5; bracts small, oblongtriangular; calyx lobes oblong-ovate, up to 5 x 3 mm; petals obovate, up to 2.4 mm across; stamens up to 50. Female flowers: solitary; pedicels 7 - 10 mm long; calyx lobes oblong-triangular, 2 - 3 x 1.4 - 2.5 mm, pubescent; petals absent; ovary ovoid-oblong, 3-lobed, stellate pilose. Fruits subglobose, somewhat flattened, 2 - 3.4 x 1.4 - 3 cm, dark stellate tomentellous; seeds oblong, narrowed at base.

Fl. & Fr.: December - May

Distribution: India: Arunachal Pradesh, Assam, Nagaland and Tripura.

Bangladesh, Borneo, China, Laos, Malayasia, Myanmar, Philippines, Sulawesi, Thailand and Vietnam.

Specimen examined: AJNU 1502. **PL-15**

Suregada Roxb. ex Rottler

Shrubs or small trees, dioecious, glabrous throughout. Leaves alternate, distichous, entire or spinulose dentate along margins, glandular but with pellucid dots in each areole between reticulations, short petioled; stipules connate, early caducous. Flowers in short leaf-

opposed clustered cymes or fascicles. Male flowers sepals 5, imbricate; disc glands many in between the stamens, angular or dentate at apex; stamens many, exerted, free, inserted on vaulted receptacle; anthers attached close above the base; thecae 2, extrorse, longitudinally dehiscent; pistillode absent. Female flowers sepals 5; disc ovary ovoid, 2 or 3-locular; locules 1-ovuled; styles 3, shortly bifid; stigmas 2- partite or lacinate. Fruit a fleshy depressed subglobose capsule, shallowly 3-lobed, 3-seeded; seeds subglobose.

Suregada multiflora (A Juss.) Baill, Etude Euphorb. 396. 1858. *Gelonium multiflorum* A Juss., Euphorb. Gen. 111, t. 10, f. 31A. 1824; Hook f., Fl. Brit. India S: 459. 1887; Gamble, Fl. Madras 2(7): 1343. 1925 (repr. ed. 2: 940. 1957). *Gelonium bifarium* Roxb, ex Willd, Sp. Pl. ed. 4, 4: 831. 1806, P. P.: Hook f., 1. c. 459. 1887. *Gelonium fasciculatum* Roxb., Fl. Ind. 3: 832. 1832.

Shrubs or trees. 2 - 10 m high. Leaves oblong-elliptic to suborbicular, cuneate, acute to obtuse at base and slightly decurrent into petioles, entire margin, rounded to obtuse or subacuminate at apex, 4 - 24 x 2 - 10 cm, coriaceous to chartaceous, pellucid-punctate: lateral nerves 5 - 8 pairs. Inflorescences unisexual, leaf-opposed, fasciculate lax cymes, sometimes shortypedunculate. Male flowers sepals 5, suborbicular; stamens many; glands many between filaments. Female flowers sepals as in male but larger; disc annular; ovary ovoid, 2 or 3-locular; styles 2 or 3, bifid. Fruits capsular or subdrupaceous, globose or subglobose, unlobed to lobed, or 3-locular, orange-brown, tardily dehiscent.

Fl. & Fr.: February – September.

Distribution: India: Assam, Andhra Pradesh, Andaman & Nicobar, Nagaland, Sikkim and West Bengal.

Bangladesh, Myanmar, China, Thailand and Malaysia.

Specimen examined: AJNU 1433. **PL-15**

URTICACEAE Juss.

Herbs or small shrubs, rarely trees, sometimes with stinging hairs. Leaves simple, opposite or alternate, often oblique and with 3 nerves at the base, presence of dot marks of cystoliths on the surface; stipules present. Inflorescence mostly in cymose, sometimes aggregated into a complex structure. Flowers small, greenish, unisexual, regular, 3-5-merous. Male flowers: perianth free or connate, 4-5 lobed; stamens opposite to the lobes; pistillode usually present. Female flowers: perianth connate, 4-5 lobed; ovary superior. Fruit a dry achene or a fleshy drupe.

Key to genera

- | | |
|--|-----------------------|
| 1a. Stinging hairs present: | <i>Dentrocnicide</i> |
| 1b. Stinging hairs absent: | |
| 2a. Anthers erect in bud | <i>Poikilospermum</i> |
| 2b. Anthers inflexed in bud | |
| 3a. Stigma penicillate | <i>Elatostema</i> |
| 3b. Stigma various, not penicillate | |
| 4a. Calyx of female flowers membranous or dry in fruit | <i>Boehmeria</i> |
| 4b. Calyx of female flowers fleshy in fruit | |
| 5a. Flower clusters densely capitate | <i>Oreocnicide</i> |
| 5b. Flowers clusters sessile or in cymes | <i>Sarcochlayms</i> |

Boehmeria Jacq.

Shrubs or small trees. Leaves opposite or alternate, not entire, strongly 3 nerved at the base; stipules free. Flowers unisexual in axillary clusters or in interrupted axillary spikes, racemes or panicles. Male flowers 4-5-merous, perianth segments free. Female perianth tubular, 2-4 toothed; style filiform, persistent. Achenes covered by persistent dry perianth.

Boehmeria macrophylla Hornem., Hort. Reg. Bot. Hafn. 2: 890. 1815; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 408. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 530. 2012; *B. platyphylla* D. Don, Prodr. Fl. Nepal. 60. 1825; Hook.f., Fl. Brit. Ind. 5: 578. 1888; Kanjilal *et al.*, Fl. As. 4: 288. 1940; Balakr., Fl. Jowai. 2: 450. 1983.

Shrubs, upto 3 m high. Leaves ovate or elliptic to suborbicular, 7-17 x 5-11 cm, base rounded or oblique, or subcordate, pilose above, sparsely pilose beneath, margin coarsely toothed, entire at base, 3-5 lateral nerves above base, basal nerves 3; petioles 3-15 cm, stipules lanceolate. Flowers axillary spike, drooping, solitary or clustered. Male spikes paniculately branched at base. Female spikes usually simple, solitary, pendulous, drooping, 10-15 or up to 30 cm. Achenes compressed, ellipsoid, beaked at apex.

Fl. & Fr.: June - November

Distribution: India (throughout), Bhutan, China, Indonesia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

Specimen examined: AJNU 1234.

Elatostema Forst.

Herbs or under-shrubs. Stem decumbent or creeping. Leaves alternate or with sometimes a minute leaf sub-opposite to the normal leaf, distichous, sessile or sub sessile, usually very oblique and unequal-sided and 3 nerves at the base or just above it; stipules membranous, 2 at each node, intrapetiolar or lateral. Flowers very minute, monoecious or dioecious, crowded in heads on peduncles or sessile borne on a fleshy receptacles, surrounded by involucre of bracts. Male flowers: sepals 4-5; 2 or more, usually tubercled or spurred at back; stamens 4-5 inflexed in bud; pistillode minute. Female flowers: sepals 3-5, very minute, much shorter than the ovary; staminode minute or absent; stigma in like a tuft of hairs. Achene minute, ellipsoid or ovoid, usually ribbed.

Elatostema platyphyllum Wedd., Arch. Mus. Nat. 9: 301. 1856; Hook.f., Fl. Brit. Ind. 5: 566. 1888; Kanjilal *et al.*, Fl. As. 4: 285. 1940; Sinha in Sinha *et al.*, Fl. Mizo 2: 541. 2012.

Undershrubs, upto 1.5 m tall. Leaves obliquely rhomboid to oblong-lanceolate, 12-25 x 6-16 cm, apex cuspidate, base auricled, margin crenulate, glabrescent beneath; stipules linear lanceolate. Heads crowded on the surface of fleshy receptacles, mostly in axils of upper leaves, borne on short peduncles. Achenes ovoid, ribbed.

Fl. & Fr.: March - August

Distribution: India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

Specimen examined: AJNU 1474

Oreocnide Miq.

Shrubs or trees, without stinging hairs. Leaves alternate, borne at ends of the branches, entire or serrate-dentate, 3-nerved; stipules two at the base of each petiole, lateral, free, deciduous. Flowers unisexual in small clusters, solitary or arranged in short cymes, in axils of fallen leaves. Male flowers: perianth lobes 3 or 4; stamens 3 or 4. Female flowers: perianth tube adnate to ovary; limb 3- or 4-toothed; staminodes absent; stigma sessile, like a tuft of hairs. Fruit an achene enclosed completely or partly by fleshy cup-shaped perianth.

Oreocnide integrifolia (Gaudich.)Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 306. 1869; Kanjilal *et al.*, Fl. As. 4: 293. 1940; Haridasan & Rao, Forest Fl. Megh. 2: 846. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 418. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 545. 2012; *Villebrunea integrifolia* Gaud., Voy. Bonite, Bot. t. 91. 1844; Hook.f., Fl. Brit. Ind. 5: 589. 1888; Balakr., Fl. Jowai. 2: 453. 1983.

Shrubs or small trees, upto 7 m tall. Leaves elliptic-oblong, obovate oblong, 9-25 x 3-10 cm, base obtuse, apex caudate acuminate, glabrous above, tomentose beneath, margin entire, petioles 1-10 cm long, tomentose; stipules lanceolate, connate at base of each petiole, deciduous. Flowers small, clustered in globose heads in dichotomously branched cymes. Male flowers perianth 3-4. Female flowers stigma plumose. Achenes ovoid, aggregated into a clustered head, white when ripe, adnate to the base of fleshy perianth.

Fl. & Fr.: March - August

Distribution: India (NE India), Bhutan, China, Indonesia, Myanmar, Thailand, Vietnam

Specimen examined: AJNU 1036

Poikilospermum Zipp. ex Miq.

Woody climbers. Leaves alternate, entire, pinnately veined, long petioled; stipules connate, axillary, deciduous. Flowers in globose heads borne in axillary cymes. Male flowers perianth deeply 4-lobes. Female flowers perianth short 4-lobes, ovary bearing short simple style. Fruit an achene, ovoid, surrounded by fleshy persistent perianth.

Poikilospermum suaveolens (Blume) Merr., Contr. Arnb. Arb. 8: 47. 1934; Balakr., Fl. Jowai. 2: 446. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 421. 2008; *Conocephalus suaveolens* Bl., Bijdr. 483. 1825; Hook.f., Fl. Brit. Ind. 5: 545. 1888; Kanjilal *et al.*, Fl. As. 4: 272. 1940.

Large scandent, shrubs or lianas, upto 25 m. Leaves broadly ovate or oblong-ovate, apex acute, base rounded or subcordate, or obtuse, lateral nerves 13-15 pairs. Flower heads 0.5-0.7 cm across, in axillary cymose heads, fragrant. Achenes oblong-lanceolate, enclosed in thin fleshy perianth.

Fl. & Fr.: Jan - September

Distribution: India (throughout), Bhutan, China, Indonesia, Malaysia, Nepal, Thailand, Vietnam

Specimen examined: AJNU 1030

Sarcochlamys Gaud.

Shrubs or small trees, evergreen, without stinging hairs. Leaves alternate, spiral; stipules deciduous, intrapetiolar; leaf blade 3-veined, margin serrulate. Inflorescences in axillary pairs, cymose panicles. Achenes somewhat drupaceous.

Sarcochlamys pulcherrima Gaud. Bot. Voy. Bon. t. 89. 1846; Hk. f., Brit. India 5: 588. 1888; Brandis, Ind. Trees 618, 718. 1906; Kanjilal *et al.*, Fl. Assam 4: 292. 1940; Deb, Fl. Tripura 1: 231. 1981; Haridasan & Rao, For. Fl. Meghalaya 2: 848. 1987.

Shrubs or small trees with pubescent branchlets. Leaves 7-20 x 1-2 cm, lanceolate, caudate-acuminate, base narrowed, rugose above, white beneath, strongly 3-nerved. Spikes 3-6 cm long; male ones white, flowers minute; female ones confluent, greenish-yellow. Achenes oblique, enclosed in a freshly perianth.

Fl. & Fr.: September-January.

Distribution: India (confined to N.E. region); Indo-Malaya.

Specimen examined: AJNU 1472

Dendrocnide Miq.

Trees or shrubs, often with terminal rosettes of leaves, armed with stinging hairs. Leaves alternate, spiral; stipules, intrapetiolar, completely connate. Inflorescences solitary, forming cymose-panicles or racemes, unisexual. Male flowers 4- or 5-merous; female flowers: perianth lobes 4, connate at base. Achene oblique, persistent stigma reflexed.

Dendrocnide sinuata (Bl.) Chew, Gard. Bull. Singapore 21: 201. 1965; Haridasan & Rao, For. Fl. Meghalaya 2: 848. 1987. *Urtica sinuata* Bl., Bijdr. Fl. Ned. India 505. 1826. *U. crenulata* Roxb. Fl. Indica 3: 591. 1832 non Sev. 1785. *Laportea crenulata* Wedd. Mon. Urtic. 133. 1856; Hk. f., Fl. Brit. India 5: 550. 1888; Kanjilal *et al.*, Fl. Assam 4: 281. 1940.

Shrubs or small trees; branchlets spreading, semiwoody; upper stem and branchlets armed with stinging hairs. Leaves elliptic, oblong or obovate-lanceolate, 10-45 x 5-20 cm, acute to acuminate, both surfaces subglabrous or sparsely armed with stinging hairs on veins, base cuneate, rounded, or cordate, entire, crenate or serrate. Flowers in dichotomously branched cymes, creamy white. Achenes white, ovoid, compressed.

Fl. & Fr.: August-December.

Distribution: India (N.E. India); China, Malaysia, Myanmar, Sri Lanka, Thailand.

Specimen examined: AJNU 1441

ULMACEAE Mirb.

Evergreen or deciduous trees or shrubs. Leaves alternate, simple, usually serrate and with oblique bases, pinnately nerved, sometimes 3-5 nerved at base, stipulate. Flowers unisexual or bisexual in axillary clusters, racemes or cymes. Female flowers sometimes solitary. Perianth usually 4-5 segments, free or united. Stamens equal to and opposite to perianth segments. Fruit indehiscent nut, drupe or samara.

Ulmus L.

Trees or shrubs, deciduous or evergreen. Stipules 2, lanceolate-ovate to linear, membranous, caduceous. Leaves distichous, blade base oblique, margin doubly or simply serrate; venation pinnate. Flowers bisexual or polygamous, Perianth 4-9-lobed, usually campanulate; tepals membranous, usually persistent, apex usually laciniate. Stamens equal in number to tepals; filaments flat; anthers extrorse. Ovary flat; ovule pendulous. Style very short, bifid; stigmas 2, linear, pubescent. Samara flat, orbicular, obovate,

oblong, elliptic, wings membranous, apex with notch and persistent stigmas. Seed at center or toward apex of samara.

Ulmus lanceifolia Roxb. ex Wall, in *Pl. Asiat. Rar.* 2: 86, t. 200. 1831; *Fl. Ind.*, ed. 2, 2: 66. 1832; Hook. f., *Fl. Brit. India* 5: 480. 1888; C. E. C. Fisch. in *Rec. Bot. Surv. India* 12(2): 131. 1938; Kanjilal *et al.*, *Fl. Assam* 4: 224. 1940.

Trees, deciduous, up to 30 m tall. Young branches parts hairy, scaly. Leaves elliptic-lanceolate, 5.6-9.4 x 2.2-3.5 cm, base unequal, acute at one side of base, rounded at other side, apex acuminate, margins finely serrate, coriaceous; surfaces glabrous. Flowers bisexual, on puberulous pedicels up to 1.3 cm long in the axils of young leaves; pedicels articulate. Perianth campanulate, 5-fid, glabrous. Ovary elliptic, glabrous. Fruit a samara, papery, ellipsoidal, 2-3 cm long, brown.

Fl. & Fr.: December – March.

Distribution: India: Assam, Meghalaya, Mizoram, Nagaland, Sikkim and Uttarakhand. Bangladesh, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1033. **PL-8**

MORACEAE Gaudich.

Trees, shrubs or herbs, often with milky latex. Leaves alternate, rarely opposite, simple or lobed, pinnately nerved but often palmately nerved at base; stipules 2, deciduous leaving annulate scar. Flowers unisexual or bisexual, small, in heads, racemes or catkinate spikes. Perianth segments (2-)4(-6), united or free, sometimes absent, often becoming fleshy in fruit. Stamens 1-4. Ovary 1-locular; style bifid or simple. Fruit an achene.

Key to genera

- 1a. Flowers borne on inner walls of hollow, globose, fleshy receptacle *Ficus*
- 1b. Flowers partially sunk into surface of solid, globose or oblong receptacles,
or borne on catkins or globose heads
 - 2a. Stipules leaving annular scar on branches *Artocarpus*
 - 2b. Stipules small, leaving no annular scar on branches
 - 3a. Fruit formed by one flower *Streblus*
 - 3b. Fruit formed by many flowers
 - 4a. Male and female flowers spicate *Morus*
 - 4b. male flowers spicate *Broussonetia*

Artocarpus J.R.Forst. & G. Forst.

Trees, deciduous or evergreen, with milky latex. Leaves alternate, coriaceous, simple, young leaves sometimes lobed, stipules usually leaving annular scars. Flowers unisexual, crowded into densely subglobose or oblong head, axillary, or on main branches of trunk. Male flowers: perianth 2-4-lobed; stamen 1; pistillode absent. Female flowers: immersed in receptacle perianth tubular, style central or lateral. Fruit an enlarged fleshy oblong, cylindric globose syncarp.

Artocarpus chama Buch.-Ham. in Mem. Wem. Nat. Hist. Soc. 5: 331. 1826. A. chaplasha Roxb., Fl. Ind. 3: 525. 1832; King in Hook, f., Fl. Brit. India 5: 543. 1888; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 131. 1938. Tatkawng (Lushai).

Trees, deciduous, 30-40 m high, shoots brownish hispid. Leaves obovate to oblong, 14-24 x 9-14 cm, apex acute or acuminate, margins entire or serrate near apex, hispid-pubescent beneath; stipules amplexicaul, leaving an annulate scar; petioles brown, 2-4 cm long, densely pubescent; juvenile leaves up to 1 cm long, deeply pinnatifid. Flower heads ellipsoid or subglobose, 1-3 x 1.5-3 cm, solitary in leaf axils. Male heads covered in flowers and peltate bracts; perianth bilobed. Female heads with deciduous peltate scales; ovaries with a simple exserted styles. Syncarps subglobose, yellowish, fleshy, tubercled. Achenes oblong, ca 1.5-2 cm long.

Fl. & Fr.: March-June

Distribution: India: Andaman & Nicobar Islands, NE India, West Bengal. Bangladesh and China.

Specimen examined: AJNU 1170. **PL-12**

Artocarpus lacucha Buch.-Ham., Mem. Wern. Nat. Hist. Soc. 5: 333. 1826; Grierson & Long, Fl. Bhut. 1. 1: 100. 1983; *A. lakoocha* Roxb., Fl. Ind. 3: 524. 1832; King in Hook. f., Fl. Brit. Ind. 5: 543. 1888; Kanjilal *et al.*, Fl. Assam 4: 268. 1940; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 565. 2012.

Large trees, young parts tomentose, bark dark brown. Leaves broadly elliptic-oblong or ovate, 10-25 x 5-15 cm, base broadly cuneate, apex short acuminate, margins entire or shallowly denticulate; petioles 2-5 cm; stipules ovate-lanceolate. Flowers axillary, solitary. Male heads ovoid to ellipsoid, spongy, yellow. Female heads with style exserted. Syncarp subglobose, irregularly lobed, yellow or orange red when ripened.

Fl. & Fr.: February - May

Distribution: India (throughout), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam

Specimen examined: AJNU 1263. **PL-12**

Broussonetia L. Heritier

Laticiferous trees; leaves rarely lobed, 3-nerved at base; flowers dioecious, male in catkins, spicate; female in globose heads; ovary stipitate; fruiting heads villous; fruits long stipitate, exserted from the calyx.

Broussonetia papyrifera (L.) L. Heritier ex Ventenat., Tabl. Regn. Veg. 3: 547. 1799; Kanjilal et al., Fl. Assam 4L275. 1940. *Morus papyrifera* L., Sp. Pl. 2: 986. 1753.

Fast growing deciduous tree up to 15 m tall. Bark dark gray. Branchlets densely pubescent. Leaves spirally arranged, 6-16 x 5-8 cm, broadly ovate to elliptic-ovate, simple or 3-5-lobed, densely pubescent beneath, sparsely pubescent above, base cordate, margin coarsely serrate, acuminate. Male inflorescences long spicate; bracts lanceolate, pubescent. Female inflorescences globose; bracts clavate. Fruit orange-red when mature, fleshy.

Fl. & Fr.: April-July.

Distribution: India: Assam, Meghalaya, Nagaland, Punjab and Uttar Pradesh.

Cambodia, China, Japan, Korea, Laos, Malaysia, Myanmar, Thailand, Vietnam; Pacific Islands.

Specimen examined: AJNU 1173

Ficus L.

Trees, shrubs, climbers, or sometimes woody epiphytes, evergreen or deciduous, with latex. Leaves simple to lobed, glabrous or hairy. Inflorescences axillary or on specialized cauliflorous branches. Fruit an achene, usually enclosed with syncarp formed from an enlarged hollow fleshy receptacle.

Key to Species

1a. Leaves opposite

2a. Leaves pubescent; receptacle solitary *F. squamosa*

2b. Leaves glabrous; receptacle fascicled *F. fistulosa*

1b. Leaves alternate

3a. Leaves serrate *F. oligodon*

3b. Leaves entire

4a. Receptacle sessile *F. curtipes*

4b. Receptacle peduncled

5a. Leaves glabrous *F. nervosa*

5b. Leaves pubescent *F. auriculata*

Ficus auriculata Lour., Balakr., Fl. Jowai. 2:439. 1983; Grierson & Long, Fl. Bhut. 1.1:92. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:391. 2008; *Ficus roxburghii* Wall., King in Hook. f., Fl. Brit. Ind. 5:534. 1888; Kanjilal *et al.*, Fl. Assam 4:262. 1997(Repr.).

Low spreading trees; young branchlets hollow. Leaves alternate, broadly ovate orbicular or ovate rounded, 12-30 x 8-24 cm, apex acute or mucronate, margin entire or toothed, glabrous above, puberulus beneath, 5-7 nerved at base; base cordate, rarely rounded; petioles slightly pubescent, up to 15 cm; stipules large, ovate lanceolate, pubescent. Receptacles solitary or fascicled on short leafless branchlets and on the trunk below, turbinate, with 8-12 ridges, up to 7 cm in diameter, often depressed, minutely tuberculate.

Fl. & Fr.: August-June.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, South India and West Bengal

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1379. **PL-12**

Ficus curtipes Corner, Grierson & Long, Fl. Bhut. 1.1:94. 1983; Haridasan & Rao, Forest Fl. Megh. 2:821. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:392. 2008; *Ficus obtusifolia* Roxb., King in Hook. f., Fl. Brit. Ind. 5:507. 1888; Kanjilal *et al.*, Fl. Assam 4:242. 1997(Repr.).

Large glabrous trees; young plants often epiphytic. Bark smooth, thin, light brownish-red, exuding sticky milky latex. Leaves coriaceous, obovate or elliptic-oblong, 9-16 x 3.5-7 cm, apex rounded obtuse or very slightly and obtusely apiculate, margin

entire, slightly undulate, glabrous, faintly 3-nerved at the base; base acute or cuneate; petioles stout, up to 1.7 cm. Receptacles axillary, in pairs, sessile, chiefly at the scars of the fallen leaves, globose, sub-trigonous, apex depressed, glabrous; basal bracts 3.

Fl. & Fr.: May-February.

Distribution: India: Andaman & Nicobar Islands, Nagaland, West Bengal and North East India.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1016. **PL-12**

Ficus fistulosa Reinw. ex Blume, Bijdr. 9: 470. 1825; King in Hook, f., Fl. Brit. India 5: 525. 1888; C. E. C. Fisch. in Rec. Bot. Surv. India 12(2): 131. 1938; Kanjilal *et al*, Fl. Assam 4: 255. 1940; Comer in Gard. Bull. Singapore 21: 93. 1965.

Trees, up to 10 m high; bark brown, smooth with annular horizontal ridges at intervals. Leaves 10-20 x 3-7 cm, alternate, oblanceolate, obovate-oblong or elliptic, base obliquely cuneate, apex acuminate, margins entire, coriaceous, glabrous; lateral nerves 5-10 pairs; petioles 2-4 cm long, hispid or hirsute; stipules ovate-lanceolate. Receptacles axillary or in bunches on stems, pedunculate, globose, 1.5-2.5 cm across, orange-yellow when ripe. Male flowers few, shortly pedicellate, near apical pore; perianth lobes 2-3, imbricate; stamen 1. Gall flowers pedicellate; perianth short, tubular; stigma funnel-shaped. Female flowers perianth tubular, enclosing the base of pedicel; styles lateral, persistent. Achenes obliquely cubic, with small tubercle.

Fl. & Fr.: March-July.

Distribution: India: Andaman & Nicobar Islands, Assam, Meghalaya, Nagaland, Jharkhand, Tripura and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1469

Ficus nervosa Heyne ex Roth in Roem. & Schult., Syst. Veg. 1: 513. 1817; King in Hook, f., Fl. Brit. India 5: 512. 1888; Kanjilal *et al.*, Fl. Assam 4: 245. 1940. *F. angustifolia* Roxb. Fl. Ind., ed. 2, 3: 554. 1832.

Trees, 18-24 m high; bark brownish-pale yellow. Leaves oblong-elliptic, alternate, 5-20 x 2-8 cm, apex abruptly acuminate or apiculate, margins entire, coriaceous, glabrous; lateral nerves 8-12 pairs; petioles 1-2 cm long; stipules pubescent. Receptacles axillary, on normal leafy stems, paired or solitary, pedunculate, globose, yellowish or reddish-yellow, smooth when mature, bracteate at base; ovate, pubescent. Male flowers pedicellate; perianth lobes 2, spatulate, unequal; stamen 1. Gall flowers pedicellate or sessile; perianth lobes 3, elongate, apex acuminate; styles lateral; stigma clavate. Female flowers sessile, rarely pedicellate; perianth lobes 3, lanceolate; stigma clavate. Achenes ovoid, acuminate.

Fl. & Fr.: January-May.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Meghalaya, Nagaland and Sikkim.

Bangladesh, China, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1210. **PL-12**

Ficus oligodon Miq., Balakr., Fl. Jowai. 2:439. 1983; Grierson & Long, Fl. Bhut. 1.1:92. 1983; Haridasan & Rao, Forest Fl. Megh. 2:830. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:401. 2008; *Ficus pomifera* Wall., King in Hook. f., Fl. Brit. Ind. 5:535. 1888; Kanjilal *et al.*, Fl. Assam 4:263. 1997(Repr.).

Tall trees. Leaves alternate, boardly ovate-elliptic, 10-18 x 8-17cm, apex acute, margin coarsely and irregularly serrate, glabrous; 3-5 nerved at base; petioles up to 7 cm long. Receptacles in pairs on long peduncle borne from leafless branches or clustered on cauline and rameal tubercles from near the base of trunks or main branches, obovoid or turbinate, minutely papillose.

Fl. & Fr.: August- April.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, South India and West Bengal.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1099

Ficus squamosa Roxb., Fl. Ind. 3: 531. 1832. *Ficus saemecarpa* Miq., Ann. Mus. 3: 232. 296. 1867; King in Hook.f., Fl. Brit. India 5: 523. 1888; Kanjilal *et al.*, Fl. Assam 4: 252. 1940.

Shrubs, 1-3 m high; bark dark grey. Leaves narrow lanceolate, oblanceolate, 2.5-12 x 0.8-3 cm, base narrowed, acute, apex acuminate, margins entire, pubescent particularly along the nerves beneath; petioles densely covered with rusty hairs; stipules subpersistent, glabrous. Receptacles pedunculate, axillary, solitary, pyriform, densely covered with rusty hairs. Male flowers bracts 3 or 4, stamen 1. Gall flowers: bracts transparent; styles lateral, short. Female flowers: bracts transparent; styles persistent with long hairs. Achenes rhombic-ovoid with hairs.

Fl. & Fr.: November-June.

Distribution: India: Arunachal Pradesh, Assam, Bihar, Meghalaya, Nagaland, Odisha, Tripura, Uttarakhand and West Bengal.

China, Myanmar, Nepal and Thailand.

Specimen examined: AJNU 1017. **PL-12**

Morus L.

Deciduous trees or shrubs, with latex. Leaves alternate, simple to deeply palmately lobed, margin toothed; pinnately nerved, 3-5 basal nerves. Stipules free, lateral, caducous. Monoecious or dioecious. Male flowers in axillary spicate on short peduncle; calyx 4-lobed; stamens 4. Female flowers on sessile spikes; calyx 4-lobed, fleshy in fruit; ovary 1-celled; style present or not; stigma 2-branched, abaxially pubescent or papillose. Fruit a syncarp.

Morus macroura Miq., Pl. Jungh. 42. 1851; *M. laevigata* Wall. ex Brandis, Forest Fl. N.W. India: 409. 1874; Hook. f., Fl. Brit. Ind. 5: 492. 1888; Kanjilal *et al.*, Fl. As. 4: 274. 1940; Grierson & Long, Fl. Bhut. 1. 1: 102. 1983; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 594. 2012.

Large trees, young parts pubescent. Leaves ovate to broadly ovate, 6-17 x 5-10 cm, base cordate, oblique, apex caudate-acuminate, membranous, margins serrate, sparsely pubescent when young; petioles upto 3.5 cm long. Flowers in axillary, elongated drooping spikes, 6-12 cm long. Male spikes hairy, female spikes almost glabrous. Syncarp yellowish, fleshy.

Fl. & Fr.: March – June

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1026. **PL-12**

Streblus Lour.

Trees or shrubs; leaves pinnately nerved; stipules small; flowers dioecious; male capitate, glomerate; female solitary, 3 bracteate; fruit indehiscent, covered by the enlarged calyx.

Streblus asper Lour. Fl. Cochinch. 2: 615. 1790; Hk. f. Fl. Brit. Ind. 5: 489. 1888; Gamble, Man. Ind. Timb. 632. 1902; Brandis, Ind. Trees 615, 718. 1906; Kanjilal *et al.*, Fl. Assam 4: 276. 1940.

Small trees with a compact crown; bark pale brown or greyish-brown, warty; leaves 2-8 x 2-4 cm, elliptic, obovate to elliptic, rhomboid, acute or obtuse, base narrowed, rounded, scabrous, serrate; stipules linear-lanceolate; heads 0.5-1 cm across; flowers yellow. Fruit is berry, globose, yellow when ripe.

Fl. & Fr.: February-August

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

Specimen examined: AJNU 1041. **PL-12**

JUGLANDACEAE A. Richard ex Kunth

Trees. Leaves alternate, even- or odd-pinnate, exstipulate. Flowers unisexual. The male flowers appearing as catkin in the twigs of the previous years; perianth 3-6 lobed; stamens 2-40. The female flowers sessile on the stem of the current year, sub- solitary or spicate; perianth of 4 segments; style short, stigma 2. Fruit a drupe or nut.

Key to genera

- | | |
|--|---------------------|
| 1a. Female flowers spicate; bracts produced into a wing in fruit (nut) | <i>Engelhardtia</i> |
| 1b. Female flowers solitary; bracts not enlarged in fruit (drupe) | <i>Juglans</i> |

Engelhardtia Blume

Trees or shrubs. Leaves pinnate; leaflets entire or serrate, often glandular. Flowers monoecious. Male flowers in lateral, slender spikes; perianth with lobes unequal scales, sometimes irregularly 4-lobed, resembling calyx; stamens 4-12, sub-sessile on the scales. Female flowers in pendulous spikes; perianth 4-lobed borne on a 3-4 lobed bract; stigma 2. Fruit a nut, borne on enlarged 3-lobed bracts.

Engelhardtia spicata Blume, Hook. f., Fl. Brit. Ind. 5:595. 1886; Kanjilal *et al.*, Fl. Assam 4:299. 1997 (Repr.); Balakr., Fl. Jowai. 2:454. 1983; Grierson & Long, Fl. Bhu. 1.1:58. 1983; Haridasan & Rao, Forest Fl. Megh. 2:850. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2:424. 2008.

Trees; branches lenticellate. Leaves pinnate; leaflets 2-6 pairs, opposite or sub-opposite, 9-18 x 3-5 cm, ovate-lanceolate or elliptic-lanceolate, apex obtuse or subacute; lateral veins 8-14 pairs; base obliquely acute; petiolule short. Fruiting spike long; bracts 3, membranous, middle one enlarges in fruit up to 7 cm. Fruit a villous nut.

Fl. & Fr.: February-August.

Distribution: India (confined to N.E. India) Indo- Malaya.

Specimen examined: AJNU 1113. **PL-5**

Juglans L.

Trees; deciduous or monocious. Leaves imparipinnate; leaflets 5-31, margin serrate or rarely entire. Inflorescences lateral or terminal on old or new growth; male spike solitary, lateral on old growth, pendulous; female spike terminal on new growth, erect. Fruit a drup like nut.

Juglans regia Linn. Sp. Pl. 997. 1753; Hook. f. Fl. Brit. Ind. 5: 595. 1888; Brandis, Ind. Trees 619. 1906; Kanjilal *et al.*, Fl. Assam 4: 298.1940.

Medium sized large deciduous trees. Shoots velvety. Bark grey, fissured. Leaves imparipinnate, 15-38 cm long, thickly tomentose when young; leaflets 6-12, sessile, opposite or subopposite, 10- 20 x 5-12 cm, elliptic-oblong, often oblique, base rounded, apex acute, margin entire, coriaceous, pubescent along the lerve beneath. Male catkins green, 5-10 cm long, often in pairs. Female flowers 1-3; fruits ovoid, up to 5 cm long, glabrous or pubescent, green with yellow dots; pericarp leathery, aromatic.

Fl. & Fr.: February-August.

Distribution: India (from temperate Himalayas to N.E. India), S.E. Europe to china.

Specimen examined: AJNU 1475. **PL-5**

MYRICACEAE Rich. ex Kunth

Evergreen trees or shrubs, aromatic. Leaves alternate, simple, entire, stipules absent. Flowers unisexual, in dense spikes or heads, in axils of each bract. Male flowers with 2-4 stamens; female uni-ocular. Fruit a drupe.

Myrica L.

Description as of Myricaceae.

Myrica esculenta Buch.-Ham. ex D.Don, Prodr. Fl. Nepal. 56. 1825; Balakr., Fl. Jowai 2: 455. 1983; Haridasan & Rao, Forest Fl. Megh. 2: 851. 1987; Sinha in Singh *et al.*, Fl. Mizo. 2: 598. 2012; *M. nagi auct., non* Thunb: Hook. f., Fl. Brit. Ind. 5: 597. 1888; *M. farquhariana* Wall., Tent. Fl. Nep. 61. 1825; Kanjilal *et al.*, Fl. As. 4: 302. 1940.

Trees, 3-10 m tall, young parts pubescent. Leaves alternate, lanceolate, oblong-lanceolate or oblanceolate, 4-10 x 1.5-3 cm, base cuneate or attenuate, apex acute, margin

serrate, coriaceous, glabrous above, resinous dots beneath; petioles short. Inflorescence a spike or racemes, axillary, solitary. Male racemes 3-8 cm, rachis hairy. Female spikes 1-5 cm. Drupe ellipsoid or ovoid, tuberculate, red when ripe.

Fl. & Fr.: October - May

Distribution: India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Sumatera, Thailand, Vietnam

Specimen examined: AJNU 1431. **PL-2**

SALICACEAE Mirb.

Trees or shrubs, deciduous, fast growing. Leaves alternate, usually petiolate, simple; stipules persistent or caducous. Catkins erect or pendulous; each flower usually with a cupular disc or 1 or 2(or 3) nectariferous glands. Male flowers with 2-many stamens; filaments filiform, free or united; to connate; anthers 2(or 4)-loculed, dehiscing longitudinally. Female flowers with 1 pistil, sessile or stipitate; ovary superior, 1- or 2-loculed; ovules several to many; style 1-2; stigmas 2-4. Fruit capsular, 2-4 valved. Seeds many, minute, exalbuminous, with a basal tuft of long silky deciduous hairs.

Xylosma G. Forst.

Small trees or shrubs, deciduous; trunks often armed with thorns at base; branchlets usually with axillary thorns. Leaves alternate, chartaceous, crenato-serrate, pinnately veined; stipules absent. Flowers in axillary, bracteate racemes. Sepals 4 - 8, imbricate, scale-like, subequal. Petals absent. Disc fleshy with distinct glands. Male flowers: Stamens numerous; anthers subglobose, basifixed. Pistillode absent.

Femaleflowers; Carpels 2 -3; ovules 2 to few, placentation parietal; style usually connate; stigma usually 2 - 3-lobed. Fruit small, a rather dry berry, globose. Seeds few, obovoid.

Xylosma longifolium Clos in Ann . Sc. Nat. Ser. 4, 8: 231 1857, Hook. f. & Th. in Hook. f., Fl. Brit. India. 1:194 1872; Gamble, Man. Ind. Timb. 41. 1902; Brandis, Ind. Trees 40. 1906; Kanjilal *et al.*, Fl. Assam 1(1): 90. 1934.

Small, evergreen trees up to 10 m high; bark smooth with black warts; trunk often with robust thorns. Leaves elliptic-lanceolate, oblong-lanceolate, ovate-lanceolate or oblanceolate, usually long-acuminate, crenato-serrate along margins, 7-14 x 2.5-6 cm, glabrous, coriaceous, glossy; petioles 5 -9 mm long, glabrous. Flowers up to 6 mm across, greenish yellow in axillary pubescent bracteate racemes; bracts ovate, acuminate, pubescent. Sepals 4 - 5, ovate or orbicular. Male flowers Stamens 15 - 20; filaments filiform; Female flowers: Ovary globular, glabrous; stigma 2 -3. Berry globose, red when ripe, crowned by persistent styles.

Fl. & Fr.: December - April

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

China, Hainan, Laos, Myanmar, Nepal, Pakistan, Thailand and Vietnam.

Specimen examined: AJNU 1130. **PL-9**

ORCHIDACEAE Juss.

Herbs of various habits, either terrestrial or epiphytic. Stems and branches regularly swollen forming a pseudo-bulb. Some orchids are saprophytic with sup toly leaves. Leaves alternate, usually fleshy with sheathing base. Flowers solitary, in spikes or in racemes. Sepals 3. Petals 3, 2 are alike and the third differently shaped often with a spur forming the lip. Column formed by the union of stamens and ovary, on which the anthers and stigmatic patches are borne, separated by a flap of tissue, the beck or rostellum. The pollen borne in sacs or pollinia. Fruit a up topsule.

Key to the genera

1a. Leaves spirally arranged

2a. Plants with root stem tuberoids; rostellum shorter than anther.

3a. Stigma free in each stigmaphore *Habenaria*

3b. Stigma not free *Peristylus*

2b. Plants without root stem tuberoids rostellum subequal to the anther.

4a. Stems woody; leaves pliup tote

5a. Stems branched; inflorescence unbranches *Tropidia*

5b. Stems unbranched; inflorescence branched *Corymborkis*

4b. Stems fleshy herbaceous; leaves condupliup tote.

6a. Lip hairy or setose within *Goodyera*

- 6b. Lip not hairy
- 7a. Saprophytes, inflorescence long *Epipogium*
- 7b. Autophytes, inflorescence stout *Biermannia*
- 1b. Leaves in two rows
- 8a. Anther erect in early bud; pollinia without stipes.
 - 9a. Large veins; stigma emergent *Vanilla*
 - 9b. Small herbs; stigma not emergent
 - 10a. Epiphytic plant; pollinia 2,4,8 *Liparis*
 - 10b. Terrestrial plant; pollinia 4 or 8
 - 11a. Pollinia 4 *Crepidium*
 - 11b. Pollinia 8 *Acanthophippium*
- 8b. Anther usually operculate; pollinia with stipes.
 - 12a. Plants always monopodial
 - 13a. Pollen mass completely divided
 - 14a. Column foot absent *Acampe*
 - 14b. Column foot distinct
 - 15b. Lip with no distinct spur or sac *Thrixyspermum*

15a. Lip with distinct spur or sac	<i>Cleisostoma</i>
13b. Pollen masses not so	
16a. Pollinia porate	<i>Gastrochilus</i>
16b. Pollinia cleft or split	
17a. Column foot short, distinct	
18a. Leaves terete	<i>Papilionanthe</i>
18b. Leaves dorsoventral	
19a. Flowers arranges on four sides	<i>Aerides</i>
19b. Flowers dictichously arranges	<i>Phalaenopsis</i>
17b. Column foot absent or indistinct	<i>Vanda</i>
12b. Plants sympodial	
20a. Pollinium without stipes	<i>Cymbidium</i>
20b. Pollinium with short strap shaped stipes.	
21a. Raceme erect	<i>Eulophia</i>
21b. Raceme nodding	<i>Geodorum</i>
22a. With pseudobulbs, epiphytic	<i>Dendrobium</i>
22b. Without pseudobulbs, terrestrial	<i>Hetaeria</i>

Acampe Lindl.

Epiphytic herbs. Stems stout, leafy. Leaves distichous, leathery, fleshy, apex bilobed. Inflorescence axillary, racemose, corymbose, or paniculate; floral bracts persistent, spatulate. Flowers, small, fleshy. Sepals and petals similar; lateral sepals adnate to spur. Lip sacculate, immovable, rigid, variously lobed, fleshy, papillose; Column short, glabrous or papillose. Pollinia 4, globose.

Acampe praemorsa (Roxb.) Blatt. & McUpton J. Bombay Nat. Hist. Soc. 35: 495 (1932); A. A. Mao, N. Odyuo, D. Verma & P. Singh, Check List Fl. Nagaland. 120. 2017. *Aptompe papillosa* (Lindl.) Lindl. Fol. Orch. 2. 1853; Hynniewta, Kataki & Wadhwa, Orch. Nagaland. 28. 2000. *Saccolabium papillosum* Lindl. in Bot. Reg. t. 1552. 841; Hook.f., Fl. Brit. India. 6: 63. 1890; King & Pantl., in Ann. Roy. Bot. Gard. Up. Calcutta. 8: 219. t. 290. 1898. *Gastrochilus papillosus* (Lindl.) O. Ktze. Rev. Gen. Pl. 2: 661. 1891.

Creeping epiphyte. Stems up to 30 cm height, erect, rigid. Leaves 10-15 × 1.2-1.5 cm, linear with truncate or obliquely notched or bifid apex, coriaceous, conduplicate, sheathing at base. Inflorescence about 2-3 cm long, many flowered, subcorymbiform racemes. Flowers up to 10 mm across, yellowish with transverse brown stripes. Dorsal sepal up to 6 × 3 mm, oblong, sub-acute apex, spreading. Lateral sepals 7 × 3 mm, oblong, sub-acute apex. Petals 6 × 2 mm, oblong, sub-spathulate, narrower than the sepals. Lip 10 × 3 mm, ovate-oblong, white with orange boundary or margins in the mid portion with rose purple transverse base in centre, slightly tapering at base, light

yellowish brown. Spur cylindric up to 1, straight held as long as the ovary, hairy within. Column 3.5 mm long, very short, straight. Pollinia 2, sub-acute, deeply bi partite.

Fl. & Fr: November - December.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal.

Bangladesh, Cambodia, China, Hainan, Laos, Malaya, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1204.

Acanthophippium Blume

Plants terrestrial; roots few, short, unbranched. Pseudobulbs coniuup tol to cylindric, covered by persistent sheath fibres and leaf sheaths. Leaf jointed; petioles sheathing. Inflorescence lateral, arising from node on new shoot or pseudobulb, erect, short, few-flowered; peduncle hidden by sheaths; floral bracts leafy, boat-shaped. Flower large, showy, fleshy, urceolate to up tompanulate; ovary grooved, finely pubescent. Sepals fleshy, connate at base, forming a large, swollen tube enclosing the petals and lip. Petals elliptic to spatulate, free, appressed to the sepaline tube. Lip 3-lobed, jointed at apex of column foot; lateral lobes hatchet-shaped, erect; mid-lobe triangular to oblong, reflexed from the middle; disc variably keeled. Column straight, broad, winged; column adnate to the lateral sepals forming a mentum; stigma broadly ovate to obovate; pollinia 8, in 2 groups of 4, ellipsoid. Fruit ellipsoid, ridged.

Acanthopippium sylhetense Lindl. in Gen. Sp. Orch. 117. 1833; Hook. F., Fl. Brit. India 5: 815. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up. Calcutta 8: 112. 111. 1898. Kataki, Orch. Meghalaya 100. 1986; Deb & Imchen, Orch. Div. Nagaland 42. 20007; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 120. 2017.

Terrestrial herb. Pseudobulbs long, up to 10 cm long, with short internodes, sheathed; sheaths broadly lanceolate, acute, many-nerved, pale brown. Leaves shortly petioled, 20-30 × 7-10 cm, elliptic-lanceolate, acuminate, many-nerved. Inflorescence as long as pseudobulbs, few-flowered. Flowers up to 4.5 cm long, dull white, large. Floral bracts ovate, acute, up to 2 cm long. Sepals white, acute, 5-nerved; dorsal sepal oblong, up to 2.5 × 1.2 cm; lateral sepals broadly ovate, up to 3 × 2.2 cm. Petals white with purple dots at tip, oblong, acute, 5-nerved, up to 2.5 cm long, up to 1 cm broad. Lip dull white, up to 2.5 cm long, 3-lobed; apex yellow; side lobes broad; midlobe small, entire.

Fl. & Fr: May – June

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland Sikkim.

Bangladesh, China, Japan, Laos, Malaysia, Myanmar, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1160.

Aerides Lour.

Epiphytic herb. Stems ascending, stout, enclosed by leaf sheaths. Leaves distichous, linear-oblong to terete, leathery, fleshy, apex bilobed. Inflorescence lateral, pendulous, racemose or paniculate. Flowers medium-sized. Sepals and petals similar, broad. Petals smaller than sepals. Lip usually immovable, spurred, 3-lobed; lateral lobes decurrent on column, erect; mid-lobe medium sized, often erose; spur coniuup tol shaped, bent forward. Column elongate, often broadened at apex. Pollinia waxy, 2, subglobose.

Aerides odorata Lour. Fl. Cochinch.: 525 (1790); Lindl. in Bot. Mag. t. 4139. 1845; Hook. f., Fl. Brit. India 6:47. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up tolcutta 8: 212. T. 282. 1898; Hynniewta, Kataki& Wadhwa, Orch. Nagaland. 30. 2000; A. A. Mao, N. Odyuo, D. Verma & P. Singh, Check List Fl. Nagaland. 120. 2017. *Aerides comutum* Roxb., Fl. India. 3: 472. 1832.

Epiphytic herb. Stems 20-40 cm long, stout, semi-erect. Leaves 10-27 × 2.5-3.5 cm, linear-oblong, apex unequally 2-lobed, sheathing at base. Inflorescence terminal, raceme 15-25 cm, arched, many flowered. Flowers 2.0-2.5 cm across, widely opening, white tinged with violet at the base. Floral bracts 4.5 × 4.0 mm, triangular, acute; pedicelled ovary up to 2 cm long. Dorsal sepal 1.1-1.2 × 0.9-1.0 cm, sub-orbicular, obtuse. Lateral sepals 1.2-1.3 × 1.0-1.1 cm, obovate- sub-orbicular, obtuse. Petals 1.0-1.1 × 0.8-0.9 cm, obovate, obtuse. Lip 1.5-1.7 × 0.7-1.5 cm, 3-lobed; lateral lobes 8.9 × 2-6 mm, minutely serrate at the apex; mid lobe 1.3 × 0.4-0.5 cm, oblong-lanceolate, sub-

acute, waxy margins, longer than lateral lobes, centre with pinkish violet. Spur up to 1 cm long, stout, curved forwards and upwards, white tinged with green & pinkish violet.

Fl. & Fr: May – June

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1302.

Biermannia King & Pantl.

Plants small, monopodial, epiphytic. Stems short. Leaves fleshy, linear, unequally 2-lobed, lobules acute. Inflorescence racemose, short. Flowers small, resupinate. Sepals subequal; lateral sepal attached to column base. Lip sessile, narrowly but firmly adnate to the column foot and attached at right-angles, sides enveloping or parallel with the column, base of lip with a small slit-like opening leading to a small hidden pouch; spur absent. Column with a short foot; pollinia 2, ovoid, slightly grooved or with a small up to vity; stipes linear-oblong.

Biermannia bimaculata (King & Pantl.) King & Pantl. Ann. Roy. Bot. Gard. (Up tolcutta) 8: 200 (1898)

Epiphytic herb up to 7.5 cm tall. Stem 0.5-0.8 cm long, covered by leaf sheaths. Leaves 2.8-7.5 × 0.6-1 cm, linear-oblong, apex obliquely 2-lobed, sessile. Inflorescence stout, 2- or 3- flowered; peduncle glabrous, 1-2 cm long; floral bracts broad. Flowers

distichous, 8-9 mm across, white with two brown blotches on the lip up to the column; pedicel and ovary 4-5 mm long. Sepals similar, ovate-lanceolate, apiculate, up to 8 × 2 mm; lateral sepals attached to column foot. Petals ovate subacute, up to 6 × 1.5 mm. Lip 3-lobed, up to 4 mm; lateral lobes narrow, elongate, erect, acuminate; mid-lobe triangular, very fleshy disc with 2 elongate basal callus.

Fl. & Fr: March – April.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Specimen examined: AJNU 1272

Cleisostoma Blume

Epiphytes. Stems short or long, terete or flat, leafy throughout. Leaves fleshy terete or flat, acute or obliquely 2-lobed. Inflorescence a simple raceme or panicle, short or long, many-flowered. Flowers small, bracteate; bracts small; sepals sub-similar, spreading, free; petals smaller than the sepals, spreading, free; lip sessile at the base of column or to its foot, acute; mid-lobe triangular, spurred; spur vertically 2-chambered, with two up to two at the mouth; column short; pollinia 2, stipitate, entire or 2-partite.

Cleisostoma subulatum Blume Bijdr. Fl. Ned. Ind.: 363 (1825); Seidenf. in Dansk Bot. Ark. 29 (3); 25. t. 9. 1975; Hynniewta, Katak & Wadhwa, Orch. Nagaland. 29. 2000; A. A. Mao, N. Odyuo, D. Verma & P. Singh, Check List Fl. Nagaland. 125. 2017. *Sarup tonthussecundus* Griff; Not. 3: 362. 1848; *lc.* Fl. 336. 1851; Hook.f., Fl. Brit. India 6: 67. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up. Calcutta 8: 241. t. 321. 1898.

Epiphytic herb. Stems 15-30 cm high, slender, pendulous, many-leaved. Leaves 3-15 × 0.5-12 cm, linear-lanceolate, acute or acuminate, often with a up toudate or subulate tip. Inflorescence axillary, racemose, few-flowered, 3-5 cm long. Flowers up to 0.8 cm across, yellowish brown. Pedicelled ovary 0.5-0.7 cm long, green. Sepals and petals obtuse, yellow with intra marginal dark brown bands. Sepal up to 4 × 2 mm long, ovate-elliptic. Petals obovate-oblong, up to 3 × 1.5 mm, linear-oblong. Lip 5-6 mm long, whitish pink; side lobes white, small, triangular, acute; mid-lobe, pale pink, keeled, broadly triangular, acute, sometimes with a small subulate tip. Spur funnel shaped, 5-6 mm long, pale lemon yellow. Column up to 2 mm long, white.

Fl. & Fr: August – September.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Nagaland and Sikkim.

Bangladesh, Borneo, Cambodia, Laos, Malaysia, Myanmar, Philippines, Sulawesi, Thailand and Vietnam.

Specimen examined: AJNU 1198.

Corymborkis Thouars

Plants terrestrial, up to several metres tall; roots fasciculate, fibrous. Stem erect, sometimes branched, leafy, leaves large, pliuip tote, sheathing at base. Inflorescences axillary, racemose or paniculate, few- to manyflowered. Flowers resupinate, somewhat tubular, distichous. Sepals and petals spreading, linear-spathulate, basally connate to form a shallow cup or tube. Liplinear, channelled with recurved apex. Column long, slender, clavate; anther dorsal; rostellum bifid; pollinia 2, sectile, obovoid.

Corymborkis veratrifolia (Reinw.) Blume Coll. Orchid.: 125 (1859); Pradhan, Indian Orch. 1: 158. 1976; H.J. Chowdhery, Orch. Fl. Arunachal Pradesh 246. 1998. *Hysteriaveratrifolia* Reinw. in Bot. Zeit. 2: 5. 1825. *Corybisveratrifolia* (Reinw.) Blume, Coll. Orchid. Arch. Ind, 125. 1859; Hook.f., Fl. Brit. India 6: 91. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up tolcutta 8: 274. 1898.

Terrestrial. Stems 80-100 cm long, subterete. Leaves sessile, 17-27 × 4-6 cm, elliptic-lanceolate, up toudate-acuminate. Inflorescence panicles 4-6 cm long, few flowered. Flowers 2.0-2.5 cm across, white, fragrant. Floral bracts lanceolate, acuminate, shorter than sessile ovary. Sepals linear-oblongate, acute, the upper half with inflexed edges. Petals like sepals but flat and slightly shorter. Lip as long as the sepals with a long linear clawed appressed to the column, the apicall lobe orbicular, the edges finely erose and minutely undulate. Column narrowly cylindrical, the apex dilated.

Fl. & Fr: July – August

Distribution: Arunachal Pradesh, Assam, Manipur, Mizoram, Nagaland and Sikkim.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, New Guinea, Philippines, Queensland, Sri Lanka, Sulawesi, Sumatera, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1334.

Crepidium Blume

Herbs, terrestrial or epiphytic. Stem cylindrical to pseudobulbous, often creeping and rooting in basal part. Leaves several, thinly textured to fleshy, petiolate, petiole

sheathing at base. Inflorescence apiup tol, erect, unbranched; floral bracts persistent, often recurved or reflexed, lanceolate or setose. Flower usually not resupinate. Dorsal sepal spreading, free; lateral sepals free or fused, spreading. Petals often narrower than sepals, free, spreading. Lip erect, flat, entire to lobed, lacking a spur. Column lacking a foot; anther movable, dorsal, attached by a slender filament; pollinia 4, clavate, waxy; stigma elliptic; rostellum often obtuse or rounded at apex.

Crepidium biauratum (Lindl.) Szlach. Fragm. Florist. Geobot., Suppl. 3: 124 (1995); A.

A. Mao, N. Odyuo, D. Verma & P. Singh, Check List Fl. Nagaland 127. 2017.

Malaxisbiaurita (Lindl.) Kze. Rev. Gen. Pl. 2: 673. 18911; Kataki, Orch. Meghalaya 31.

1986. *Microstylis biaurita* Lindl. Gen. & Sp. Orch. 30. 1830; Hook.f. Fl. Brit. India 5:687. 1890.

Terrestrial. Stems 3 – 4 cm, cylindrical, sheathed. Leaves petioled, 5-8 × 1.5 cm broad, ovate-lanceolate, acute. Inflorescence a raceme 10-15 cm long, yellowish-green, slender, erect; peduncle devoid of sheaths; racemes few flowered. Flowers purplish red to green, sub-globose; bracts ovate, acute, as long as the pedicelled ovary; sepals and petals oblong, acute; petals linear, up to 5 × 0.3 mm; dorsal sepal oblong-lanceolate, up to 6 × 2 mm, apex obtuse; lateral sepal oblong-ovate, up to 5 × 2 mm, apex obtuse. Lip ovate-lanceolate; auricles narrowly ovate, acute. Column short, crenate.

Fl. & Fr: May – June

Distribution: Arunachal Pradesh, Meghalaya and Nagaland.

Bangladesh, China, Laos, Myanmar, Nepal and Thailand.

Specimen examined: AJNU 1307.

Cymbidium Sw

Epiphytic, lithophytic or terrestrial autotrophic or rarely mycotrophic herbs usually with. Pseudobulbs ovoid, ellipsoid, rarely absent. Leaves many, base of pseudobulb or rarely from axils of leaves, erect to pendulous with several flowered. Flowers large or medium sized. Sepals and petals free. Lip free or basally fused for 3–6 mm to base of column, usually 3-lobed; lateral lobes erect, often clasping column; mid-lobe often recurved. Column rather long, often narrowly winged. Pollinia 2, deeply cleft, or 4 and in unequal pairs, waxy.

Cymbidium aloifolium (L.) Sw. in Nova Acta Regiae Soc. Sci. Upsal. 6: 73.1799; Hook.f. Fl. Brit. India 6:10. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up. Colcutta 8: 189. t. 252. 1898; Kataki, Orch. Meghalaya 150. 1986; Hynniewta, Kataki & Wadhwa, Orch. Nagaland 126.2000; A. A. Mao, N. Odyuo, D. Verma & P. Singh, Check List Fl. Nagaland 127. 2017. *Epidendrum aloifolium* L., Sp. pl. 853. 1753. *Cymbidium bicolor* Hook.f., l.c. 6: 11. 1890. *Cymbidium pendulum* (Roxb.) Sw. King & Pantl. in l.c. 8: 188. t. 251. 1898.

Epiphyte. Pseudobulb 5-7 cm long, elongated-ovoid, enclosed in leaf base. Leaves 45-70 × 2.3-2.5 cm, linear-oblong, obtusely bilobed at apex, fleshy. Sp. tope 20-50 cm long, arising from the base of pseudobulbs. Inflorescence 10-30 cm long, many flowered, pendulous. Flowers 4 cm across, usually pale yellow to cream-yellow with maroon stripe, widely opening. Sepals equal, 1.9-2.1 × 0.6 cm, oblong, acute, pale yellow with maroon stripe. Petals 1.8-2.0 × 0.7 cm, elliptic-oblong, acute, slightly shorter and broader than sepals. Lip 1.3 cm long, maroon with pale yellow, disc with 2 interrupted keels, lateral lobes 4-5 × 2-4 mm, oblong, obtuse, erect; mid lobe 1.0-1.2 × 6-7 mm,

ovate-oblong, decurved. Column 1.2-1.3 cm long, curved at base. Pollinia 2 dissected, ovoid.

Fl. & Fr: April – June.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1182.

Dendrobium Sw.

Epiphytic or terrestrial. Stems rhizomatous or pseudo-bulbous. Leaves one-many, apiculate to from pseudo-bulb or arranged distichously along stem, apex usually 2-lobed or emarginate. Inflorescence racemose, 1- to many-flowered. Flowers resupinate or non-resupinate. Sepals sub-equal; lateral sepals adnate to the foot of the column. Petals similar to sepals. Lip entire to 3-lobed, base jointed to the column foot, often forming a closed spur with the lateral sepals. Column short, foot short or long, apex angled or toothed. Pollinia 4, in pairs, compressed.

Key to species

- 1a. Plants with fusiform to clavate stems or pseudobulbs, often angled, sometimes compressed; leaves 1-5, thick, nearly sheath-less, more or less, clustered at apex; leaf-sheaths insignificant.

2a. Pseudobulbs 1-leaved

D. jenkinsii

2b. Pseudobulbs 2–5-leaved

D. chrysotoxum

1b. Plants otherwise; leaves with distinct sheaths, often covering most of the internodes.

3a. Sepals and petals bright yellow to copper, never purple except sometimes on lip

D. moschatum

3b. Sepals and petals purple or white, with purple tinge or dots, rarely pure white or creamy

D. aphyllum

Dendrobium aphyllum (Roxb.) C.E.C. Fisch. J. S. Gamble, Fl. Madras 1416. 1928; Katakai, Orch. Meghalaya 61. 1986; Hynniewta, Katakai & Wadhwa, Orch. Nagaland 138. 2000; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 128. 2017. *Limodorum aphyllum* Roxb. Cor. Pl. 1: 34. t. 41. 1795. *Dendrobium cucullatum* R. Br. in Bot. Reg. 7. t. 548. 1821. *D. pierardii* Roxb. Fl. Ind. 3: 482. 1832; Hook. f., Fl. Brit. India 5: 738. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up. Calcutta 8: 51. t. 72. 1898.

Pendulous epiphyte. Stems elongate, 30-120 cm long, cylindrical, with a sub-orbicular bulbous base. Leaves 6-10 × 2.5-3.5 cm, ovate-elliptic, acuminate, sessile. Inflorescence fascicle of 1-2 flowered at the nodes. Flowers pinkish white with cream mouth, sweet scented. Floral bracts tightly clasping; ovary with pedicel up to 2 cm long, purplish. Sepals thinly coriaceous, 5-nerved, pale pinkish white; dorsal sepal linear-lanceolate to oblong-lanceolate, acute or sub-acute, 15-22 mm long; lateral sepals acute, 18-28 × 7-8 mm. Petals membranous, elliptic, broadly acute, 5-nerved, 16-25 × 9-11 mm, pinkish white. Lip sub-orbicular, 21-30 × 15-22 mm, pubescent; margins emarginate-ciliolate. Column 8-10 mm long, Pollinia yellow.

Fl. & Fr: March – April.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1094.

Dendrobium chrysotoxum Lindl. in Bot. Reg. 33: t. 19. 1847; Hook.f., Fl. Brit. India 5: 750. 1890; Hynniewta, Kataki & Wadhwa, Orch. Nagaland 140. 2000; Mao, Odyuo, Verma & Singh 128. 2017. *D. suavissimum* Reichb. F. in Gard. Chron. 406. 1874.

Epiphyte. Stem 15-25 cm long, erect, covered with white membranous sheaths, many leaved. Leaves 9-15 × 2-3 cm, sub-terminal, oblong-lanceolate, acute or unequally and obtusely 2-fid, coriaceous. Inflorescence 15-25 cm long, laxly many flowered, racemose, erect or semi-pendulous. Flowers 3.5-4.0 cm across, golden yellow to orange yellow, fragrant. Floral bracts up to 2 mm long, ovate, acute, pale brown; pedicelled ovary 3-4 cm long, yellowish green. Dorsal sepal oblong, 12-20 mm, 5-9 mm wide at middle, 7-veined, slightly obtuse; lateral sepals nearly equal to dorsal sepal; mentum subglobose, up to 4 mm wide. Petals 2.5 × 1.5 cm, broadly oblong, obtuse, 2-fid. Lip up to 2.5 cm long, yellow with one deep yellow-orange blotched and a patch of reddish nerves at base, pubescent, margins deeply fimbriate, densely papillose inside. Column up to 5 mm long, yellow. Pollinia 4, oblong.

Fl. & Fr: April - May

Distribution: Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Cambodia, China, Laos, Myanmar, Thailand and Vietnam.

pecimen examined: AJNU 1288.

Dendrobium jenkinsii Wall. ex Lindl. in Bot. Reg. 25: t. 37. 1839; Kataki, Orch. Nagaland 46. 1986; Deorani et Nathani, Orch. Nagaland 182. 1995; Mao, Odyuo, Verma & Singh 129. 2017.

A dwarf epiphyte. Pseudobulbs aggregated, compressed, fusiform, angular, 1-3 × 0.5-0.8 cm; internodes 2-3, sheathed. Leaves up to 2.5 × 1.0 cm, oblong-elliptic, thickly coriaceous, with median veins, glossy green above and paler beneath. Inflorescences 1 or 2 flowered racemes, lateral, from the upper nodes of the pseudobulbs; peduncles short, up to 1.5 cm long, sheathed at base. Flowers 2 or 3 cm across, yellow-orange. Pedicelled ovary 3.5-4.5 cm long. Sepals subequal, 5-nerved, sub-coriaceous, entire, yellow; dorsal sepal elliptic-ovate, obtuse, up to 1.3 × 0.6 cm; lateral sepals ovate, acute, up to 1.4 × 0.8 cm. Petals elliptic-ovate, 1-nerved, reticulate, up to 1.4 × 0.9 to 1.0 cm, acute or rounded at apex, erose, yellow; mentum short. Lip sub-orbicular, 2.2 × 2.1 cm, yellow. Column stout; pollinia oblong, up to 1mm long, yellow.

Fl. & Fr: March - April

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland and Sikkim.
China, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1132.

Dendrobium moschatum (Banks) Sw. Neues J. Bot. 1: 94 (1805); Schltr. Neim. J. Bot. 1: 943. 1905; Lindl. Gen. & Sp. Orch. 82. 1830; in Wall. Pl. Asiat. Rar. 2: 83.t. 195. 1831; King & Pantl. in Ann. Roy. Bot. Gard. Up tolcutta 8: 60.t. 84. 1898; Kataki, Orch. Meghalaya 51. 1986; Hynniewta, Kataki & Wadhwa, Orch. Nagaland 150. 2000; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 129. 2017. *Dendrobium uptolceolaria* Up tory in Hook. Exot. Fl.t. 184. 1825; Hook.f. Fl. Brit. Indi. 5: 744. 1890.

Epiphyte. Stems 60-180 cm high, cylindrical, stout, erect or semi erect, many leaved. Leaves 10-20 × 2-3.5 cm, lanceolate or oblong-lanceolate, apex acute or minutely notched, sessile, coriaceous. Inflorescence 1-3 flowered, 3-5 cm long, terminal or lateral, drooping. Floral bracts 4-5 mm long, oblong, acute, pale brown. Flowers 2.2-2.3 cm across, light orange-yellow. Pedicelled ovary 3.0-4.0 cm long, light, curved. Sepals subequal, up to 4 × 1.5 cm, elliptic-oblong, acute. Petals up to 3.5 × 2 cm, sub-orbicular, broader than the sepals. Lip up to 3 cm long, light cup-shaped, orange, with two large brownish purple spots inside, margins ciliate. Column 3-4 mm long, orange, stout. Pollinia 4, oblong.

Fl. & Fr: November – December

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1424.

Epipogium Borkh.

Mycotrophic herbs, without leaves, lacking chlorophyll. Roots coralloid or tuberous. Stem erect, sheathed. Flowers pendent in lax racemes. Sepals and petals similar, free, connivent or spreading. Lip sessile, apex entire or 3-lobed, spurred at base. Colum short. Pollinia 2.

Epipogium roseum (D. Don) Lindl. in J. Proc. Linn. Soc., Bot. 1: 177. 1857; Holtr. Fl. Malaya. 1: 107. Ed. 2. 1957; Katakai, Orch. Meghalaya 212. 1986; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 130. 2017. *Limodorum roseum* Don. Prodr. Fl. Nep. 30. 1825.

Terrestrial. Stems 6-20 cm long, fleshy white, glabrous. Rachis laxly 5-15 flowered. Flowers white with pale purple spots on lip, drooping; pedicel 3-7 mm. Floral bracts membranous, elliptic-lanceolate, acute, up to 5 mm long. Sepals spreading, linear - lanceolate, subacute, 10 mm long, 3-veined. Petals similar to sepals, spreading weakly, slightly shorter and wider than sepals, oblong, acute, 9 mm long. Lip elliptic, up to 10×5 mm, white, pink-spotted; margin erose. Spur up to 5 mm long, projecting backward, cylindrical, apex obtuse. Column 2-4 mm.

Fl. & Fr: May- not seen.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland and Sikkim.

Borneo, Cameroon, Africa, China, Congo, Ghana, Guinea, Hainan, India, Japan, Kenya, Laos, Malawi, Malaya, Maluku, Myanmar, Nepal, New Guinea, Nigeria, Pakistan, Philippines, Queensland, Sri Lanka, Sudan, Sulawesi, Sumatera, Taiwan, , Thailand, Uganda and Vietnam.

Specimen examined: AJNU 1171.

Eulophia R. Br.

Autotrophic or rarely mycotrophic herbs. Pseudo-bulbs usually borne horizontal below or above ground with many nodes. Leaves one to several, thin, coriaceous, appears during or after flowering. Inflorescence erect, in lateral racemes. Flowers small or large, often showy. Sepals and petals similar, free to base; lateral sepals sometimes fused to the column foot. Lip 3-lobed, spurred or not at base. Column short to long, sometimes winged. Pollinia 2.

Eulophia zollingeri (Rchb.f.) in J.J.Sm. Orch. Java: 228. 1905; Mao, Odyuo, Verma & Singh 131. 2017. *Cyrtopera zollingeri* Reichb.f. in Bonplandia 5: 38. 1857.

Saprophyte. Pseudobulbs absent. Leaves absent. Stem up to 20-55 cm long, sheathed with several well-spaced flowers. Inflorescence many flowers. Flowers 4 cm across, brownish-red. Floral bracts ovate-lanceolate, acute, longer than the pedicelled ovary, deflexed. Sepals 3-4 × 0.9-1.2 cm, ovate-lanceolate, acute. Petals 3.0-3.5 × 1.0-1.5 cm, ovate-lanceolate, acute. Lip 3 lobbed, dark brownish red, oblong in outline, sacp tote in base, lateral lobes erect with round edges, mid lobe triangular-ovate, obtuse, 2 keels in mid. Column 0.8-1.2 cm, broad at base; pollinia 2, oblong.

Fl. & Fr: April – May

Distribution: Arunachal Pradesh, Nagaland, Sikkim.

Borne, China Japan, Malaysia, Myanmar, New Guinea, Philippines, Queensland, Sri Lanka, Sulawesi, Sumatera, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1230.

Gastrochilus D. Don

Monopodial, epiphytic, medium sized herbs. Stems short or elongate, ascending or pendulous. Leaves many, arrowly elliptic, fleshy, flat, jointed, apex unequally bilobed. Inflorescence lateral, short, racemose or subumbellate, few to many flowered. Flowers small to medium-sized, fleshy. Sepals and petals free, similar, spreading. Lip firmly attached to base of column, with a sac up to the hypochile with lateral lobes reduced to often fleshy edges of sac; epichil fan-shaped, often broadly triangular, papillose, margin entire to fimbriate. Column short and thick. Pollinia waxy, 2, subglobose, porate.

Gastrochilus obliquus (Lindl.) Kuntze Revis. in Gen. Pl. 2: 661. 1891; Rastoki, B.B., Orch. Nepal 1; 252. 2009; Chowdhery, J. Orchh. Soc. India 23 (1-2): 31. 2009.
Saccolabium obliquum Lindl. in Gen. Sp. Orchid. Pl.: 1833.

Epiphytic herb. Stems 1-2 cm, stout, with 3-5 leaves. Leaves 9-18 × 2-6 cm, distichous, oblong to oblong-lanceolate, apex obtuse and unequally 2-lobed, slightly leathery. Inflorescences subumbellate, 5-8-flowered; peduncle straight, 1-2 cm, stout,

with 2 cupular sheaths. Floral bracts broadly ovate, up to 3 mm; pedicelled ovary 1-1.5 cm. Flowers yellow and white lip with brownish purplish spots. Sepals elliptic, 7-11 × 3-5 mm, base contracted, apex obtuse. Petals spatulate, smaller than sepals, apex obtuse; lip sac up to, margin lacerate or erose, yellow with purplish red spots. Column short.

Fl. & Fr: October – December.

Distribution: Assam, Meghalaya, Nagaland and Sikkim.

China, Laos, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1115.

Notes: New record for Nagaland.

Geodorum Andrews

Terrestrial. Rootstock tuberous. Pseudostems fleshy, rather short, sheathed. Sheaths 1-2, long tubular, acute. Leaves few, elliptic, acute, many nerved. Inflorescence a raceme, from the rootstock, erect, shorter than the leaves; peduncle sheathed; racemes short, decurved, many-flowered. Flowers crowded, not widely open; bracts membranous, narrow; sepals subequal, acute; petals slightly broader than the sepals, acute; lip sessile, at the base of column or at apex of the short foot of column, cymbiform; disk with or without ridges or up to; column short, stout, erect; pollinia 2, sessile or sub-sessile on a broad strap.

Geodorum densiflorum (Lam.) Schltr. Repert. Spec. Nov. Regni Veg. Beih. 4: 259. 1919; Katak, Orch. Meghalaya 156. 1986; Mao, Oduo, Verma & Singh, Check List Fl. Nagaland 132. 2017. *Limodorum densiflorum* Lam. in Encycl. 3: 516. 1795. *L.*

recervuum Roxb. 1: 34. 1795. *Geodorum purpureum* R. Br. in Ait. Hort. Kew 5: 207. 1813; Hook.f. Ind. 6: 16. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up tolcutta 8: 181. 1898.

Terrestrial. Pseudobulbs tuberous, underground, up to 4 cm diam, ovoid with concentric rings. Pseudostem lateral, from older pseudobulb, terete, sheathed, fleshy, 6-8 cm long. Leaves 13-24 × 3.5-7.0 cm, lustrous, 2-3, broadly elliptic to oblong-lanceolate, acute or subacuminate, many nerved. Peduncles 9-12 cm long, Inflorescence compact, many flowered, rachis drooping. Floral bracts narrowly lanceolate, acuminate, longer than the pedicelled ovary. Flowers 1.4-1.8 cm across, white with yellow and pinkish lip. Sepals oblong-lanceolate, sub-equal, acute, 5-nerved; dorsal sepal up to 11 × 3 mm; lateral sepals 10-11 × 3.0-3.5 mm, midvein slightly keeled. Petals subequalling the sepals, obtuse or subacute, 11.5-12.5 × 5.5-6.5 mm. Lip cymbiform, sessile at the foot of the column; disc brown dotted within the sac, 3-nerved, rugose, a big yellow and a small orange patch in the middle and a faintly papillose, purple and irregular patch. Column short, stout, erect; pollinia 2, globose, orange-yellow.

Fl. & Fr: May – June

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Borneo, Cambodia, China, Fiji, Laos, Malaysia, Maluku, Myanmar, Nepal, New Caledonia, New Guinea, Philippines, Queensland, Solomon, Sri Lanka, Sulawesi, Sumatera, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1181.

Goodyera R. Br.

Terrestrials or epiphytes. Stems creeping below, erect above, slender, noded leafy. Leaves petioled, sub-radiup tol, thick, sheathing at base. Inflorescence raceme, secund or spike, elongated, erect or decurved manyflowered. Flowers small, usually longer than broad pubescent or not; sepals and petals sub-equal, erect; dorsal sepal forming a hood with the petals; lateral sepals free; lip sessile at the base of column, sac with or without setose; column short or long, stout or slender; apex cupular; rostellum erect; pollinia 2, granular.

Key to species

- | | |
|----------------------------------|-------------------|
| 1a. Lateral sepals spreading | <i>G. fumata</i> |
| 1b. Lateral sepals not spreading | <i>G. procera</i> |

Goodyera fumata Thwaites Enum. Pl. Zeyl.: 314 (1861). *Orchiodes fumatum* (Thwaites) Kuntze, Revis. Gen. Pl. 2: 657 (1891). *Epipactisfumata* (Thwaites) Eaton in Proc. Biol. Soc. Wash. 21:64 (1908).

Plants terrestrial upto 1 m tall. Stem erect, 20-45 cm tall with 5-7 leaves. Leaves petiolate, obliquely elliptic, acuminate arising from the base of the stem up to 18 ×6.5 cm; petiole up to 5.3 cm long. Inflorescence cylindric with laxly many-flowered; peduncle greenish brown, narrowly lanceolate, puberulent, apex acuminate. Flowers opening widely, yellowish brown; ovary cylindric, sessile, up to 1cm long. Sepals pubescent on the surface; dorsal sepal oblong-lanceolate, acute puberulent, up to 6 mm

long; lateral sepals spreading, reflexed. Petals linear oblanceolate, apex obtuse. Lip rhombic-orbicular; apex produced into a long coiled linear lobes. Column pale brown, stipulate, up to 6 mm long.

Fl. & Fr: March- not seen.

Distribution: Arunachal Pradesh, Nagaland and Sikkim.

China Hainan, Myanmar, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1135.

Goodyera procera (Ker Gawl.) Hook. Exot. Fl. 1: t. 39 (1823); Fl. Brit. Ind. 6: 111. 1890. *Nettia procera* Ker. -Gawl. In Edw. Bot. Reg. 8: t. 629. 1822.

Terrestrial herb. Roots thick fibrous. Stem stout, glabrous, many leaved, enveloped in sheaths. Leaves 10-18 × 4.0-5.8 cm, narrowly elliptic or ovate elliptic, acuminate, broadly sheathing at base. Inflorescence 10-20 cm long, densely many flowered, raceme with several lanceolate, acute bracts and pubescent rachis. Flowers 0.4-0.6 cm across, white with greenish tinge, scented. Floral bract ovate-lanceolate, acuminate, green, pubescent at the edges, longer than the ovary. Sepals sub-equal, 3.5-5.0 × 3 mm, ovate, sub-obtuse, glabrous, white. Petals 0.4-0.5 × 0.2 cm, obovate, spathulate, clawed, white. Lip 4-5 mm long slightly longer than sepals, white tip light green, minutely 3-lobed. Column short, nearly 3 mm; pollinia up to 1.0 mm long, obovoid.

Fl. & Fr: April – May.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Borneo, Cambodia, China , Hainan, Japan, Myanmar, Nepal, Philippines, Sri Lanka, Sumatera, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1136.

Habenaria Willd.

Terrestrial herbs. Tubers subglobose, ellipsoid, or oblong having slender roots. Stem erect with several leaves. Leaves 1 to several, loosely arranged or tufted. Inflorescence racemose, terminal, few to many flowered. Flowers resupinate. Sepals free; dorsal sepal connivent with petals forming a hood; lateral sepals spreading and reflexed. Petals simple or bilobed; lip often 3-lobed, base often spurred. Column short, both sides often with auricles. Pollinia 2, sectile.

Key to species

- | | |
|--------------------|-----------------------|
| 1a. Petals simple | <i>H. furcifera</i> |
| 1b. Petals 2 lobed | |
| 2a. Greenish white | <i>H. digitata</i> |
| 2b. Greenish brown | <i>H. stenopetala</i> |

Habenaria digitata Lindl. in Gen. Sp. Orchid Pl.: 307. 1835; Hook. l.c 134; Seidenfaden & Arora, Enum. Orchids, N.W. Himal; Nord. J. Bot. 2: 18. 1982; Deb & Imchen, Orch. Div. Nagaland 134. 2007; Moe, Odyuo, Verma & Singh, Check List Fl. Nagaland 132. 2017.

Terrestrial herb, 20- 50 cm tall. Stems stout, sheathed at base. Leaves 11 × 4 cm, obovate-lanceolate, undulate margins, acute apex. Inflorescence raceme laxly many

flowered. Flower greenish white, 1.5-2 cm across. Sepals green; lateral sepals ovate, acute up to 11×4 mm; dorsal sepals subobicular. Petals bipartite, lower lobes narrower than the upper lobe, curved backwards. Lip 3-lobed, lobes subequal; side lobes curved backwards, shorter than the mid lobe; mid lobe straight. Spur clavate. Column 4-5 mm.

Fl. & Fr: May – June.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Cambodia, Laos, Myanmar, Nepal and Pakistan.

Specimen examined: AJNU 1318.

Habenaria furcifera Lindl. Gen. Sp. Orch. 319. 1835; Hook. f. Fl. Brit. India 6: 149. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up. Calcutta 8: 313. 1898; Deb & Imchen, Orch. Div. Nagaland 134. 2007; Mao, Odyuo, Verma & Singh, check List Fl. Nagaland 132. 2017.

Erect terrestrial herb. Stem upto 70 cm long, basal sheath overlapping, stem bracts lanceolate, acuminate. Leaves ovate-lanceolate, acuminate, 3-nerved, petiolate up to 1 cm long. Inflorescence raceme, many flowered, upto 20 cm long. Flowers greenish white or green, 3-4 cm across. Floral bracts lanceolate, acuminate, margins ciliate, up to 2×1 cm. Sepals unequal, lanceolate; dorsal sepal ovate-lanceolate, hooded, obtuse; lateral sepals lanceolate, acute, reflexed to spreading, sub-falup tote, up to 4×1 mm. Petals linear-oblong, obtuse, forming a hood with dorsal sepal, up to 3.5×1 mm. Lip 3-lobed, spurred,

side lobes pectinate; lateral lobes filiform, mid lobe linear; spur subclavate. Column stout, up to 1 mm; pollinia ovoid.

Fl. & Fr: August – September.

Distribution: Assam, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, China Laos, Myanmar, Nepal, Pakistan and Thailand.

Specimen examined: AJNU 1485.

Habenaria stenopetala Lindl. in Gen. Sp. Orchid. Pl.: 319. 1835; Hook.f., Brit. India 6: 134. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Up. Calcutta 8: 308.t. 404. 1898; Hynniewta, Katak & Wadhwa, Orch. Nagaland 200. 200; Mao, Odyuo, Verma & Singh, Check List. Fl. Nagaland 132. 2017. *Habenaria amanoana* Ohwi in J. Jap. Bot. 31: 139. 1956.

Terrestrial. Stems 30-45 cm high, stout, erect, many-leaved. Leaves 5-10 × 1-1.2 cm, oblong-lanceolate or ovate-lanceolate, acute; margin sometimes undulate. Inflorescence many flowered, dense, 10-20 cm long, erect. Flowers 2.4-2.6 cm across, greenish white. Floral bracts 0.7-0.8 cm long, longer than flowers, lanceolate, acuminate, green; pedicelled ovary 0.6-0.7 cm long, green. Sepals sub-equal, greenish white; dorsal sepal erect, ovate-elliptic, 1.5-1.6 × 0.4-0.6 cm, apex acuminate; lateral sepals reflexed, obliquely ovate, 1.7-1.9 × 0.6-0.7 cm, apex acuminate. Petals 0.6-0.7 cm long, greenish white, bi-partite nearly to the base, filiform; upper lobe 10-13 mm, linear, apex acuminate; lower lobe 2-3 mm long; lip 1.0-1.1 cm long, greenish brown, lobes filiform,

arched, unequal; lateral lobes shorter than the mid-lobe; mid lobe linear; spur drooping, green slender; column up to 2 mm long, pale green; pollinia linear-oblong, grooved.

Fl. & Fr: October – November.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland and Sikkim.

Bangladesh, China, Myanmar, Nepal, New Guinea, Philippines, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1209.

Hetaeria Blume

Plant terrestrial; rhizome short, decumbent, rooting at nodes. Stem ascending to erect, leafy. Leaves fleshy, petiolate. Inflorescence terminal, spiky, laxly to densely many-flowered. Flowers nonresupinate, small. Sepals free or gaping. Petals adherent to the dorsal sepal. Lip with a ventricose base, convex, up to lobes within; entire or with 2 lobes. Column short, with 2 parallel, keeled lamellae in front; anther dorsal, erect with distinct cells; pollinia granulate; rostellum bifid; stigma transverse, 2-lobed.

Hetaeria affinis (Griff.) Seidenf. & Ormerod *Oasis*, Suppl. 2: 9. 2001; Mao, Odyuo, Verma & Singh, *Check List Fl. Nagaland* 133. 2017. *Hetaeria rubens* (Lindl.) Benth. ex Hook.f., *Gen. Pl.* 3: 164. 1880; Hook.f. *Fl. Brit. India* 6: 115. 1890; King & Pantl. in *Ann.*

Roy. Bot. Gard. Up tolcutta 8: 300.t. 399. 1898; Hynniewta, Kataki& Wadhwa, Orch. Nagaland 202. 200.

Erect terrestrial herb. Stems 20-35 cm high, with 7-9 well spaced leaves, glabrous, terete. Leaves 7-12 × 4-5 cm, ovate to elliptic, apex acute, base obtuse. Inflorescence 15-20 cm long, pubescent, rachis densely many flowered. Flowers up to 4 mm long, greenish, purple tipped. Foral bracts 3-4 mm long, purplish brown, lanceolate, acuminate, pubescent; pedicelled ovary 4-6 mm long, pubescent. Sepals and petals up to 4 mm long; sepals green, ovate, acute, pubescent outside; petals oblique, hammer-shaped, up to 4 × 1 mm. Lip up to 5 mm long, green, white tipped, sacup tote. Column up to 2 mm long; pollinia pyriform.

Fl. & Fr: March- not seen.

Distribution: Arunachal Pradesh, Nagaland, Sikkim and Tripura.

Bangladesh, China, Laos, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1004.

Liparis Rich.

Terrestrial, epiphytic or lithophytic herbs. Pseudobulbous fleshy, clustered. Leaves 1 to several, linear to ovate, thinly textured to leathery. Inflorescences erect to pendulous, racemose, laxly or densely many flowered. Flowers small or medium-sized, yellow, green, orange, or purple. Sepals spreading, dorsal sepal free, lateral sepals sometimes fused. Petals free, often reflexed. Lip often reflexed, ovate, oblong, entire or lobed, usually with a basal up tollus, lacking a spur. Column incurved, long, winged at apex. Pollinia 4 in 2 pairs, waxy, ovoid.

Liparis viridiflora (Blume) Lindl. Gen. Sp. Orchid. Pl.: 31.1830; Hook. f., Fl. Brit. India 5: 704. 1890; Hynniewta, Kataki & Wadhwa 213. 2000. *Malaxis viridiflora* Bl. Bijdr. 392. 1825. *Liparis longipes* Lindl. in Wall. Pl. As. Rar. 1: 31. 1830.

Epiphyte. Pseudobulbs 2.5-4.5 cm high, ovoid, 2 leaved. Leaves sessile 10-15 × 1.7-2.5 cm, oblong-lanceolate, obtuse or sub-acute. Inflorescence 10-17 cm long, many flowered, arising from the top of pseudobulbs. Flowers up to 1 cm across, orange-light green. Floral bract 5-6 mm long, green, linear-lanceolate, obtuse, reflexed, margins revolute; pedicelled ovary up to 5 mm long, green. Sepals sub-equal, up to 5 × 2 mm, broadly oblong, obtuse 1-nerved, lateral sepals linear-oblong, obtuse or sub-acute. Petals up to 5 × 1 mm, oblong, acute, filiform. Lip 3-4 mm long, sessile at base, deflexed, apex triangular, acute, forming 2 ear like marginal folds. Column 2-3 mm long, orange-yellow, slightly curved, pollinia oblong.

Fl. & Fr: November - December

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, Borneo, Cambodia, China, Hainan, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Sulawesi, Taiwan, Thailand and Vietnam.

Specimen examined: AJNU 1211.

Papilionanthe Schltr.

Monopodial epiphytic herbs. Stems erect to pendulous, climbing or pendulous, elongate, terete, many noded, laxly many leaved. Leaves terete, fleshy, jointed and sheathing at

base tightly enclosing stem, persistent. Inflorescence axillary, 1-to several flowered. Flowers flat, large. Sepals and petals subsimilar, free, spreading. Petals usually larger. Lip continuous with column foot, immovable, spurred, 3-lobed; lateral lobes erect; mid-lobe often dilated and 2- or 3-lobed at apex. Column subterete, short, fleshy. Pollinia waxy, 2, shortly cleft.

Papilionanthe teres (Roxb.) Schltr. Orchis 9: 78. 1915; Katak. Orch. Meghalaya 176. 1986; Hynniewta, Katak. & Wadhwa 234. 2000; Deb & Imchen 170. 2007. Mao, Odyuo, Verma & Singh 136. 2017. *Dendrobium teres* Hook., Fl. Ind. 3: 621. 1832.

Epiphytic herb. Stems 50-150 cm tall, slender, terete, erect or sub erect with many nodes, green in colour; internodes 2.0-4.5 cm long. Leaves up to 8-12 cm long with an obtuse apex, terete. Inflorescence lateral, laxly flowered, erect. Peduncle terete, raceme alternate 3-5 flowered. Flowers 5-7 cm, large, pink with yellow base in colour, widely opening; pedicelled ovary 2-3 cm. Dorsal sepal 2.5-2.7 × 1.7-1.8 cm, oblong-elliptic, blunt; lateral sepals 2.6-2.7 × 2.2-2.3 cm, oblong-elliptic, obovate, margin slightly undulate. Petals 3.0-3.2 × 2.4-2.5 cm orbicular-elliptic, obtuse. Lip 3.6 cm long, adnate to short column foot, 3-lobed, light pink in colour with crimson spotted lines, midlobe larger than the side lobes. Spur conical in shape 2.2 cm long. Column 5-6 mm short; pollinia 2, ovoid.

Fl. & Fr.: April – May.

Distribution: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh, China, Laos, Myanmar, Nepal, Thailand and Vietnam

Specimen examined: AJNU 1051.

Peristylus Blume

Plants terrestrial orepiphytic, small to medium; tubers small, cylindrical to ellipsoid. Stem erect, bladeless sheaths at base, few to several-leaved, leaves basal, distant or inserted at middle of stem. Leaves thin, linear to broadly elliptic, uppermost bract-like. Inflorescence terminal, racemose, laxly to densely few-to many-flowered. Flowers small, resupinate. Dorsal sepal and petals forming a hood over column. Petals broad. Lip simple to 3-lobed, connate at base with the margins of the column; spur short, pouch-shaped to cylindrical. Column short; stigmas 2, sessile, convex; stigma arms 2, remote, adnate to base of lip and staminodia; pollinia 2, shortly clavate, sectile.

Peristylus constrictus Lindl. Gen. Sp. Orchid. Pl.: 300. 1835; Katakai *et al.* in Pl. Conserv. Bull. 5: 27. 1984; Deb & Imchen, Orch. Div. Nagaland 174. 2007; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 137. 2017. *Habenaria constricta* (Lindl.) Hook. f., Fl. Brit. India 6: 161. 1890.

Terrestrial herb, 20-70 cm high. Stem 15-20 cm long, sheaths at base. Leaves petioled, 7-16 × 3.5-7 cm, elliptic, apex acute, clustered at the top of stem. Inflorescence spike, many flowered, 15- 30 cm long; peduncle cylindrical; sterile bracts, lanceolate. Flowers up to 1.5 cm across, white, scented. Floral bracts lanceolate, apex acuminate. Sepals brown; dorsal sepals connate, lanceolate, up to 8 × 3 mm, apex obtuse; lateral sepals spreading linear-lanceolate, up to 8×2 mm, apex acute; petals larger than sepals, ovate-lanceolate, up to 10×4 mm; lip oblong-obovate, 3-lobes. Spur globose, 2-3 mm. Column very short and broad.

Fl. & Fr: June- not seen.

Distribution: Assam, Meghalaya, Nagaland and Sikkim.

Bangladesh, Cambodia, China, Myanmar, Nepal, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1253.

Phalaenopsis Blume

Monopodial, epiphytic, lithophytic or terrestrial herbs. Stems short, leafy, rooting at base. Leaves persistent or sometimes deciduous, alternate, distichous, oblong to broadly elliptic. Inflorescences erect to laxly pendulous, axillary pedunculate racemes or panicles. Flowers often fragrant, many, resupinate, showy, fleshy. Sepals and petals free, spreading, subsimilar; lateral sepals usually oblique and larger than dorsal sepal. Lip 3-lobed, clawed, sometimes saccup tote; lateral lobes erect and subparallel; mid-lobe oblong-elliptic, apex sometimes with a pair of appendages. Column stout with a pair of fleshy knee like protrusions. Pollinia 2 or 4.

Key to species

- | | |
|------------------------------------|---------------------|
| 1a. Lip spurred or saccup tote | <i>P. deliciosa</i> |
| 1b. Lip not spurred or saccup tote | <i>P. manii</i> |

Phalaenopsis deliciosa Rchb.f. in Bonplandia (Hannaover) 2: 93. 1854; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 136. 2017. *Kingidium deliciosum* (Rchb. F.) H. R. Sweet in Sweet in Amer. Orchid Soc. Bull. 39: 1095. 1970.

Epiphyte. Stems up to 2.5 cm long, short. Leaves 10-15 × 3-5 cm, 3 leaved, oblong-lanceolate, apex minutely and obliquely notched, dark green, undulate margins,

sessile. Inflorescence 12-15 cm long, shortly branched, shorter than the leaves, many flowered racemes, pendulous. Flowers 1.5-2.0 cm across, pale yellow with purple spotted base. Floral bracts minute, ovate, acute. Dorsal sepal up to 8.5×5.0 mm, oblong-obtuse, blunt; lateral sepals up to 7.5×5.5 mm, oblong, obtuse, shorter and broader than dorsal. Petals up to 7.5×3.5 mm, oblong, blunt. Lip yellow with pinkish-purple markings, 2-lobed. Column elongated, narrow; pollinia 4, obovoid.

Fl. & Fr: May – June.

Distribution: Arunachal Pradesh, Nagaland and Sikkim.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1088.

Phalaenopsis mannii Rchb.f. Gard. Chron. 1871: 902. 1871; Hook.f., Fl. Brit. India 6: 30. 1890; King & Pantl. Ann. Roy. Bot. Gard. Up tolcutta 197. Pl. 264. 1898. *Phalaenopsis boxall* Rchb. f. in Gard. Chron. n.s. 19: 274. 1883. *Polychilosmanii* (Rchb.f.) P. S. Shim in Malayan Nat. J. 36: 24. 1982.

Epiphyte. Stems stout, 2- 7 cm, 4-5 leaved. Leaves sessile, $20-30 \times 5-8$ cm, oblong-lanceolate, base cuneate, apex acute, coriaceous, flat. Inflorescence 6-25 cm, laxly few flowered, pendulous. Flowers 2.5-3.0 cm across, brownish-yellow, horizontal strips, fleshy. Floral bract 2-2.5 cm, ovate-lanceolate, acute, shorter than the stalk ovary. Sepals $2.0-2.2 \times 0.5-0.6$ cm, oblong-lanceolate, acute, laterals oblong-elliptic, sub-acute, $2.1-2.3 \times 0.6-0.8$ cm. Petals $2.0-2.2 \times 0.3-0.4$ cm, oblong, acute, slightly falup tote. Lip

up to 2.0 cm long, 3-lobed; lateral lobes erect, oblong, up to 4×2 mm; midlobe anchor shaped, margin erose. Column 0.5-0.7 cm long, yellow, short two-horned foot; pollinia 2, obovoid-elliptic.

Fl. & Fr: March - May

Distribution: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland and Sikkim.

China , Myanmar, Nepal and Vietnam.

Specimen examined: AJNU 1184.

Thrixspermum Lour.

Epiphytes. Stems short or long, straight or arched, few-leaved. Leaves sessile, usually arched; apex acute or lobed. Inflorescence a spike or raceme, lateral, shorter or longer than the leaves, 1-many-flowered. Flowers open in succession, usually facing upwards; bracts shorter than the pedicelled ovary, flattened; sepals and petals subequal; lip sessile at the apex of the foot of column. 3-lobed; column short, stout; pollinia in pairs, unequal, on a short broad strap.

Thrixspermum pygmaeum (King & Pantl.) Holttum Kew Bull. 14: 275. 1960; Kataki, Orch. Meghalaya 170. 1986; N. Pearce and P. T. Cribb, Orchids Bhutan 568. 2002; Luckson, Orchids Sikkim N. E. Himalaya 790. 2007. *Sarcochilus pygmaeus* King & Pantl., Ann. Roy. Bot. Gard. Up tolcutta 8: 207. 1898.

Epiphytic herb, perennial. Stem up to 3 cm long, stout, entirely clothed by leaf sheaths. Leaves sessile 6.3-9.1× 1.5-2.6 cm, sheathing at base, oblong, with emarginate and unequally bilobed apex, obtuse. Inflorescence glabrous, raceme, laxly 3-5 flowers

arising from along the stem, 6.5-14 cm long, peduncle 4-20 cm long, with small sterile bracts, rachis nodding, green with densely dark spots. Floral bracts green with dark purple dots, ovate, apex acute, $2.5 \times 1.5-2$ mm. Flowers widely opening, up to 4 mm across; sepals and petals yellow, column white with many red blotches. Sepals free, obovate, subacute to obtuse, $0.9 - 1 \times 0.4-0.5$ cm; lateral sepals slightly oblique and larger. Petals, oblanceolate, apex obtuse, 0.7-0.8 cm long, 0.2-0.25 cm wide. Lip white with red marked on adaxial and lateral lobes; adnate to the column foot, spur 3-lobed; lateral lobes erect, margin slightly erose, with irregular red stripes, mid lobe fleshy, apex obtuse. Column short; pollinia subglobose.

Fl. & Fr: May – June.

Distribution: Arunachal Pradesh, Nagaland and Sikkim.

China, Nepal, Taiwan and Vietnam.

Specimen examined: AJNU 1236.

Notes: New record for Nagaland.

Tropidia Lindl.

Plants terrestrial, with fibrous, fasciculate roots. Stem branched, or superposed, erect. Leaves sheathing. Inflorescence terminal, racemose. Flowers non-resupinate, small. Sepals connivent, free; lateral sepals more or less connate. Petals free. Lip sessile, entire or lobed, basally gibbous; often with a spur. Column short; clinandrium thin-margined; anther erect, dorsal; pollinia 2, granulose.

Tropidia angulosa (Lindl.) Blume Coll. Orchid.: 122. 1859; Hook.f. Fl. Brit. Ind. 6: 92. 1890; Fisher in Gamble, Fl. Pre. Madras 1452. 1928. *Cnemidia angulosa* Lindl., Gen. Sp. Orch. 463. 1840.

Terrestrial 20-32 cm high. Stem 0.4-0.6 cm thick, clothed with obtuse sheaths, bearing two leaves at the apex. Leaves 10-13 × 5-6 cm, broadly elliptic, many nerved, acute, widely sheathing at base. Inflorescence densely many flowered, solitary, terminal, somewhat in condensed racemes. Peduncle green, bearing numerous linear bracts equaling the flower. Flowers up to 1.5 cm, white. Floral bracts 2.5-3.0 × 0.3-0.5 cm, lanceolate, -acuminate. Sepals 1.9-2.0 × 0.3-0.5 cm, sub-equal, oblong-lanceolate; laterals sepals slightly concave. Petals 1.4-1.5 × 0.2-0.3 cm, smaller than the sepals. Lip up to 2.0 cm long, oblanceolate-oblong, obtuse, with a cylindric, blunt spur.

Fl. & Fr: August - September

Distribution: Arunachal Pradesh, Meghalaya, Nagaland and Sikkim.

Bangladesh, China, Laos, Malaysia, Myanmar, Philippines, Sumatera, Thailand, Tibet and Vietnam

Specimen examined: AJNU 1192.

Notes: New record for Nagaland.

Vanda R. Br.

Epiphytic or lithophytic. Stems leafy, usually, erect. Leaves distichous, coriaceous, sessile, jointed. Inflorescence axillary, laxly racemose. Flowers usually large and showy. Sepals and petals free, sub-equal. Lip large, 3-lobed, shortly spurred at

base. Column short, stout; foot absent. Rostellum broad. Stipes and ciscidium short, broad. Pollinia 2.

Key to species

1a. Flowers tessellated, more than 4 cm across; lip apex 2-lobed *V. bicolor*

1b. Flowers not tessellated, less than 2 cm across; lip apex not 2-lobed *V. testacea*

Vanda bicolor Griff. Not. Pl. Asiat. 3: 354. 1851; Hook.f., Fl. Brit. India 6: 52. 1890; Hynniewta, Kataki & Wadhwa, Orch. Nagaland 274. 2000; Deb & Imchen, Orch. Div. Nagaland 201. 2007; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 140. 2017.

Epiphyte. Stem 20-50 cm high, very stout, erect. Leaves 17-25 × 2.5-3.5 cm, narrowly oblong, apex obliquely, toothed or unequally and obtusely 2-lobed. Inflorescence 10-15 cm long, laxly few flowered, racemose, erect or sub-erect, stout. Flowers up to 5 cm across, white, pale purple mottled above, violet flushed beneath. Floral bract 0.4-0.5 cm long, pale brown; pedicelled ovary 4-5 cm long, white. Sepals sub-equal, up to 2.5 × 1.0 cm, obovate, obtuse, margins undulate; lateral sepals slightly deflexed in the middle. Petals up to 2.2 × 0.8 cm, obovate, obtuse, spatulate, tessellate, margins undulate. Lip up to 2.0 cm long, white, purple tinged, lateral lobes oblong or sub-orbicular, large, yellow margins, mid lobe panduriform, small, lobules short disc smooth. Column up to 0.6 cm long, whitish violet; pollinia ovoid.

Fl. & Fr: March- not seen.

Distribution: Arunachal Pradesh, Assam, Nagaland and Sikkim.

Myanmar, Nepal and Tibet.

Specimen examined: AJNU 1140.

Vanda testacea (Lindl.) Rchb.f. Gard. Chron., n.s., 8: 166. 1877; Hynniewta, Kataki & Wadhwa 276. 2000; Deb & Imchen, Orch. Div. Nagaland 203. 2007; Mao, Odyuo, Verma & Singh, Check List Fl. Nagaland 140. 2017. *Aerides testaceum* Lindl., Gen. & Sp. Orch. 238. 1833. *Vanda parviflora* Lindl. in Bot. Reg. 30 Misc. 45. 1835. Hook.f. Fl. Brit. India 6: 50. 1890.

Epiphyte. Stems 15-30 cm high, stout, erect. Leaves 7.5-10 × 0.8-1.2 cm, linear-oblong, apex obliquely truncate, toothed or unequally and obtusely bilobed. Inflorescence laxly many flowered, raceme, 5-8 cm long, erect or sub-erect. Flowers up to 1.5 cm across, creamy. Floral bracts 2-3 mm long, brown; pedicelled ovary 1-1.2 cm long, creamy. Sepals and petals 0.7-0.8 × 0.3-0.4 cm, oblong, spatulate, obtuse; lateral sepals lanceolate. Lip 0.9-1.0 cm long, creamish blue; side lobes oblong, obtuse or rounded, sometimes purple spotted towards the apex; mid-lobe oblong-lanceolate; apex erose; disc with a deep central groove; column 2-3 mm long, creamy; foot short; pollinia sub-globose.

Fl. & Fr: April – May.

Distribution: Arunachal Pradesh, Assam, Manipur, Nagaland and Sikkim.

Bangladesh, Myanmar, Nepal, Sri Lanka and Thailand.

Specimen examined: AJNU 1324.

Vanilla Plum. ex Mill.

Vines, climbing, several meters long. Stem with an aerial root and a leaf at each node. Leaves large, fleshy, shortly petiolate. Inflorescence is axillary racemes, several to many flowered. Flowers resupinate, often large. Sepals and petals similar, free, spreading. Lip often joined to sides of column with its basal margin, sometimes almost to top of column, free part often dilated, spurless, sometimes 3-lobed, disk often with hairy appendages adaxially. Column long, slender, slightly curved near top; anther inserted pointing downward; pollinia 2 or 4, granular-farinaceous. Fruit cylindrical, fleshy, often indehiscent. Seeds with stout testa, often black, wingless.

Vanilla parishii Rchb. f., in *Otia Bot. Hamburg.* 39. 1878; Ormerod, *Oasis Suppl.* 2: 9. 2001; Kumar & Kumar, *Rheedea* 15 (1): 67. 2005; A. N. Jamir *et al.*, *Int. J. Res. Stud. Biosci.* 3 (6): 8. 2015. *Vanilla pilifera* auct. Non Holtt. : *Seidenfaden, Dansk Bot. Ark.* 32(2): 142. 1978; Borthakur&Hajra, *Bull. Bot. Surv. India* 18(1-4): 228. 1976. *Vanilla borneensis* auct. Non. Rofe, K. Gogoi, *Wild Orchids Assam* 417. 2017.

Terrestrial climbing herb. Stem terete, fleshy, green, 0.4-0.6 cm thick. Leaves sub-sessile, 6-17 × 1.5-3 cm, alternate, coriaceous, elliptic, acuminate, dark green, many nerved. Inflorescence axillary, raceme with 6-14 flowers. Flowers fragrant, green with pinkish white lip. Floral bracts green, persistent, ovate, obtuse, clawed, 3-8 × 2-5 mm; pedicelled ovary, white, 5-7 cm long. Sepals pale green, lanceolate, subequal, apex obtuse, coriaceous; dorsal sepal 2.9-3 × 0.8-1.2 cm; lateral sepal 2.9-3 × 0.8-1.2 cm, hooded at apex; lip 3-lobed, 2.8 × 2.7 cm; side-lobe oblong-orbicular with pink hair

inside; midlobe oblong, margin wavy, with a tuft of pink hair; column white up to 2 cm long.

Fl. & Fr: April - May

Distribution: Assam, Manipur and Nagaland.

Bangladesh, Malaysia, Myanmar and Thailand.

Specimen examined: AJNU 1129.

ZINGIBERACEAE Martinov

Terrestrial or epiphytic, perennial or annual or perennial rhizomatous herbs. Rhizome usually present, more or less aromatic. Leaves distichous, sessile or petiolate, sheathing, linear, lanceolate or oblong, usually caudate-acuminate, glabrous or pubescent, ligulate. Flowers terminal on a stem leafy, or on a separate peduncle, spicate or paniced, sessile or sub-sessile, bisexual, zygomorphic. Bracts (primary bracts) enclosing a solitary or several flowers cincinni. Bracteoles (secondary bracts) usually present. Calyx tubular or truncate, usually 3-toothed, frequently split on one side. Corolla tubular or funnel-shaped, 3-lobed, the dorsal lobe usually somewhat larger and hooded over the rest in buds. Stamen one; filament short or long, or rarely absent; connective sometimes spurred at base or produced above forming an anther-crest or produced on sides forming wings. Lateral staminodes two, petaloid, subulate or absent. Fruit a dehiscent capsule or rarely indehiscent. Seeds arillate.

Key to the genera

1a. Lateral staminodes petaloid

2a. Anther crest long, narrow, wrapping around style and curved over labellum; Petiole pulvinate *Zingiber*

2b. Anther crest, if present, shorter, not wrapping around style; Petiole not pulvinate

3a. Filament longer than labellum, arched. Ovary unilocular *Globba*

3b. Filament shorter or longer than labellum. Ovary trilocular

4a. Bracts connate, forming pouches *Curcuma*

4b. Bracts not connate, but sometimes adnate to main axis

5a. Inflorescence on a separate, leafless shoot *Boesenbergia*

5b. Inflorescence terminal on the leafy shoot *Hedychium*

1b. Lateral staminodes small or absent

6a. Inflorescence terminal

7a. Labellum narrow, elongate, with slightly thickened edges and a deeply channeled center; lateral staminodes cup-shaped; filament strongly arched

Larsenianthus

7b. Labellum, lateral staminodes and filament not as above *Alpinia*

6b. Inflorescence basal

8a. Staminal tube present

Etilingera

8b. Staminal tube absent

9a. Anther crest distinctly trilobed

Wurfbainia

9b. Anther crest entire to subentire

10a. Anther crest semilunar, entire or trilobed; fruit smooth or prickly

Meistera

10b. Anther crest fan-shaped, obscurely trilobed; fruit winged or ridged

Amomum

Alpinia Roxb.

Rhizome creeping; roots many, stout, root tubers absent. Leafy shoots many-leaved. Leaves petiolate, large, oblong-lanceolate. Inflorescence a terminal, usually lax raceme or panicle. Bracts often absent or when present open to the base, each subtending a single flower or a cincinnus of 2-many flowers. Bracteoles present or absent, open to the base or tubular. Calyx usually tubular, shortly 3-toothed, unilaterally split. Corolla tube cylindrical, more or less than equal to or shorter than the calyx. Labellum large, showy or inconspicuous, apex variously lobed or entire. Lateral staminodes reduced to small tooth-like or absent. Anthers sessile or with a filament, connective crest or not. Ovary trilocular with axile placentation. Capsule globular.

Alpinia malaccensis (Burm. f.) Rosc., Baker in Hook. f., Fl. Brit. Ind. 6:255. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:140. 1972; M. Sabu, Zingib. & Cost. of South India 58. 2006.

Stem leafy, up to 3 m high, robust. Leaves lanceolate, acuminate, lamina 50-60 x 5-7 cm, pubescent beneath, margin wavy, fringed with hairs. Inflorescence in terminal erect racemes, 17-28 cm long, rachis stout, villous. Bracts absent. Bracteoles brownish white, split open to the base, 2-4 cm long, hairy at the apex. Calyx white, 1.5-2 cm long, shortly 3-lobed, split open at one side, hairy at the apex. Corolla tube about 1 cm long, shorter than the calyx; lobes oblong, 2.5-3 cm long, margin ciliate. Lateral staminodes, subulate, 0.5 cm long. Labellum yellow orange, striped scarlet, ovate, sides incurved, apex emarginate, 3-5 x 3 cm. Filament 1.5 cm long. Ovary pubescent. Capsule globose, becoming red at maturity.

Fl. & Fr.: May - September

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland and Tamil Nadu.

Bangladesh, Cambodia, China, Myanmar, Tibet and Vietnam.

Specimen Examined: AJNU 1274. **PL-20**

Alpinia galanga (L.) Swartz, obs.Bot.8.1971.Maranta L. Sp. Pl. ed. 2:2. 1762. *Languas galangal* Stuntz in U.S. Dept. Agr. Bull. 261: 21.1912. ; Rao & Verma in Bull. Bot. Surv. Ind. 14:140. 1972.

Rhizomatous herbs. Pseudostems upto 2.5 m high. mm; petiole up to 6 mm; Leaf blade oblong or lanceolate, 22-34 × 7--12 cm, abaxially pubescent, base attenuate, apex

acute . Panicles narrow, up to 18 × 32 cm; rachis pubescent; 3--6-flowered; bracts and bracteoles persistent. Flowers green-white, fragrant. Calyx tubular, 5--11 mm, persistent. Corolla tube 6--10 mm; lobes oblong, 1.5 -1.9 cm. Lateral staminodes purple, subulate, linear, 2--10 mm. Labellum elliptic, white with red lines, *up to* 3 cm, apex deeply bifid. Filament up to 15 mm long. Capsule brown or red on ripening.

Fl. & Fr.: June – October.

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Tamil Nadu, Tripura and West Bengal.

Bangladesh, Borneo, Cambodia, China, Malayasia, Myanmar, Philippines, Sumatera, Thailand and Vietnam.

Specimen Examined: AJNU 1153. PL-20

Alpinia nigra (Gaertner) B. L. Burtt, Notes Roy. Bot. Gard. Edinburgh. 35: 213. 1977. *Zingiber nigrum* Gaertner, Fruct. Sem. Pl. 1: 35. 1788; *Alpinia allughas* (Retz.)Rosc. in Trans. Linn. Soc. 8: 346. 1807; *Heritiera allughas* Retz. Observe. 6: 17.t.1.1791 ;Rao &Verma in Bull. Bot. Surv. Ind. 14:140. 1972.

Rhizomatous herbs. Leafy shoots 1.6--5 m. tall. Leaves sessile or subsessile; lamina lanceolate or elliptic-lanceolate, 25--44 × 7--9 cm, glabrous, base and apex acute. Panicles erect, *up to* 30 cm; bracts ovate; bracteoles funnelform, tomentose, persistent. Calyx tubular, 1.3--1.7 cm. Corolla tube up to 1 cm. Lateral staminodes subulate. Labellum obovate, up to 1.7 cm, apex bi-lobed with a pair of close median pink lines. Stamen *up to* 1.6 cm. Capsule black when dry, globose, sparsely pubescent, irregularly dehiscent, apex with flower remains.

Fl. & Fr.: July - October

Distribution: India: Assam, Kerala, Nagaland, Odisha, Tamil Nadu and Tripura.

Bangladesh, China, Myanmar, Nepal, Sri Lanka and Thailand.

Specimen Examined: AJNU 1239. **PL-20**

Amomum Roxb.

Perennial herbs with creeping rhizome. Leaves sessile or petiolate, caulin. Inflorescence radical, pedunculate, dense flowered spike. Bracts imbricating, persistent or quickly deciduous; each subtending a single flower. Bracteoles usually tubular, 2 or 3-lobed, rarely absent. Calyx tubular, 3-toothed. Corolla tube usually as long as or little longer than the calyx. Segments linear-oblong, the dorsal segment often broader and more concave. Labellum obovate, cuneate, sub entire or bilobed. Lateral staminodes subulate or absent. Stamen shorter than the lip. Fruit a capsule or a berry, smooth, sometimes winged or ridged.

Key to the species

1a. Flower yellow with a pinkish yellow median band at the base *A. subulatum*

1b. Flower white with a yellow median band and red streaks at the base

A. pauciflorum

Amomum pauciflorum Baker in Hook.f. Fl. Brit. Ind. 6: 238.1892; A.S. Rao & D.M. Verma in Bull. Bot. Surv. Ind. II: 245.1971; Rao & Verma in Bull. Bot. Surv. Ind. 14:140. 1972.

Rhizomatous stoloniferous herbs. Leafy shoots *up to* 2 m tall. Leaves Lamina oblanocelate, 29- 38 x 5-6 cm. Spikes several, distant bearing, 5-8 successively opening flowers on a very short rachis; peduncle 3.7 cm long; bracts lanceolate, up to 7.5 x 1.3 cm. with reddish cups at the lip, 1-flowered. Flowers white, calyx 3-7 cm long, split on one side; corolla lobes 3.5 – 4.7 cm long; staminodes subulate, up to 4 mm long, pinkish, hairy; labellum 4.9- 5.4 x 3.6- 4 cm, white with a fleshy orange median bands towards base, marginated with purple dots and yellow central blotch, apex notched; filament 5-9 mm long. Fruits white, hairy when young.

Fl. & Fr.: June – not seen.

Distribution: India: Meghalaya and Nagaland.

Myanmar.

Specimen Examined: AJNU 1168. **PL-20**

Amomum subulatum Roxb., Baker in Hook. f., Fl. Brit. Ind. 6:240. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:135. 1972.

Rhizomatous perennial herb *up to* 2 m tall. Leaves elliptic-lanceolate, acuminate, lamina 22-77 x 5-12 cm, glabrous. Inflorescence radical, sub-globose or clavate, up to 3-5 cm broad, peduncle up to 7 cm long. Bracts ovate to obtuse- oblong with a horny cusp, reddish brown; each bract subtends one flower. Flowers pale yellow with a pinkish yellow median band at the base. Calyx longer than the bract, lobes long sub-ulate. Corolla tube shorter than the bract. Lateral staminodes red, subulate up to 2 mm. Labellum obovate-cuneate, emarginate, up to 3 cm, white pubescent, veins conspicuous,

apex involute. Stamen shorter than the labellum. Capsule sub-globose, echinate. Capsule purple or red- brown, globose, 2- 2.6 mm in diam., having 10 undulated wings with persistent calyx.

Fl. & Fr.: April - September

Distribution:India: Arunachal Pradesh, Assam, Meghalaya and Nagaland.

Bangladesh, China, Myanmar, Nepal, and Tibet.

Specimen Examined:AJNU 1276. **PL-20**

Boesenbergia Kuntze

Rhizome creeping, small, with many roots. Leafy shoots with 3-4 leaves, axillary bulbils may or may not present. Leaves petiolate of moderate size. Inflorescence basal, directly from the rhizome or terminal enclosed within the leaf sheaths, or from the leaf axils. Each bract subtends a single flower. Bracteoles almost equal to the bracts, open to the base. Calyx short, tubular, smaller than or as long as the bracteole. Corolla tube slender, usually a little longer than the bracts; lobes sub-equal, spreading. Labellum longer than the corolla lobes and lateral staminodes, entire or emarginate. Lateral staminodes with a broad ends. Stamens about as long as the anther. Ovary trilocular. Fruit ellipsoid.

Boesenbergia kingii Mood & L.M. Prince, Gard. Bull. Singapore. 65(1): 47. 2013.

Rhizomatous herb upto 70 cm tall, with perennial root stock, Rhizome yellow inside. Stem absent. Leaves 3-5, elliptic to oblong-lanceolate, acuminate, lamina 20-8 x 8-9 cm, glabrous, base cordate or cuneate ; petiole 15-18 cm long, erect, channelled. Inflorescence in a radical spike with 4-5 flowers on a 13-22 cm long

peduncle, arising directly from the rhizome. Bracts oblong lanceolate, 5-4 cm long. Calyxtubular, shorter than the bracts. Corolla tube 4- 6 cm long ; lobes 1.5-2 cm long. Lateral staminodes petaloid, obovoid, apex rounded, white, about 2.5 cm long. Labellum oblong-cuneate, 3 x 2 cm, margin undulate, creamy white to pale yellow, throat center red, maculate with white dots. Filaments shorter than the labellum. Capsule not seen.

Fl. & Fr.: May – not seen

Distribution: India: Assam, Nagaland and Sikkim.

Bangladesh, China, Myanmar and Thailand.

Specimen Examined: AJNU 1060. PL-20

Curcuma L.

Herbs with profusely branched rhizome, roots often bearing root tubers. Leaves petiolate in basal bunches, oblong lanceolate. Inflorescence in a terminal spike, sometimes lateral or central. Spike pedunculate, compact. Bracts obovate-oblong, fused to each other in the lower part forming pouches; lower fertile bracts subtends a cincinnus of 2-7 flowers; upper sterile bracts larger, differently coloured. Calyx cylindric, split on one side with unequal lobes. Corolla tube funnel shaped. Lateral staminodes petaloid. Labellum obovate with a thickened central portion and thinner side lobes. Filament short and broad, constricted at apex; anther versatile, spurred. Capsule ellipsoid.

Key to Species

1a. Leaves finely pubescent beneath

C. aromatica

1b. Leaves glabrous beneath

C. angustifolia

Curcuma angustifolia Roxb., Baker in Hook. f., Fl. Brit. Ind. 6:210. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:121. 1972; Balakr., Fl. Jowai. 2:520. 1983.

Rhizome pale yellow, faintly aromatic. Stem leafy, 25-50 cm. Leaves elliptic to oblong-lanceolate, lamina caudate acuminate, narrowed at the base, lamina 30-40 x 8-10 cm, glabrous. Inflorescence in lateral spike, 10-15 cm long, peduncles about 10 cm long. Lower fertile bracts green ovate-lanceolate, upper sterile bracts pale purple or purple, 3-4 cm long. Calyx 1.2 cm long. Corolla tube about 2 cm long, lobes 2-2.3 cm long. Lateral staminodes 2.6-2.8 cm long. Labellum pale yellow with deeper yellow median, emarginate, apex bilobed, 2.8 cm long. Filament about 1.5 cm long.

Fl. & Fr.: May - November.

Distribution: India: Assam, Meghalaya, Nagaland and Uttarakhand.
Bangladesh, Myanmar, Nepal, Thailand and Vietnam.

Specimen Examined: AJNU 1086.

Curcuma aromatic Salisb., Baker in Hook. f., Fl. Brit. Ind. 6:210. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:122. 1972.

Rhizome yellow inside, aromatic. Stem leafy, 50-70 cm long. Leaves elliptic lanceolate, acuminate, lamina 26-43 x 11-13 cm, glabrous above, finely pubescent beneath; petiole about as long as the lamina. Inflorescence in lateral spike, 12-18 cm long, peduncles about 22 cm long. Lower fertile bracts pale green, ovate, upper sterile bracts whitish pink, ovate, 4-6 cm long. Calyx 1.6 cm long. Corolla tube up to 2.7 cm

long, lobes pinkish white, 2-2.6 cm long. Lateral staminodes 2-2.6 cm long. Labellum yellow, emarginate, obscurely 3-lobed, 2.3 cm long. Filament up to 1 cm long.

Fl. & Fr.: May - August.

Distribution. Throughout India

Native to India.

Specimen Examined: AJNU 1207.

Etilingera Gieske

Rhizome creeping. Stems leafy with many leaves. Leaves sessile. Inflorescence a basal spike, borne separately from leaves, usually enclosed by sterile bracts; each fertile bract subtends a single flower. Bracteoles tubular bracteole. Calyx tubular, split on one side; 3-lobed. Corolla tube usually long and slender. Labellum with an elongate central portion, lower part jointed to filament and forming a conspicuous tube above insertion of petals. Lateral staminodes absent. Anthers crested or not. Ovary trilocular with axile placentation. Fruit indehiscent.

Etilingera linguiformis (Roxb.) R. M. Smith, Noltie, Fl. Bhu. 3.1:207. 1994. *Amomum linguiforme* Baker in Hook. f., Fl. Brit. Ind. 6:235. 1892. *Hornstedtia linguiformis* (Schult.) K. Schum., Balakr., Fl. Jowai. 2:521. 1983. *Hornstedtia loroglossa* (Gagnep.) Schum., Rao & Verma in Bull. Bot. Surv. Ind. 14:136. 1972.

Stem leafy, 1- 2 m high. Leaves oblong- lanceolate, acuminate, lamina 40-60 x 8-15 cm, glabrous. Inflorescence radical, 8-12 cm, shortly peduncled. The outer bracts ovate, brownish; inner bracts oblong 4-6 cm, reddish purple, whitish below; each floral bracts subtends one flower. Segments oblong- lanceolate, reddish. Flowers yellow with a

red median band. Calyx slightly longer than the bract. Corolla tube almost as long as the bract. Labellum ligulate, deflexed, about 5-6 cm, bilobed, margin incurved. Stamens shorter than the labellum.

Fl. & Fr.: June-September.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal.

Bangladesh and Myanmar.

Specimen Examined : AJNU 1180. **PL-20**

Globba L.

Perennial herbs with creeping rhizomes. Leaves sessile or shortly petiolate. Inflorescence terminal. Flowers often reproduced by bulbils. Calyx funnel-shaped, shortly 3-lobed. Corolla tube much longer than the calyx lobes, lobes ovate, sub-equal, spreading. Lateral staminodes petaloid, attached to the corolla tube at the same level as corolla segments. Labellum connate to the filament in a slender tube about 1 cm above staminodes, apex usually bilobed or emarginate. Filament long, slender, with inflexed edges, strongly curved in upper part; anther not or obscurely crested, sometimes winged on sides. Fruit small, globose or sub-globose capsule.

Globba racemosa Smith, Baker in Hook. f., Fl. Brit. Ind. 6:201. 1892 ; Rao & Verma in Bull. Bot. Surv. Ind. 14:118. 1972; Balakr., Fl. Jowai. 2:523. 1983; *Globba orixensis* Roxb., Baker in Hook. f., Fl. Brit. Ind. 6:201. 1892; M. Sabu, Zingib. & Cost. of South India 112. 2006 ; *Globba clarkei* Baker in Hook. f., Fl. Brit. Ind. 6:201. 1892; Rao

& Verma in Bull. Bot. Surv. Ind. 14:118. 1972; Balakr., Fl. Jowai. 2:523. 1983. *Globba hookeri* Cl. ex Baker in Hook. f., Fl. Brit. Ind. 6:202. 1892.

Stem leafy, up to 1.5 cm long. Leaves elliptic-lanceolate, acuminate, lamina 15-25 x 2-4 cm, glabrous above, finely hairy on the mid-rib beneath. Inflorescence 20-35 cm long. Bracts linear-lanceolate, 2-3 cm. Flowers 1-3 together, yellow or orange-yellow with deeper yellow blotch at the mouth, often mostly reproduced by bulbils. Calyx up to 1 cm long. Corolla tube up to 2.5 cm long, lobes 0.7-0.8 x 0.3-0.4 cm. Lateral staminodes 1-1.5 cm long. Labellum obovate, apex bilobed, base auricled, 1.5-2 cm. Capsule globose to oblong, faintly 3-lobed, wrinkled.

Fl. & Fr.: August-November.

Distribution: India: Sikkim, Nagaland and Uttarakhand.

Bangladesh, China, Myanmar, Nepal, Thailand and Tibet.

Specimen Examined: AJNU 1293. **PL-20**

Hedychium Koenig

Terrestrial or epiphytic perennial, rhizomatous herbs. Leaves distichous, sessile or shortly petiolate. Inflorescence a terminal spike, with closely imbricating or lax bracts, each subtending one-several flowers. Bracteoles small, membranous. Calyx tubular, 3-toothed, split on one side to about 1/3 of its length from the top. Corolla tube as long as or exceeding the bract. Segments 3, narrowly linear, reflexed in the flower. Labellum broad, elliptic or obovate, clawed or not, more or less deeply bilobed, white or coloured. Lateral staminodes petaloid, usually as long as the corolla lobes but wider, white or coloured. Stamen often long exserted; anther thecae free at base, neither crested nor

spurred. Capsule globose, sometimes oblong, dehiscent by recurved valves. Seeds sub-globose with lacerate aril.

Key to Species

1a. Filaments white *H. coronarium*

1b. Filaments yellow: *H. stenopetalum*

Hedychium coronarium Koenig, Baker in Hook. f., Fl. Brit. Ind. 6:225. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:128. 1972; Balakr., Fl. Jowai. 2:527. 1983.

Stem leafy, up to 2 m high. Leaves oblong-lanceolate, acuminate, lamina 23-42 x 2.5-6 cm, glabrous above, appressed hairy beneath. Inflorescence terminal, 10-16 cm. Bracts large, obtuse-oblong, acuminate; each bract subtends 3-4 flowers. Flowers white with a pale yellow blotch at the mouth. Calyx shorter than the bracts. Corolla tube exceeding the bract by about 4-4.5 cm. Lateral staminodes obliquely spatulate, 4-5 x 2.5-3 cm. Labellum suborbicular, clawed at base, bilobed, 2.5-3 cm. Stamen shorter than the labellum; filament white.

Fl. & Fr.: August-October.

Distribution: India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

China, Myanmar, Nepal, Taiwan, Thailand and Vietnam.

Specimen Examined: AJNU 1158. PL-20

Hedychium stenopetalum Lodd., Baker in Hook. f., Fl. Brit. Ind. 6:231. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14: 133. 1972; Balakr., Fl. Jowai. 2:530. 1983.

Stem leafy, 2-3 m high. Leaves oblong-lanceolate, acuminate, lamina 46-65 x 8-12 cm, glabrous above, appressed white hairy beneath. Inflorescence terminal, erect, 42-60 cm, lax-flowered. Bracts oblong, convolute; each bract subtends 2-4 flowers. Flowers white with pale yellow blotch at the mouth. Calyx equal to or longer than the bract. Corolla tube longer than the bract. Lateral staminodes narrowly oblanceolate 2.3-3.2 x 0.5 cm. Labellum obovate, cuneate to shortly clawed, deeply bilobed 3 x 1.3 cm. Stamen longer than the labellum exceeding by about 2.5 cm; filament white.

Fl. & Fr.: August- October.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Nagaland.

Bangladesh, Myanmar, Thailand and Vietnam.

Specimen Examined: AJNU 1117. PL-21

Larsenianthus W. J. Kress & Mood

Evergreen, rhizomatous, terrestrial herbs. Rhizome much branched; roots often bearing root tubers. Leaves petiolate, oblong-lanceolate. Inflorescence terminal on leafy shoot or basal on leafless shoot, pedunculate. Flowers mature from base to apex of inflorescence. Flowers conspicuous, in cincinni of 2-6 flowers or rarely reduced to one flower in each bract. Bracts sub-coriaceous, each subtends a single flower. Calyx short, minutely toothed. Corolla tube much longer than the calyx; lateral segments oblong or lanceolate, sub-equal. Lateral staminodes petaloid. Filament as long as the labellum. Ovary 3-celled; stigma turbinate. Fruit a capsule, oblong-trigonous, finally dehiscent.

Larsenianthus careyanus (Benth.) W. J. Kress & Mood in *PhytoKeys* 1:15-32. 2010;
Hitchenia careyana Benth., Baker in Hook. f., *Fl. Brit. Ind.* 6:225. 1892; Rao & Verma in
Bull. Bot. Surv. Ind. 14:125. 1972; Balakr., *Fl. Jowai.* 2:525. 1983.

Stem leafy, 1-2 m high. Leaves oblong-lanceolate, acute, lamina 40-60 x 8-14 cm, glabrous or puberulus along midrib beneath, margin membranaceous or fringed with hairs, sub-sessile; ligules about 1 cm, hairy. Inflorescence in terminal spike, cylindric, dense flowered, 14-25 cm long. Flowers conspicuous, 4-6 per bract. Bracts obovate-cuneate, with recurved tips ; lower bracts greenish, puberulus, 3.5-5 x 1.5-2 cm ; upper bracts pale green along the middle, glabrous, 2.5-3 cm long. Bracteoles white, 3 cm long. Flowers pinkish white. Calyx about 1.2 cm long. Corolla tube about as long as the bract. Lateral staminodes minute, obovate-cuneate, emarginate, creamy white. Labellum oblanceolate, shallowly 3-lobed above, notched at the tip. Filament about 2.5 cm long. Capsule oblong.

Fl. & Fr.: October – December.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Manipur and Nagaland.
Bangladesh and Myanmar.

Specimen Examined: AJNU 1119. **PL-21**

Meistera Giseke

Mostly medium-sized to large herbs, clump forming, rarely creeping. Leafy shoots distichous, with sessile or subsessile leaf blades. Peduncles usually short, creeping or ascending, rarely longer and erect. Flowering heads mostly many-flowered, compact. Fertile bracts always subtending a single flower, soon decaying with age, not persisting until fruiting; bracteoles tubular. Labellum white with a yellow patch and red

markings. Staminodes usually small, subulate, to 3 mm long, rarely longer or absent. Anther crest well-developed, semilunar, either entire or broadly 3-lobed. Fruit echinate or smooth.

Meistera koenigii (J.F. Gmel.) Shornick. & M.F. Newman, *Taxon* 67: 26. 2018. *Amomum koenigii* J.F. Gmel., *Syst. Nat.* ed. 13, 2: 6. 1791. *Amomum corynostachyum* Wall., *Pl. Asiat. Rar.* 1: 48. 1830.

Stem leafy, 1-3 m tall. Ligule bi lobed; petiole 5-8 mm. Leaf blade lanceolate or linear-lanceolate, 30-40 × 4-10 cm, glabrous, base cuneate, apex caudate. Inflorescence a spikes, narrowly ellipsoid, 4-6 cm; bracts oblong, 2-2.6 cm × 6-8 mm; bracteoles tubular, 1.1-1.3 cm, pubescent, apex 2-cleft. Calyx up to 1.5 cm, base white villous, apex 2- or 3-lobed. Corolla tube equaling calyx, base white; lobes oblong-lanceolate, 1-1.4 cm. Labellum subrhombic, up to 1 cm × 6-8 mm, apex 2-cleft, white pubescent. Anther linear-oblong, up to 3 cm. Ovary densely brownish pubescent. Capsule ellipsoid, faintly many-ridged, hairy.

Fl. & Fr.: May – July

Distribution: India: Assam and Nagaland.

Bangladesh, China, Laos, Myanmar, Thailand and Vietnam.

Specimen Examined: AJNU 1289. **PL-21**

Meistera mizoramensis (M. Sabu, V.P. Thomas & Vanchh.) Skornick. & M. F. Newman in *Taxon*.67:26. 2018. *Amomum mizoramense* M.Sabu, V.P.Thomas & Vanchh. in *Nordic J. Bot.* 31(5): 565. 2013.

Rhizomatous stoloniferous herbs. Leafy shoots 55 – 170 cm tall, with 12 – 18 leaves per shoot. Lamina elliptic to elliptic-lanceolate, 18 – 25 x 3.0 – 5.3 cm, wavy

along margin, curled, glabrous on both surfaces; midrib glabrous. Inflorescence 5 – 14 cm long, many flowered, arises from the rhizome under soil. Fertile bract obovate, 2.6 – 4.0x 0.7 – 1.9 cm, chartaceous, pubescent externally, minutely mucronate at apex. Bracteole tubular, 2-lipped, 1.3 – 1.5 0.6 cm, membranous, pale pink. Flower 3.3 – 3.6 cm long, white to pale yellow. Calyx 3-lobed, 1.8 – 2.0 cm long, white, membranous. Corolla tube 1.2 – 1.6 long. Labellum obovate, tri-lobed with pale yellow at centre with red spots along margin. Lateral staminodes highly reduced. Stamen 1.3 – 1.5 cm long; white, glabrous. Epigynous glands 2, oblong, creamy-yellow, minutely lobed at apex. Infructescence 11 – 16 cm long, with 5 – 9 capsules per spike. Capsule sphaerical, densely echinate, red, pubescent with persistent calyx.

Fl. & Fr. : May – July.

Distribution: India: Mizoram and Nagaland.

Native to India

Specimen Examined: AJNU 1201. **PL-21**

Wurfbainia Giseke

Medium sized rhizomatous herbs often with creeping rhizomes and occasionally loosely clump-forming. Leafy shoots distichous, with sessile or almost sessile. Peduncles usually short, creeping or ascending, holding floweringheads at ground level, sometimes more or less erect. Flowering heads few- to many-flowered, lax or compact. Fertile bracts always subtending a single flower; bracteoles tubular. Labellum white with yellow patch and red marking Flowers always of exposed type with labellum more or less flat and reflexed margins, or spoon-shaped. Staminodes mostly absent, sometimes small, linear or scale-like. Anther crest composed of three small lobes, the side lobes usually pointing

upwards and the mid lobe positioned behind stigma (crown-like appearance). Fruit prominently echinate.

Wurfbainia jainii (S. Tripathi & V. Prakesh) Skrnick. & A.D. Poulsen in *Taxon* 67:30. 2018. *Amomum jainii* S. Tripathi & V. Parkash in *Nordic J. of Bot.* 19(5): 609.1999.

Rhizomatous perennial herb up to 1 m tall. Leaves petiolate; lamina up to 25-32 x 3.5-6 cm, oblong-oblongate, tip caudate, glabrous, margins pubescent, covered by wax layer beneath. Inflorescence radical, spike sub-globose, decumbent, covered with brownish ovate, imbricating, pubescent sheaths. Bracts up to 2.6 x 0.9 cm oblong, convolute, mucronate, pubescent outside, margins entire, pale brown persistent. Bracteoles tubular up to 1.9 cm long, bilobed. Flower one per bract, 3-6 open at one time, up to 6 cm long. Calyx tubular ca .5 cm long, white, 3-lobed, pubescent. Corolla-tube shorter than the calyx, pubescent outside, hairy inside, pinkish; lobes oblong, rounded, yellowish; Labellum obovate, concave up to 2.7 x 2.4 cm, white, with a fleshy red median band. Lateral staminodes subulate up to 2 mm long, hairy. Epigynous glands subulate, yellowish. Ovary up to 5 x 3 mm, pubescent, trilocular with axile placenta. Fruit ovoid, brownish, ribbed and hairy.

Fl. & Fr.: May – July.

Distribution: India: Meghalaya and Nagaland.

Native to India.

Specimen Examined: AJNU 1157. **PL-21**

Zingiber Mill.

Rhizomatous perennial herbs. Leaves sessile or sub-sessile, linear or oblong-lanceolate. Inflorescence usually radical, rarely terminal on a separate leafless shoot, compact. Bracts large, imbricate; each bract subtends one flower; bracteoles split to the base. Calyx tubular, shortly 3-lobed. Corolla tube about as long as the bracts; lobes lanceolate, dorsal lobe broader than the lateral lobes. Labellum obovate, cuneate, appear like 3-lobed with the lateral staminodes adnate to the labellum. Filament short. Capsule oblong.

Key to the species

1a. Plants 1.6- 2 m tall; labellum yellow with dark red motting at base. *Z. rubens*

1b. Plants up to 1.3 m tall; labellum cream coloured without patches at base *Z. zerumbet*

Zingiber rubens Roxb. in Asiat. Res. 11: 348.1810; Baker in Hook. f., Fl. Brit. India 6: 243. 1892.

Stems up to 40 cm high. Leaves oblong-lanceolate, 20-50 x 7-10 cm, puberulus along midrib beneath. Inflorescence a globose spike, 60 cm long; bracts ovate-oblong, 3-5 cm long; bracteoles lanceolate, 4.5-5.6 cm long. Calyx 3-4cm long, reddish, pubescent. Corolla tube 3.6-4.6 cm long, red, the lateral two fused at the base. Labellum linear oblong, 2.4-3.8 x 0.7-1.6 cm, mid lobe slightly bifid, side-lobes obscure ; anther subsessile, 1.4-2 cm long, beak 10-13 mm long, red. Capsules ellipsoid, 4 x 1 .6 cm, reddish.

Fl. & Fr.: May – September.

Distribution: India: Assam, Sikkim, Nagaland and Uttarakhand.

Bangladesh, China, Myanmar, Thailand and Vietnam.

Specimen examined: AJNU 1092. **PL-21**

Zingiber zerumbet (L.) Sm., Baker in Hook. f., Fl. Brit. Ind. 6:247. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:137. 1972; Balakr., Fl. Jowai. 2:520. 1983; M. Sabu, Zingib. & Cost. of South India 247. 2006.

Stem leafy, 1-1.5 m high. Leaves linear or oblong-lanceolate, acuminate, lamina 15-30 cm long, glabrous above, pubescent beneath, more along the midrib. Inflorescence lateral spike on a leafless 15-35 cm long peduncle; spike 5-9 x 5-7 cm, globose-oblong, rounded at the tip. Bracts ovate-obovate, rounded apex, 3 x 5 cm, densely imbricate. Bracteoles ovate-oblong, shorter than the bracts. Flowers pale yellow, delicate. Calyx 1.5-2 cm long, split on one side. Corolla tube as long as the bracts, split into 3-sub equal lobes. Labellum 3 lobed, margin crumpled, with a deeper yellow blotch in the middle, midlobe orbicular, lateral lobes ovate. Filament about 0.8 cm long. Capsule oblong.

Fl. & Frt.: August-October.

Distribution: India: Andhra Pradesh, Assam, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Tamil Nadu and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malayasia, Myanmar, Philippines, Taiwan, Thailand and Vietnam.

Specimen Examined: AJNU 1384. **PL-21**

COSTACEAE Nakai

Plants without aromatic cells. Leaves arranged spirally; leaf sheaths tubular. Inflorescence terminal. Bracts broad, imbricating; each bract subtends a large single flower. Calyx 3-lobed. Labellum conspicuous. Lateral staminodes absent. Filament petaloid. External epigynous glands absent.

Hellenia Retz.

Rhizome tuberous. Stem erect, branched or un-branched, covered with tubular sheaths towards the base. Leaves distinctly spirally arranged, shortly petiolate. Inflorescence dense globose or ellipsoid spicate, terminally on leafy stem or on short leafless shoots. Each bract subtends 1 or 2 flowers. Calyx unequally 3-lobed. Corolla tube shorter or longer than the calyx. Labellum large, obovate, the edges often crisped. Lateral staminodes absent. Stamens with a broad filament. Epigynous glands absent. Capsule 3-angled.

Hellenia speciosa (J. Koenig) S. R. Dutta, *Pleione* 7: 228. 2013. *Costus speciosus* (J. Koenig) J. E. Sm., *Trans. Linn. Soc.* 1: 249. 1800. *Banksea speciosa* J. Koenig, A.J. Retzius, *observ. Bot.* 3: 75. 1783. *Costus speciosus* var. *nipalensis* (Roscoe) Baker in Hook. f., *Fl. Brit. India* 6: 250. 1892. *Hellenia speciosa* var. *dilnavaziae* (M. R. Almeida & S.M. Almeida) S.R. Dutta, *Pleione* 7: 228.2013.

Leafy shoot up to 3 m tall. Leaves oblanceolate to obovate, acuminate, glabrous above, silky pubescent beneath. Spikes terminal, compact, ovoid or ellipsoid, up to 12 cm long. Bracts ovate-oblong, 2-3.5 x 0.8-1.5 cm, greenish red. Bracteoles 1.5 x 0.6 cm, red.

Calyx funnel shaped, 3-lobed. Flowers white. Labellum obovate –orbicular. Capsule globose-oblong, trigonous.

Fl. & Fr.: July-December.

Distribution: India: Throughout India.

Myanmar, Nepal, New Guinea, Philippines, Queensland, Sri Lanka, Taiwan, Thailand, Vietnam.

Specimen examined: AJNU 1252. **PL-22**

MARANTACEAE R.Br.

Perennials, rhizomatous, caespitose herbs or shrubs. Leaves clustered at the base and on peduncle of the inflorescence, oblong- lanceolate, petioled, pinnately nerved; petiole usually with an elongated thickening towards the apex. Inflorescence paniculate or capituliform. Flowers bisexual, often bracteolate, often borne in pairs, subtended by a prophyll.

Key to Genera

1a. Flower with a long, extended corolla tube, at least twice as long as the petals; sepals small, less than half as long as the corolla tube *Stachyphrynium*

1b. Flower with a short corolla tube, equal in length to the petal lobes or shorter; sepals large, at least half as long as the corolla tube *Phrynium*

Phrynium Willd.

Caespitose herbs without stem. Leaves large, radical, peduncular; petioles long. Inflorescence spirally condense spikes. Flowers in 2-5 subtended by prophylls. Capsule 1-3 seeded.

Phrynium pubinerve Blume, Rao & Verma in Bull. Bot. Surv. Ind. 14:141. 1972; Balakr., Fl. Jowai. 2:531. 1983. *Phrynium capitatum* Willd., Baker in Hook. f., Fl. Brit. Ind. 6:258. 1892.

Leaves oblong to ovate-oblong, cuspidate, base rounded or acute, 20-40 x 8-23 cm; petiole up to 60 cm long. Inflorescences a sessile capitulate on the upper half of the petioles. Flowers reddish-orange. Bracts green, tip yellowish-orange, hairy, 2-2.5 cm long. Capsule ellipsoid.

Fl. & Fr: June-September.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam

Specimen examined: AJNU 1281

Stachyphrynium K. Schum.

Rosulate ground herbs, rhizomes creeping. Basal leaves 1 or more. Inflorescences borne terminally on leafy shoots or on separate, leafless shoots arising directly from

rhizomes, spike like, ellipsoid or spindle-shaped; bracts distichous, usually herbaceous. Flower pairs 1-5 per bract. Sepals less than 1/2 as long as corolla tube, usually much shorter, membranous. Corolla solid, distally hollow; lobes 3, oblong, subequal. Outer staminodes 2, obovate, petaloid. Ovary often 2-loculed. Style cylindric, curved after tripping; stigma enlarged, blunted. Fruit ellipsoid, dehiscent. Seeds usually 2; aril reflexed, 2-lobed.

Stachyphrynium spicatum (Roxb.) K. Schum in Engl.Pflanzenr. IV, 50.1902. *Phrynium spicatum* Roxb., Hort. Bengal.1. 1814. *Phrynium zeylanicum* Benth., in Gen. Pl. 3: 653.1883; *Phrynium candellinum* King ex Baker in Hook. f., Fl. Brit. Ind. 6.260. 1892. *Stachyphrynium candellianum* (King ex Baker) Balakr., Bull. Bot. Surv. India 22: 176.1890.

Rhizomatous ground herb, up to 140 cm high. Leaves 1-3 per shoot; sheath 14- 45 cm long, green, glabrous; petiole up to 80 cm long, green, glabrous. Leaf blade narrowly oblong to ovate-oblong, acute to acuminate, 10.5- 45.0 x 2.0-16.4 cm, dark green above, pale below, glabrous. Inflorescence interfoliar, erect, protruding from the sheath of an accompanying leaf; peduncle 1-36 cm long. Flowers white, 3.6- 4.6 cm long; sepals 3, free linear, creamy white with reddish brown spots; corolla tube 2.2-3.0 cm long; petals lobes elliptic-oblong to oblong, acute, 8.3- 8.8 mm, white to pinkish white, translucent ; outer staminodes 2, subequal , rounded at apex; fertile stamen 1.0-1.4 mm long, with a hood-like appendages; style curved; ovary up to 2.6 mm long, glabrous or with minute hairs in the upper part. Fruit broadly ellipsoidal to narrowly obovate, 12- 16 mm. Seed 1, broadly ellipsoid, aril large with 2 long appendages.

Fl. & Fr.: May – July

Distribution: India: Andaman & Nicobar Islands, Karnataka, Kerala, Maharashtra and Nagaland.

Bangladesh, China, Laos, Myanmar and Thailand.

Specimen examined: AJNU 1228

MUSACEAE Juss.

Sub-arborescent herbs. Leaves very large, oblong with convolute leaf sheaths forming a pseudo- stem, arranged spirally. Inflorescence a terminal, erect or decurved spike on a solid fleshy scape. Flowers sub unisexual, subtended by a large bract; lower female, upper male. Calyx 3-5 lobed, split to the base at one side. Corolla wrapped around the stamens and style. Male flowers: stamens 5 perfect and one rudimentary or 0; pistillode present. Female flowers: staminodes present, ovary inferior, stigma sub-globose, 6- lobed. Fruit fleshy, oblong- elliptic, trigonous; seeds inside the fleshy pulp.

Key to the species

1a. Plant robust, petiole yellowish green, male bud broadly ovoid, flowers purplish in colour *Musa balbisiana*

1b. Plant medium sized, petiole not yellowish green, male bud lanceolate, flower yellowish in colour *Musa flaviflora*

Musa balbisiana Colla, Mem. Reale Accad. Sci. Torino 25: 384. 1820; A. Spreng. Syst. Veg. (ed. 16) 1: 832. 1825; Schult. & J.H. Schult., Syst. Veg., ed. Nov. 15 7(2):1296. 1830; D. Dietr., Syn. Pl. 2: 1199. 1840; Cheesman, Kew Bull. 3(1):11. 1948; Simmonds, Kew Bull. 14(2): 203. 1960; Argent, Notes Roy. Bot. Gard. Edinburgh 35: 80. 1976; B.D. Sharma & N.P. Singh, Fl. Karnataka 281. 1984; Karthik. *et al.*, Fl. Ind. Enum. Monocot. 4:104. 1989; Vare & Hakkinen, Taxon 58(3): 2009; Giriet *al.*, Materials Fl. Arunachal Pradesh, 3: 184. 2009.

Plant robust, suckering close to the parent plant, mature pseudostem green, up to 10 m tall, 35 cm in diameter at base; sheath glaucous. Petiole up to 68 cm long, with brown blotches, canal narrow, tightly clasping the pseudostem. Leaves spreading, lamina oblong, 190 cm long, adaxially dark green, shining, abaxially glaucous, base rounded to slightly cordate, midrib green. Inflorescence arching, downwards, to 2.6 m long, peduncle glabrous; female bud ovate, up to 45 cm long to 25 cm in diameter, bract caducous, broadly ovate, adaxially deep purple, glaucous, abaxially crimson, not revolute; flowers upto 16 in two rows. Male bud broadly ovoid to ellipsoid, bract ovate to lanceolate, persistent, purple; male flowers upto 20 per bract in 2 rows; compound tepal whitish, abaxially purplish below, yellowish; free tepal half the length of compound tepal; stamens 5, exceeding perianth. Fruit bunch pendent, compact, upto 10 hands, with 16 fruits per hand, in 2- rows; individual fruits upto 13 x 4 cm angled at maturity. Seeds irregularly globose, warty, black, surrounded by thin whitish pulp.

Fr. & Fr.: September - May

Distribution: India: Manipur, Meghalaya, Mizoram, Nagaland, Sikkim.

China, Japan, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Tibet, Vietnam.

Specimen examined: AJNU 1070. **PL-22**

Musa flaviflora N.W. Simmonds, Kew Bull., 11(3): 471. 1956, Kew Bull. 14(2):203. 1960, in Champion, Les bananiersetleur culture, 33. 1967; Karthik. *et al.*, Fl. Ind. Enum. Monocot. 4: 104. 1989; Hore *et al.*, J. Econ. Taxon. Bot. 16(2): 451. 1992; Noltie, Fl. Bhutan 3(1): 182. 1994; Hakkinen & Vare, Adansonia 30(1):77. 2008; Joe *et al.*, Ann. Pl. Sci. 2(8): 262. 2013; Hakkinen, Taxon 62(4): 810. 2013; Hakkinen *et al.*, Nordic J. Bot. 32(5):579. 2014.

Plant medium, suckering close to parent plant, mature pseudostem up to 8m tall, 20 cm in diameter at base; sheaths underlaying colour green with black blotches. Petiole up to 110 cm long, initially waxy, with black blotches, tightly clasping the pseudostem. Leaves intermediate, lamina elliptic, up to 250 cm long, apex truncate, adaxially deep green, slightly corrugated. Inflorescence arching downwards, peduncle up to 50 cm long, glabrous, light green; female bud lanceolate, up to 30 cm long, bracts pink, convolute, waxy, revolute and deciduous, ovate; basal flowers female; 18–22 flowers in 2 rows; compound tepal orange in colour, 2-keeled on the dorsal side, with 5-lobed unequal apex, orange coloured; free tepal oblong, wide, translucent yellow, simple folding under apex; staminodes 5. Male bud lanceolate, up to 28 cm long, bracts pink–reddish, slightly waxy, light reddish, convolute, lifting one bract at a time, revolute; male flowers on average 19–22 per bract in 2 rows; compound tepal 5-toothed, light orange in colour; free tepal translucent white, oblong with a short orange acumen; stamens 5, exerted. Fruit

branch compact, up to 7 hands and 16–20 fruits per hand, in 2 rows, with finger tips pointing towards the stalk; individual fruit to 12 x 2.5 cm, slightly curved. Seeds irregularly depressed angular, surface slightly warty.

Fr. & Fr.: May - June

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, West Bengal.

Specimen examined: AJNU 1071. **PL-22**

AMARYLLIDACEAE J.St. -Hil.

Perennial herbs often with bulbs, corms, rhizomes, or tubers. Leaves basal or cauline, narrow, margin entire. Inflorescence terminal or axillary, in umbels or flower solitary, often with one of few spathes. Flowers bisexual, usually actinomorphic. Perianth segments 6, in 2 whorls, free or connate to form a short tube, with or without a corona. Stamens 6, inserted at perianth throat or at base of segments; filaments sometimes basally connate; anther dorsifixed or basifixed, mostly introrse. Ovary inferior, 3-loculate, with axillary placentas; ovules 1 to numerous per locule. Fruit capsular, loculicidally dehiscent or a berry. Seed globose or sometimes flat or winged.

Crinum L.

Perennial herbs, bulbiferous. Leaves radical, basal or basally packed forming a distinct aerial stem, ligulate or ensiform, often large. Inflorescences umbellate; spathes large and broad. Flowers pedicellate or sessile. Perianth actinomorphic, salverform; lobes oblong, lanceolate, or linear, straight or curved upward. Stamens inserted at throat of perianth tube; filament suberect to declinate, filiform; anther versatile, linear. Ovary 3-loculed; ovules 2 to many per locule. Style slender; stigma capitate, small. Fruit a

capsule, subglobose, dehiscent irregularly. Seeds orbicular or angular, large.

Crinum amoenum Roxb. ex Ker-Gawl. in J. Sci. Arts London 3: 106. 1817; Hook. f., Fl. Brit. India 6: 282. 1892.

Perennial herbs. Bulbs ovoid, 4-8 cm thick. Leaves basal, ensiform, large, acuminate, 20 -50 x 2.0 -3-6 cm, smooth or scaberulous at margins; peduncles lateral, solitary, arising from the axils of old leaves, terete, 15 - 40 cm; umbel 3 -10-flowered; spathes lanceolate, 4.4-5.5 x 1.0-1.4 cm; flowers white; perianth-tube 8-12 cm; lobes lanceolate, 5-6 x 0.2-1.0 cm; stamens shorter than segments ; filaments red. Fruit a capsule, subglobose, dehiscent irregularly.

Fl. & Fr.: June - December.

Distribution: India: Assam, Maharashtra, Meghalaya, Nagaland and Sikkim. Bangladesh, Myanmar and Nepal.

Specimen examined: AJNU 1504

HYPOXIDACEAE R. Br.

Perennial herbs. Root-stock tuberous. Leaves radical, elliptic-lanceolate, lamina often pleated; shortly petioled. Inflorescence in simple or condensed raceme forming like capitulum on a leafless scape. Perianth 6-lobed. Stamens 6 fused to the base of the perianth lobes; filament free. Fruit a capsule or berry.

Key to the genera

- 1a. Leaves sessile or shortly petioled *Hypoxis*
1b. Leaves long petioled *Curculigo*

Hypoxis L.

Root-stock a corm with fibrous tunics. Leaves strongly nerved, linear. Flowers solitary, few flowered raceme or in umbels. Perianth divided up to the base, rotate. Stamens 6 on the base of the perianth segments; filament short; anthers erect, sagittate at base, dorsifixed. Ovary 3-celled; style short, stout; stigmas 3. Capsule dehiscing longitudinally.

Hypoxis aurea Lour, Hook. f., Fl. Brit. Ind. 6:277. 1892; Balakr., Fl. Jowai. 2:532. 1983; Polunin & Stainton, Flow. Hima. 417. 2008 (Repr.); Yadav & Sardesai, Fl. Kolh. Dist. 484. 2002.

Leaves sessile or shortly petioled, elliptic to linear-lanceolate, acuminate, 10-22 x 1-2.5 cm, sparsely villous pubescent; base sheathing. Flowers solitary or 2-3 on a leafless filiform, hairy scape borne in between the leaf sheath. Bracts filiform. Perianth-lobes elliptic-lanceolate, yellow; outer 3-lobes outside hairy; inner 3-lobes outside glabrous. Capsule clavate, 3-valves.

Fl. & Fr.: May-October.

Distribution: India (Throughout of India); Bangladesh, China, Cambodia, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Specimen examined: AJNU 1487

Curculigo Gaertn.

Herbs. Leaves several, basal, sessile or petiolate, usually lanceolate, plicate, leathery or papery. Inflorescences racemose, spicate, or subcapitate. Perianth often yellow, spreading, subequal, sometimes basally connate into a tube. Stamens inserted at base of perianth segments; filament very short, sometimes subequaling anther. Ovary usually hairy. Style columnar, slender; stigma 3-lobed. Fruit a berry, indehiscent, apex sometimes beaked. Seeds small, often striped.

Curculigo orchiodes Gaertn., Fruct. 1: 63. T. 16. 1788; Hk. f. Fl. Brit. India 6: 279. 1892; Haines, Bot. Bih. Or. 1812. 1924; Deb. Fl. Tripura 2: 443. 1983.

Rootstock tuberous, crowned with fibrous remains of old sheaths. Leaves linear-lanceolate, acuminate, 6-35x1-4 cm; scapes 2 cm; bracts lanceolate, 2 - 3 cm. Flowers sessile or subsessile, distichous, yellow or orange; lower bisexual; upper male; perianth lobes oblong. Fruits berry, oblong, seeds shiny-black

Fl. & Fr.: May-December.

Distribution: India(throughout); Tropical and Subtropical Asia.

Specimen examined: AJNU 1439

TACCACEAE Dumort.

Perennial herbs. Rhizomes cylindrical or tubers, broadly ellipsoid-globose. Leaves radical; petiole erect, base sheathing; lamina entire to deeply lobed at margin. Flowering stem often a long scape. Inflorescences umbels; involucre bracts up to 12 in 2 whorls, broad. Flowers bisexual, actinomorphic; bracteoles linear, narrower than bracts. Perianth

tube adnate to ovary, 6-lobed; lobes in 2 whorls, petaloid. Stamens 6, inserted on perianth lobes; filaments short, apex hooded; anthers 2-loculed. Ovary inferior; ovules many. Style short; stigma 3-lobed, usually petaloid. Fruit a berry or rarely a 3-valved capsule. Seeds many.

Tacca J. R. Forst. & G. Forst.

Perennial, rhizomatous herbs. Rhizomes tuberous. Leaves large, radical, long petioled, elliptic-ovate or oblong, entire acuminate, pinnatelynerved. Flowers in umbellate, on a long bare scape, pedicellate, bracteate, actinomorphic, bisexual, subtended by two pairs of spathaceous involucre bracts; pedicels long, slender; perianth urceolate or subcampanulate; lobes 6, bi-seriate, subequal, scarcely united at the base; stamens 6, inserted near the base of the perianth ; filaments short, dilated ; anthers sessile, dehiscent by longitudinal slits ; ovary inferior, 1-celled, with 3 parietal placentas ; ovules numerous, anatropous ; styles short ; stigmas 3, broad. Fruit a berry; seeds numerous, ovoid-elliptic, compressed.

Tacca laevis Roxb. Fl. Ind. 2: 171. 1824; Fl. Brit. Ind. 6: 288. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 15: 191. 1973.

Perennial herbs. Rhizomes subcylindric, sheathed. Leaves elliptic, ovate or oblong, 20 – 35 x 10 - 20 cm; petioles 20 - 40 cm; flowering scape 35 -70 cm. Flowers 4-15 on each scape, bluish-green or greyish-purple; pedicels 3 -4 cm; bracts many, filiform; perianth spreading, oblong, 1.0 -1.5x 0.4 -1.0 cm. Fruits obconic, turbinate, 6-ribbed, black.

Fl. & Fr.: May – December.

Distribution: India: Manipur, Meghalaya, Mizoram, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu.
China, Nepal, New Guinea, Philippines, Queensland, Sri Lanka, Taiwan, Thailand, Tibet, Vietnam.

Specimen examined: AJNU 1248. **PL-22**

DIOSCOREACEAE R. Br.

Climbing herbs with tubers. Stem often with bulbils at the axils. Leaves alternate or opposite, entire, lobed or digitately 3-5 foliolate, costate and reticulate, petiole often angular or twisted at the base. Inflorescence a paniculate racemes, spicate or fascicles in axillary or terminal. Flowers small, unisexual, and rarely bisexual. Male flower: Perianth 6-lobed in two whorls. Stamens 6 (3 perfect and 3 staminodes), inserted at the base of the perianth. Female flower: perianth similar to male but smaller. Staminodes 3, 6 or 0, styles 3, ovary inferior. Fruit a berry or 3-valves capsule.

Dioscorea L.

Stem twining to left or right, with or without recurved prickles, often with axillary bulbils. Flowers dioecious. Male flowers sessile borne singly or clustered in spikes on axillary or terminal axis. Female flowers sessile or pedicelled on axillary spikes. Capsule 3-valves.

Key to Species

- 1a. Stems twining to the right; male flowers usually sessile *D. glabra*

1b. Stem twining to the left; male flowers usually pedicelled *D. pentaphylla*

Dioscorea glabra Roxb., Fl. Ind. 3: 804. 1832; Hook. f., Fl. Brit. India 6: 294. 1892; A.S. Rao & D.M. Verma in Bull. Bot. Surv. India 15 (3 & 4): 199. 1976.

Climbing herbs, up to 10 m high, terete or faintly ridged. Leaves elliptic-ovate, 7-9 x 4.4-6 cm, apex acuminate or mucronate; base rounded or cordate, 5-7- costate; petioles 4-7 cm long. Male flowering axes on up to 80 cm long leafless branches, or on branch endings, (rarely axillary); 15- 25-flowered; bracts ovate; tepals broadly ovate, up to 1 mm ; stamens 6. Female flowering axes solitary or paired, up to 25 cm long, up to 40-flowered; bracts and tepals as in the male. Seeds inserted near middle of capsule, winged all round.

Fl. & Fr.: October - February.

Distribution: India: Almost throughout India.

Bangladesh, Cambodia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam.

Specimen examined: AJNU 1503

Dioscorea pentaphylla L., Sp. Pl. 1032. 1753; Fl. Brit. Ind. 6: 289. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 15: 193. 1973; Balakr., Fl. Jowai. 2:537. 1983.

Stem twining to left, angled, prickles present. Bulbils present, globose. Leaves alternate, 3-5 foliate; leaflets acuminate-mucronate, base acute; petiolule 0.3- 0.5 cm long; lateral nerves 5-7 pairs; petioles up to 7 cm. Male inflorescence in spikes, solitary or in pairs on axillary or terminal leafless branches. Flowers sessile, borne singly. Female inflorescence 1-3 together. Capsules oblong, winged.

Fl. & Fr.: September-May.

Distribution: India: throughout India

China, Nepal, New Guinea, Philippines, Queensland, Sri Lanka, Taiwan, Thailand, Tibet, Vietnam

Specimen examined: AJNU 1237

STEMONACEAE Engler

Root-stock tuberous or creeping; stem erect or climbing. Leaves alternate or opposite, petioled, lamina 3 or more-basal nerves with parallel cross nervules. Inflorescence axillary, regular, bisexual. Perianth 4-lobed. Stamens 4 at the base of the perianth lobes. Capsule 2-valves.

Stichoneuron Hook. f.

Erect or decumbent branched herbs with rhizomatous rootstock. Leaves alternate, petiole slightly sheathing at base; blade simple, ovate-oblong or elliptic, margin entire, apex acute-acuminate, lateral veins 2–4 pairs. Inflorescences axillary, pedunculate, with flowers arranged in clusters or raceme-like. Flowers small, perfect; pedicel stiff, articulate; bracts narrow, margins fringed, acute, persistent; perianth of 4 tepals, imbricate; stamens 4, free, filaments at base shortly adnate to tepals; anther with 2 dorsifixed thecae. Ovary superior, ovoid, minute, 1-celled, ovules 2–4, placentation apical. Fruit elongate, apex acute or beaked, green, capsular with 1–4 seeds. Seeds large, brown or reddish-brown.

Stichoneuron membranaceum Hook. f., Fl. Brit. India 6: 299. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 15: 203. f. 1-2. 1973.

Rhizomatous creeping herbs. Stem erect, 50–80 cm tall, glabrous. Petiole 1–6 mm long, blade narrowly ovate-elliptic or narrowly elliptic, 5–14 x 2–6 cm, base (broadly) rounded or short cuneate, lateral veins 2 to 3 pairs. Inflorescences subglabrous; peduncle 1.6–2 cm long, flowers 4–10, crowded. Flowers pale, subglabrous. Hermaphroditic flowers: pedicel up to 12 mm long, hypanthium enlarged, corolla up to 4 mm diam.; tepals subtriangular, adaxially glabrous, abaxially sparsely hairy; filaments up to 1 mm long. Male flowers: pedicel 3–6 mm long, corolla up to 4 mm diam. Fruits not seen.

Fl. & Fr.: May – November

Distribution: India: Assam, Nagaland, Meghalaya, Tripura.

Bangladesh, Myanmar.

Specimen examined: AJNU 1126. **PL-22**

SMILACACEAE Vent.

Climbing or straggling shrubs, with tendril like petiole and prickly stem. Leaves alternate or opposite, 3 or more nerved at base. Inflorescences axillary umbels, racemes or spikes. Perianth segments 6; stamens 6. Fruit berry.

Smilax L.

Climbing shrubs, dioecious, with short, thick rhizomes. Petiole usually narrowly winged proximally. Leaves ovate to lanceolate, main veins 3-7. Inflorescence borne in axil of leaf. Flowers small; ovary 3-loculed; stigmas 3. Fruit a berry, red to black.

Key to species

1a. Plant is a climber

S. glabra

1b. Plant is a shrub

S. perfoliata

Smilax glabra Roxb., Fl. Ind. 3: 792. 1832; Hook. f. Fl. Brit. India 6: 312. 1892.

Woody scandent shrubs. Rhizomes lobed, tuber like, occasionally branched, cylindrical. Stem branched, terete, woody, smooth, unarmed. Leaves lanceolate, 8-14 x 2-5 cm, acuminate, rounded at base, glabrous, 3-nerved. Inflorescence of 1 umbel; peduncle 8-10 mm; base thickened. Male umbels; perianth greenish white, gamophyllous, 6-angled; outer tepals broadly obovate-orbicular abaxially deeply channeled. Female umbels; tepals 6, gamophyllous, inner tepals with entire margin. Stamines 3. Carpels 3, syncarpous; stigma 3-loculed; ovary 3-chambered. Berries bluish black, 7-10 mm in diameter.

Fl. & Fr.: April-October.

Distribution: India (throughout); Bangladesh, Cambodia, China North-Central, China South-Central, China Southeast, Hainan, Laos, Myanmar, Taiwan, Thailand, Tibet, Vietnam

Specimen examined: AJNU 1355

Smilax perfoliata Lour., Fl. Coch. 622. 1790. *S. prolifera* Roxb., Fl. Indica 3: 795. 1832; Hook. f., Fl. Brit. India 6: 312. 1892. *S. roxburghiana* Wall. (Cat. N. 5115. 1832. Nom. nud.) ex Hk. f., Fl. Brit. India 6: 311. 1892.

Shrubs to 10 m high, armed with short, stout prickles. Leaves 14-20 x 6-12 cm, 5-7 nerved, apex acute, base subcordate or truncate. Petioles to 4 cm long. Wings clasping

the stem, with 2-4 tendrils. Inflorescences axillary umbels. Male flowers: perianth 5mm long, outer segments longer than inner ones; stamens 6, filaments filiform. Female flowers similar to male flowers. Berries 1-2 seeded.

Fl. & Fr.: April-October.

Distribution: India (throughout); Tropical and subtropical S.E. Asia.

Specimen examined: AJNU 1464

ASPARAGACEAE Juss.

Root-stock bulbous. Leaves basal, usually spirally arranged, entire. Inflorescence in terminal racemes, umbels or solitary. Perianth segments 6 in two whorls, free or fused at the base. Stamens 6. Style simple. Fruit a capsule or rarely berry.

Key to Genera

1a. Leaves reduced to minute membranous scales bearing 1- many cladodes at axis

Asparagus

1b. Leaves normal

2a. All leaves radical

3a. Ovary superior

Tupistra

3b. Ovary inferior

Peliosanthes

2b. Leaves cauline or radical and cauline

Dracaena

Asparagus L.

Herbs or subshrubs, dioecious or hermaphrodite, with short rhizomes. Main stems erect or climbing, with cladodes. Cladodes borne in clusters. Leaves scalelike, base spurred. Inflorescence an axillary cluster of flowers. Perianth segments free or connate at base. Stamens 6. Fruit a berry.

Asparagus racemosus Willd. Sp. PL 152. 1799; Fl. Brit. Ind. 6: 316. 1892.

Climbing perennial herbs with tuberous rootstock. Stems triquetrous. Cladodes 2 -3 together in a tuft, acute, falcate. Flowers in racemes, white. Pedicels solitary or paired, articulate above the middle; perianth 0.3 – 0.5 cm, white; anthers minute; purplish. Fruit is a berry, red or pink.

Fl. & Fr.: May - July

Distribution: India: Almost throughout India.

Africa, Angola, Bangladesh, Cambodia, Ethiopia, Gabon, Ghana, Kenya, Liberia, Madagascar, Malayasia, Maldives, Mozambique, Myanmar, Nepal, Nigeria, Oman, Pakistan, Sri Lanka, Tanzania, Thailand, Uganda, Vietnam, and Zimbabwe.

Specimen examined: AJNU 1174

Tupistra Ger Gawler

Herbs perennial, rhizomatous, monopodial. Rhizome ascending, rarely creeping, thick, stout, sometimes slightly woody. Stem very short. Leaves basal, alternate fasciculate or distichous equitant, distinctly petiolate or not; leaf blade narrowly lanceolate - ovate. Scape axillary. Inflorescence a terminal spike, 2 - many flowered,

without sterile bracts apically; bracts deltoid to ovate, usually shorter than flowers. Perianth segments 6 or 8; lobes spreading. Stamens 6 or 8; filaments nearly wholly adnate to perianth tube; anthers positioned lower than stigma, dorsifixed. Ovary 3 or 4 loculed; ovules 2 per locule. Style 1, cylindrical; stigma peltate to mushroom-shaped, fleshy. Fruit a berry, 1-seeded.

Tupistra nutans Wall, in Edw. Bot. Reg. 15: t. 1223. 1829; Fl. Brit. Ind. 6: 324. 1892.

Creeping herbs. Leaves narrowly oblanceolate, cuneate at base, acute to acuminate, 40 - 80 x 4 - 8 cm, coriaceous glossy; petioles 10-45 cm; peduncles 4-8 cm, dark purple, decurved; spikes 7-14 cm, dense-flowered; bracts deltoid, scarious; perianth cupshaped, hemispheric, pale creamy at base, dark purple above; stigma peltate, sessile, dark purple. Fruit a berry, subglobose.

Fl. & Fr.: October - January

Distribution: India: Arunachal Pradesh, Meghalaya, Nagaland and Sikkim.
Bangladesh.

Specimen examined: AJNU 1128

Peliosanthes Andrews

Perennial rhizomatous herbs with thick roots. Stem usually short. Leaves usually basal petiolate; leaf blade linear to elliptic-ovate with conspicuous, transverse veins. Scape terminating in a raceme. Flowers solitary or in clusters of 2--5, subtended by a bract; pedicel articulate near apex; Perianth segments 6, united into a tube. Stamens 6; connate in a fleshy ring, rarely free; anthers sessile. Ovary inferior to semi-inferior, 3-

loculed; ovules 2--4(or 5) per locule. Style shortly conical; stigma capitate to 3-lobed, small. Fruit dehiscent. Seeds blue at maturity, berrylike, globose.

Peliosanthes teta Andrews, Bot. Repos. 10: t. 605. 1808. *Peliosanthes bakeri* in Hook. f., Fl. Brit. Ind. 6: 267. 1892. *Peliosanthes courtallensis* Wight, Icon. Pl. Ind. Orient. T. 2052. 1853. *Peliosanthes griffithii* Baker, J. Linn. Soc. 17: 505. 1879. *Peliosanthes macrophylla* Wall. ex Baker, J. Linn. Soc., 17: 502. 1879. *Peliosanthes neilgherriensis* Wight, Icon. Pl. Ind. Orient. T. 2052. 1853.

Perennial rhizomatous herbs. Stem short. Leaves 3-8; petiole up to 30 cm, slightly compressed; leaf blade lanceolate to elliptic, 16-23 × 2-5 cm, with 5 main veins, apex acute. Inflorescence a reduced panicle, up to 15 cm; bracts lanceolate, membranous. Flowers in clusters of 2-5; bracteole 1. Perianth purple; tube mostly adnate to ovary; lobes oblong to ovate, 2.4-5 × 1.4-2 mm. Corona purple; anthers up to 0.6 mm. Style short; stigma capitate. Seeds subglobose, 5-9 mm, blue at maturity.

Fl. & Fr.: May – October

Distribution: India: Arunachal Pradesh, Kerala, Manipur, Meghalaya, Nagaland and Sikkim.

Bangladesh, Borneo, Cambodia, China, Hainan, Laos, Malaysia, Myanmar, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1082

Dracaena Vand. ex L

Plants tree like, shrubby. Stems simple or branched, sometimes woody. Leaves crowded toward apex of stems or spaced along distal part of stems, sessile or petiolate;

petiole up to 9 cm, base amplexicaul; leaf blade usually sword-shaped, veins truly parallel from base. Inflorescence terminal, branched, rarely simple. Flowers bisexual, clustered; pedicel articulate. Perianth cylindrical, campanulate, or funnelform; tube short; lobes 6. Stamens 6; anthers versatile. Ovary 3-loculed; ovules 1 or 2 per locule. Style slender; stigma capitate or 3-lobed. Fruit a berry, globose, 1-3-seeded.

Dracaena angustifolia (Medik.) Roxb., Hort. Bengal. 24. 1814; Baker in J. Bot. 11: 262. 1873 & in J. Linn. Soc. Bot. 14: 526. 1875; Kurz, Forest Fl. Burma 2: 543. 1877; Hook.f., Fl. Brit. India 6: 327. 1892; C.E. Parkinson, Forest Fl. Andaman Isl. 261. 1923; N.P. Balakr., Fl. Jowai 2: 534. 1983; Karthik. *et al.*, Fl. Ind. Enumerat., Monocot. 1. 1989; B.K. Sinha & S.K. Srivast. in Bull. Bot. Surv. India 38: 15. 2001. *Terminalis angustifolia* Medik., Theodora 83. 1786. *Pleomele angustifolia* (Medik.) N.E. Br. in Bull. Misc. Inform. Kew 1914: 277. 1914; Deb, Fl. Tripura 2: 424. 1983.

Plants shrubby, up to 5 m tall. Stems simple or few branched; bark grayish, smooth. Leaves crowded near apices of branches, subsessile; petiole up to 1 cm, base not completely covering internode; lamina sword-shaped to linear-oblongate, 20-40 × 1.6-5.8 cm. Inflorescence terminal, branched, paniculate, 20-50 cm; rachis glabrous. Flowers in clusters of 2 or 3; pedicel 7-9 mm, articulate near apex. Perianth greenish white, 1.8-2.5 cm; tube 7-9 mm; lobes 1.2-1.5 cm. Stamens 1-1.6 cm long. Berry brownish-green, orange or red when ripe, sub globose, 1-2 cm in diameter.

Fl. & Fr.: August – December

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam.

Specimen examined: AJNU 1259

COLCHICACEAE DC.

Perennial herbs or climbers. Leaves alternate, spiral, distichous, petiolate or sessile, leaf blade entire, linear to lanceolate; parallel-veined. Inflorescences scapiflorous or non scapiflorous in terminal or axillary, or leaf opposed cymes, racemes or umbels. Flowers hypogynous, hermaphrodite. Perianth of 6 tepals, united to form a tube or split to the base. Stamens 6, inserted at the bases of the perianth segments, included; anthers extrorse. Carpels 3; ovary sessile, trilocular, styles 3, free to the base or united within the perianth tube; ovules many. Fruit capsular, dehiscence septicidal.

Key to the genera

1a. Plants cormous, perianth segments strongly reflexed and neither saccate nor spurred at base *Gloriosa*

1b. Plants not cormous, perianth segments not strongly reflexed and saccate or spurred at base *Disporum*

Gloriosa L.

Perennial herbs with a stout, tuberous rhizome. Stem sometimes branched and scandent. Leaves cauline, alternate, opposite, or whorled, subsessile, apex bearing a tendril. Flowers few, long pedicellate, large, showy. Tepals 6, free, spreading or reflexed, persistent. Stamens 6, inserted at base of tepals; filaments filiform; anthers versatile.

Ovary 3-loculed; ovules many per locule. Style long, filiform, apically 3-lobed, adaxially stigmatic. Fruit a capsule. Seeds subglobose; testa bright red, spongy.

Gloriosa superba L., Sp. Pl. 305. 1753; Hook. f., Fl. Brit. India 6: 358. 1892.

Perennial rhizomatous climbing herbs. Stem scandent, 2-4 m or more, rather slender. Leaves alternate or occasionally also opposite, sessile or shortly petiolate, lanceolate to ovate-lanceolate, 6-14 cm, apex long caudate with a tendril. Flowers nodding; pedicel 10-15 cm. Tepals reflexed, bright red, proximally tinged with yellow, linear-oblongate, 4.6-6 cm × 6-10 mm, base slightly clawed, margin much crisped. Filaments 3-5 cm; anthers up to 1 cm. Style 2.3-3.6 cm; stigmatic lobes 6-9 mm long. Fruit a capsule. Seeds globose to subglobose; testa bright red, spongy.

Fl. & Fr.: June – December

Distribution. India: Almost throughout India

Angola, Bangladesh, Borneo, Botswana, Cambodia, Cameroon, Africa, China, Ethiopia, Gabon, Ghana, Guinea, Kenya, Madagascar, Malaysia, Maldives, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, Sri Lanka, Sudan, Sulawesi, Sumatera, Tanzania, Thailand, Uganda, Vietnam, and Zimbabwe.

Specimen examined: AJNU 1176. **PL-21**

Disporum Salisb.

Perennial, shortly rhizomatous herbs, sometimes long stoloniferous, often glabrous. Roots fleshy. Stem erect, simple or branched with 1 to several sheaths proximally. Leaves concentrated in distal part of stem, alternate, often shortly petiolate, sometimes sessile, linear to suborbicular, 3-7-veined. Inflorescences terminal or

pseudolateral, umbellate or with flowers paired or solitary; bract absent. Flowers bisexual, sometimes horizontal, tubular-campanulate. Tepals 6, free, white, greenish, yellow, pink, dark red, or dark purple, often saccate or spurred at base. Stamens 6, inserted at base of tepals; filaments usually flat; anthers basifixed, extrorse. Ovary 3-loculed; ovules 2-6 per locule. Style filiform, 3-lobed. Fruit a berry, dark blue to black, 2(-6)-seeded.

Key to the species

- 1a. Perianth lobes spatulate, saccate at base *Diporum cantoniense*
- 1b. Perianth lobes lanceolate, long spurred at base *Disporum calcaratum*

Disporum calcaratum D.Don, Proc. Linn. Soc. London 1: 45. 1839; Hook. f., Fl. Brit. India 6: 359. 1892; Karthik. *et al.*, Fl. Ind. Enum. Monocot. 93. 1989.

Rhizomatous creeping herbs. Stem usually branched, up to 80 cm long. Petiole 3-6 mm; leaf blade elliptic to ovate-lanceolate, 5-9 × 2-4 cm. Inflorescences a umbellate cymes, 3-12-flowered; pedicels 1-3 cm, ridged. Flowers campanulate. Tepals often purple, sometimes pink to dark red, oblanceolate, 1.2-2 cm × 3-6 mm, base long spurred; spurs straight, cylindrical. Stamens 1.1-1.6 cm, nearly included; Ovary 2.5-3 mm. Style 5-8 mm. Berries subglobose, fleshy, black up to 1.2 cm in diam.

Fl. & Fr.: May - December.

Distribution: India: Almost throughout India
China, Myanmar, Thailand, Nepal, Vietnam

Specimen examined: AJNU 1287 **PL-21**

Disporum cantoniense (Lour.) Merr., Philipp. J. Sci. 15: 229. 1919; Karthik. *et al.*, Fl. Ind. Enum. Monocot. 93. 1989. *Fritillaria cantoniensis* Lour., Fl. Cochinch. 206. 1790. *Disporum pullum* Salisb., Trans. Hort. Soc. London 1: 331. 1812, *nom. Illeg.*; Hook. f., Fl. Brit. India 6: 360. 1892.

Rhizomatous creeping herbs without stolon. Stem usually branched distally, up to 100 cm. Petiole 2-4 mm; leaves lanceolate to narrowly oblong-lanceolate, 5-10 × 1-5 cm. Inflorescences a umbellate cymes, 2 -10-flowered; pedicels 1-4 cm, usually scabrous. Flowers slightly opening. Tepals purplish, oblanceolate, 1.4-2.6 cm × 4-5 mm, base gibbous-spurred, apex subacute and without dense papillae; spurs 2-3 mm. Stamens 0.7-1.4 cm, included; Ovary up to 3 mm. Style 0.6-1.5 cm. Berries subglobose, black, fleshy , 6-10 mm in diam.

Fl. & Fr.: April - November.

Distribution: India: Almost throughout India

Cambodia, China, Laos, Malayasia, Myanmar, Nepal, Sri Lanka, Sumatera, Thailand and Vietnam.

Specimen examined: AJNU 1112

COMMELINACEACE R. Br.

Annuals and perennials. Stem fleshy climbing or under-shrubs. Leaves alternate, entire, basal sheaths encircling the stem. Inflorescence various, often subtended by

spathe-like bracts. Flowers bisexual, more or less irregular, 3 sepals, alternating with 3 petals. Stamens 6 all fertile or 3 sterile. Fruit a capsule.

Key to Genus

- | | |
|---|------------------|
| 1a. Stem erect or subscandent | <i>Floscopa</i> |
| 1b. Stem creeping or straggling | |
| 2a. Inflorescence scorpioid cymes | <i>Cyanotis</i> |
| 2b. Inflorescence cymes | |
| 3a. Leaf base tapered into petiole-like | <i>Commelina</i> |
| 3b. Leaf base rounded | <i>Murdannia</i> |

Commelina L.

Herbs annual or perennial;. Stems creeping, ascending or erect. Leaves alternate. Cincinni subtended by and included in spathe-like involucre bracts. Flowers zygomorphic. Petals free, spatulate or orbicular, inner 2 larger and clawed. Fertile stamens 3; ovary 2- or 3-loculed. Capsule oblong, globose or ellipsoid, 2- valved.

Commelina benghalensis L., Sp. Pl. 41. 1753; Cl. In Hook. f., Fl. Brit. India 6: 370. 1892; Deb, Fl. Tripura 2: 354. 1983. *C. nervosa* Burm. f. Fl. Indica 18. t. 7.f. 3. 1768.

Stems creeping, much branched, rooting at the nodes. Leaves 4-6 x 2-3 cm, ovate, base rounded, abruptly narrowed into the petiole. Sheaths pubescent. Cymes 1-3 flowered, short peduncled. Sepals 3, unequal, green. Petals 3, blue. Stamens 3; filaments bearded; staminodes 3. Style coiled at the apex. Capsule trigonous.

Fl. & Fr.: April-November.

Distribution: India: throughout; tropical Asia and Australia.

Specimen examined: AJNU 1426

Cyanotis D. Don

Herbs, usually prostrate or creeping. Leaves small. Flowers in terminal and lateral scorpioid cymes, with closely imbricating, sickle-shaped bracteoles inserted in two rows and subtended by leaf-like spathe bract; sometimes flowers all in axillary clusters. The petals and stamens alone exerted, rarely with the corolla-tube exerted. Sepals sub-equal, free or connate below. Petals sub-equal often united in a tube below; 3-lobed. Stamens 6, all similar; filaments bearing clump of jointed hairs near apex. Ovary 3-celled. Capsule loculicidal, 3-valves.

Cyanotis vaga (Lour.) Schult. in Roem. & Schult. Syst. Veg. 7(2): 1153. 1830; Fl. Brit. Ind. 6: 385. 1892. *Tradescantia vaga* Lour. Fl. Cochinch. 1: 193. 1790. *C. barbata* D. Don. Prodr. Fl. Nep. 46. 1825; Fl. Brit. Ind. 6: 385. 1892.

Stem 7-30 cm long, decumbent, much branched, rooting at nodes purplish, hairy. Leaves sessile, linear-lanceolate, 3-8 x 1-1.3 cm, sparsely hairy on both the surfaces, margin densely hairy; sheaths hairy. Cymes scorpioid subtended by leaf-like spathes; spathes up to 3.5 cm long. Flowers blue subtended by long straight or curved bracts. Filaments long exerted from corolla, hairs bluish. Capsule small, sub-quadrately oblong, 0.2-0.3 cm long, hairy at top.

Fl. & Fr.: September-December.

Distribution: India: throughout; E. Asia and tropical Australia.

Specimen examined: AJNU 1490

Floscopa Lour.

Erect or decumbent herbs. Leaf sheaths tubular. Flowers in terminal or axillary thyrsoid panicles. Bracts present. Petals free. Stamens 6, sometimes one imperfect; upper 2-3 filaments glabrous, fused below; lower 3 filaments free. Ovary 2-celled. Capsule loculicidal, 2-valves; 2-seeded.

Floscopa scandens Lour., Hook. f., Fl. Brit. Ind. 6: 390. 1892; Balakr., Fl. Jowai. 2: 551.1983; Noltie, Fl. Bhu. 3. 1: 225. 1994.

Stem erect or subscandent with creeping base, hairy, strongly striated. Leaves 5-10 x 2-4 cm, elliptic-lanceolate, acuminate, scabrous hirsute on both the surfaces; base tapered into short petiole-like; sheaths cylindrical, densely hirsute. Panicles on a short peduncle, with densely hispid many flowered branches. Flowers whitish-purplish; Sepals 3, oblong, hairy; petals 3, pink, hairy. Capsule suborbicullar-ellipsoid.

Fl. & Fr.: August-November.

Distribution: India: throughout; E. Asia and tropical Australia.

Specimen examined: AJNU 1190. **PL-22**

Murdannia Royle

Herbs with usually tuberous roots. Leaves in a basal rosette and or along stem, base not narrowed into a petiole. Inflorescence in a terminal thyrse of several flowered or fascicles of 1-flowered cymes in leaf axils, usually borne on a leafy stem. Petals free, all similar. Stamens 2-3; filaments hairy or glabrous; staminodes 3-4. Ovary 3- celled. Capsule 3-valves.

Murdannia divergens (Clarke) Bruck. In H.G.A. Engler, Nat. Pflanzenfam. Ed. 2, 15a. 173. 1930; Karthik. & al., Fl. Ind. Enum. Monocot. 28. 1989. *Aneilema herbaceum* (Roxb.) Wall. ex C.B. Clarke var. *divergens* C.B. Clarke, J. Linn. Soc., Bot. 11: 448. 1870. *Aneilema divergens* (C.B. Clarke) C.B. Clarke, Commelyn. & Cyrtandr. Bengal. 28. 1874; Hook. f., Fl. Brit. Ind. 6: 376. 1892.

Herbs, annual or perennial; roots tuberous; stems up to 35 cm long, erect. Leaves sessile, linear-lanceolate, 9-15 x 1-1.5 cm, acute at apex, rounded at base, minutely red spotted above; leaf sheaths 1-2 cm long, white ciliate at margin and mouth. Inflorescences in terminal panicles, 3-8 cm long; bracts ovate, persistent. Flowers pinkish; sepals linear-oblong, glabrous; petals obovate, stamens 3, perfect, unilateral, filaments 3-4 mm long, bearded with purplish hair; styles 2-4 mm long, straight. Capsules ellipsoid, acute at both ends, 3-locular, styles persistent in fruit. Seeds 3 in each locule, yellow.

Fl. & Fr.: June-September.

Distribution: India: throughout; E. Asia and tropical Australia.

Specimen examined: AJNU 1491

ARECACEAE Bercht. & J. Presl

Shrubs, woody scandent climbers or trees. Leaves pinnate, palmate, spirally or rarely distichously arranged; sheaths usually open and forming crownshafts; petioles short to elongate, smooth, spiny, in palmate leaves with a hastula at apex; rachis short to elongate; segments in palmate leaves single or multi-fold. Plants monoecious, sometimes dioecious, pleoanthic or less often hapaxanthic. Inflorescences borne among or below leaves, solitary; peduncle bearing a prophyll and usually 1 or more peduncular bracts;

rachillae 1 to many, bearing flowers in various arrangements, often solitary, paired, in threes or more; flowers usually with 3 sepals, 3 petals, 6 stamens, and 3 carpels. Fruits drupaceous to berrylike; endosperm ruminant or homogeneous.

Key to Genera

- 1a. Leaves undivided, except sometimes with an apical cleft
 - 2a. Leaves rounded in outline; petiole armed with thorns *Licuala*
 - 2b. Leaves not rounded; petiole unarmed *Pinanga*
- 1b. Leaves divided into segments or leaflets to form a palmate, pinnate or bipinnate lamina. *Calamus*

Calamus L.

Solitary or clustering, stemless to high-climbing or erect pleoanthic dioecious rattans; sheaths usually heavily armed with spines; flagellum borne on the leaf sheath. Male and female inflorescences superficially similar, often ending in long flagellum; bracts always tubular at the base. Inflorescences usually much longer than the subtending bract, floral bracteoles inconspicuous. Male flower solitary in each rachilla bract, with cup-shaped calyx, epipetalous. Female flower usually larger than the male, with calyx shallowly 3-lobed; corolla with 3 petals; staminodes 6, jointed basally to form a ring. Fruit variously shaped, covered in a thin to thick sarcotesta; endosperm homogeneous.

Calamus flagellum Griffith. in Mart. Hist. Nat. Palm. 3: 333, t. 176. F. 1849; Becc. & Hook. f. in Hook. f., Fl. Brit. India 6: 439, 1892.

Robust clustering rattan. Stems climbing, up to 30 m long. Leaves ecirrate, sheaths greenish yellow with reddish brown indumentums and armed with densely different types of spines; flagellum massive, up to 6 m long; petiole 30- 60 cm long. Leaf rachis up to 2 m long; leaflets to 35 on each side of the rachis, lanceolate, the largest 60-70 by 3.5- 4.5 cm, conspicuous black bristles present along the main veins. Inflorescence male and female superficially similar, the male branched up to 3 orders, the female up to 2 orders, with 6 very distant pendulous partial inflorescences, up to 60 cm long. Mature fruit ovoid, beaked, up to 2 cm across.

Fl. & Fr.: April – December

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, West Bengal

Bangladesh, Cambodia, China, Laos, Myanmar, Thailand, Tibet, Vietnam.

Specimen examined: AJNU 1109

Licuala Wurmb

Small rosette plants to medium sized shrubs, solitary or caespitose. Leaf plamate; petiole usually elongate, armed along the margins. Inflorescence interfoliar; peduncular bracts and rachis bracts tubular; number of partial inflorescence 1-7, spicate or branched, decreasing in size towards the distal nodes. Flowers hermaphrodite and protandrous, inserted in groups or solitary; stamens 6, fused to the corolla basally. Fruit one-seeded ripening from green to red, globose, endosperm homogenous.

Licuala peltata Roxb. ex Buch.- Ham., Mem. Wern. Nat. Hist. Soc. 5: 313.1826; Becc. & Hook. f., Fl. Brit. India 6: 430. 1892; Furtado, Gard. Bull. Straits Settlements 11: 44. 1940; Saw, Sandakania 10:8. 1997.

Solitary palm. Stem usually less than 2 m tall, often covered by old, black spine-like leaf bases. Leaf sheaths 50-60 cm long; petiole armed in entire length with recurved spines; lamina divided up to 21 segments. Inflorescences with about seven, spicate, pendent, partial inflorescences; peduncle up to 1.2 m long; prophyll 35- 40 cm long; peduncular bract one, green to dry. Flowers up to 200 on longest rachilla, solitary; floral subtending bract up to 0.25 cm long; pedicel hairy; calyx campanulate; corolla sericeous, reflexed, ; androecium filaments free, anthers elongate; ovary barrel shaped, truncate, glabrous. Fruit ellipsoidal.

Fl. & Fr.: March – September

Distribution: India: Assam, Manipur, Meghalaya, Nagaland, Mizoram, Andaman & Nicobar Islands

Bangladesh, Malaysia, Myanmar, Thailand.

Specimen examined: AJNU 1023

Pinanga Blume

Small, understory palms.. Leaves pinnate or occasionally undivided; leaf sheaths closed and forming a prominent crownshaft; pinnae regularly arranged along the rachis and spreading in the same line, linear to sigmoid. Inflorescences branched, sometimes spicate; rachillae few, usually pendulous., glabrous. Flowers borne in triads, the triads spirally arranged or more often arranged distichously along the rachillae. Fruits small to

moderate, spindle-shaped, commonly beaked, red, orange, or black, 1- seeded. Seed with ruminant endosperm.

Pinanga gracilis (Roxb.) Blume, Rumph. 2.77.1839; Becc. & Hook. f., in Hook. f. , Fl. Brit. India 6: 407. 1892. *Areca gracilis* Roxb., Fl. Ind. 3: 619. 1832.

Stems clustered, to 5 m tall, up to 1.5 cm in diam., reddish brown. Leaves pinnate, rarely undivided; sheaths closed and forming crownshafts, 22-34 cm, green with reddish brown scales; petioles 9-14 cm; rachis 40-60 cm; pinnae (1-)3-8 per side of rachis, green abaxially, sigmoid, regularly arranged, distantly spaced.. Inflorescences spicate, pendulous; rachis absent; rachilla 1, straight, glabrous. Male flowers deciduous; sepals connate at base into a 3-lobed ; petals valvate; stamens upto 35; female flowers sepals rounded at apex, ciliate; petals ciliate. Fruits red, ellipsoid.

Fl. & Fr.: July - December

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Tripura
Bangladesh, Myanmar, Nepal, Tibet,

Specimen examined: AJNU 1122

ARACEAE Juss.

Herbs, perennial, of diverse habit including climbers, aquatics and geophytes. Underground stems rhizomatous or tuberous. Leaves alternate or abasal, usually petiolate with sheathing bases; leaf blade linear, simple sometimes peltate. Inflorescences consisting of a spadix subtended by a spathe. Spadix bearing bisexual or unisexual flowers. Bisexual flowers; tepals 0, 4, or 6; stamens 4-6, filaments free; ovary usually 3-loculed or more loculed. Unisexual flowers almost always naked; male represented by 1-

6 free stamens; female flowers consisting of a single ovary, 1-loculed, placentation parietal, axile, basal, or apical. Fruit usually berries.

Key to Genera

- | | |
|--|-----------------------|
| 1a. Climbers | <i>Scindapsus</i> |
| 1b. Terrestrial or epiphytic | |
| 2a. Leaves epeltate; base entire | <i>Aglaonema</i> |
| 2b. Leaves peltate; base entire, retuse or hastate | |
| 3a. Rhizomatous herbs | <i>Homalomena</i> |
| 3b. Tuberous herbs | <i>Amorphophallus</i> |

Aglaonema Schott

Evergreen herbs. Stem erect to decumbent, unbranched or creeping. Leaves several, forming an apical crown; petiole shorter than leaf blade. Leaf blade ovate-elliptic or narrowly elliptic. Inflorescences 1-8 per each floral sympodium, spathecaducous, erect, green to whitish, boat-shaped. Spadix cylindric to clavate, shorter or longer than spathe; female zone rather few flowered; male zone fertile to apex. Female flowers: ovary subglobose, 1-loculed; ovule 1, broadly ovoid. Male flowers: stamens free; filaments distinct; obovoid, short. Fruit an ellipsoid berry, turning yellow and finally red. Seed solitary, ellipsoid.

Aglaonema hookeriana Schott in Bonplandia 7: 30. 1859 Nicolson in Smithsonian Contr. Bot. no. 1 : 28. 1969. *Aglaonema clarkei* Hook. f., Fl. Brit. Ind. 6: 529. 1893.

Monoecious rhizomatous herbs. Stem erect, 5-12 cm long. Leaves simple, coriaceous, obliquely elliptic-ovate or oblong, 15-30 x 7-10 cm, apex apiculate or caudate-acuminate, base rounded; petioles 15-25 cm long. Peduncles slender, often curved, 8-16 cm long. Spathes elliptic, cuspidate, convolute at the base, 3-6 x 1 cm, dark green, caduceous. Spadix sessile, narrowly cylindrical, dense-flowered-; male and female floriferous zones contiguous; appendage and perianth absent ; male zone 1-4 cm long ; stamens 2, subclavate ; connective broad. Ovaries 1-loculed, ovule solitary; style short, stigma discoid. Berries few, orange-red.

Fl. & Fr.: November - February.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

Bangladesh and Myanmar.

Specimen examined: AJNU 1001. **PL-22**

Amorphophallus Blume ex Decne

Terrestrial herbs. Stem subterranean or tuberous. Leaves usually solitary; petiole terete, shallowly grooved. Leaf blade decompose; bulbils sometimes developing on leaves. Inflorescence 1, rarely 2 or 3, solitary. Spathe base convolute, often cymbiform or campanulate. Spadix sessile or shortly stipitate; female flowers consisting of 1 pistil; ovary sessile or shortly stipitate, 1-4-loculed. Male zone cylindrical, fusiform; male flowers consisting of 3-6 stamens; stamens depressed or elongate. Berries ripening red, rarely blue, globose, ovoid, smooth 1-4-seeded.

Amorphophyllum napalensis (Wall.) Bogner & Mayo, *Aroideana* 8:19, f. 1. 1985.

Thomsonianapalensis Wall., *Pl. Asiat. Rar.* 1: 83, t. 99. 1830. *Thomsonia hookeri* (Schott)

Engl. in A.DC. & C.DC. Monogr. Phan. 2: 307. 1879. *Allophythionhookeri*Schott, Gen. Aroid t. 24. 1858.

Monoecious tuberous herbs. Leaf solitary, appearing after the flower; petiole 30-40 cm long, pale green with deep green blotches. Lamina 25- 40 cm broad, tripartite, each part again many- lobed; lobes ovate to oblong-lanceolate, caudate-acuminate, margin waved. Peduncle solitary, stout, blotched like the petiole. Spathe coriaceous, oblong-cymbiform, light green outside, obtuse. Spadix: male and female zones contiguous; male zone 7-16 cm long; female zone 2- 5 cm long; appendages cylindrical, yellowish green, white; anthers 3-4, subsessile, pale orange-yellow; ovary globose, 2-loculed; ovule solitary, basal; style linear, stigma capitate.

Fl. & Fr.: June - December.

Distribution: India: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

Bangladesh and Nepal.

Specimen examined: AJNU 1165. **PL-22**

HomalomenaSchott

Aromatic evergreen herbs. Stem creeping, erect or ascending. Leaves long petiolate; leaf blade oblong, elliptic, lanceolate, deltoid, or sagittate, thinly leathery, base usually cordate, apex acuminate. Inflorescences usually several together. Spathe persistent, often constricted. Spadix elongate; stipe very short or absent; female flowers

usually each with an associated staminode. Flowers unisexual, naked; female flowers: ovary incompletely 2-5-loculed with parietal and axile placentation, ovules numerous, style minute, stigma sessile, disciform or lobed; sterile flowers sometimes present at base of male axis of spadix; male flowers (fertile) consisting of 2-6 stamens. Berry few or many seeded. Seeds on a long funicle, longitudinally striate.

Homalomena aromatica (Roxb.) Schott in Schott in Schott & Endl., Meletem. Bot. 20. 1832; Hook. f., Fl. Brit. Ind. 6: 532. 1893. *Calla aromatica* Roxb., Fl. Ind. 3: 513. 1832.

Monoecious, rhizomatous herbs up to 50 cm tall. Rhizomes aromatic. Leaves several together; petiole pale to mid-green up to 30 cm. Leaf blade mid-green, ovate-sagittate to elliptic-sagittate, 20-30 × 10-16 cm, thinly leathery, base sagittate. Inflorescences 1 or 2 together; peduncle erect, 10-16 cm. Spathe oblong, 8-10 cm. Spadix tapering cylindrical, 7-9 cm, stipitate; female zone 1.4-3 cm across; ovary ovoid-globose, stigma sessile, capitate; staminode ivory-colored; male zone 5.3-6 cm across; male flowers white. Berries ripening dull orange yellow.

Fl. & Fr.: June - December.

Distribution: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Tripura
Bangladesh, Cambodia, Laos, Myanmar, Thailand, Vietnam.

Specimen examined: AJNU 1056

Scindapsus Schott

Lianas; stem robust, branched. Leaves spiro-distichous; petiole usually; leaf blade undivided, pinnately veined. Inflorescence very often solitary; spathe boat-shaped; spadix sessile to shortly stipitate, cylindrical, narrowly ellipsoid or clavate; flowers bisexual; stamens 4, free; filaments oblong, flattened, connective slender; thecae oblong-ellipsoid, dehiscent by apical slits; ovules 1(–2), anatropous, placenta basal; style truncate; stigma globose, elliptic or linear. Infructescence fusiform, ripening dull orange to dull red or white; ovary 1-seeded. Seed rounded to subreniform.

Scindapsus officinalis (Roxb.) Schott in Schott & Endl., Meletem. Bot. 21. 1832; Hook. f., Fl. Brit. India 6: 541. 1893. *Pothos officinalis* Roxb., Fl. Ind. 1: 431. 1831.

Robust shrubby climber, 10–20 m long. Leaves spirally arranged; petiole prominently winged; leaf blade ovate-lanceolate to ovate-elliptic, 14–22 by 8–16 cm, slightly oblique, base rounded, usually oblique, apex acute to attenuate, dull pale to medium green. Inflorescence solitary, subtended by foliage leaf; peduncle compressed-cylindrical; spathe broadly cigar-shaped, 11–15 by 3–5 cm, stoutly long-beaked, dull yellow, caducous; spadix cylindrical, 6–11 by 1–2.5 cm, sessile; style truncate; stigma elongated. Infructescence fusiform cylindrical, yellow when ripe.

Fl. & Fr.: June - October

Distribution: India: Assam, Arunachal Pradesh, Manipur, Nagaland, Sikkim, Tripura, West Bengal, Andaman & Nicobar Islands, Andhra Pradesh, Bihar, Kerala, Tamil Nadu, Bangladesh, Cambodia, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimen examined: AJNU 1477

CYPERACEAE Juss.

Perennial or annual herbs, usually tufted. Stem commonly 3-angled. Leaves narrow, sheathing at base, ligule absent. Inflorescence spike or panicle. Flowers unisexual or bisexual, small, solitary in the axils of the spikes subtended by glumes or arranged variously in spikelets. Perianth absent or reduced to bristles or scales. Stamens 1-3. Fruit a compressed or trigonous nut.

Key to Genera

- 1a. Achenes enclosed within an utricle *Carex*
- 1b. Achenes not enclosed in utricle
 - 2a. Flowers unisexual; nuts large, smooth or sculptured *Scleria*
 - 2b. Flowers bisexual; nuts not as above
 - 3a. Style jointed with ovary, often fimbriate *Fimbristylis*
 - 3b. Style continuous with ovary *Cyperus*

Carex L.

Perennials with creeping rhizome. Spikelets unisexual subtended by a glume. Inflorescence in spikes composed of only male spikelets or female spikelets or both, with the spike arranged in panicles or racemes or rarely single.

Key to species

- 1a. Spikelets upto 1.5 cm long; utricles ellipsoid *C. cruciata*
- 1b. Spikelets upto 6 cm long; utricles obovoid *C. baccans*

Carex baccans Nees, R. Wight, Contr. Bot. Ind. 122. 1834; C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 722. 1894; Balakr. Fl. Jowai. 2: 573. 1983.

Herbs tufted, 1-2 m tall. Stem erect or nodding. Leaves exceeding the stem. Panicles 30-70 cm; bracts foliaceous. Spikelets 3-5 cm, glumes oblong, ovate, reddish-brown. Nuts ellipsoid, dark brown.

Fl. & Fr.: September – March.

Distribution: India (throughout), China, Java, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam.

Specimen examined: AJNU 1419. **PL-22**

Carex cruciate Wahlenb., Kongl. Vetensk. Acad. Nya Handl. 24: 149. 1803; C. B. Clarke in Hook. f., Fl. Brit. Ind. 6:715. 1894; Balakr. Fl. Jowai. 2:572. 1983.

Rhizome stout, stem erect. Leaves exceeding stems, acuminate, 0.4-1.2 cm broad; sheaths reddish brown. Inflorescence elongate on distant peduncled pyramidal compound panicles, 15-45 cm long. Spikes numerous, linear-oblong. Nut ellipsoid, trigonous.

Fl. & Fr.: April-August.

Distribution: India (throughout), China, Myanmar, Nepal, Sumatera, Thailand, Vietnam.

Specimen examined: AJNU 1420.

Cyperus L.

Annuals or perennials herbs. Rhizomes short. Stem erect, trigonous. Leaves sheathing at the base. Inflorescence umbellate or capitate on unequal peduncle subtended by an involucre of leaf-like bracts usually exceeding inflorescence. Spikelets arranged in spikes along a rachis, or in heads or umbels. Perianth absent. Stamens 3, sometimes 2, rarely 1. Nuts trigonous.

Key to species

- 1a. Flowers in heads *C.brevifolius*
1b. Flowers in umbels
 2a. Nuts oblong-obovate, triquetrous *C. iria*
 2b. Nuts linear-oblong, apiculate *C. cyperoides*

Cyperus brevifolius (Rottb.) Hassk., Balakr. Fl. Jowai. 2:585. 1983. *Kyllinga brevifolia* Rottb. C. B. Clarke in Hook. f., Fl. Brit. Ind. 6:588. 1894.

Perennials herbs. Rhizome creeping elongated. Stems more than 5 together, 1-3 cm apart. Leaves 1-5, very much shorter than or longer than the stem, up to 0.2 cm broad. Inflorescence in heads on a long peduncle. Bracts 3-4. Spikes usually single or often with 2-3 median additional ones. Spikelets 0.2-0.3 cm long, usually with single nut. Glumes keeled, 3-nerved.

Fl. & Fr.: April-September.

Distribution: India (throughout), China, Myanmar, Nepal, Sumatera, Thailand, Vietnam

Specimen examined: AJNU 1417

Cyperus cyperoides (L.) Kuntze, Revis. Gen. Pl. 3: 333. 1898; Balakr. Fl. Jowai. 2: 584. 1983; *Marsiscus sieberianus* C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 622. 1893.

Perennial herbs. Stems tufted. Leaves shorter than or longer than stem, up to 0.4 cm broad; sheaths red brown. Inflorescence in simple umbels. Bracts 5-7, longer than the umbels, up to 18 cm long and 0.4 cm broad. Spikes sessile or peduncled, slightly ovoid-

cylindric; spikelets linear-lanceolate. Glumes greenish, many nerved. Nuts linear-oblong, apiculate.

Fl. & Fr.: April-October.

Distribution: India (throughout), Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa, Australia.

Specimen examined: AJNU 1418.

Cyperus iria L., C. B. Clarke in Hook. f., Fl. Brit. Ind. 6:606. 1894; Balakr. Fl. Jowai. 2:588. 1983; Yadav & Sardesai, Fl. Kolh. Dist. 540. 2002.

Annual herbs. Stem tufted, compressed. Leaves few, linear-lanceolate, about as long as or shorter than the stem, up to 0.5 cm broad. Inflorescence in simple or compound umbels. Bracts 3-7, up to 30 cm long. Spike loosely spicate, up to 4 cm long, spikelets 5-20, compressed. Nuts oblong-obovate, triquetrous.

Fl. & Fr.: May- October.

Distribution: India (throughout), Afghanistan, Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa, Australia.

Specimen examined: AJNU 1421.

Fimbristylis Vahl.

Herbs, annual or perennial, often rhizomatous. Culms usually tufted, slender. Leaves basal, sometimes reduced to a bladeless sheath. Inflorescence terminal, a simple, compound, or reduced to 1 terminal spikelet. Spikelets solitary or fascicled. Glumes spirally imbricate. Flowers bisexual. Stamens 1-3. Nutlet biconvex, 3-sided.

Fimbristylis dichotoma (L.) Vahl, Enum. 2:287. 1906; Balakr. Fl. Jowai. 2:580. 1983; *Scirpus dichotoma* L. Sp. Pl. 50. 1753; *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2:289. 1806; C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 636. 1893.

Grass-like rhizomatous, tufted herbs. Culms flattened striate. Leaves equaling the culms, margin scabrid towards the apex. Ligule a ring of cilia. Bracts leaf-like. Spikelets in compound or decompound umbel. Glumes imbricate, with strong keel. Rachilla deeply pitted. Nuts ovoid, beaked, covered with thick membrane.

Fl. & Fr.: August – December.

Distribution: All warm regions of the world.

Specimen examined: AJNU 1422.

Scleria P.J. Bergius

Herbs, annual or perennial. Stem trigonous. Leaves linear, 3-veined, base sheathing. Inflorescences terminal, paniculate, sometimes reduced to a spike. Flowers unisexual, rarely bisexual. Nutlet shiny, white or yellowish, smooth or variously sculptured.

Scleria terrestris (L.) Fas. Rhodora 26: 159. 1924; Balakr. Fl. Jowai. 2:578. 1983; *Zizania terrestris* L. Sp. Pl. 991. 1753; *S.elata* Thw. Enum. Pl. Zeyl. 353. 1864; C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 690. 1893.

Erect or scrambling herbs. Rhizomes woody. Culms about 3m high. Leaves 20-70 x 0.5-2 cm, scabrous, acuminate. Inflorescences terminal, paniculate. Spikelets numerous on the spreading branches of pyramidal panicle. Glumes 3. Nuts globose, apiculate, glossy white or purplish black.

Fl. & Fr.: February - December

Distribution: India (throughout), Tropical & Subtropical Asia to Australia

Specimen examined: AJNU 1489.

POACEAE Barnhart

Annual or perennial herbs, rarely shrubs or arborescent, rhizomatous or stoloniferous. Culms jointed, nodes solid; internodes usually hollow, occasionally solid at the lower internodes, generally rooting from the lower nodes. Nodes with culm-sheaths. Leaves simple, solitary at nodes, basal, at branch ends or arranged distichously along the culm-sheath with ligules at the joining with the blade. Inflorescence composed of spikelets arranged in panicle spike or racemes or pseudo-racemes, inflorescence sometimes interrupted by spathes. Spikelets made up of distichously arranged bracts, the two lower glumes sterile, the two lower and upper glumes (occasionally one of the glume reduced or absent), succeeded by one to several lemmas each enclosing a floret, opposed by a scale the palea. Rachilla often produced beyond the upper floret. Flowers usually bisexual, occasionally unisexual or sterile. Perianth represented by 1-3 hyaline or fleshy scales, the lodicules. Stamens usually 3. Fruit an indehiscent grain (caryopsis) with its seed-coat and pericarp fused, rarely free, occasionally fleshy.

Key to genera

- 1a. Spikelets 1-many flowered, breaking up at maturity above the more or less persistent glumes
- 2a. Shrubs or trees with woody often tall persistent culms; leaf blade flat,

- many nerved, often with transverse veins; spikelets bisexual
- 3a. Shrubby bamboo; nodes armed with a
circle of spines; *Bambusa*
- 3b. Arborescent bamboo; nodes unarmed; stamens 6 *Dendrocalamus*
- 2b. Perennial or annual herbs with herbaceous, very rarely woody culms;
leaf blades sessile and not articulated with sheaths
- 3a. Spikelets with 2 or more fertile florets or if with one fertile floret,
then sterile florets above it
- 4a. Tall grasses with large plume like panicles; lemmas or
rachilla joints bearing long silky hairs *Phragmites*
- 4b. Low grasses; lemma and rachilla glabrous or hairy
- 5a. Spikelets loosely to densely imbricate in digitate spikes or
spikelike racemes *Eleusine*
- 5b. Spikelets in open contracted or spike like panicles *Eragrostis*
- 3b. Spikelets with 1 fertile floret, with or without 1 or 2 male or barren florets below it
- 6a. Spikelets with 2 florets; the lower male or barren,
the upper bisexual *Thysanolaena*
- 6b. Spikelets with 1 fertile florets
- 7a. Lemmas 3-5-veined, awned *Alopecurus*
- 7b. Lemmas 1-3-veined, awnless
- 8a. Inflorescence digitate; spikelets laterally compressed *Cynodon*
- 8b. Inflorescence compressed panicle; spikelets gaping *Sporobolus*

1b. Spikelets 2-flowered, falling entire at maturity, usually with the upper floret bisexual and the lower male

9a. Spikelets solitary or paired; upper lemma awnless

10a. Spikelets with an involucre of bristles,

falling with or without the bristles

Setaria

10b. Spikelets falling singly, not subtended by bristles

11a. Lemma of upper floret thinly cartilaginous

Digitaria

11b. Lemma of upper floret more or less coriaceous

Paspalum

9b. Spikelets often paired, with one sessile and the other pedicelled; upper lemma awned

12a. Spikelets awned

Chrysopogon

12b. Spikelets unawned

13a. Raceme spiciform; spikelets all pedicelled

Imperata

13b. Raceme paniculate; spikelets paired, one sessile

and the other pedicelled

Saccharum

Bambusa Schreb.

Tropical and sub tropical Bamboos. Rhizomes pachymorph, without extended necks. Culm 2-25 m, usually glabrous. Culm sheaths usually with large auricles and long, dense oval setae. Branches small and uniform, or large and variable. Leaf blades under 25 cm. Inflorescence fully bracteate, spicate to globular, enclosed within a 2-keeled prophyll. Spikelets with basal buds, terminating in an incomplete, or rudimentary floret. Florets usually separated by clearly distinguishable rachilla internodes. Palea keeled, acute, acute, never deeply bifid. Stamens 6, filaments free. Lodicules 3.

Bambusa tulda Roxb. Fl. Ind. 2 : 193. 1832; Gamble in Hook. f., Fl., Brit. Ind. 7: 387. 1896; Borin Kanjiial *et al.* Fl. Assam 5: 27. 1940.

Culms 15-20 m, usually erect, slightly crooked; internodes 30 - 45 cm, 6 -10 cm thick. Culm-sheaths 15 - 20 x 15 - 20 cm, attenuate towards apex, appressed-hairy outside, shiny smooth inside. Leaf blade triangular or reniform, decurrent at base into rounded long-fringed auricles, cuspidate at apex, 15 - 34 x 10 - 20 cm, hairy -inside; braves linear or oblong-lanceolate, 10-30 x 1.5-3.5 cm. Inflorescence spicate; spikelets 2.5-8 cm, 7- 14-flowered, in fascicles of 3 -5 on leafless branches.

Fl. & Fr.: Not seen

Distribution:India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Karnataka, Meghalaya, Mizoram, Nagaland, Odisha, Tripura, Uttar Pradesh, Uttarakhand, West Bengal.

Bangladesh, China, Laos, Myanmar, Nepal, Thailand, Tibet and Vietnam.

Specimen examined: AJNU 1260.

Chrysopogon Trin.

Perennials with tuft or spreading rhizomes. Inflorescence a lax panicles, branches bearded, usually whorled, sometimes solitary or paired, with spikelets at the apex in groups of threes, one sessile awned and two pedicelled, unawned or aristate. Pedicelled spikelet florets 1 or 2, the lower sterile, when present, the upper male or bisexual. Stamens 3.

Chrysopogon aciculatus (Retz.) Trin., Fund. Agrost. 188. 1820; Bor, Fl. Assam 5: 357. 1940; Balakr., Fl. Jowai 2: 628. 1983; U. Shukla, Grasses N.E. India 7. 1996. *Andropogon aciculatus* Retz., Obs. Bot. 5:22. 1789; Hook.f., Fl. Brit. India 7: 188. 1896.

Perennials. Culms rhizomatous, ascending from a creeping stem base, 20-60 cm high. Leaves linear, obtuse or acute, glaucescent, without hairs or scattered hairs at the base. Inflorescence an erect panicle, narrow to oblong or linear-oblong, 2.5-10 cm long. Branches fragile, 4-5, slender. Spikelets often purplish, 2-4 mm long; lower floret sterile; upper hermaphrodite. Pedicelled spikelets 5-6 mm long.

Fl. & Fr.: April - October

Distribution: India (throughout), Southeast Asia

Specimen examined: AJNU 1408.

Imperata Cirillo

Perennial with creeping rhizomes. Inflorescence a dense, silvery spike-like panicle, bearing a single pair of unequal pedicelled spikelets; florets 2; lower sterile, upper bisexual. Stamens 2.

Imperata cylindrica (L.) P.Beauv., Ess. Agrost. 165. 1812; Bor, Fl. Assam 5: 310. 1940; Balakr., Fl. Jowai 2: 625. 1983; *Imperata arundinacea* Cyr., Pl. Rar. Neap. 2: 26. 1792; Hook. f., Fl. Brit. India: 7. 106. 1896.

Perennial grasses. Culms solid, 0.1-2.5 m or more higher. Leaves about 1.7 m long, basenarrowed, margins scabrid, glabrous with only some long hairs at the base or slightly pubescent; ligule a ciliate membrane. Inflorescence spike-like, cylindrical panicle, dense, silvery, 3-30 cm long. Spikelets lanceolate about 4.5 mm long.

Glumes membranous: the lower lanceolate, 3-9-nerved, hairs silvery on the back. Upper glume keeled. Lower floret sterile; lemma hyaline, 1.5-2.0 mm long; palea absent. Upper floret hermaphrodite; lemma hyaline, ca 2 mm long, ciliate or glabrous. Stamens 2.

Fl. & Fr.: May – November

Distribution: Warm and temperate parts of Asia, Australia and SE Africa

Specimen examined: AJNU 1411

Saccharum L.

Rhizomatous perennials. Culms erect, solid. Leaves flat, oblong-lanceolate, margin serrate. Inflorescence a plumose paniculate raceme with sessile and pedicelled spikelets. Florets 2.

Saccharum arundinaceum Retz., Obs. Bot. 4; 14. 1786; Hook. f., Fl. Brit. India 7: 119. 1986; Bor, Fl. Assam 5; 320. 1940 & Grass. Ind. 211. 1960; N.P. Balakr., Fl. Jowai 2: 623. 1983; U. Shukla, Grasses N. E. India: 123. 1996.

Perennial grasses. Culms about 6.5m long. Leaves 1.5 x 4.5cm, villous at the base, broader than the mid-rib; stripes of green blades broader than the mid-rib. Peduncle glabrous below; joint of the rachis 3.5-4.0mm long. Spikelets 2.5-4.0mm long; callus hairs as long as the lower neuter floret; the upper hermaphrodite.

Fl. & Fr: October - February

Distribution: India (throughout), Southeast Asia

Specimen Examined: AJNU 1256

Digitaria Haller

Perennials or annuals. Culms usually decumbent at base and rooting from lower nodes. Leaf blade flat, linear; ligule membranous. Inflorescence of linear raceme, raceme digitate or inserted along a short axis. Spikelets borne in pairs or groups of 3-5 on lower side of rachis. Lower floret sterile; upper floret bisexual. Stamens 3.

Digitaria ciliaris (Retz.) Koeler, Descr. Gram. 27. 1802; *Panicum ciliare* Retz., Obs. Bot. 4: 16. 1786; *P.adscendens* Kunth., Nov. Gen. Sp. 1: 97.1816; *Digitaria adscendens* (Kunth) Henr., Blumea 1: 92. 1934; Bor, Fl. As. 5: 204, 1940.

Annual or biennial herbs; culm erect or decumbent. Leaves flat, acute; sheath 5-10 cm long. Inflorescences conjugate or false whorled racemes, rachis short, compressed; spikelets lanceolate to oblong-elliptic, glabrous; upper glume deltoid, hairy, 3-nerved; lower lemma smooth; upper florets fertile, grains oblong, pale.

Fl. & Fr.: June – November

Distribution: Cosmopolitan

Specimen examined: AJNU 1409

Paspalum L.

Perennials or annuals, tufted or spreading by creeping rhizomes. Inflorescence in a simple panicle or raceme usually upper in pairs, with spikelets second and usually 2-nate on the flattened or triquetrous rachis. Spikelets plano-convex, shortly pedicelled. Florets 2, the lower floret sterile, the upper floret bisexual; lodicules 2. Stamens 3.

Key to species

- 1a. Spikelets solitary, glabrous *P. distichum*
1b. Spikelets 2-seriate, ciliate *P. conjugatum*

Paspalum conjugatum P.J.Bergius, Acta. Helv. Phys.-Math. 7: 129. 1772; Hook.f., Fl. Brit. Ind. 7: 11. 1896; Bor, Fl. As. 5: 255. 1940; Balakr. Fl. Jowai 2: 616. 1983.

Annual or perennial, stoloniferous herbs; culms erect, up to 60 cm tall. Leaves lanceolate-oblong, cordate at base, compressed, pubescent above; densely ciliate at margin; sheaths ciliate at margin and at base; ligule with pubescent ridges. Racemes 3-4, spikelets 2-seriate, orbicular-ovate, pedicels hairy at base. Upper glumes ovate, ciliate, hairy. Lemmas ovate-rounded, hairy at tip.

Fl. & Fr.: July - December

Distribution: Cosmopolitan

Specimen examined: AJNU 1412

Paspalum distichum L., Syst. Nat. ed. 10, 2: 855. 1759; Bor, Fl. As. 5: 255. 1940.

Tufted perennial; culms 15 cm high. Leaves lanceolate, acuminate at apex, rounded at base, glabrous. Inflorescences racemose spikes, usually 2, spikelets 2-3 per spike, terminal, alternate, unequal in two rows, rachis flat, orbicular, obtuse-rounded, glabrous; lower glume absent, upper glumes 3-nerved, membranous, lemma equal to the length of spikelets; palea membranous. Caryopsis biconvex, enclosed by hardened lemma and palea.

Fl. & Fr.: June - December

Distribution: Cosmopolitan

Specimen examined: AJNU 1407

Setaria P. Beauv.

Loosely tufted or rhizomatous annuals or perennials. Inflorescence a terminal spike-like panicle, branches short or long. Spikelets borne singly, often subtended by one or more bristles; florets 2, the lower floret male or sterile, the upper floret bisexual. Stamens 3.

Setaria palmifolia (J.Koenig) Stapf, J. Linn. Soc., Bot. 42: 186. 1914; Bor, Fl. As. 5: 284. 1940; Balakr., Fl. Jowai. 2:609. 1983 *Panicum palmifolium* Koen., Naturf. 23: 208. 1788; *P. plicatum* (non Lamk. 1791) Willd. Enum. Pl. 1033. 1809; Hook. f. Fl. Brit. Ind. 7: 55. 1896.

Stout perennial herbs, rhizome woody; culms up to 2 m tall, lower parts rooting at nodes. Leaves elliptic, abruptly acuminate at apex, glabrous or sparsely hairy; sheaths smooth or hispid, often with tubercled based hairs. Inflorescences loose, speculate panicle; spikelets solitary, subtended by single bristle.

Fl. & Fr.: July - November

Distribution: Cosmopolitan

Specimen examined: AJNU 1414

Alopecurus L.

Tuft annuals or perennials. Inflorescence a dense, cylindric, spike-like. Spikelets laterally compressed, falling entire at maturity; floret one.

Alopecurus arundinaceus Poir., *Encycl.* 8: 766. 1808; Hook. f. *Fl. Brit. Ind.* 7:238. 1896.

Root stock creeping. Culm erect, slender, strait, glabrous, up to 1.5 m tall. Leaves linear-lanceolate, acuminate, 10-14 x 0.2-0.4 cm. Panicles green, cylindric, silky, up to 8 cm long. Spikelets silky, densely crowded. Glumes membranous, lanceolate, acuminate, villous hairs on the dorsal side; lower and upper glumes fused at the base. Lemma acute. Awn sub-basal.

Fl. & Fr.: March - August

Distribution: Cosmopolitan

Specimen examined: AJNU 1406

Cynodon Rich.

Perennials, usually stoloniferous. Culms leafy throughout, much branched, decumbent and rooting, each nodes bearing 2-3 leaves. Leaf blade linear, flat. Inflorescence digitate, racemes linear, secund, spikelet sessile. Spikelets laterally compressed. Glumes shorter than spikelet. Lemma lanceolate, conduplicate. Palea oblong-elliptic.

Cynodon dactylon (L.) Pers., *Syn. Pl.* 1: 85. 1805; Hook.f., *Fl. Brit. Ind.* 7: 288. 1896; Bor, *Fl. As.* 5: 125. 1940; *Panicumdactylon* L., *Sp. Pl.* 1: 58. 1753.

Slender perennials. Culms erect with creeping stolon. Leaves linear; sheath rounded, compressed, glabrous; ligule bearded, acuminate. Spikes 2-6, up to 6 cm long, digitate, rachis pubescent at base; spikelets 1-3 mm, sessile, 1-flowered, glumes similar, lanceolate, acute to subulate; lemma oblique, strongly compressed, keeled; palea linear, oblong, obtuse, anther 3. Caryopsis 1 mm long.

Fl. & Fr.: February-October.

Distribution: All warm regions of the world.

Specimen examined: AJNU 1327.

Dendrocalamus Nees

Arborescent bamboos, large sized. Rhizomes pachymorph, without extended necks. Culms often large, up to 60 m tall. Culm sheaths with small auricles. Leaves shortly petioled. Stamens 6; filaments free. Lodicules 3, sometimes absent.

Dendrocalamus giganteus Munro, Trans. Linn. Soc. London 26: 150. 1868; Gamble in Hook. f. Fl. Brit. Ind. 7:406. 1896; Shukla, North-East. Ind. 198. 1996; Bor, Fl. As. 5:11. 1940.

Rhizomes pachymorph, neck short. Culms up to 25 m tall, grey green, young pubescent, mature glabrous, diameter 20-27 cm, internodes 30-46 cm long, hollow 2.5-3.3 cm. Clump closely packed. Leaves pubescent on both surfaces, 5.0-7.6 x 2.5-3.8 cm; Leaf sheath auricles absent. Branches from upper nodes. Culm sheath pale-brown, hairy. Caudex, 40-44 x 38-48 cm; blade horizontal. Auricles 2, narrow, wavy.

Fl. & Fr.: Not seen

Distribution: India (throughout), China, Myanmar

Specimen examined: AJNU 1328

Eleusine Gaertn.

Tufted annuals. Culms branched or erect. Leaf blade linear, flat or folded, inserted regularly along culm, sheaths compressed; ligule membranous. Inflorescence digitate, or lowest raceme slightly distant, racemes oblong, spikelet subsessile. Grain with free, membranous pericarp.

Eleusine indica (L.) Gaertn. Fruct. 1: 8. 1789; Hook. f. Fl. Brit. Ind. 7: 293. 1896.; Bor, Fl. As. 5: 108. 1940; *Cynosurus indicus* L., Sp. Pl. 72. 1753.

Culms tufted; leaves crowded at base, erect; spikes 2-4, digitate, subumbellate; rachis pubescent, villous at base; spikelets ovate or oblong; glumes lanceolate, acute; lower 2-3 mm; upper 3-4 mm; lemmas lanceolate, acute, 3-4 mm. Palea 2 keeled. Stamens 3, styles 2, stigmas feathery.

Fl. & Fr.: June – November

Distribution: Tropical and subtropical regions

Specimen examined: AJNU 1332

Eragrotis Wolf

Tufted annuals or perennials. Inflorescence a compound panicle or cylindrical spike. Spikelets laterally compressed, borne singly, sometimes terete, awnless, several-flowered; florets bisexual. Stamens 2 or 3.

Eragrostis nigra Steud. Syn. Pl. Glum. 1: 267. 1854; Fl. Brit. Ind. 7: 324. 1896; Bor, Fl. As. 5: 101. 1940.

Culms simple or branched; leaves mostly basal, elongate-lanceolate, tapering; sheaths bearded at mouth; ligules ciliate; panicles spreading, ovate-oblong, up to 60 cm; branches in whorls of 3-5; spikelets linear-oblong, olive grey; pedicels 4-6 mm; glumes acuminate, strongly 1-nerved; lemmas ovate-acute.

Fl. & Fr.: May-October.

Distribution: India (throughout), Bangladesh, China, Myanmar, Nepal, Pakistan, Sri Lanka, Tibet, Vietnam

Specimen examined: AJNU 1410

Phragmites Adans.

Perennials with creeping rhizomes. Inflorescence a branched compound plumose panicle. Spikelets borne singly, pedicelled, gaping between florets; florets dissimilar, the lowest male, longer, the upper 2-4 bisexual, uppermost often reduced. Stamens 1-3. Lodicules 2.

Phragmites karka (Retz) Trin. ex Steud., Nomencl. Bot., ed. 2, 2: 324. 1841; Hook. f. Fl. Brit. Ind. 7:304. 1896; Balakr., Fl. Jowai. 2:605. 1983; Shukla Grass. North-East. Ind. 149. 1996; Bor, Fl. As. 5:88. 1940; *Phragmetis vallatoria* (Pluk. ex L.) Velk., Yadav & Sardesai, Fl. Kolh. Dist. 601.2002.

Culms tufted, stout, smooth, up to 7 m. Leaves lanceolate, acuminate. Panicles lax, branches fascicled, hairy at the base, 20-60 cm long. Spikelets many-flowered. Lower glume oblong-lanceolate, 3-5 nerved. Upper glume narrowly oblong-lanceolate,

3-nerved. Fertile florets 2-4. Lowest lemma up to 1.1-1.3 cm long, the upper shorter than the lower. Palea much shorter than the lemma. Rachilla with white long hairs.

Fl. & Fr: November-March

Distribution: India (throughout), Southeast Asia, Australia

Specimen Examined: AJNU 1413

Sporobolus R. Br.

Tufted perennials, rarely annuals. Inflorescence compound panicle or spike-like, branches spreading or sub-erect, solitary or whorled. Spikelets gaping, pedicelled, 1-flowered, bisexual. Stamens 2-3. Grain free between the lemma and palea.

Sporobolus piliferus (Trin.) Kunth, Enum. Pl. 1: 211. 1833; Hook. f. Fl. Brit. Ind. 7:251. 1896; Shukla, Grass. North-East. Ind. 370. 1996; Bor, Fl. As. 5:119. 1940; Balakr., Fl. Jowai. 2:604. 1983; *Vilfiapilifera* Trin. Diss. Bot. 157. 1824.

Annuals. Culms erect, tufted, up to 35 cm tall, often with geniculate base. Leaves linear-lanceolate, flat or convolute, caudate acuminate, margin serrulate near the base. Panicles slender, spike-like with erect branches, often interrupted, up to 9 cm long. Spikelets densely crowded. Lower glume lanceolate-truncate, without nerves. Upper glume lanceolate, 1-nerved. Lemma almost equal to upper glume in length. Palea narrowly oblong, truncate.

Fl. & Fr: November-February

Distribution: Cosmopolitan

Specimen Examined: AJNU 1415

Thysanolaena Nees

Robust rhizomatous perennials. Inflorescence a large, dense branched panicle with appressed branches to primary branches. Spikelets borne singly, pedicelled, laterally compressed, gaping, falling with pedicels; floret 2, sometimes 3, dissimilar, the lowest sterile, the upper bisexual, sometimes a reduced terminal one present. Stamens 2-3.

Thysanolaena latifolia (Roxb.ex Hornem.) Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 312. 1930; *T. maxima* (Roxb.) Kuntze, Revis. Gen. Pl. 2: 784. 1891; Bor, Fl. As. 5:176. 1940; Balakr., Fl. Jowai. 2: 602. 1983; *T. agrostis* Nees, Edin. New Phil. J. 18: 180. 1835; Hook. f. Fl. Brit. Ind. 7: 61. 1896.

Clums smooth, glabrous, up to 3.5 m tall. Leaves broadly lanceolate, acuminate, base sub-amplexical, 30-60 x 3-8 cm, margin scabrid. Panicles 30-60 cm long, profusely branched and spreading. Spikelets 2-flowered, ovate-lanceolate, acuminate, pedicellate; rachilla produced into a short stipe. Glumes sub-equal, ovate, 1-nerved. Lower floret sterile; palea absent. Upper floret bisexual; palea short.

Fl. & Fr: September - March

Distribution: India (throughout), Southeast Asia

Specimen Examined: AJNU 1416

CHAPTER 5

RESULTS AND DISCUSSION

Floristic Analysis

In the present work of, “**Floristic studies of Angiospermic Plants In Intangki National Park, Nagaland**” a total of 470 taxa of flowering plants belonging to 360 genera and 120 families have been recorded. Out of 470 taxa 277 genera with 102 families belongs to dicots and 83 genera and 18 families belongs to monocots (Table 1). A graphical representation is shown in Fig.1.

Groups	Families	Genera	Species
Dicots	102	277	365
Monocots	18	83	105
Total	120	360	470

Among the 120 families of angiosperms surveyed, the dicotyledonous families account 84.87% and monocotyledonous families represents 15.13%. Out of 360 genera, the dicotyledons represents 76.94% genera, while monocotyledons represents 23.06% genera as shown in Table 2.

Groups	Dicots	% of Dicots	Monocots	% of Monocots	Total
Family	102	84.87	18	15.13	120
Genera	277	76.94	83	23.06	360

The ten family with the highest number of genera are Orchidaceae (24 genera), Rubiaceae (22 genera), Euphorbiaceae (20 genera), Asteraceae (18 genera), Poaceae (15 genera), Fabaceae (12 genera), Zingiberaceae (11 genera), Acanthaceae (10 genera), Apocynaceae (9 genera) and Verbenaceae (6 genera). The remaining genera belong to the rest of the families of which 56 families are represented by single genera, 32 families by 2-3 genera and 15 families by 4-5 genera. (Table 4)

Table 4. Ten largest families by number of genera in the present work			
Sl. No.	Family	Genera	Species
1.	Orchidaceae	24	32
2.	Rubiaceae	22	26
3.	Euphorbiaceae	20	27
4.	Asteraceae	18	22
5.	Poaceae	15	16
6.	Fabaceae	12	20
7.	Zingiberaceae	11	16
8.	Acanthaceae	10	14
9.	Apocynaceae	9	11
10.	Verbenaceae	6	8

The most dominant families with the maximum number of species are Orchidaceae (32 species), Euphorbiaceae (27 species), Rubiaceae (26 species each), Asteraceae (22 species), Fabaceae (20 species), Zingiberaceae (18 species), Poaceae (16 species), Acanthaceae (14 species), Moraceae and Apocynaceae (11 species) and Malvaceae (10 species). The remaining species belong to the rest of the families out of which 49 families are represented by single species, 16 families by 2 species, 11 families

by 3 species, 13 families by 4 species, 2 families by 5 species, 6 families by 6 species and 5 families by 7 - 8 species. (Table 5)

Table 5. Ten largest families by number of species of the present work			
Sl. No.	Family	Genera	Species
1.	Orchidaceae	24	32
2.	Euphorbiaceae	20	26
3.	Rubiaceae	22	27
4.	Asteraceae	18	22
5.	Fabaceae	12	20
6.	Zingiberaceae	11	18
7.	Poaceae	15	16
8.	Acanthaceae	10	14
9.	Apocynaceae & Moraceae	9	11
10.	Malvaceae	5	10

Out of the total 470 species, 164 species are herbs, 113 are shrubs, 111 are trees and 82 are climbers. There are 459 terrestrial, 8 epiphytes and 3 parasitic plants of the 470 species of plants. (Fig: 6)

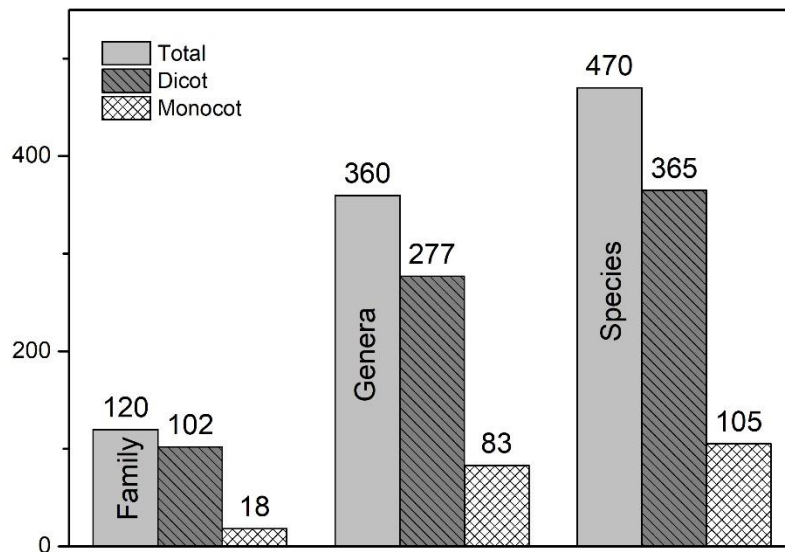


Fig. 1. Bar graph showing the Floristic composition

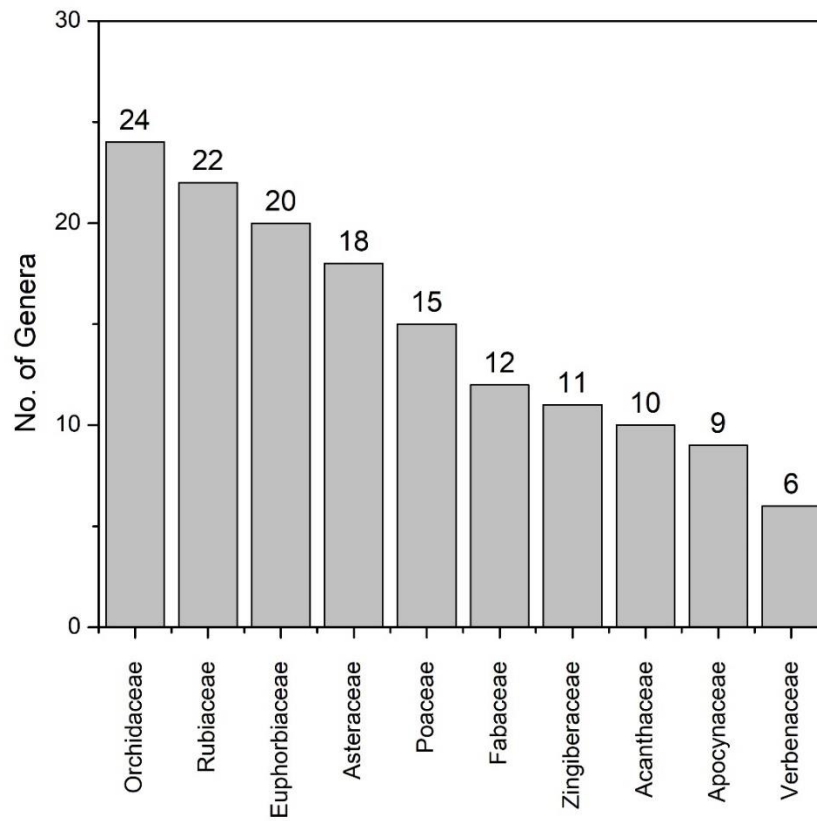


Fig. 2. Column chart showing the ten largest families by number of genera in the present work

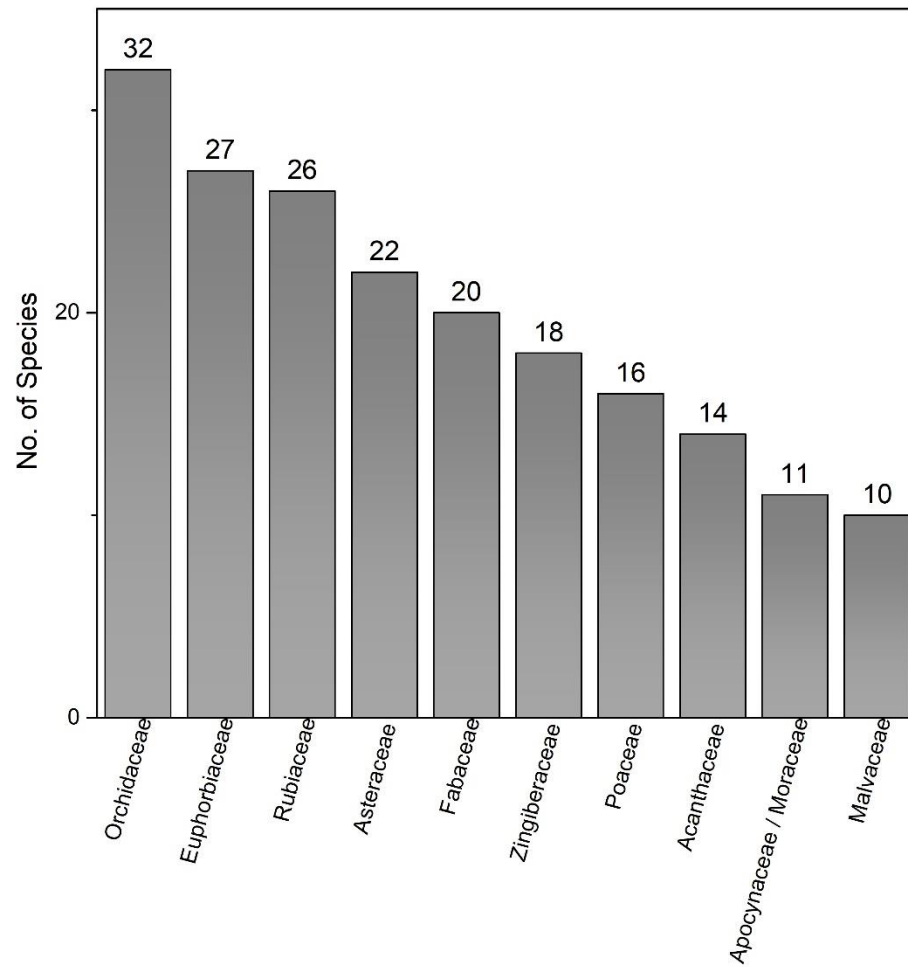


Fig. 3. Column chart showing the ten largest families by number of species of the present work

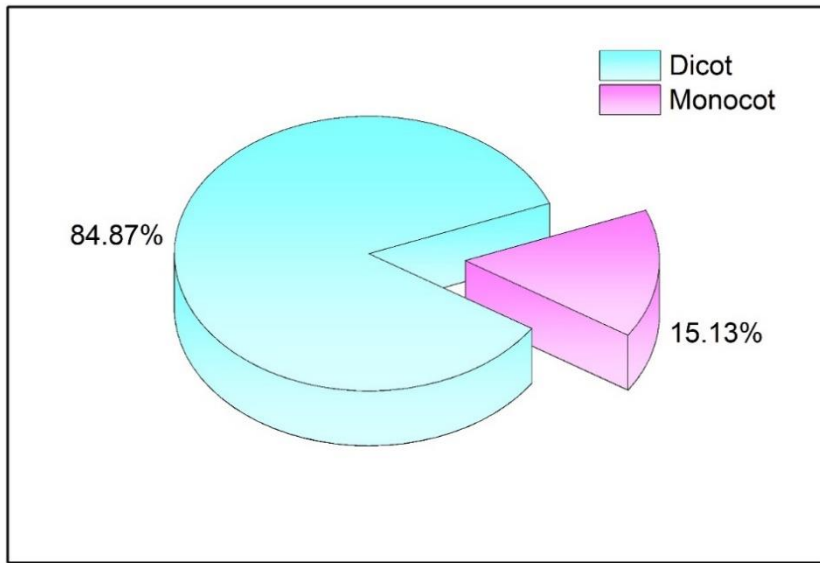


Fig4: Pie chart showing the Family percentage of Dicots and Monocots

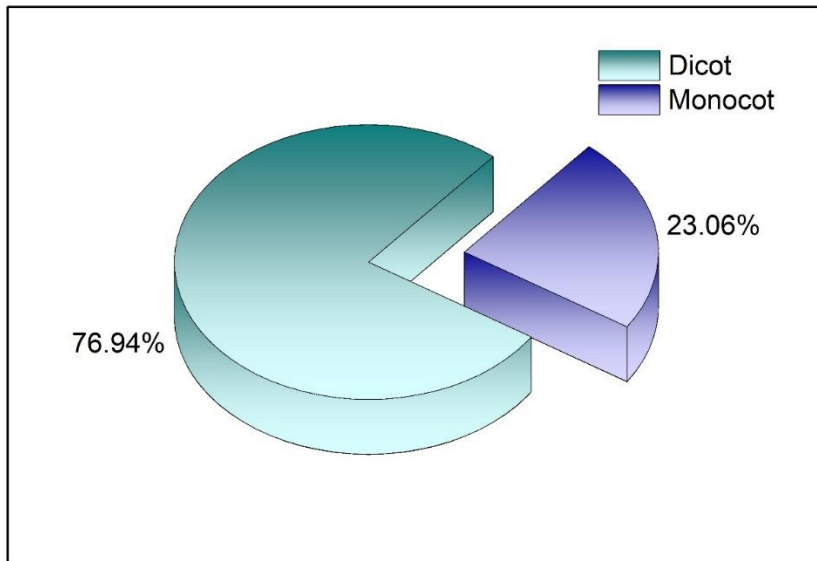


Fig5: Pie chart showing the Genera percentage of Dicots and Monocots

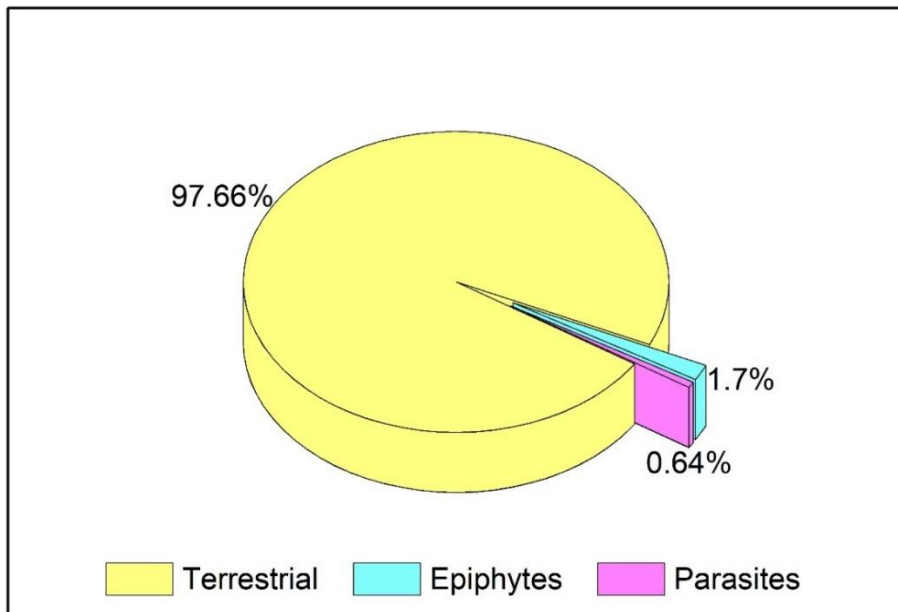
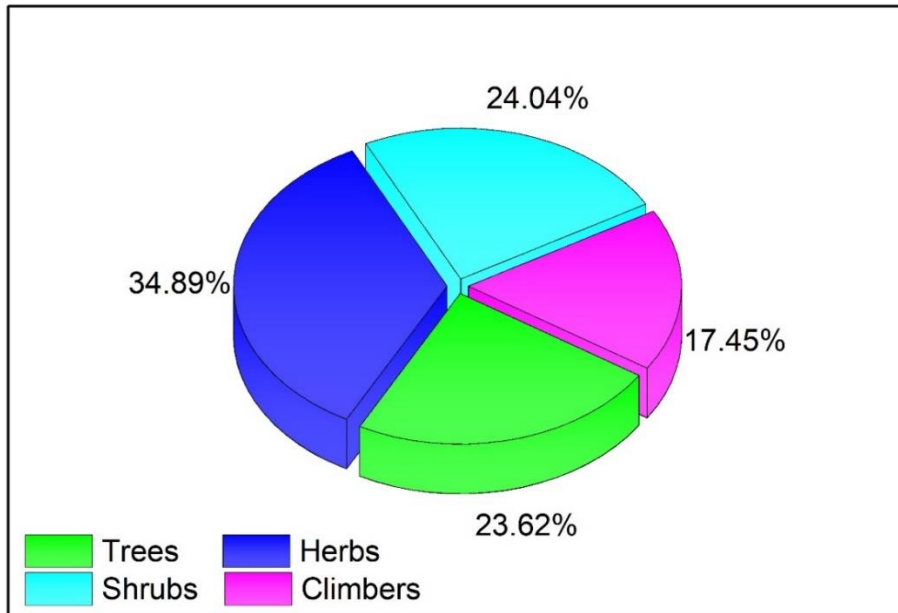


Fig 6: Pie charts showing different vegetation components of INP

Salient Findings

The present study deals with 454 angiospermic taxa belonging to 256 genera and 99 families under dicotyledons and 79 genera and 17 families under monocotyledons. During the survey of Angiospermic plants of Intangki National Park 5 new records for the state was observed. As such:

New record for state: *Goodyera fumata* Thwaites

Phalaenopsis manii Rchb. f.

Vanilla parishii Rchb. f.

Gastrochilous obliquus (Lindl.) Kuntze

Tropidia angulosa (Lindl.) Blume.

Some interesting Plants:

Intangki National Park harbours some curious plants of biological significance such as:

(a) Saprophytic plants like;

i. *Epipogium roseum* (D.Don) Lindl. (Orchidaceae)

ii. *Eulophia zollingeri* (Rchb.f.) J.J. Sm.(Orchidaceae)

iii. *Orobanche aegyptiaca* Pers. (Orobanchaceae)

(b) Root parasites like;

i. *Aeginetia indica* Roxb. (Orobanchaceae)

ii. *Balanophora dioica* R. Br. (Balanophoraceae)

Economically Important Plants of the Flora

Plants of Ornamental Values

Dendrobium aphyllum (Roxb.) C.E.C.Fisch., *Phlogacanthus thrysiformis* (Hardwicke) Mabb., *Dendrobium jenkinsii* Wall. ex Lindl., *Hiptage benghalensis* (L.) Kurz, *Saraca*

asoca (Roxb.) De Wilde, *Papilionanthe teres* (Roxb.) Schltr, *Hedychium coronarium* J.Koenig, *Tabernaemontana divaricata* (L.) R. Br. ex. Roem. & Schult, *Tacca laevis* Roxb., *Corymborkis veratrifolia* (Reinw.) Blume, *Engelhardtia spicata* Lechen ex Blume, *Thunbergia grandiflora* Roxb., *Thunbergia coccinea* Wall. etc.

Timber Yielding Plants

Pterospermum acerifolium Willd., *Gmelina arborea* Roxb., *Pterospermum lancifolium* Roxb., *Artocarpus chama* Buch. – Ham, *Duabanga grandiflora* Walp., *Chukrasia tabularis* A. Juss., *Mesua ferrea* L., *Albizia lebbeck* Benth., *Kydia calycina* Roxb., *Macaranga denticulata* (Blume) Muell. Arg., *Terminalia myriocarpa* Van Heurck & Mill. Arg. *Bischofia javanica*, *Artocarpus lakoocha*, etc.

Edible Fruit Plants

Stixis suaveolens (Roxb.) Pierre, *Garcinia lanceifolia* Roxb., *Citrus indica* Tanaka, *Garcinia pedunculata* Roxb. ex Buch.-Ham, *Terminalia chebula* Retz., *Dillenia indica* Blanco, *Baccurea ramiflora* Lour., *Terminalia bellirica* (Gaertn.), *Myrica esculenta* Buch.-Ham. ex D.Don, *Aglaia edulis* (Roxb.) Wall., *Flacourtia indica* (Burm.f.) Merr. etc.

Brooms

Inflorescence of *Thysanolaena latifolia* (Roxb. ex Hornem.) Honda and dried whole plant of *Sida rhombifolia* L. are generally used to make brooms.

Thatching

Generally *Imperata cylindrica* (L.) Rauschel is used for making for thatching.

Fish poisoning

Randia spinosa (Thunb.)Poir. and *Milletia pachycarpa* Benth. are used in fish poisoning as a means of fishing.

Medicinal Plants

Tinospora cordifolia (Willd.) Miers, *Asparagus racemosus* Willd., *Alpinia galanga* Willd., *Homalomena aromatica* (Spreng.) Schott, *Rhus javanica* L., *Phyllanthus emblica*

L., *Justicia adhatoda* L., *Centella asiatica* (L.), *Gloriosa superba* L., *Rauwolfia serpentina* (L.) Benth. ex Kurz., *Eclipta prostrata* (L.) L. etc.

Primitive Plants

Some primitive families such as Magnoliaceae, Annonaceae, Saururaceae, Lauraceae, Menispermaceae, Chloranthaceae, etc. are well documented. The primitive members among them are *Magnolia hodgsonii* (Hook.f. & Th.) H. Keng, *Fissistigma polyanthum* (Wall.) Merr., *Friesodielsia fornicata* (Roxb.) D.Das, *Miliusa dioica* (Roxb.) Chaowasku & Kessler, *Chloranthus elatior* Link, *Litsea cubeba* (Lour.) Pers., and *Houttuynia cordata* Thunb.,

Floristic Affinities

The flora of Intangki National Park shows greater affinities with the nearby floras mainly with Sino-himalayan, Indo- Burmese and Malaysian elements and to the lesser extent with the flora of peninsular India. The affinities are best represented by counting some of the common elements. Chinese and the Himalayan genera found in the study area mainly *Itea*, *Thunbergia*, *Silvianthus*, *Scurrula*, *Disporum*, *Jasminum*, *Phlogacanthus* etc. Malayan elements occurring in the study area are genera like *Engelhardtia*, *Balanophora*, *Helicia*, *Spondias* and species like *Cardiopteris quinqueloba*, *Corymborkis veratrifolia* *Dichroa febrifuga* ranges from China to Malaysia through Nagaland.

Peninsular Indian elements occurring in the study area include *Dillenia indica*, *Dichapetalum gelonoides*, *Helicia robusta*, *Leea indica*, *Miliusa dioica* etc.

Many genera like *Zanthoxylum*, *Itea*, *Disporum*, *Buddleja*, *Houttuynia*, *Saurauia*, *Turpinia* etc. which occur in the study area shows wide distribution in New World also.

A salient feature of the flora of the Intangki National Park is the presence of many primitive flowering plants like *Houttuynia*, *Magnolia* and families like Annonaceae, Magnoliaceae Piperaceae, Lauraceae etc.

Species of wide distribution: Phytogeographically the flora has following floristic elements.

(i) Indo-Myanmar elements: The Indo-Myanmar elements recorded from the study area include species like *Stichoneuron membranaceum*, *Boesenbergia kingii*, *Etilingera longuiformis*, *Linostoma decandrum*, *Mycetia nutans*, *Balanophora dioica* etc.

(ii) Indo-Chinese elements: The Indo-Chinese elements recorded from the study area include species like *Dillenia scabrella*, *Thunbergia coccinea*, *Mangifera sylvatica*, *Saurauia armata*, *Hoya globulosa* etc.

(iii) Indo-Malaysian elements: The Indo-Malaysian elements recorded from the study area include species like *Ficus curtipes*, *Bombax ceiba*, *Leea indica*, *Hellenia speciosa*, *Sterculia hamiltonii* etc.

(iv) Indo-Bangladesh elements: The Indo-Bangladesh elements recorded from the study area include species like *Artocarpus chama*, *Scurrula garcilifolia*, *Oxyspora vagans*, *Tacca integrifolia*, *Tinospora cordifolia*, *Calamus flagellum* etc.

Out of the families identified in the study, some of the species are classified as Rare, Endemic and Threatened ((RET) Species which is shown in Table 6:

SL. No.	Name	Conservation Status
1.	<i>Piper pedicellatum</i> C. DC.	Vulnerable
2.	<i>Garcinia indica</i> (Thouars) Choisy	Vulnerable
3.	<i>Aglaia edulis</i> (Roxb.) Wall.	Near Threatened
4.	<i>Wurfbainia jainii</i> (S. Tripathi & V. Prakash) Skornick. & A. D. Poulsen	Endemic to Meghalaya and Nagaland
5.	<i>Boesenbergia kingii</i> Mood & L.M. Prince	Rare
6.	<i>Biermannia bimaculata</i> (King & Pantl.) King & Pantl.	Rare
7.	<i>Stichoneuron membranaceum</i> Hook. f.	Rare
8.	<i>Meistera mizoramensis</i> (M. Sabu, V.P.Thomas & Vanchh.) Skornick & M. F. Newman	Endemic to Meghalaya and Nagaland
9.	<i>Mycetia mukerjiana</i> Deb & R.M. Dutta	Rare

10.	<i>Illigera khasiana</i> C.B. Clarke	Rare
11.	<i>Memecylon celastrinum</i> Kurz	Rare
12.	<i>Stauroanthera umbrosa</i> C.B. Clarke	Rare
13.	<i>Bridelia sikkimensis</i> Gehrm.	Rare
14.	<i>Goodyera fumata</i> Thwaites	Rare
15.	<i>Vanilla parishii</i> Rechb. f.	Rare
16.	<i>Citrus indica</i> Tanaka	Rare

CHAPTER 6

CONCLUSION

With the understanding that for proper conservation and management of Biodiversity of any particular area or region, the knowledge of its various biotic units needs to be identified and documented accordingly and it could be achieved only through consistent exploration and systematic analysis of the region or area. The present study has been attempted towards understanding the flowering plants of Intangki National Park, Nagaland. The National Park is endowed with rich and fascinating vegetation and holds a large number of curious and economically important plants.

It was found from the study that Intangki National Park (INP) was an ideal habitat for numerous angiosperms. A total of 470 taxa of flowering plants belonging to 360 genera and 120 families have been recorded. Out of 470 taxa 277 genera with 102 families belongs to dicots and 83 genera and 18 families belongs to monocots.

The most dominant families with maximum number of species are: Orchidaceae (32 species), Euphorbiaceae (27 species), Rubiaceae (26 species), Asteraceae (22 species), Fabaceae (20 species), Zingiberaceae (18 species), Poaceae (16 species), Acanthaceae (14 species), Apocynaceae and Moraceae (11 species), Malvaceae (10 species), The remaining species belong to the rest of the families out of which 49 families are represented by single species, 16 families by 2 species, 11 families by 3 species, 13 families by 4 species, 2 families by 5 species, 6 families by 6 species and 5 families by 7 - 8 species.

The ten families with the maximum number of genera are Orchidaceae (24 genera), Rubiaceae (22 genera), Euphorbiaceae (20 genera), Poaceae (15 genera), Fabaceae (14 genera), Zingiberaceae (13 genera), Asteraceae (12 genera), Acanthaceae (10 genera), Apocyanaceae (8 genera) and Malvaceae, Verbenaceae and Urticaceae (6 genera). The remaining genera belong to the rest of the families of which 56 families are represented by single genera, 32 families by 2-3 genera and 15 families by 4-5 genera. *Ficus* is the most dominant genera with 6 species followed by *Jasminum* (5 species) and *Solanum* (4 species).

The study also found that out of the total 470 species, 164 species are herbs, 113 are shrubs, 111 are trees and 82 are climbers. There are 459 terrestrial, 8 epiphytes and 3 parasitic plants of the 470 species of plants. Some of which belong to the RET category.

Like other parts of Nagaland, this region is also a varitable place of orchids, a total of 32 species have been recorded belonging to 24 genera. The study also yields 5 new records to the state flora viz. *Goodyera fumata*, *Phalaenopsis manii*, *Vanilla parishii*, *Gastrochilous obliquus* and *Tropidia angulosa*. The flora of INP was also found to be of great economic importance, such as ornamental plants, timber yielding plants, dye and fibre yielding plants, fruit bearing plants, plants used for thatching besides some plants of primitive origin. Numerous plants with high medicinal value were also found to occur in the district.

From the exploration and documentation, it is understood that Intangki National Park is a vast repository of rich gene pool. However, even though it is a protected area the National Park is facing both abiotic and biotic pressures resulting in loss of habitats

and biodiversity. Some of the issues and problems faced by the Park are: Demographic pressures, Sporadic illegal loggings, Collection of firewood, Poaching and illegal hunting, Settlement of Beisumpuikam proposed exchange land, Inadequate infrastructure for protection and management, Lack of interface connectivity for camping and surveillance.

Intangki National Park is the only National park in Nagaland and also the habitat of important flagship species such as endangered Asian Elephant (*Elephas maximus*). The park is also known for endangered White-winged duck, vulnerable Roufus-necked hornbill, near threatened Great pied hornbill and brown hornbill (Choudhury, 2001). As most of the forest areas in Nagaland belong to the community, where the community has full rights over the land, Intangki is the only large contiguous protected area (forest) in Nagaland, which conserves and protects the wildlife of the state, the park is the last vestige of Wildlife heritage in the State. The goal of the National Park is conservation of this key habitat and the diverse flora and fauna of the forest but since no extensive work in the plant resources has been done, the present study hopes to aid the goal of the Park.

It is also evident from the literature that so far there is no detailed floristic account of INP. So in order to offset this insufficiency of floristic knowledge of the INP, it is essential to study the plant resources and follow the evolution of the biological diversity. Though much effort has been given to document the flowering plant species, the present study does not claim to be 100% due to topography, time constraints and insurgency issues in the area.

The botanical data generated from the base line survey will help forest managers, researchers and policy makers to formulate plan for biodiversity conservation and sustainable uses of natural resources in and around Intangki National Park. Keeping in mind this present research work was undertaken to document the diversity of angiospermic plants of the Intangki National Park.

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