

FLORA OF SONANADI WILDLIFE SANCTUARY, UTTARAKHAND



भारतीय वनस्पति सर्वेक्षण
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FLORA OF SONANADI WILDLIFE SANCTUARY

UTTARAKHAND

Author
R. Manikandan

Assistance: Nithya S P



Botanical Survey of India
Ministry of Environment, Forest and Climate Change
2025



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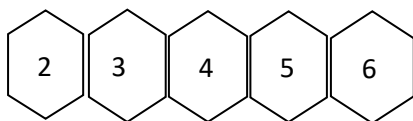
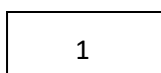
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Front cover: A view of palain river

Back cover:



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E - Publication

1. Streams near Pakhro
2. *Glycosmis pentaphylla* (Retz.) DC.
3. *Helicteres isora* L.
4. *Osbeckia stellata* Buch.-Ham. ex D.Don
5. *Senna occidentalis* (L.) Link
6. *Mimosa himalayana* Gamble

ए.ए. माओ
निदेशक
A. A. Mao
Director



सत्यमेव जयते



भारत सरकार
पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय
भारतीय वनस्पति सर्वेक्षण
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST
& CLIMATE CHANGE
BOTANICAL SURVEY OF INDIA

FOREWORD

The Botanical Survey of India under the Ministry of Environment, Forests and Climate Change has been documenting the wild plant diversity of our country including non-flowering plants from protected areas, hotspots, fragile ecosystems and sacred groves in particular. Protected area serve as key ecosystems for conserving the biodiversity. In India, there are 998 protected areas covering 173,629.52 km² of land under protection. Floristic studies in these protected areas are vital for the functional aspects of the ecosystem and the status of various species. India is one of the 19 Mega diverse countries and one of the 12 Mega gene centers of the World. India is endowed with *c.* 22,214 species of angiosperms, out of which, more than 8000 are useful to mankind.

Present publication is an outcome intensive and extensive studies on the 'Flora of Sonanadi Wildlife Sanctuary, Uttarakhand' dealing 113 families, 463 genera, 661 species and 5 subspecies and 12 varieties of Angiosperms which includes a few cultivated species. Besides these, 21 Pteridophytes have also been recorded from the study area. The Flora is represented with plant resources such as medicinal, economical, horticultural, aquatic, weed and fodder value, ethno-botanically important plant species and their utilization practices by local communities and their traditional conservation approaches from the Sanctuary.

Sincere efforts made by the authors in bringing out the present work are laudable. I am sure that this 'Flora' will be of immense help to field botanists, foresters, conservationists, environmentalists, nature enthusiasts and others interested in knowing the flora of this Wildlife Sanctuary. This work will also be useful in the publication of *Flora of Uttarakhand State*.

Botanical Survey of India
Kolkata, India

A.A. Mao
Director



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PREFACE

In India, there are 998 protected areas, of these, 6 National Parks, 7 Wildlife Sanctuaries and 1 Biosphere Reserve (partly) in Uttarakhand state. The Sonanadi Wildlife Sanctuary situated in Sonanadi Wildlife Sanctuary is situated in the neighborhood of Corbett National Park, lies in the Pauri district of Uttarakhand and spreads over an area of 301 sq. km and amidst the virgin forests that serve as home to a large variety of fauna and flora. The sanctuary is named after the river Sonanadi (*Sona*-gold, *nadi*-river in Hindi), and it is a perfect example of the Northern Indian tropical forests. The scenic beauty of the area is unmatched. Also, it is a home for a lot of endemic plants, endangered animals and endangered birds along with the contiguous forests helps in maintaining genetic diversity. The Sonanadi Wildlife Sanctuary encompasses a rich biodiversity of both flora and fauna and it is located at Pauri district of Uttarakhand. It covers of rich Northern Tropical Moist deciduous forests, Northern Tropical dry deciduous forests and Himalyan Sub-tropical Pine forests.

The area is very rich in medicinal plants many of which form base for certain life saving drugs. Though a few workers have explored some parts of the sanctuary as a part of general floristic work, major portion of the sanctuary remained unexplored resulting in the present studies on 'Sonanadi Wildlife Sanctuary, Uttarakhand' were carried out to bring a comprehensive account of the plant wealth of the area. The study consists of field, herbarium and literature survey. Intensive and extensive plant collections were carried out by the author over a period of three years. The sanctuary composed of 113 families, 463 genera, 661 species and 5 subspecies and 1 varieties of Angiosperms which includes a few cultivated species. Besides these, 21 Pteridophytes have also been recorded from the study area. The plants have been identified using relevant floras and herbarium material. The book is divided into several chapters covering all aspects of the area, people, vegetation, endemic and threatened plants, economically important plants including medicinal plants, systematic treatment, bibliography. Though the flora of the area is partially covered in the published 'Flora of Corbett National Park', the present work forms first hand information on the Sanctuary exclusively.

The families have been arranged according to Bentham & Hooker's (1862-1863) system of classification by incorporating modifications as proposed in the classifications by Cronquist (1981), Kubitzki (1990-2006), Brummitt (1992), APG (1998) and Mabberley (2008). Bracketed keys have been provided for the families, genera, species and infra-specific taxa. For each species, the currently accepted botanical name, basionym if any, relevant synonyms and their full citations have been given. Local names are provided wherever available. The names of authors, titles of books and journals are abbreviated following Authors of Plant Names (Brummitt & Powell, 1992) and IPNI website, journals following Botanico-Periodicum-Huntianum (G.H.M. Lawrence et al., 1968), BPH Supplementum I (G.D.R. Bridson, 1991); BPH Supplementum II (G.D.R. Bridson, 2004) and books following Taxonomic Literature (F.A. Stafleu & R.S. Cowan, 1976) & TL Supplements (F.A. Stafleu; E.A. Mennega, 1992-2000). The nomenclature of all taxa has been updated following the latest ICBN and referring to recent taxonomic literature. A short description of the species followed by phenological data, distribution and details of specimens examined. In addition, relevant notes have been provided wherever necessary and quite good numbers of photographs are provided which add value for identification. It is sure that this book will be helpful to the conservation authorities for future management and restoration of some of the degraded habitats with suitable plant species. Besides, this book will be helpful to botany students, researchers, biodiversity management committees, and plant enthusiasts to know about the diversity of the local flora of this region.

The author wish to record his sincere thanks to the Director, Botanical Survey of India for granting the project and also thankful to Scientist 'F' & Head of Office, Botanical Survey of India, Northern Regional Centre, Dehradun and Botanical Survey of India, Southern Regional Centre, Coimbatore for facilities. I would like to thank Dr. Kumar Ambrish, Scientist 'F' & Head and Dr. Kuldeep S. Dogra, Scientist 'E' (presently at High Altitude Western Himalayan Regional Centre, Solan) Dr. B.S. Kholia, Ex-Scientist 'E', Dr. Giriraj Singh Panwar, Scientist 'E' (presently at BGIR, Noida), Dr. Puneet Kumar, Scientist 'D', Dr. Brijesh Kumar, Scientist 'C' Botanical Survey of India, Northern Regional Centre, Dehradun for their constant moral support and encouragement. Also my special thanks to Mr. B.P. Uniyal, Ex-Botanist, Botanical Survey of India, Northern Regional Centre, Dehradun for critically going through the manuscript.

My special gratitude to Mrs. Bhatnagar, Ex-Librarian & Information Assistant, Botanical Assistants, Photographer, Preservation Assistants, Research scholars and other staff members of Botanical Survey of India, Northern Regional Centre, Dehradun for their constant moral support.

I also thankful to the Forest Department Officials of Uttarakhand for permitting me to collect plant specimens from the Sanctuary and also acknowledge the help received from the in-charges of DD, during the herbarium consultation and the field staff of Botanical Survey of India, Northern Regional Centre. I thank Mr. Sanjai Uniyal for formatting the manuscript and plates.

Botanical Survey of India
Kolkata, India

[R. Manikandan]

This book is dedicated to



Dr. (Late) H.C. Pande [1965-2013]

Ex-Scientist 'D', Botanical Survey of India

Northern Regional Centre, Dehradun

Late Dr. H.C. Pande made significant contributions to the floristic studies of the Western Himalayas through his research work on the floristic survey and assessment of biodiversity (flora) in the Corbett Tiger Reserve. Dr. Pande will be remembered forever as a good human-being and an active and renowned pteridologist of national fame, ethnobotanist and conservationist.

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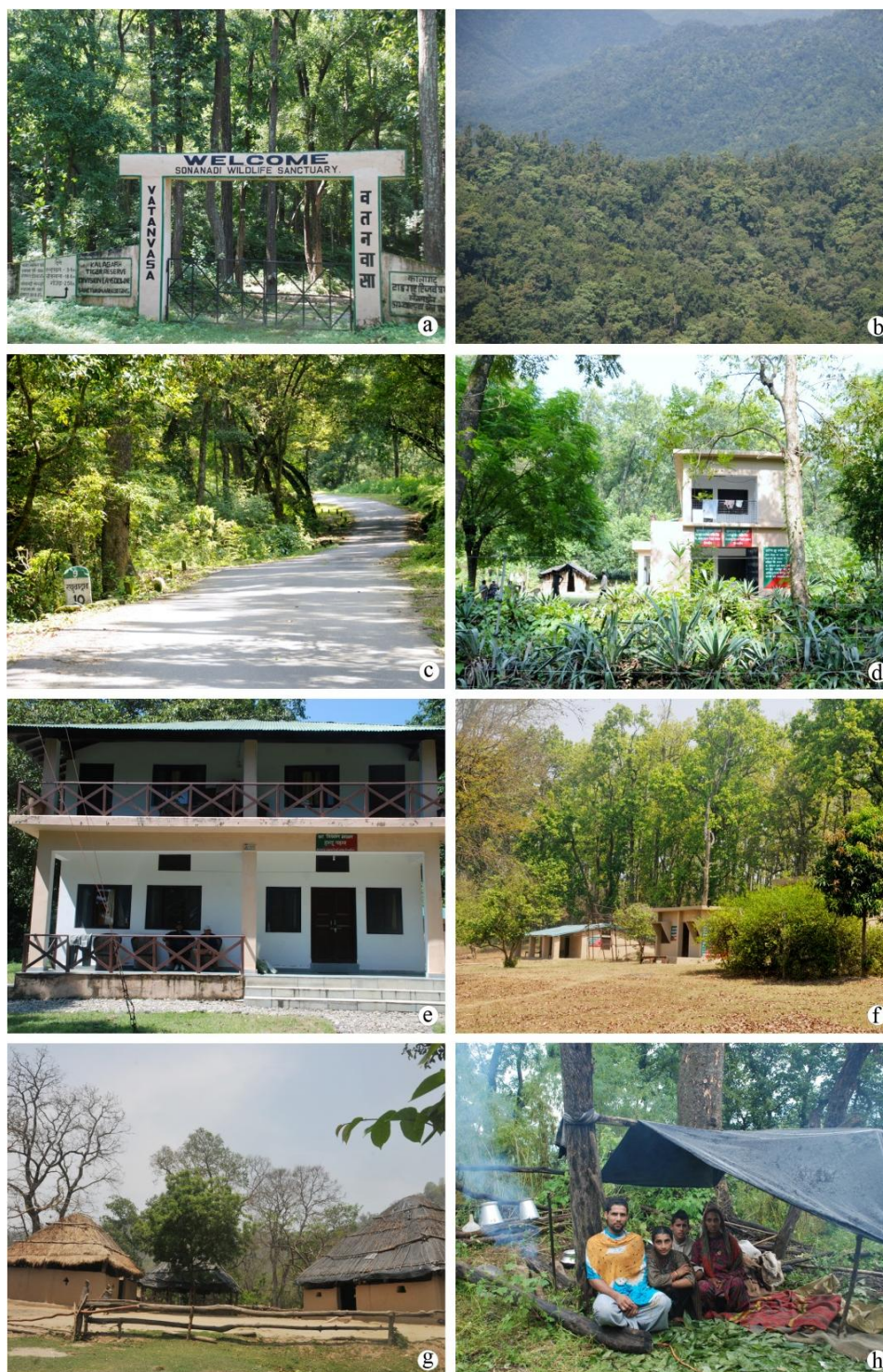


Plate 1: **a.** Entrance gate of Sonanadi Wildlife Sanctuary at Vatanwasa; **b.** A view of moist deciduous forests near Mundiapani; **c.** On way to Rathuadhab; **d.** Forest Rest House at Sonanadi Wildlife Sanctuary; **e.** Halduparao Forest Rest House; **f.** Hathikhund Forest region; **g.** Gujar's tent; **h.** Gujar tribe lives inside the thick forests.



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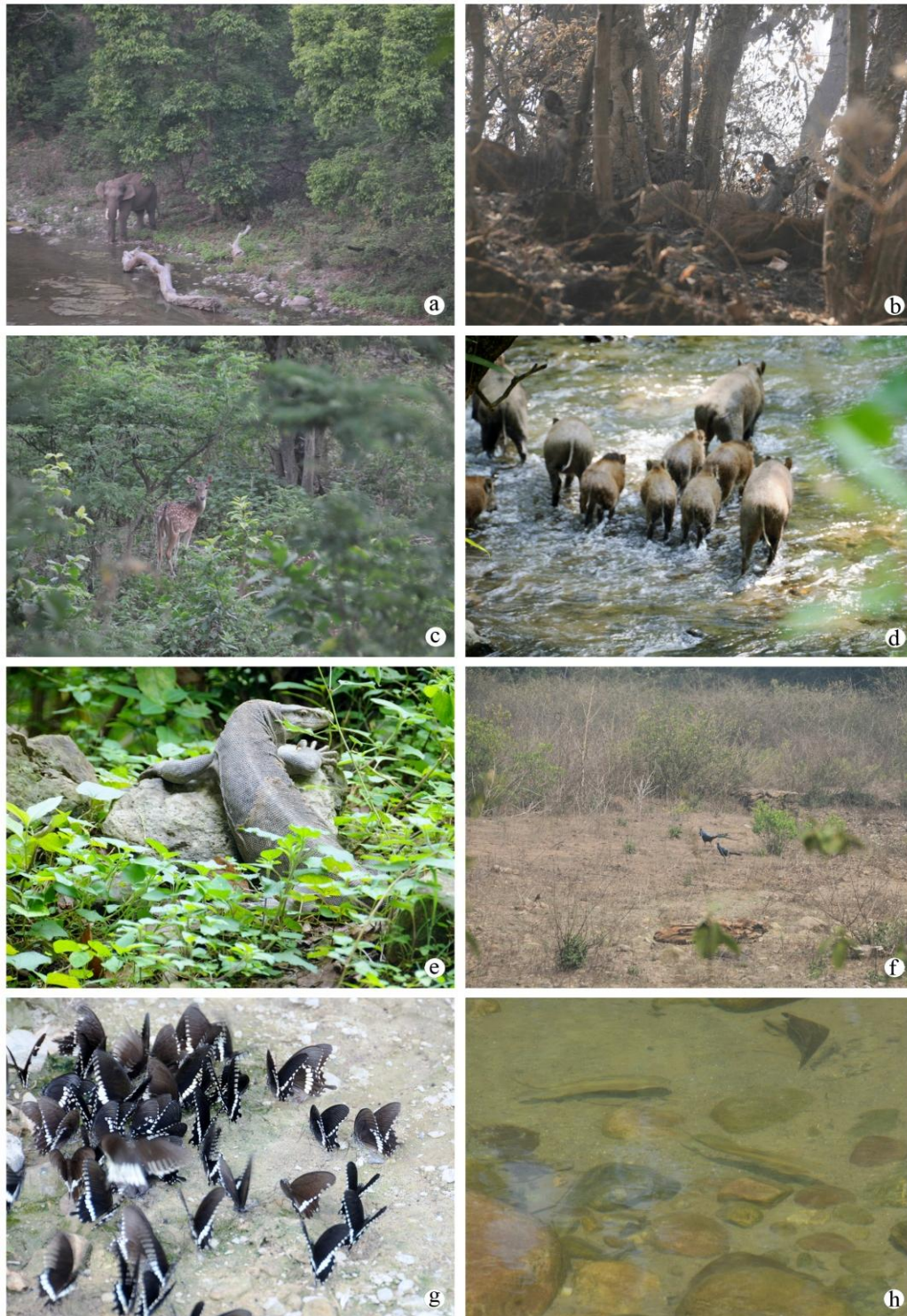


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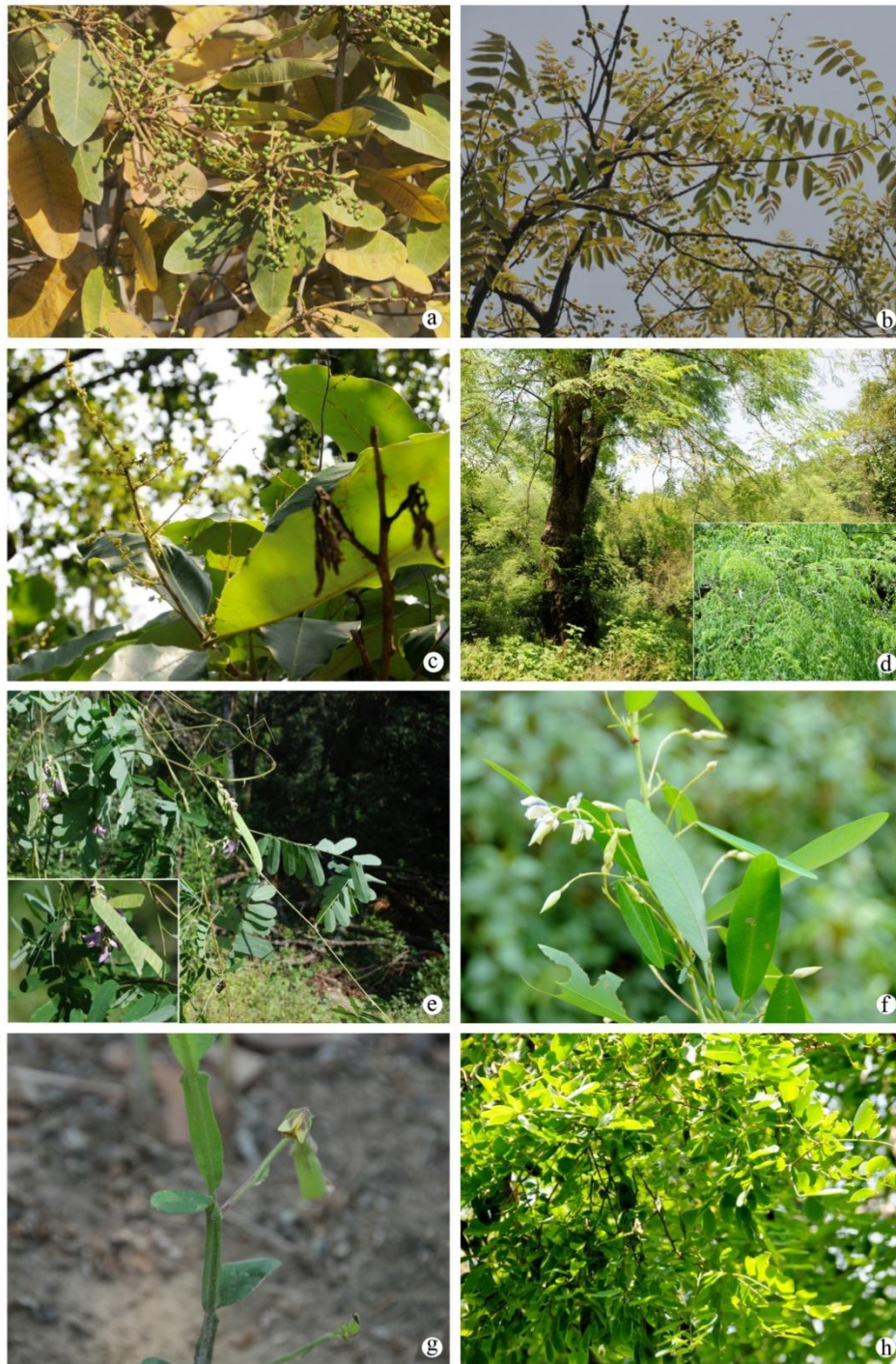


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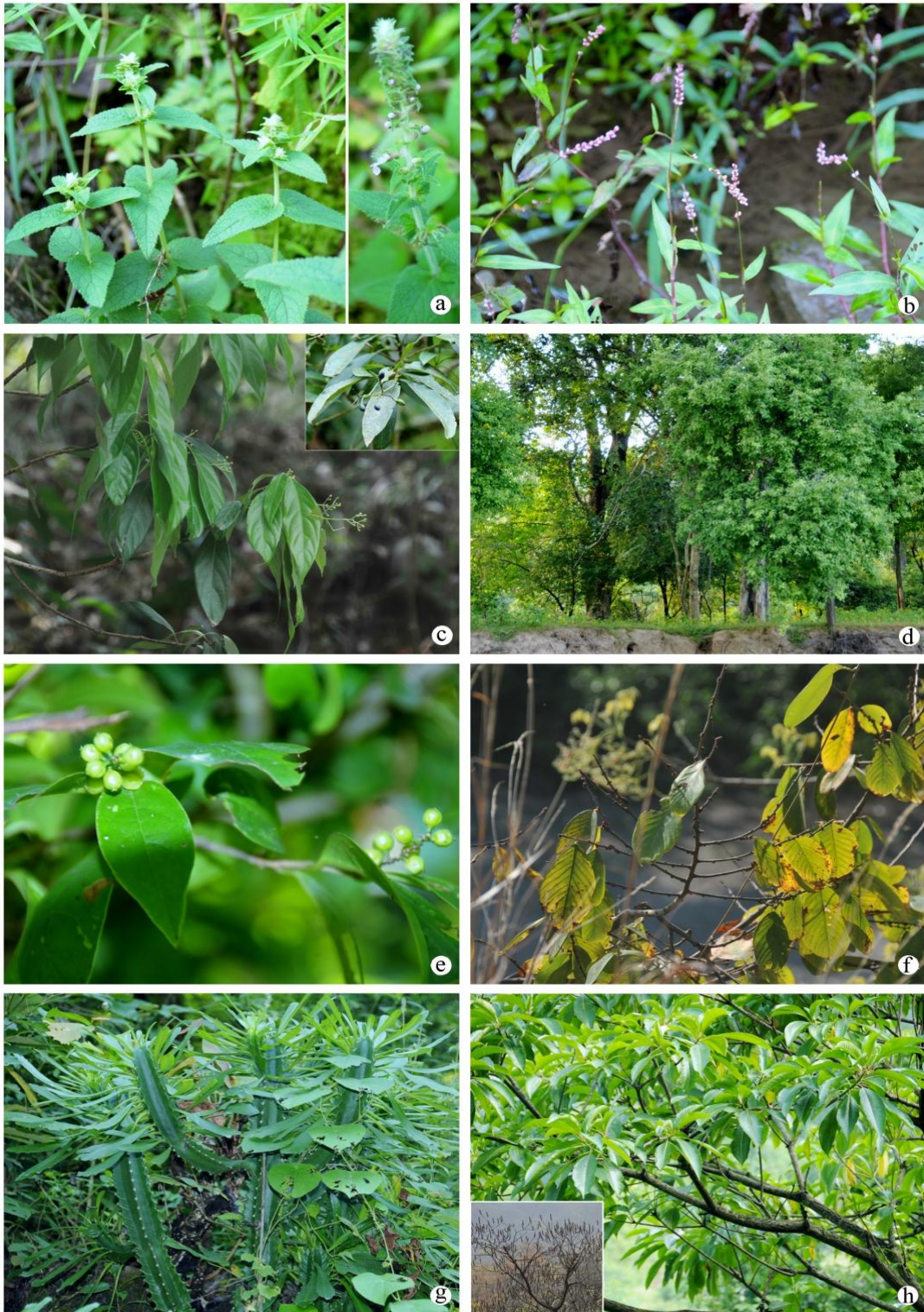


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Plate 17: **a.** *Glochidion heyneonum* (Wight & Arn.) Wight ex Bedd.; **b.** *Jatropha curcas* L.; **c.** *Phyllanthus emblica* L.; **d.** *Boehmeria macrophylla* Hornem.; **e.** *Boehmeria rugulosa* Wedd.; **f.** *Holoptelea integrifolia* (Roxb.) Planch.; **g.** *Trema politoria* (planch.) Blume; **h.** *Cannabis sativa* L.



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Plate 20: **a.** *Cheilocostus speciosus* (J. Konig) C.D. Specht.; **b.** *Musa paradisiaca* L.- a wild banana; **c.** *Dioscorea bulbifera* L.; **d.** *Commelina paludosa* Blume; **e.** *Phoenix acaulis* Roxb.; **f.** *Phoenix loureiroi* Kunth; **g.** *Wallichia oblongifolia* Griff.; **h.** *Amorphophallus bulbifer* (Roxb.) Blume



Plate 21: **a.** *Amorphophallus sylvaticus* (Roxb.) Kunth; **b.** *Remustia vivipara* (Roxb.) Schott.; **c.** *Lemna perpusilla* Torr.; **d.** *Chrysopogon zizanioides* (L.) Roberty; **e.** *Oplismenus burmannii* (Retz.) P. Beauv.; **f-g.** *Thysanolaena maxima* (Roxb.) O. Ktze.; **h.** *Saccharum spontaneum* L.

FLORA OF SONANADI WILDLIFE SANCTUARY PAURI DISTRICT, UTTARAKHAND

INTRODUCTION

It is worth to explore any area with wide range of forest types and to identify economically and medicinally important plants found there. Further, the reserve forests and territorial forests are preserved for specific purposes such as proper maintenance of the wildlife in that area and prevention of human interference through activities such as deforestation, cultivation and grazing of animals. It is a rewarding experience to make available a systematic account of the floristic wealth of such region or area. Moreover, the knowledge about the plants in any region is essential with the increasing consciousness of people about the environment and its impact on living organisms in general. Also, it is very important to conserve our plant wealth/diversity for the major role in providing food, fuel, fibres, medicine, shelter, maintaining a stable environment and to study the scientific value of plants. This is useful in assessing the periodic changes in flora that may occur in the study area.

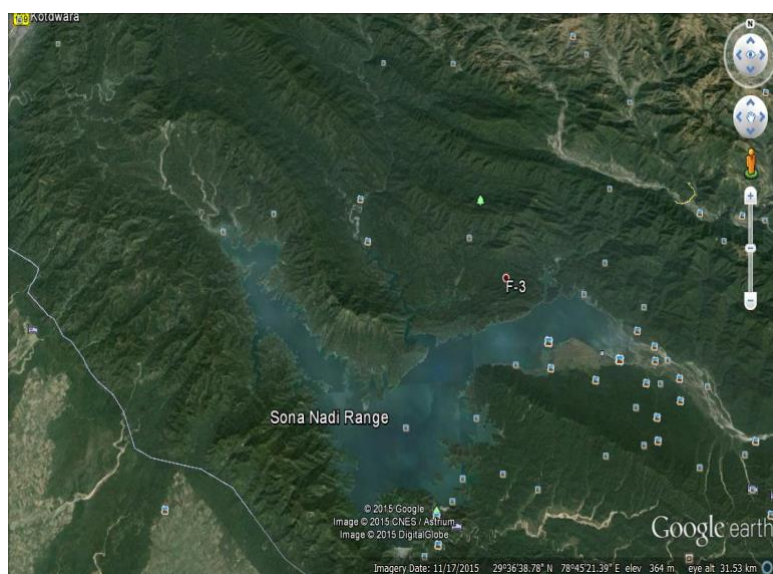
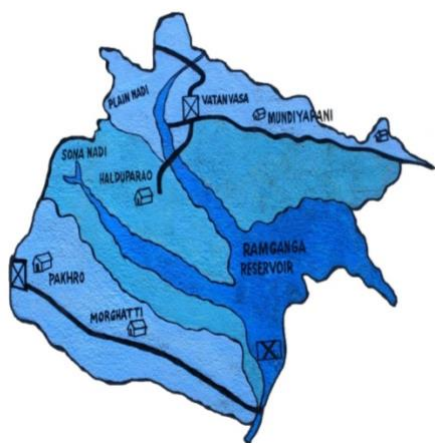
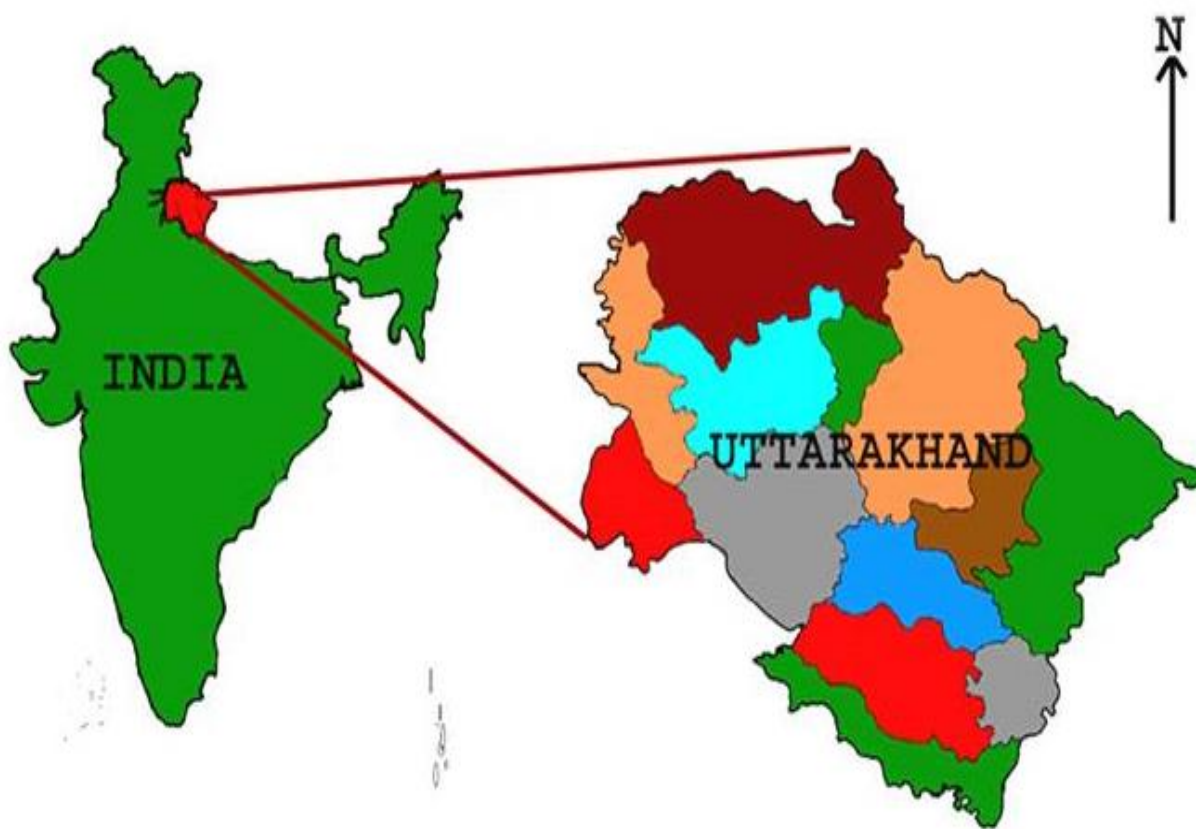
National Parks and Wildlife Sanctuaries are declared for specific purposes such as proper maintenance of the wildlife in that area and prevention of human interference through activities such as deforestation, cultivation and grazing of animals. Moreover, a taxonomic study and preparation of the flora is prerequisite for understanding and evaluating the ecosystem of a particular area in general. With this conviction the Flora of Sonanadi Wildlife Sanctuary is being proposed here for approval. The Uttarakhand state has a total land area of 53, 483 sq. km. which accounts for 1.69 per cent of the geographical area of the country. At present, there are 6 National Parks, 7 Wildlife Sanctuaries and 1 Biosphere Reserve (partly) [National Wildlife Database, May 2016].

AREA OF THE STUDY

Sonanadi Wildlife Sanctuary is located between 29°32'55.76 N latitude and 79° 45'23.86 E longitude and situated in the neighborhood of Corbett National Park, lies in the Pauri District of Uttarakhand and spreads over an area of 301 sq. km in altitudinal range varying between 465 m and 1050 m ASL (Map. 1, 2). The sanctuary is located at the riverside of Sonanadi and amidst the virgin forests that serve as home to a large variety of fauna and flora. The sanctuary is named after the river Sonanadi (*Sona*-gold, *nadi*-river in Hindi), and it is a perfect example of the Northern Indian tropical forests. Sonanadi Wildlife Sanctuary houses a variety of medicinal plants including some endangered species of herbs and shrubs. The area is very rich in medicinal plants, many of which form the basis for certain life saving drugs. The scenic beauty of the area is unmatched. Also, it is a home for a lot of endemic plants, endangered animals and endangered birds along with the contiguous forests helps in maintaining genetic diversity.

REASONS FOR UNDERTAKING THE PRESENT WORK AND ITS IMPORTANCE

The present study was undertaken to explore this under-explored area which is endowed with a rich floristic diversity. Extensive and intensive plant explorations were undertaken to assess and prepare the floristic account and plant wealth of Sonanadi Wildlife Sanctuary. According to the report of FAO (1993) shows the rate of deforestation is estimated to be 15 million hectares per annum. Besides, the Uruguay round of the General Agreement on Trade and Tariffs (GATT) have led to greater vulnerability of forest elements owing to market prices, new seed varieties and patenting laws. There is an alarming trend of forests transforming into agro industries.



Map. 1. Location map of Sonanadi WLS

Map. 2. Location map of Sonanadi WLS (Source: Google earth)

In addition, introduction of exotic species of flora whether accidentally or intentionally in the forests threatens the local biodiversity. Recently, Pitman & Jorgensen (2002) found that the number of species unique to each country is a rough guide to the number that is threatened and nearly half of the world's plants could be close to extinction.

According to National Remote Sensing Agencies (NRSA), the natural forests support the maximum biodiversity, which are depleting at a very fast rate. Our country too is losing its natural forests at the rate of 1.3 m ha every year (Kushalappa, 1992). Ahmedullah & Nayar (1987) have estimated about 1,500 species accounting for about 10% of the flowering plants of India are threatened. Thus, to protect and conserve the remaining 90% of the flowering plants, a judicious management and innovative methods of conservation are required. India is facing an alarming rate of loss of floristic diversity particularly due to declining forest cover and species.

Major problems faced in the present study area are cattle grazing, forest fire, difficulty in managing wildlife corridors and human interference mostly due to tourism. As the reserve forests/territorial forests are the prime centres of conservation and diversity, scientific information on all taxa needs to be collected and documented. Therefore, it is very important to make an assessment of the existing floristic diversity. Considering these reasons, Sonanadi Wildlife Sanctuary was selected for an assessment of floristic diversity.

REVIEW OF LITERATURE:

PAST AND PRESENT WORK

PAST WORK:

Hooker & Thomson (1855) in their '*Flora Indica*' reported quite comprehensive information on the flora of Garhwal Himalaya which includes the present study area. Hooker and his collaborators have dealt with many species in *The Flora of British India* (1872–1897). Some others have made botanical explorations in the region were carried-out by Keshwanand in 1897, Machinnon in 1889, 1897–98, 1903; Gollen in 1889 and Gamble in 1893 (Burkill, 1965). The work of Atkinson (1882) on flora of the Himalayas with special reference to Kumaon, Garhwal, Nepal and Tibet.

Some scholars like Deva & Naithani (1986), Garg (1987), Aswal *et al.* (1988), Dangwal (1993) and Nautiyal (1996) have made efforts to study the flowering plants of the Garhwal Himalaya in terms of certain families or groups of a given geographical entity. Important information can be derived from *Flowers of the Himalaya* (Polunin & Stainton, 1984), *Blossoming Garhwal Himalaya* (Rawat *et al.*, 1985), *Flowers of Himalaya* (Stainton, 1988) and *Flowers of West Himalaya* (Dang, 1990), *Flora of Nainitalensis* (Gupta, 1968), *Flora of Corbett Natl. Park* by P.C. Pant (1986); R.D. Gaur's *Flora of Pauri Garhwal* (1999) and *Flowering Plants of Uttarakhand- A checklist* by Uniyal *et al.* (2007). Other important unpublished works include Manis Kandwal's (2009) *Grass Flora of Uttarakhand* and Jalal's *Orchidaceae of Uttarakhand* (2017).

Though there are sporadic works on floristic account from the sanctuary (Naithani & Tiwari, 1982; Pant, 1986; Gaur & Barthwal, 1995; Gaur, 1999) and as there was no details floristic account of the Sanctuary, so the present work is proposed here.

PRESENT WORK:

The present comprehensive account of floristic diversity of the Sonanadi Wildlife Sanctuary and adjoining, Pauri District of Uttarakhand is the outcome of intensive and extensive studies on the vegetation of the area.

OBJECTIVES OF THE STUDY:

- Survey, identification and inventorisation of the floristic diversity of the Wildlife Sanctuary.
- Documentation of plant resources and their utilization practices by local communities living in and around the Sanctuary and their traditional conservation approaches.
- Listing of endemic, rare and threatened species.
- Listing of economically important plants in the Wildlife Sanctuary.
- Listing of plants having medicinal, horticultural and fodder value.
- Listing of aquatic plant species from the Sanctuary.
- Listing of Ethno-botanically important plant species from the Sanctuary.

MATERIALS AND METHODS

Intensive and extensive surveys will be undertaken periodically along different topographic and climatic gradients within the potential area of the Sanctuary, in order to achieve the above said objectives. The duration of each study tour ranged from 15 to 25 days. While carrying out the assessment of floristic diversity, efforts will be made to collect the plants in all seasons. The field observations such as habit, habitat, flower colour, odour, distribution, along with local names and uses, if any gathered from the tribals of Sonanadi Wildlife Sanctuary has to be noted in the field itself and any details which cannot be deduced from a herbarium specimen. After returning from the field, plant specimens, which have been tentatively identified in the field, have been carefully and critically studied, before these could be processed through conventional methods of drying, poisoning, mounting, stitching and labeling (Fosberg & Sachet, 1965; Bridson & Forman, 1998).

The identification of the collected specimens have to be done by comparing them with authentic specimens available in different herbaria such as **BSD**, **CAL** and **DD** protologues, journals and other relevant floras such as *Flora Indica* (Hooker & Thomson, 1855), *The Flora of British India* (Hooker, 1872-1897), *Flora of Corbett National Park* (Pant, 1986), *Flora of the district Garhwal, North-West Himalaya* (Gaur, 1999), *Flowering Plants of Uttarakhand* (Uniyal & al., 2007), etc. besides many other recent monographs and revisions.

The specimens will be processed and deposited at the Herbarium of Botanical Survey of India, Northern Regional Centre, Dehradun (**BSD**). In the preparation of the present assessment of floristic diversity of this sanctuary, all the available information and data will be gathered from some earlier collections pertaining to this Sanctuary, which were available in the above mentioned herbaria have also been taken into account to incorporate and assess the distribution pattern of all species in this Sanctuary.

PLAN OF THE FLORA:

The arrangement of the families followed in the present work, is based primarily on Bentham & Hooker's (1862-1883) system of classification with slight modifications as per current concepts following Hutchinson (1959), Cronquist (1968, 1981, 1986) and Kubitziki (1990–2004).

The genera under a family and the species under a genus have been arranged in alphabetical order. Bracketed keys have been provided for families, genera, species and infra taxa, if more than one taxon is present. These keys are artificial and are based on exo-morphic characters. The family keys are largely based up on the Bentham & Hooker's system of classification with modification wherever necessary. The nomenclature of plants has been updated applying IBC (McNeill & al., 2012) and referring to recent taxonomic literature.

For each species, correct botanical name followed by basionym and synonyms, if any, wherever necessary to connect the name with Hooker's *The Flora of British India*, *Flora of Corbett National Park* by Pant, *Flora of the district Garhwal, North-West Himalaya* (Gaur, 1999), and *Flowering Plants of Uttarakhand*- A checklist by

Uniyal *et al.* have been given. The names of authors, titles of books and journals are often abbreviated following 'Authors of Plant Names' (Brummitt & Powell, 1992), *Taxonomic Literature* ed. 2 and B-P-H (*Botanico Periodicum Huntianum*) respectively. After citation, local names, if available are given in italics.

The species have been described based primarily on morphological characters, followed by relevant data on flowering and fruiting. The details such as frequency and habitat have been given. Throughout the present work, decimal and metric systems have been used for the measurements. Maps representing various data in connection with the present work are also given. Some colour photographs depicting habits, ecology, vegetation, etc. are provided.

VEGETATION:

Generally, the vegetation types are influenced by climate, rainfall, temperature, humidity, wind, altitude, structure and composition of soils. The vegetation of the study area has been classified as per the revised survey of the forest types of India by Champion and Seth (1962) mainly as

1. Northern Tropical Moist deciduous forests:
 - a. Moist Siwalik Sal Forests
 - b. Moist bhabar-dun Sal Forests
 - c. Moist mixed deciduous forests
 - d. Bombax-Albizia-Alluvial Savanna Woodland
2. Northern Tropical dry deciduous forests:
 - a. Dry Siwalik Sal Forests
 - b. Northern dry mixed deciduous forests
 - c. Dry Bamboo brakes
 - d. Khair-Sisso Forests
3. Himalayan Sub-tropical Pine forests:
 - a. Lower or Siwalik Chir forests

Flora:

Generally, the vegetation types are influenced by climate, rainfall, temperature, humidity, wind, altitude, structure and composition of soils. Major floral species found in the present study area are *Adina cordifolia*, *Alangium salviifolium*, *Anogeissus latifolia*, *Bauhinia malabrica*, *Cassia fistula*, *Cocculus laurifolius*, *Diospyros excelsa*, *Ficus* spp., *Grewia* spp., *Helictres isora*, *Lannea coromandelica*, *Machilus odoratissima*, *Mallotus philippensis*, *Milletia extensa*, *Ougenia oojenensis*, *Phyllanthus emblica*, *Scheuchzeria oleosa*, *Semecarpus anacardium*, *Shorea robusta*, *Terminalia bellirica*, *T. elliptica*, *Cassia fistula*, *Caesaria tomentosa*, *Ougenia oojenensis*, *Syzygium cumini*, *Phyllanthus emblica*, *Bauhinia racemosa*, *Anogeissus latifolia*, *Alangium salviifolium*, *Helictres isora*, *Ficus* spp., *Holoptelea integrifolia*, *Kydia calycina*, *Cocculus laurifolius*, *Grewia* spp., *Adina cordifolia*, *Lannea coromandelica*, *Firiana pallens*, *Milletia auriculata*, *Machilus odoratissima*, *Diospyros excelsa*, *Semecarpus anacardium*, *Wrightia tinctoria*, etc.

Climbers or lianas: *Millettia extensa*, *Pueraria tuberosa*, *Cryptolepis buchmani*, *Porana paniculata*, *Ichnocarpus frutescens*, *Pothos cathartii*, *Clematis gouriana*, *Bauhinia vahlii*, *Ampleocissus divaricata*, *Dioscorea belophylla*, *D. bulbifera*, *Ipomea quamoclit*, etc.

Undergrowth elements area *Wallichia densiflora*, *Colebrookia oppositifolia*, *Murraya koenigii*, *M. paniculata*, *Clerodendrum viscosum*, *Pogostemon plectranthoides*, *Woodfordia fruticosa*, *Berberis* spp., *Nyctanthes arbortrix*, *Hollarbena antidysentrica*, *Indigofera* spp., *Embelia* spp., *Callicarpa macrophylla*, etc.

Orchids: *Diplomeris hirsuta*, *Eria pubescens*, *Dendrobium* spp., *Luisia trichorbiza*, *Nervilia crispata*, *Vanda* spp., etc.

Parasites: *Dendrophthoe falcata*, *Aeginetia indica*, etc.

Grasses such as *Cyanodon dactylon*, *Themeda arundinacea*, *Erianthus munja*, *Saccharum spontaneum*, *Neyraudia arundinacea*, *Heteropogon contortus*, *Desmostachya bipinnata*, *Imperata cylindrica*, *Vetivera zizanioides*, *Arundinella nepalensis*, *Oplismenus compositus*, *O. burmanii*, etc.

Lower storey: *Crotalaria sericea*, *Desmodium* spp., *Flemingia strobilifera*, *Sida cordata*, *S. cordifolia*, *S. rhombifolia*, *Urena lobata*, *Lantana camara*, *Acanthospermum hispidum*, *Cannabis sativa*, *Zornia gibbosa*, *Cassia absus*, *C. tora*, *Alysicarpus* spp., *Ageratum conyzoides*, *Artemisia* spp., *Bidens biternata*, *B. bipinnata*, *Eclipta procera*, *Elephantopus scaber*, *Acrocephalus indicus*, *Begonia picta*, *Biophytum* spp., *Lactuca procumbens*, *Sphaeranthus senegalensis*, *Tridax procumbens*, *Siegesbeckia orientalis*, *Lindernia ciliata*, *L. anagalis*, *Linderbergia indica*, *Torenia indica*, *Rhynchoglossum obliquum*, *Hedyotis* spp., etc.

RET species:

During the botanical exploration tour to Sonanadi Wildlife Sanctuary and its surroundings, the following RET species were collected viz., *Alysicarpus bupleurifolius* var. *hybridus*, *Bauhinia malabarica*, *Dioscorea belophylla*, *Diplomeris hirsuta*, *Eria pubescens*, *Flingeria fugax*, *Dendrobium* spp., *Hedychium thysiforme*, *Litsea* sp., *Luisia trichorbiza*, *Nervilia crispata*, *Oberonia falconeri*, *Vanda testacea*, *Wallichia densiflora*, etc.

Fauna:

Wildlife in the Sanctuary includes Tigers, Leopards, Sambars, Cheetal, Spotted deer, Bears, Crocodile, Ghariyals, Porcupine, Monitor Lizard, Otters, Pythons, etc. Additionally, there are about 550 species and sub-species of birds in this sanctuary. The Pied hornbill, Palash Fishing eagle, Hawk eagle, Black necked stork, Kaleej pheasant, and the collared falconets are just a few examples of the local avifaunal diversity.

FLORISTIC ANALYSIS

The present work, mainly deals with the flowering plants. The statistical analysis of the Sonanadi Wildlife Sanctuary reveals that, it composed of 113 families, 463 genera, 661 species and 5 subspecies and 12 varieties of Angiosperms which includes a few cultivated species. Besides these, 21 Pteridophytes have also been recorded from the study area.

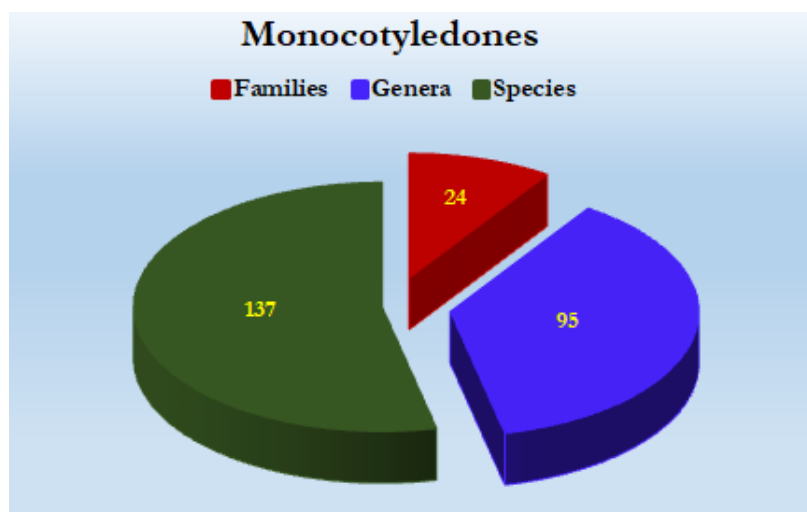
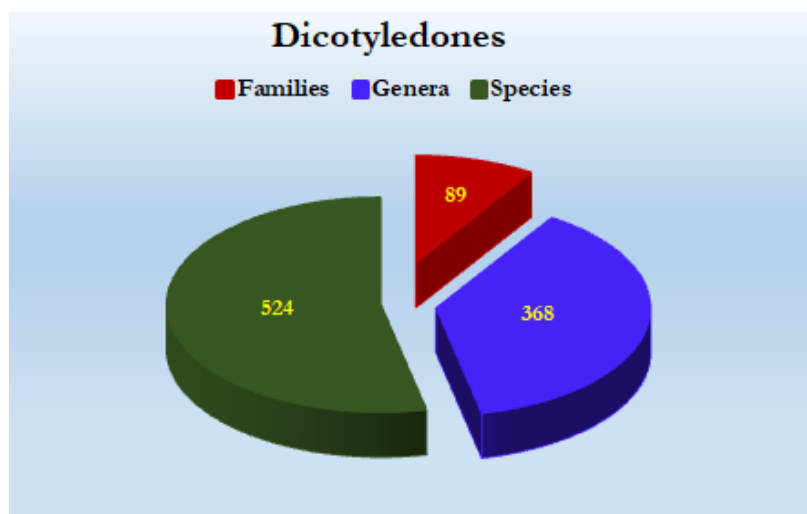
Table 1. Statistical Analysis of the Flora of Sonanadi Wildlife Sanctuary

GROUPS	FAMILIES	GENERA	SPECIES
Dicotyledones	89	368	524
Monocotyledones	24	95	137
Total	113	463	661

Ten dominant families present in Sonanadi Wildlife Sanctuary is compared with the dominant families in *The Flora of British India*, *Flora of Uttarakhand- A checklist* and *Flora of Corbett National Park*:

Table 2. **Flora of Sonanadi Wildlife Sanctuary: 10 dominant families**

Position	The Flora of British India	Flora of Uttarakhand	Flora of Corbett National Park	Flora of Sonanadi WLS
I	Orchidaceae	Poaceae	Poaceae	Poaceae
II	Fabaceae	Asteraceae	Fabaceae	Asteraceae
III	Poaceae	Fabaceae	Asteraceae	Fabaceae
IV	Rubiaceae	Orchidaceae	Cyperaceae	Lamiaceae
V	Euphorbiaceae	Cyperaceae	Scrophulariaceae	Euphorbiaceae
VI	Acanthaceae	Rosaceae	Euphorbiaceae	Rubiaceae Scrophulariaceae Acanthaceae
VII	Asteraceae	Lamiaceae	Acanthaceae	Apocynaceae Cyperaceae
VIII	Cyperaceae	Scrophulariaceae	Lamiaceae	Caesalpiniaceae
IX	Lamiaceae	Ranunculaceae	Rubiaceae	Malvaceae
X	Urticaceae	Brassicaceae	Caesalpiniaceae	Cucurbitaceae Convolvulaceae Solanaceae



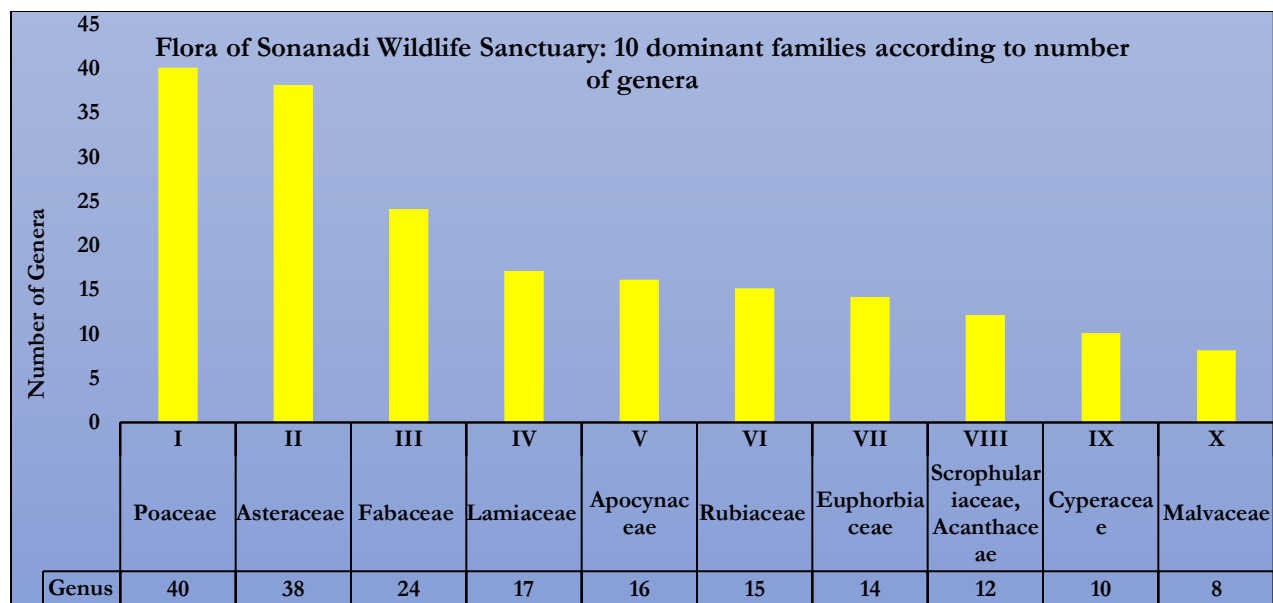


Table 3. **Flora of Sonanadi Wildlife Sanctuary, Uttarakhand:**
10 dominant families according to number of genera

POSITION	FAMILY	NUMBER OF GENERA
I	Poaceae	40
II	Asteraceae	38
III	Fabaceae	24
IV	Lamiaceae	17
V	Apocynaceae	16
VI	Rubiaceae	15
VII	Euphorbiaceae	14
VIII	Scrophulariaceae, Acanthaceae	12
IX	Cyperaceae	10
X	Malvaceae	8

Table 4. **Flora of Sonanadi Wildlife Sanctuary, Uttarakhand**
10 dominant families according to number of species

POSITION	FAMILY	NUMBER OF SPECIES (including infraspecific taxa)
I	Poaceae	61
II	Asteraceae	49
III	Fabaceae	48
IV	Lamiaceae	22
V	Euphorbiaceae	21
VI	Rubiaceae, Scrophulariaceae, Acanthaceae	19
VI	Apocynaceae, Cyperaceae	18
VII	Caesalpinaceae	17
IX	Malvaceae	13
X	Cucurbitaceae, Convolvulaceae, Solanaceae	11

WEED FLORA

Weed is a plant that interferes with human intentions. The term 'weed' was first coined by Jethro Tull in 1731. Weed as a plant, which interferes with man's utilisation of land for a specific purpose and in general is a plant out of place (Tadulingam & Venkatanarayana, 1955). The definition of weeds adopted by the European Weed Society is 'any plant or vegetation, excluding fungi, interfering with the objectives or requirements of people'. Similarly the Weed Science Society of America has adopted the definition 'a plant growing where it is not desired' (Naylor, 2002). Man played a key role in the distribution of weeds. Unlike other plants, weeds are capable of growing everywhere. Weeds are the biggest competitors for the economic crops and they cause tremendous loss to crop production. The IUCN defines alien invasive species as "An alien species which becomes established in natural or semi-natural ecosystems or habitats, is an agent of change and threatens native biological diversity". A commonly used term for invasive plants is 'environmental weeds' (Weber, 2003). However weeds are sometimes useful in many cases as fodder for animals, food or medicine for man and also as ornamentals.

Weeds are generally classified based on their habitats viz, weeds of cultivated crop fields, fallow fields or harvested fields, etc. However, it has been observed that a particular weed is not specific to any particular habitat or crop. The following are some of the common weeds occurring in different habitats of Sonanadi Wildlife sanctuary, such as cultivated fields, roadsides, hedges, waste places, etc.

Abutilon indicum, *Acalypha ciliata*, *Achyranthes aspera*, *Ageratum conyzoides*, *Alternanthera pungens*, *Alternanthera sessilis*, *Alysicarpus bupleurifolius*, *Amaranthus spinosus*, *Argemone mexicana*, *Barleria cristata*, *Bidens biternata*, *Cajanus scarabaeoides*, *Calotropis gigantea*, *Canscora diffusa*, *Cardiospermum halicacabum*, *Centella asiatica*, *Chamaecrista absus*, *Commelina benghalensis*, *Crotalaria* spp., *Cuscuta reflexa*, *Cyanthillium cinereum*, *Cyanotis axillaris*, *Cynodon dactylon*, *Cynoglossum zeylanicum*, *Cyperus* spp., *Dactyloctenium aegyptium*, *Datura metal*, *Dendrophthoe falcata*, *Desmodium laxiflorum*, *Desmodium triflorum*, *Digitaria* spp., *Echinochloa* spp., *Eclipta prostrata*, *Emilia sonchifolia*, *Eragrostis tenella*, *Eriocaulon* spp., *Euphorbia heterophylla*, *Evolvulus alsinoides*, *Fimbristylis* spp., *Gomphrena serrata*,

Heteropogon contortus, *Indigofera* spp., *Ipomoeahederifolia*, *Ipomoea nil*, *Kyllinga* spp., *Lantana camara*, *Limnophila indica*, *Lindernia ciliata*, *Lindernia crustacea*, *Lobelia alsinoides*, *Ludwigia perennis*, *Malvastrum coromandelianum*, *Monochoria vaginalis*, *Mukia maderaspatana*, *Murdannia nudiflora*, *Ocimum americanum*, *Oxalis corniculata*, *Panicum* spp., *Parthenium hysterophorus*, *Paspalum scrobiculatum*, *Pennisetum* spp., *Pentanema indicum*, *Phyla nodiflora*, *Phyllanthus urinaria*, *Phyllanthus virgatus*, *Physalis minima*, *Pilea microphylla*, *Polygala arvensis*, *Polygonum plebeium*, *Portulaca oleracea*, *Pseudognaphalium luteo-album*, *Pycreus* spp., *Rorippa indica*, *Scoparia dulcis*, *Setaria* spp., *Sida rhombifolia*, *Solanum anguivi*, *Solanum nigrum*, *S. virginianum*, *S. trilobatum*, *Sonchus oleraceus*, *Spermacoce pusilla*, *Sphaeranthus senegalensis*, *Sporobolus* spp., *Synedrella nodiflora*, *Tephrosia* spp., *Themeda* spp., *Tribulus terrestris*, *Trichodesma zeylanicum*, *Tridax procumbens*, *Urena lobata*, *Vigna vexillata*, *Waltheria indica*, *Xanthium strumarium*, *Zornia gibbosa*, etc.

AQUATIC ANGIOSPERMS

Aquatic vegetation has mainly influence on the nutrient budget of the aquatic ecosystems and their hydrological balance (Karthikeyan *et al.*, 1982). Subramanyam (1962) has made a major contribution to the field of aquatic vegetation of India as a whole. Recently Cook (1996) has provided a detailed account of the aquatic and wetland plants of India. The following aquatic angiosperms found in Sonanadi Wildlife Sanctuary viz., viz., *Aponogeton crispus*, *Eriocaulon* spp., *Lemna perpusila*, *Limnophila indica*, *Najas indica*, *Potamogeton nodosus*, *Wolffia arrhizal*, etc. Some of the plants belonging to wetland hydrophytes are *Alternanthera sessilis*, *Bacopa monnieri*, *Canscora decurrens*, *Cyanotis axillaris*, *Cyperus* spp., *Echinochloa colona*, *Eclipta prostrata*, *Eragrostis* spp., *Eriocaulon* spp., *Fimbristylis* spp., *Heliotropium indicum*, *Kyllinga* spp., *Limnophila heterophylla*, *Limnophila indica*, *Lindernia* spp., *Ludwigia* sp., *Monochoria vaginalis*, *Phyla nodiflora*, *Polygonum plebeium*, etc. Some of the plants occurring along wet banks or margins of rivers, ponds, streams or water-logged areas or rocky crevices along water sources or river beds are *Scoparia dulcis* and *Solanum virginianum*.

ECONOMICALLY IMPORTANT PLANTS

Globally c. 75,000 plants are edible. The forests are national repositories of a variety of raw materials. The forest products and byproducts can be divided into major and minor forest products.

I. MAJOR FOREST PRODUCTS

(i) Timber yielding plants:

(a) Hardwood timber species are *Albizia lebbeck*, *Anogeissus latifolia*, *Dalbergia latifolia*, *Gmelina arborea*, *Grewia* spp., *Lagerstroemia parviflora*, *Terminalia elliptica*, etc.

(b) Softwood timber species are *Bombax ceiba*, *Haldina cordifolia*, *Kydia calycina*, *Mangifera indica*, etc.

These are used for various purposes as follows:

Furniture:

The timber of *Anogeissus latifolia*, *Gmelina arborea*, *Mangifera indica*, *Tectona grandis*, *Terminalia elliptica*, etc. are used for making furniture.

Construction purposes:

The timber of *Albizia lebbeck*, *Anogeissus latifolia*, *Bridelia retusa*, *Dalbergia paniculata*, *Eucalyptus* spp., *Lagerstroemia parviflora*, *Lannea coromandelica*, *Madhuca longifolia* var. *latifolia*, *Tectona grandis*, *Terminalia bellirica*, *Terminalia chebula*, *Terminalia elliptica*, etc. are used for construction purposes.

Agricultural implements:

The wood of *Acacia* spp., *Anogeissus latifolia*, *Bridelia retusa*, *Diospyros exsculpta*, *Flacourtia indica*, *Phyllanthus emblica*, *Terminalia elliptica*, etc. are used for making agricultural implements.

Carts and Accessories:

The wood of *Acacia* spp., *Albizia odoratissima*, *Anogeissus latifolia*, *Cordia dichotoma*, *Holoptelea integrifolia*, *Pongamia pinnata*, *Syzygium cumini*, *Terminalia bellirica*, *Terminalia elliptica*, etc. are used for making carts and accessories.

Boat and Ship building:

Cordia dichotoma, *Diospyros* spp., *Syzygium cumini*, *Xylia xylocarpa*, etc. are used for making boats. *Gmelina arborea*, *Tectona grandis*, etc. are used in ship building.

Plywood:

Timber of *Dalbergia latifolia*, *Holoptelea integrifolia*, *Kydia calycina*, *Lannea coromandelica*, *Tectona grandis*, *Terminalia bellirica*, etc. are used for making plywood.

Panelling of Railway carriages:

The timber of *Albizia lebbbeck*, *Cordia dichotoma*, *Haldina cordifolia*, etc. is used for panelling of railway carriages.

Walking sticks:

Wood of *Cassia fistula*, *Diospyros* sp., *Murraya* spp., etc. is used for making walking sticks.

(ii) Firewood and charcoal:

Wood of *Butea monosperma*, *Diospyros exsculpta*, *Glochidion heyneanum*, *Hiptage benghalensis*, *Miliusa velutina*, *Syzygium cumini*, etc. are used as fire wood. Similarly the woods of *Aegle marmelos*, *Anogeissus latifolia*, *Calotropis gigantea*, *Holoptelea integrifolia*, *Lagerstroemia parviflora*, etc. are used in making charcoal.

Bamboos:

Bamboos are valuable raw material for paper pulp and rayon production: *Dendrocalamus strictus* is found in the Sanctuary.

II. MINOR FOREST PRODUCTS

The various forest products other than timber, bamboos, firewood and charcoal come under this group.

Aromatic plants:

At present, essential oils are obtained from more than 100 different plant species and are being used as raw materials for fragrance and flavour all over the world (Khanuja *et al.* 2006). India is world's leading producer of essential oils. India's exports mainly consist of sandal-wood and vetiver oils or their end products. Heartwood of *Santalum album*, leaves of *Artemisia nilagirica*, flowers of *Hedychium thyrsiformi*, *Jasminum* spp., etc. yield aromatic compounds.

Fodder plants:

The whole plants of *Elephantopus scaber*, *Indigofera* spp., *Scoparia dulcis*, *Solanum* spp., etc. and twigs of *Bridelia retusa*, *Buchanania lanzan*, *Dalbergia latifolia*, *Ficus* spp., *Flacourtia indica*, *Kydia calycina*, *Oroxylum indicum*, *Phyllanthus emblica*, *Syzygium cumini*, *Terminalia elliptica*, etc. are used as fodder plants. The following are some of the fodder grasses: *Apluda mutica*, *Arundinella* spp., *Chloris dolichostachya*, *Dactyloctenium aegypticum*, *Digitaria abludens*, *Digitaria ciliaris*, *Echinochloa colona*, *Eragrostis* spp., *Heteropogon contortus*, *Imperata cylindrica*, *Panicum* spp., *Setaria* spp., *Themeda* spp., etc.

Dye yielding plants:

Bauhinia variegata, *Bixa orellana*, *Mallotus philippensis*, *Mangifera indica*, *Phyllanthus emblica*, *Syzygium cumini*, *Terminalia chebula*, *Tribulus terrestris* and *Toona hexandra* are some of the dye yielding plants.

Plants used in paper industry:

Dendrocalamus strictus, *Ficus benghalensis*, *Ficus racemose* and *Terminalia elliptica* are some of the plants used in paper industry.

Plants used in soap industry:

Oil extracted from seeds of *Brassica nigra*, *Pongamia pinnata*, *Santalum album* and *Xanthium strumarium* are used for making soap.

Tannin yielding plants:

Bark of *Bridelia retusa*, *Caesalpinia decapetala*, *Cassia fistula*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Ziziphus oenoplia*, etc., leaves of *Anogeissus latifolia* etc. yield tannin.

Plants used in cordage:

Some of the plants used in cordage are *Agave sisalana*, *Butea monosperma*, *Cryptolepis buchananii*, etc.

Perfumes:

Some of the plants used in perfumes are *Sigesbeckia orientalis*.

Fibre yielding plants:

Agave americana, *Butea superba*, *Ficus hispida*, *Helicteres isora*, *Sida cordifolia*, etc. are some of the fibre yielding plants.

Plants used as Green manure:

Calotropis gigantea, *Crotalaria juncea*, *Desmodium gangeticum*, *Desmodium heterocarpon*, *Eragrostis unioides*, *Tephrosia purpurea*, etc. are some of the plants used as green manure.

Gum yielding plants:

Aegle marmelos, *Anogeissus latifolia*, *Bauhinia variegata*, *Butea monosperma*, *Cordia dichotoma* and *Stereospermum chelenoides* are some of the gum yielding plants.

Flavouring agents:

Cymbopogon citratus, *Oxalis corniculata*, *Mangifera indica*, *Murraya koenigii* and *Tamarindus indica* are some of the plants used as flavouring agents.

Fish poison:

The whole plants of *Sphaeranthus senegalensis*, etc. and fruits of *Catunaregam spinosa*, etc. are used as fish poison.

Plants used for thatching:

Some of the plants used for thatching are *Bambusa bambos*, *Dendrocalamus strictus*, *Imperata cylindrica*, *Sida acuta*, *Sida rhombifolia* subsp. *rhombifolia* and *Sida rhombifolia* subsp. *retusa*.

Plants used for making musical instruments and baskets:

Dendrocalamus strictus and *Tectona grandis*.

Edible fruits:

Some of the plants yielding edible fruits are *Bombax ceiba*, *Cordia* spp., *Ficus benghalensis*, *Ficus auriculata*, *Ficus racemosa*, *Flacourtia montana*, *Mangifera indica*, *Psidium guajava*, *Scheleichera oleosa*, *Syzygium cumini*, *Syzygium nervosum* and *Ziziphus oenoplia*.

Fruits used as pickles:

Fruits of plants used as pickles are *Mangifera indica* and *Phyllanthus emblica*.

Vegetables

(a) Wild: Some of the wild plants used as vegetables are *Alternanthera sessilis*, *Amaranthus spinosa*, *Bauhinia racemosa*, *Caesalpinia bonduc*, *Commelina benghalensis*, *Celosia argentea*, *Dioscorea bulbifera*, *Oxalis corniculata*, *Portulaca oleracea*, *Solanum anguivi*, *Solanum*.

(b) Cultivated: Some of the plants cultivated for vegetables are *Abelmoschus esculentus*, *Allium cepa*, *Amaranthus tricolor*, *Brassica oleracea* var. *capitata*, *Capsicum annuum*, *Cucumis sativus*, *Cucurbita maxima*, *Lagenaria siceraria*, *Luffa acutangula*, *Luffa cylindrica*, *Lycopersicon esculentum*, *Momordica charantia*, *Moringa oleifera*, *Solanum melongena* and *Trigonella foenum-graecum*.

Cereals and Millets:

Some plants used as cereals and millets are *Eleusine coracana*, *Oryza sativa*, *Triticum vulgare*, *Sorghum bicolor* and *Zea mays*.

Pulses:

Some of the plants cultivated as pulses are *Cajanus cajan*, *Cicer arietinum*, *Lablab purpureus*, *Phaseolus vulgaris*, *Pisum sativum*, *Vigna mungo* and *Vigna unguiculata*.

Fermented drinks:

Some plants that yield fermented drinks are *Agave americana* (juice), *Calotropis gigantea* (latex), *Senna tora* (seed decoction), *Eleusine coracana* (grains), *Madhuca longifolia* var. *latifolia* (flowers), *Sorghum bicolor* (seeds) and *Syzygium cumini* (fruits).

Wrapping bidis:

Leaves of *Bauhinia racemosa*, *Butea monosperma* and *Diospyros exculpta* are used for wrapping bidis.

Edible oil:

Brassica nigra, *Glycine max*, and *Sesamum indicum* yield edible oil.

Ornamental plants:

They are planted for the beauty of their foliage, flowers or shape that appeal to aesthetic sense of human in general. They can be classified as follows:

Purely for ornamental purposes:

Bauhinia variegata, *Cassia fistula*, *Delonix regia*, *Melia azedarach*, *Mirabilis jalapa*, *Senna siamea*, etc.

Avenue trees:

Albizia lebbek, *Ficus benghalensis*, *Melia azedarach*, *Pongamia pinnata*, *Polyalthia longifolia*, etc.

Ornamentals used for worshipping:

Aegle marmelos, *Butea monosperma*, *Azadirachta indica*, etc.

Ornamentals which are economically useful:

Azadirachta indica, *Bauhinia variegata*, *Dalbergia latifolia*, *Eucalyptus* spp., *Tamarindus indica*, etc.

Ornamentals for medicinal uses:

Azadirachta indica, *Butea monosperma*, *Eucalyptus* spp., etc.

POISONOUS PLANTS

Abrus precatorius, *Argemone mexicana*, *Arisaema tortuosum*, *Calotropis gigantea*, *Catharanthus roseus*, *Datura metel*, *Mucuna* spp., etc. are some of the poisonous plants found in the Sanctuary.

MEDICINAL PLANTS

Globally, c. 30,000 plants are used in traditional systems of medicines. Around 8000 plants species are reported to be used by the different systems of medicine in India (Anonymous, 1999). The plants are generally classified according to their therapeutic value and use. In India the medicinal plants are mainly used in the indigenous system of medicines such as Ayurveda, Siddha and Unani. The extract concentrates of plants is used in Homoeopathy, whereas in Allopathy purely chemicals are used and having more advance technology than homoeopathy. However, even allopathic doctors prescribe ayurvedic medicine for some diseases like jaundice, etc., because there is no proper medicine in allopathy.

It is estimated that by 2050, the global market of herbal-based products may be around US \$ 5 Trillion. Most of developing and developed countries in the world may continue to depend on the herbal medicines.

Important contribution in medicinal plants of India was made by many workers like Kirtikar & Basu (1933), Chopra & al. (1956), etc. The following information has been gathered from the tribals of Sonanadi Wildlife Sanctuary as well as on the basis of literature: *Achyranthes aspera*, *Aegle marmelos*, *Ageratum conyzoides*, *Alangium salviifolium*, *Allium cepa*, *Aloe vera*, *Alteranthera sessilis*, *Amaranthus spinosus*, *Argemone mexicana*, *Artemisia nilgirica*, *Asparagus racemosus*, *Azadirachta indica*, *Bacopa monnieri*, *Boerhavia diffusa*, *Bombax ceiba*, *Bridelia stipularis*, *Butea monosperma*, *Caesalpinia bonduc*, *Cajanus cajan*, *Calotropis gigantea*, *Cardiospermum halicacabum*, *Careya arborea*, *Cassia fistula*, *Catharanthus roseus*, *Catunaregam spinosa*, *Celastrus paniculata*, *Centella asiatica*, *Cissampelos pareira* var. *hirsuta*, *Clerodendrum infortunatum*, *Cucurlogo orchioides*, *Cuscuta reflexa*, *Cymbopogon citratus*, *Eclipta prostrata*,

Elephantopus scaber, *Ficus benghalensis*, *Helicteres isora*, *Hemidesmus indicus*, *Hibiscus lobatus*, *Hibiscus rosa-sinensis*, *Mangifera indica*, *Momordica charantia*, *Moringa oleifera*, *Ocimum tenuiflorum*, *Pavetta indica*, *Phyllanthus emblica*, *Phyllanthus fraternus*, *Plumbago zeylanica*, *Plumbago zeylanica*, *Pongamia pinnata*, *Portulaca oleracea*, *Punica granatum*, *Ricinus communis*, *Rubia cordifolia*, *Saraca asoca*, *Semecarpus anacardium*, *Senna occidentalis*, *Senna tora*, *Sida acuta*, *Sida rhombifolia*, *Solanum anguivi*, *Sphaeranthus senegalensis*, *Streblus asper*, *Syzygium cumini*, *Terminalia bellirica*, *Terminalia chebula*, *Terminalia elliptica*, *Tinospora glabra*, *Tridax procumbens*, *Triumfetta rhomboidea*, *Tylophora indica*, *Urena lobata*, *Viscum angulatum*, *Vitex negundo*, *Ziziphus mauritiana*, etc.

TRADED OR COMMERCIALY EXPORTED PLANTS

India is a land of diverse culture, flora and fauna existing since the time immemorial. Biopiracy, intellectual property rights (IPR) and loss or extinction of plant species has prompted the country to initiate remedial measures to protect its indigenous and rare biodiversity especially medicinal plants or commercial exported plants, in order to prevent claim by other nations on their origin and value.

The global market for medicinal plants and its medicine is estimated to be worth US \$ 800 billion a year. China is the highest in exporting medicinal plants for trade i.e. 1, 21,900 tonnes/ year, but India exports only 32, 600 tonnes/ year (Anonymous 1997 b). The central council of Research in Ayurveda and Siddha medicine has made a list of 243 commonly used medicinal plants having bulk demand for manufacture of gelanical, mixures, compound formulations and patent medicines (Gupta, 1998).

In India c. 9500 species are having Ethno-botanical importance compared to world which is estimated over 21,000 plant species used in herbal medicine. India is tenth among the plant rich countries of the world and fourth among the Asian countries. 2,500 plant species are being used in indigenous systems of medicine. Most (95%) of medicinal plants are raw materials collected from wild for herbal pharmaceuticals and export. Around 400 plants are used in regular production of Ayurvedic, Unani, Siddha and tribal medicine, in which 75% are collected from tropical and remaining from temperate forests. The percentage of herbal medicine preparations from the plant parts are 30% roots, 14% bark, 15% whole plants, 5% flowers, 10% fruits, 6% leaves, 7% seeds, 3 % wood, 4% rhizomes, 6% stems (Anonymous 1997, b).

The following species are commercially exported / having trade value (FRLHT, *ined.*), *Abelmoschus moschatus*, *Abrus precatorius*, *Achyranthus aspera*, *Aegle marmelos*, *Ageratum conyzoides*, *Alangium salviifolium*, *Albizia lebbekke*, *Allium cepa*, *Allium sativum*, *Alternanthera sessilis*, *Amaranthus spinosa*, *Amaranthus tricolor*, *Amorphophallus paeoniifolius*, *Andrographis paniculatus*, *Anogeissus latifolia*, *Argemone mexicana*, *Aristolochia indica*, *Baliospermum montanum*, *Barleria cristata*, *Caesalpinia bonduc*, *Cajanus cajan*, *Calotropis gigantea*, *Careya arborea*, *Carissa carandus*, *Catharanthus roseus*, *Cassia fistula*, *Catunaregam spinosa*, *Celastrus paniculatus*, *Centella asiatica*, *Cyanthillium cinereum*, *Dioscorea bulbifera*, *Eucalyptus* spp., *Ficus arnottiana*, *Ficus benghalensis*, *Ficus racemosa*, *Gmelina arborea*, *Ipomoea nil*, *Lantana camara*, *Mucuna pruriens*, *Naringi crenulata*, *Nervilia plicata*, *Rhaphidophora pertusa*, *Ricinus communis*, *Rubia cordifolia*, *Santalum album*, *Semecarpus anacardium*, *Sesamum orientale*, *Sesbania grandiflora*, *Sida acuta*, *Sida cordifolia*, *Smilax zeylanica*, *Solanum melongena*, *Solanum nigrum*, *Tamaridus indicus*, *Tectona grandis*, *Terminalia chebula*, *Toona hexandra*, *Tragia involucrata*, *Tribulus terrestris*, *Tridax procumbens*, *Vanda terrestris*, *Wrightia arborea*, *Zea mays*, *Zingiber officinalis*, *Ziziphus* spp., etc.

List of Pteridophytes:

The following 21 species of Pteridophytes were reported (Rao & al., 2000) from the Sanctuary viz.,

1. **Ampelopteris prolifera** (Retz.) Copel.
2. **Asplenium dalhousiae** Hook.f.
3. **Cheilanthes albomarginata** C.B. Clarke

4. **Christella appendiculata** (Pr.) Holtt.
5. **Christella parasitica** (L.) Lev.
6. **Dryopteris cochleata** (D. Don) C. Chr.
7. **Equisetum debile** Roxb.
8. **Glaphyopteridopsis erubescens** (Wall. ex Hook.f.) Ching
9. **Lycodium flexuosum** (L.) Sw.
10. **Lycodium japonicum** (Thunb.) Sw.
11. **Marsilea minuta** L
12. **Ophioglossum reticulatum** L.
13. **Pronephrium penangianum** (Hook.f) Holtt.
14. **Pseudocyclosorus canus** (Baker) Holtt.
15. **Pteris biaurita** L.
16. **Pteris vittata** L.
17. **Pyrrosia adnascens** (Sw.) Ching
18. **Pyrrosia flocculosa** (D. Don) Ching
19. **Selaginella exigua** Spring
20. **Selaginella involuence** (Swartz.) Spring
21. **Tectaria ployomorpha** (Wall. ex Hook.f.) Copel.

CONCLUDING REMARKS

Intensive plant collection tours covering all seasons were made and a total of 1,857 field numbers comprising c. 11,142 specimens have been collected and deposited in **BSD**. The Flora of Sonanadi Wildlife Sanctuary comprises 113 families, 463 genera, 644 species, 5 subspecies and 12 varieties of Angiosperms which includes some cultivated species. Besides Angiosperms, 21 Pteridophytes have also been recorded from the Sanctuary.

SYSTEMATIC TREATMENT

Key to the Families

- | | | |
|------|---|--------------------------|
| 1a. | Leaves with reticulate venation; seeds with embryo of 2-cotyledons..... | 2 |
| 1b. | Leaves with parallel venation; seeds with embryo of 1-cotyledon..... | 92 |
| 2a. | Perianth biseriate, both calyx and corolla present..... | 3 |
| 2b. | Perianth uniseriate, sometimes petaloid or none..... | 79 |
| 3a. | Petals free..... | 4 |
| 3b. | Petals united..... | 55 |
| 4a. | Sepals free from ovary..... | 5 |
| 4b. | Sepals united with ovary..... | 23 |
| 5a. | Stamens indefinite..... | 6 |
| 5b. | Stamens definite..... | 10 |
| 6a. | Plants aquatic..... | 7 |
| 6b. | Plants terrestrial..... | 8 |
| 7a. | Leaves scale-like..... | 11. TAMARICACEAE |
| 7b. | Leaves broad, not scale-like..... | 22 |
| 8a. | Ovary apocarpous..... | 9 |
| 8b. | Ovary syncarpous..... | 3. MENISPERMACEAE |
| 9a. | Herbs often climbing; fruit an achene..... | 1. RANUNCULACEAE |
| 9b. | Trees or shrubs; fruit a berry, follicle or baccate..... | 2. ANNONACEAE |
| 10a. | Ovary on an elongated gynophore..... | 6. CAPPARACEAE |
| 10b. | Ovary not on elongated gynophore..... | 11 |
| 11a. | Fruit a silique..... | 5. BRASSICACEAE |
| 11b. | Fruit a capsule..... | 12 |
| 12a. | Plants armed with prickles, with yellow juice..... | 4. PAPAVERACEAE |
| 12b. | Plants unarmed, without yellow juice..... | 13 |
| 13a. | Ovary unilocular..... | 7. FLACOURTIACEAE |
| 13b. | Ovary usually bi or more locular..... | 14 |

14a. Plants succulent; calyx lobes 2.....	10. PORTULACACEAE
14b. Plants not succulent; calyx lobes 5.....	15
15a. Flowers actinomorphic.....	8. POLYGALACEAE
15b. Flowers zygomorphic.....	16
16a. Leaves alternate.....	17
16b. Leaves opposite.....	9. CARYOPHYLLACEAE
17a. Sepals valvate.....	18
17b. Sepals imbricate.....	22
18a. Leaves palmately compound.....	15. BOMBACACEAE
18b. Leaves simple or lobed.....	19
19a. Stamens united by filaments in a tube, cup or sometimes in several bundles.....	20
19b. Stamens usually free.....	21
20a. Leaves opposite; sepals imbricate.....	12. HYPERICACEAE
20b. Leaves alternate; sepals valvate.....	14. MALVACEAE
21a. Ovary stipitate; petals usually absent or 5.....	16. STERCULIACEAE
21b. Ovary sessile; petals usually 5, rarely absent.....	17. TILIACEAE
22a. Plants with resinous sap.....	13. DIPTEROCARPACEAE
22b. Plants without resinous sap.....	19. MALPIGHIACEAE
23a. Ovary superior.....	24
23b. Ovary inferior.....	38
24a. Disc annular, adnate to stamens.....	25
24b. Disc cupular, free.....	30
25a. Flowers with spur.....	21. BALSAMINACEAE
25b. Flowers without spur.....	26
26a. Leaves pellucidly glandular punctate.....	22. RUTACEAE
26b. Leaves not pellucidly glandular punctate.....	27
27a. Flowers bisexual; stamens connate.....	28
27b. Flowers usually polygamous; stamens free.....	23. BURSERACEAE
28a. Herbs.....	29
28b. Shrubs or trees.....	24. MELIACEAE
29a. Stipules present; petals imbricate.....	18. GERANIACEAE
29b. Stipules absent; petals contorted.....	20. OXALIDACEAE
30a. Flowers regular.....	31
30b. Flowers irregular.....	34

31a. Stamens opposite to petals	25. CELASTRACEAE
31b. Stamens alternate to petals.....	32
32a. Plants with tendrils.....	27. VITACEAE
32b. Plants without tendrils.....	33
33a. Petals cucullate.....	26. RHAMNACEAE
33b. Petals not cucullate.....	28. LEEACEAE
34a. Petals often bearded or squamate within.....	35
34b. Petals not as above.....	36
35a. Leaves alternate.....	29. SAPINDACEAE
35b. Leaves opposite.....	30. ACERACEAE
36a. Fruits elongated.....	33. MORINGACEAE
36b. Fruits not elongated.....	37
37a. Plants with resinous juice.....	32. ANACARDIACEAE
37b. Plants without resinous juice.....	31. SABIACEAE
38a. Carpels free.....	39
38b. Carpels united.....	42
39a. Stamens numerous.....	37. ROSACEAE
39b. Stamens twice as many as petals or fewer.....	40
40a. Flowers actinomorphic, radially symmetrical; petals valvate in bud.....	36. MIMOSACEAE
40b. Flowers zygomorphic; petals imbricate in bud.....	41
41a. Median petal overlapped by others; sepals generally free.....	35. CAESALPINIACEAE
41b. Median petal overlaps others; sepals united at base into a calyx tube.....	34. FABACEAE
42a. Ovary 1-celled; fruits often 3-5-winged.....	38. COMBRETACEAE
42b. Ovary 2-many-celled; fruits not winged.....	43
43a. Ovules on parietal placentation.....	44
43b. Ovules on axil or basal placentation.....	52
44a. Plants tendrillar.....	46. CUCURBITACEAE
44b. Plants non-tendrillar.....	45
45a. Stamens definite.....	46
45b. Stamens indefinite.....	49
46a. Herbs.....	47
46b. Shrubs or trees.....	50. ALANGIACEAE
47a. Flowers unisexual.....	47. BEGONIACEAE
47b. Flowers bisexual.....	48
48a. Anther connectives appendaged.....	41. MELASTOMATACEAE

48b. Anther connectives not appendaged.....	44. ONAGRACEAE
49a. Flowers unisexual.....	50
49b. Flowers bisexual.....	51
50a. Plants with milky sap.....	45. CARICACEAE
50b. Plants without milky sap.....	43. PUNICACEAE
51a. Leaves gland dotted.....	39. MYRTACEAE
51b. Leaves not gland dotted.....	40. LECYTHIDACEAE
52a. Calyx tube adnate to ovary.....	53
52b. Calyx tube usually free.....	48. MOLLUGINACEAE
53a. Plants aromatic.....	49. APIACEAE
53b. Plants not aromatic.....	54
54a. Fruits capsular.....	42. LYTHRACEAE
54b. Fruits drupaceous.....	50. ALANGIACEAE
55a. Flowers epigynous.....	56
55b. Flowers hypogynous.....	53. CAMPANULACEAE
56a. Leaves opposite.....	51. RUBIACEAE
56b. Leaves alternate.....	57
57a. Inflorescence a capitulum; calyx reduced to pappus	52. ASTERACEAE
57b. Inflorescence other than capitulum; calyx not reduced to pappus.....	58
58a. Ovary 1-celled.....	59
58b. Ovary 2-many-celled.....	61
59a. Calyx glandular-hairy.....	54. PLUMBAGINACEAE
59b. Calyx not glandular-hairy.....	60
60a. Leaves gland dotted.....	56. MYRSINACEAE
60b. Leaves not gland dotted.....	55. PRIMULACEAE
61a. Stamens as many as corolla lobes.....	62
61b. Stamens more than the numbers of corolla lobes.....	63
62a. Stamens free from corolla.....	58. EBENACEAE
62b. Stamens inserted on corolla.....	57. SAPOTACEAE
63a. Flowers regular.....	64
63b. Flowers irregular.....	70
64a. Leaves usually alternate.....	65
64b. Leaves opposite or whorled.....	67
65a. Fruits drupaceous.....	63. BORAGINACEAE
65b. Fruits capsules or rarely berries.....	66

66a. Ovary with many ovules.....	65. SOLANACEAE
66b. Ovary with 1-4 ovules.....	64. CONVULVACEAE
67a. Stamens 2.....	59. OLEACEAE
67b. Stamens as many as petals.....	68
68a. Carpels free; milky sap present.....	60. APOCYNACEAE
68b. Carpels united; milky sap absent.....	69
69a. Trees or climbing shrubs	61. LOGANIACEAE
69b. Herbs or epiphytic shrubs.....	62. GENTIANACEAE
70a. Plants insectivorous.....	68. LENTIBULARIACEAE
70a. Plants not insectivorous.....	71
71a. Plants saprophytic or root parasitic.....	67. OROBANCHACEAE
71b. Plants autotrophic.....	72
72a. Leaves pinnately compound.....	70. BIGNONIACEAE
72b. Leaves simple.....	73
73a. Fruits capsular.....	74
73b. Fruits drupaceous, pyrenes or nutlets.....	75
74a. Seeds with inconspicuous funicle.....	66. SCROPHULARIACEAE
74b. Seeds with distinct funicle.....	73. ACANTHACEAE
75a. Corolla swollen or inflated on one side.....	71. PEDALIACEAE
75b. Corolla neither swollen nor inflated on one side.....	76
76a. Capsules oblong-obovoid, with curved shortly beaked, spiny along suture.....	72. MARTYNIACEAE
76b. Capsules tetragonous, with straight shortly beaked, not spiny along suture.....	71. PEDALIACEAE
77a. Leaves mostly radical; corolla scarious.....	76. PLANTAGINACEAE
77b. Leaves mostly cauline; corolla not scarious.....	78
78a. Plants usually aromatic; calyx bilabiate.....	75. LAMIACEAE
78b. Plants not aromatic; calyx not bilabiate.....	74. VERBENACEAE
79a. Ovary 1-celled.....	69. GESNERIACEAE
79b. Ovary 2-4-celled.....	80
80a. Flowers bisexual.....	81
80b. Flowers unisexual.....	86
81a. Plants parasitic.....	82. LORANTHACEAE
81b. Plants not parasitic.....	82
82a. Perianth lobes plicate.....	77. NYCTAGINACEAE
82b. Perianth lobes not plicate.....	83

83a. Stipules ochraceous.....	80. POLYGONACEAE
83b. Stipules absent or inconspicuous	84
84a. Seeds ex-albuminous.....	81. LAURACEAE
84b. Seeds albuminous.....	85
85a. Perianth scarious and dry.....	78. AMARANTHACEAE
85b. Perianth membranous, herbaceous.....	79. CHENOPODIACEAE
86a. Inflorescence a cyathium; ovary 2-many-celled	84. EUPHORBIACEAE
86b. Inflorescence other than cyathium; ovary 1-celled.....	87
87a. Ovary inferior or half inferior.....	88
87b. Ovary superior.....	89
88a. Plant autotrophic; leaves coriaceous with spiny margins.....	89. FAGACEAE
88b. Plants semi-root parasitic; leaves otherwise.....	83. SANTALACEAE
89a. Plants with milky sap; leaves with bud scale.....	88. MORACEAE
89b. Plants with watery sap; leaves otherwise.....	90
90a. Stamens inflexed in buds.....	85. URTICACEAE
90b. Stamens erect in buds.....	91
91a. Plants erect shrubs; fruit an achene.....	87. CANNABACEAE
91b. Plants trees; fruit a samara or drupe.....	86. ULMACEAE
92a. Plants reduced to minute thalloid structure.....	108. LEMNACEAE
92b. Plants well developed.....	93
93a. Flowers in axils of glumaceous bracts.....	94
93b. Flowers not in axils of glumaceous bracts.....	96
94a. Inflorescence in solitary heads; flowers always unisexual.....	111. ERIOCAULACEAE
94b. Inflorescence in spikelets of florets; flowers uni or biexual, rarely dioecious.....	95
95a. Stems terete or 2-edged, with nodes; styles 2; fruit a grain.....	113. POACEAE
95b. Stems usually triangular, without nodes; style 1; fruit a nutlet.....	112. CYPERACEAE
96a. Perianth series both corolline, rarely herbaceous.....	97
96b. Perianth series usually both calycine, rarely absent or reduced to scales or bristles.....	104
97a. Ovary inferior.....	98
97b. Ovary superior.....	103
98a. Plants aquatic.....	90. HYDROCHARITACEAE
98b. Plants terrestrial.....	99
99a. Flowers regular.....	100
99b. Flowers irregular.....	101
100a. Climbers; fruits winged.....	98. DIOSCOREACEAE

100b. Herbs; fruits not winged.....	97. HYPOXIDACEAE
101a. Pollinia present; staminodes not petaloid.....	91. ORCHIDACEAE
101b. Pollinia absent; staminodes petaloid.....	102
102a. Stems spirally twisted.....	93. COSTACEAE
102b. Pseudo-stems straight.....	94. MUSACEAE
103a. Plants usually aromatic; sepals united; anthers 2-celled	92. ZINGIBERACEAE
103b. Plants not aromatic; sepals free; anthers 1-celled.....	95. CANNACEAE
104a. Perianth present.....	105
104b. Perianth absent or reduced to scales or bristles.....	107. ARACEAE
105a. Leaves pinnately or palmately divided.....	106. ARECACEAE
105b. Leaves usually simple or 3-5-foliolate.....	106
106a. Plants xerophytes.....	96. AGAVACEAE
106b. Plants marshy or aquatic.....	107
107a. Perianth petaloid.....	108
107b. Perianth not petaloid.....	109
108a. Leaves radical.....	109. APONOGETONACEAE
108b. Leaves cauline.....	110. POTAMOGETONACEAE
109a. Inner series of perianth only corolline.....	110
109b. Inner and outer series of perianth corolline.....	114
110a. Plants aquatic or marshy.....	104. PONTEDERIACEAE
110b. Plants terrestrial.....	111
111a. Climbing shrubs.....	112
111b. Erect herbs.....	113
112a. Leaves reduced to cladodes.....	100. ASPARAGACEAE
112b. Leaves well developed.....	99. SMILACACEAE
113a. Leaves fleshy, spiny along margins.....	101. ALOACEAE
113b. Leaves not as above.....	105. COMMELINACEAE
114a. Flowers greenish-purple.....	102. HYACINTHACEAE
114b. Flowers white.....	103. ALLIACEAE

1. RANUNCULACEAE

1a. Climbers; leaves compound.....	1. Clematis
1b. Herbs; leaves simple.....	2
2a. Sepals petaloid	4. Thalictrum
2b. Sepals not petaloid	3
3a. Sepals with long spur	2. Delphinium

3b. Sepals without spur3. **Ranunculus**

1. **Clematis** L.

- 1a. Leaves hairy; bracts partite.....1. *C. gouriana*
 1b. Leaves glabrous; bracts otherwise.....2. *C. roylei*

1. **Clematis gouriana** Roxb. ex DC., Syst. Nat. 1: 138. 1817 & Prodr. 1: 3. 1824; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 4. 1872; P.C. Pant, Fl. Corbett Natl. Park: 35. 1986; M.A. Rau in B.D. Sharma & al., Fl. India 1: 64. 1993; R.D. Gaur, Fl. Distr. Garhwal: 68. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 66. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 338. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 16. 2020. *C. martini* H. Lévy, Bull. Acad. Int. Géogr. Bot. 17(210–211): 2. 1907. *C. simplicifolia* Qureshi & Chaudhri, Pakistan Syst. 11(1–2): 17. 1978. *C. vitaiba* subsp. *gouriana* (Roxb.) O. Kuntze, Verh. Bot Ver Brandenbrug. 26: 100. 1885. *Kanguli*

Climbing herb, to 10 m long; stems slender, with many branches, ribbed, sparsely hairy. Leaves petioled, pinnate to bipinnate, 5–9-foliolate; leaflets 2–10.5 × 1–4.2 cm, ovate, obtuse to subcordate at base, entire or serrate along margins, acute to acuminate at apex, hairy beneath, palmately 3–5-nerved. Flowers white, in axillary and terminal, dense panicles; perianth lobes 4, obovate or oblong; filaments linear, glabrous. Style feathery; achenes ovoid, c. 5 cm long, hairy.

Flowering & Fruiting: August–March.

Fairly common, climbing on bushes and trees in deciduous forests.

Specimens examined: Sonanadi river, B. Datta & H.C. Pande 220113 (LWG).

Distribution: India (almost throughout the country), Bhutan, China, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka.

Uses: Leaves poisonous to livestock; fibre used for coarse ropes.

Notes: It can easily be recognised by its shiny leaves, usually entire leaflets and very small flowers.

2. **Clematis roylei** Rehder, J. Arnold Arbor. 22(4): 575. 1941; P.C. Pant, Fl. Corbett Natl. Park: 35. 1986; R.D. Gaur, Fl. Distr. Garhwal: 69. 1999; M.A. Rau in B.D. Sharma & al., Fl. India 1: 74. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 66. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 346. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 18. 2020. *C. nutans* Royle, Ill. Bot. Himal. Mts. 51. 1834, *nom. illeg. hom.*; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 5. 1872.

Climbing herb; stems slender, with many branches, ribbed, villous or sparsely so. Leaves petioled, bipinnate or decompund, 3–5-foliolate; leaflets 2.8–10.5 × 1–6.5 cm, ovate-lanceolate, rounded or oblique at base, entire or serrate-dentate along margins, acute to acuminate at apex, hairy. Flowers creamish-white, 3–many-flowered, in axillary, pubescent panicles; perianth lobes 4–5, broadly oblong, recurved at tips, erect or spreading, villous outside; filaments linear, glabrous, only hairy towards base. Style feathery; achenes ovoid-ellipsoid, compressed, silky, c. 3 cm long.

Flowering & Fruiting: November–April.

Growing along banks of rivers, forest edges in deciduous forests.

Distribution: India (Himalayas, C & S. India), Nepal.

Uses: Stems used for coarse ropes.

Notes: Included on the authority of Samir Sinha (2001).

2. *Delphinium* L.

Delphinium denudatum Wall. ex Hook.f. & Thomson, Fl. Ind.: 49. 1855 & in Hook.f., Fl. Brit. India 1: 25. 1872; Munz, J. Arn. Arb. 48: 515. 1967; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 21. 2020. *D. denudatum* var. *latifolium* Qureshi & Chaudhri, Pak. Syst. 3(1): 11. 1987; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 356. 2018. *D. denudatum* var. *linearifolium* Qureshi & Chaudhri, Pak. Syst. 3(1): 11. 1987. *D. pauciflorum* Royle, Illustr. Bot. Himal. Mount.: 55. 1834, *non* D. Don 1825.

Herb, much branched, subglabrous to strigose, to 70 cm high. Leaves petioled, basal one 2–4 × 0.5–1.5 cm, rounded, 3–5-parted, with pinnately and divaricately laciniate teeth; cauline leaves similar but smaller. Flowers blue or violet, with bluish-white at apex, few in paniculate racemes; bracts linear; bracteoles present; sepals oblong-ovate, rounded, with spur to 1.5 cm long; petal glabrous, 2-dentate, oblique, broadly elliptic, rounded. Follicles 3, *c.* 1.5 × 0.35 cm, sparsely strigose or subglabrous. Seeds obpyramidal, dark, scales irregularly arranged.

Flowering & Fruiting: May–August.

Rare in open grassy fields on hillslopes.

Distribution: India (Himalaya, N.W. India), Pakistan.

Specimens examined: Vatanvasa, H.C. Pande 220839 (LWG).

3. *Ranunculus* L.

Ranunculus sceleratus L., Sp. Pl.: 776. 1753; D. Don, Prodr. Fl. Nepal.: 195. 1825 & in Royle, III. Bot. Himal. Mts. 1: 53. 1834; Hook.f. & Thomson, Fl. Ind. 1: 35. 1855 & in Hook.f., Fl. Brit. India 1: 19. 1872; P.C. Pant, Fl. Corbett Natl. Park: 35. 1986; M.A. Rau in B.D. Sharma & al., Fl. India 1: 128. 1993; R.D. Gaur, Fl. Distr. Garhwal: 71. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 68. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 388. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 29. 2020.

Herb, annual, stout, erect, to 30 cm high; stems sulcate, hollow, often much branched, glabrous. Leaves basal petioled, tripartite or trilobed, irregularly crenate along the margins; cauline leaves sessile, trilobed, 1.5–4.5 × 1–3 cm, linear-oblong, entire or deeply crenate to lobulate along the margins. Flowers yellow, numerous; sepals ovate, obtuse, deflexed, pubescent outside; petals obovate, shorter than calyx. Achenes *c.* 1.2 mm across, globose, smooth to rugose, arranged in cylindrical spikes, spinous, with spindle-shaped receptacle.

Flowering & Fruiting: May–September.

Rare along the streams or lakes and wet grassy places.

Distribution: India (N. India), Afghanistan, N. America, SW Asia, Bhutan, China, Europe, Japan, Kazakhstan, Korea, Nepal, Pakistan, Russia, Thailand.

Uses: The plant believed to be poisonous, used as vermifuge, anodyne and in skin disorders.

Notes: Included on the authority of Samir Sinha (2001).

4. *Thalictrum* L.

- 1a. Anthers beaked or mucronate.....1. *T. foliolosum*
 1b. Anthers neither beaked nor mucronate.....2. *T. javanicum*

1. **Thalictrum foliolosum** DC., Syst. Nat. 1: 175. 1817; Hook.f. & Thomson, Fl. Ind. 1: 14. 1855 & in Hook.f., Fl. Brit. India 1: 14. 1872; M.A. Rau in B.D. Sharma & al., Fl. India 1: 136. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 68. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 398. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 31. 2020.

Herb, erect, robust, bushy glabrous, to 1 m high; stems simple or branched, smooth, subterete, sparsely pubescent. Leaves petioled, pinnately-decompound, exstipulate; leaflets 4–18 × 2–15 mm, ovate to orbicular, rounded or rarely subcordate at base, crenate-dentate or entire along the margins. Flowers white outside, greenish or pale purple inside, in subpyramidal panicles; bracts linear, entire; sepals petaloid, lobes 4, elliptic-oblong, distinctly veined, glabrous or pubescent; stamens 10–15, filaments whitish, filiform, anthers yellowish. Carpels c. 3 × 1 mm, suture convex or straight, lateral ribs 6, with filiform styles.

Flowering & Fruiting: July–September.

Common in shady places near deciduous forests.

Distribution: India (Himalaya, Sikkim, South India), China, Myanmar, Nepal, Pakistan, Thailand.

Specimens examined: Sonanadi river side, *R. Manikandan* 125537, 122468 (BSD).

2. **Thalictrum javanicum** Blume, Bijdr. Fl. Ned. Ind. 1: 2. 1825; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 13. 1872; P.C. Pant, Fl. Corbett Natl. Park: 35. 1986; M.A. Rau in B.D. Sharma & al., Fl. India 1: 136. 1994; R.D. Gaur, Fl. Distr. Garhwal: 72. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 68. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 399. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 31. 2020. *T. glyphocarpum* Wight & Arn., Prodr. Fl. Ind. Orient.: 2. 1834.

Herb, annual, erect, to 90 cm high; stems branched, glabrous or glandular pubescent. Leaves petioled, decompound; leaflets 3-lobed, 1–2.2 × 0.6–1.5 cm, obovate or elliptic, rounded or cuneate at base, crenate or toothed along the margins, obtuse-acute at apex, membranous. Flowers white or purplish, in terminal panicles; sepals 4, early caducous; stamens many, filament filiform, broader than anther. Carpels 8–35, with circinate style. Achene 2–3 mm long, oblong-ellipsoid, strongly ribbed.

Flowering & Fruiting: June–October.

Occasional along wayside in shady places.

Distribution: India (Himalaya, Sikkim, South India), Bhutan, China, Indonesia, Nepal, Sri Lanka.

Specimens examined: Sonanadi river, B. Datta & H.C Pande 220192 (LWG).

Uses: Roots used in ophthalmia and also in colic and fever.

2. ANNONACEAE

Miliusa Lesch. ex A. DC.

Miliusa velutina (Dunal) Hook.f. & Thomson, Fl. Ind. 1: 151. 1855 & in Hook.f., Fl. Brit. India 1: 87. 1872; P.C. Pant, Fl. Corbett Natl. Park: 36. 1986; Debika Mitra in B.D. Sharma & al., Fl. India 1: 221. 1993; R.D. Gaur, Fl. Distr. Garhwal: 54. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 69. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 92. 2009; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 424. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 47. 2020. *Uvaria velutina* Dunal, Monogr. Anonac.: 91. 1817. *U. villosa* Roxb., Fl. Ind. 2: 664. 1832. *Guatteria velutina* (Dunal) A. DC., Mem. Anon. 42. 1832.

Domsal, Gidar-rukab [Plate-5a]

Tree, deciduous, to 10 m high; young branches densely tomentose. Leaves petioled, 8–28.5 × 3.5–12 cm, elliptic or ovate-lanceolate, rounded to cordate at base, acute to shortly acuminate at apex, pilose to subtomentose above, tomentose below. Flowers brownish-yellow, in extra-axillary or terminal short cymes; bracts and bracteole minute, tomentose, caducous; sepals ovate, acute; petals glabrous within, outer lanceolate, inner broadly ovate. Carpels *c.* 2.5 mm long, with many monocarps, ovoid, pilose.

Flowering & Fruiting: February–May.

Occasional in moist deciduous forests.

Distribution: India (Himalaya, Bihar, C. & E. India), Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Specimens examined: Hathipani-Kanda, P.C. Pant 43762 (BSD); Halduparao, R. *Manikandan* 125760 (BSD).

Uses: Wood used for agricultural implements; leaves as fodder.

Cultivated species:

***Annona squamosa* L.**, Sp. Pl.: 537. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 78. 1872; Debika Mitra in B.D. Sharma & al., Fl. India 1: 207. 1993; R.D. Gaur, Fl. Distr. Garhwal: 54. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 69. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 86. 2009; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 421. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 40. 2020. *Sitaphal, Sharifa*

Tree, to 3.5 m high. Leaves oblong-lanceolate, glaucous beneath. Flowers green, solitary or 2–4 together, on extra-axillary branchlets. Fruits yellowish-green, bullate. Seeds oblong, shining.

Flowering & Fruiting: March–August.

Native of West Indies, naturalised throughout Asia. Cultivated for its edible fruits.

***Polyalthia longifolia* (Sonn.) Thwaites**, Enum. Pl. Zeyl.: 398. 1864; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 62. 1872; Debika Mitra in B.D. Sharma & al., Fl. India 1: 274. 1993; R.D. Gaur, Fl. Distr. Garhwal: 55. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 69. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 95. 2009; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 52. 2020. *Uvaria longifolia* Sonn., Voy. Indes Orient. 2: 233, t. 131. 1782.

Evergreen tree, with straight trunk. Leaves oblong-lanceolate, acuminate at apex, undulate along margins. Flowers greenish-yellow, clusters in axil of fallen leaves. Carpels ovoid to ellipsoid, yellowish-red on ripe. Seed 1, ellipsoid.

Flowering & Fruiting: March–September.

Native of Tropical Asia. Infrequently cultivated in gardens.

Specimens examined: Morghatty F.R.H., R. *Manikandan* 124931 (BSD).

3. MENISPERMACEAE

1a. Trees.....2. **Cocculus**
1b. Climbers.....2

2a. Sepals 6; petals 3.....3. **Stephania**

2b. Sepals 4; petals 4..... 1. **Cissampelos**

1. **Cissampelos** L.

Cissampelos pareira L. var. **hirsuta** (Buch.-Ham. ex DC.) Forman, Kew Bull. 22: 356. 1968; P.C. Pant, Fl. Corbett Natl. Park: 36. 1986; M. Gangop. in B.D. Sharma & al., Fl. India 1: 317. 1993; R.D. Gaur, Fl. Distr. Garhwal: 76. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 69. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 427. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 53. 2020. *C. hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535. 1817. *C. pareira* L., Sp. Pl.: 1031. 1753, *p.p.*; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 103. 1872. *Hajuri, Pabre, Parba* [Plate-5b]

Climbing shrub; branches tomentose. Leaves petioled, 2.5–6.5 × 3–8 cm, broadly ovate-suborbicular, subcordate at base, apiculate at apex, sparsely pubescent above, pubescent on nerves beneath and pale. Flowers greenish-white: male flowers in cymose panicles or corymbs; sepals 4, free; petals 4, connate, cupular; stamens connate, forming peltate synandrium; female flowers in clustered racemes, on axil of foliar bracts, greenish-white. Drupes $\approx$ 5 mm across, ovoid, scarlet, pubescent, compressed, endocarp with tuberculate ridges.

Flowering & Fruiting: Almost throughout the year.

Common in deciduous forests.

Distribution: India (almost throughout the country), Africa, America, Asia, Pacific Islands, West Indies.

Specimens examined: On way to Halduparao, R. *Manikandan* 124988, 125645, 122369 (BSD).

Uses: Leaves and roots believed as an antidote to snakebite or scorpion bite; roots extract used in constipation and gastric problems also in cough and urinary troubles.

Notes: It can easily be identified by its female flowers covered with distinct leafy foliar bracts.

2. **Cocculus** DC., *nom. cons.*

Cocculus laurifolius DC., Syst. 1: 530. 1817 & Prodr. 1: 100. 1824; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 101. 1872; R.D. Gaur, Fl. Distr. Garhwal: 77. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 70. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 430. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 53. 2020. *Cebatha laurifolia* (DC.) Kuntze, Revis. Gen. Pl. 1: 9. 1891. *Tilpharya* [Plate-5c]

Small evergreen tree, to 8 m high; branches striate, slightly angular, glabrous. Leaves petioled, 4–15 × 1.5–5 cm, elliptic-ovate or lanceolate-elliptic, cuneate or acute at base, leathery, both surfaces glabrous, glossy, palmately 3-veined. Flowers minute, cream-coloured, in axillary, cymose or thyrsoïd, glabrous. Male flowers: sepals 6, outer whorl subelliptic, inner whorl ovate-elliptic to broadly elliptic-rotund; petals 6, obcordate, apex 2-lobed; stamens 6. Female flowers: sepals and petals as in male flower; staminodes 6, minute. Drupes $\approx$ 7 mm long, rotund, slightly flattened, black, endocarp bony.

Flowering & Fruiting: April–September.

Occasional along the bushes and open forests.

Distribution: India (Himalayas), China, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Thailand.

Specimens examined: Vatanvasa, H.C. Pande 220735 (LWG); Sonanadi WLS, R. *Manikandan* 125691, 122459 (BSD).

Uses: An alkaloid in the bark has a muscle-relaxing effect and also been used as a diuretic and as a vermifuge. Leaf juice used to kill lice and klins of livestock and used for manuring; wood is used for walking sticks and fuel.

3. *Stephania* Lour.

Stephania glabra (Roxb.) Miers., Ann. Mag. Nat. Hist. ser. 3, 18: 14. 1866; M. Gangop. in B.D. Sharma & al., Fl. India 1: 334. 1993; R.D. Gaur, Fl. Distr. Garhwal: 77. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 70. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 433. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 56. 2020. *Cissampelos glabra* Roxb., Fl. Ind., ed. 1832, 3: 840. 1832; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 103. 1872. *Gindaru, Ganeeth* [Plate-5d]

Twiner, perennial, herbaceous; stems striate, glabrous, hollow. Leaves petioled, peltate, 3–12 × 2.5–10 cm, broadly ovate or orbicular, rounded at base, entire along the margins, acute-acuminate at apex, membranous, pale or glaucous beneath, glabrous on both surfaces, with 5-palmately veins. Flowers minute, greenish-yellow, umbellate, in axillary or on leafless old stems; sepals 6, outer 3, linear-oblong, inner whorl, obspatulate; petals 3, thicker, obspatulate, with *c.* 2 mm long synandrium. Drupes obovate, flattened; endocarp with rows of 20–25 transverse ridges.

Flowering & Fruiting: May–August.

Common in ravines and along roadside.

Distribution: India (E, N.W. & S. India), Bangladesh, China, Myanmar, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125528, 122573, 122466 (BSD).

Uses: Tubers are used in pschomedicine and worshipped by locals and aslo used in tuberculosis, asthma, dysentery and fever.

Notes: Sometime this species is considered as endangered because of its overuse as a medicinal plant (Chhetri & al., Curr. Sci. 89: 267. 2005).

4. PAPAVERACEAE

- 1a. Prickly herbs; flowers bright yellow.....1. **Argemone**
1b. Non prickly herbs; flowers white or pale pinkish 2. **Fumaria**

1. *Argemone* L.

Argemone mexicana L., Sp. Pl.: 508. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 117. 1872; P.C. Pant, Fl. Corbett Natl. Park: 36. 1986; Debnath & M.P. Nayar, Poppies Ind. Reg.: 15, f. 1. 1986 & in B.D. Sharma & N.P. Balakr., Fl. India 2: 2, f. 1. 1993; R.D. Gaur, Fl. Distr. Garhwal: 81. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 72. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 477. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 68. 2020. *Pili kateli*

Herb, annual, to 1 m high; prickly branches divaricate, with yellow juice. Leaves sessile, radical and cauline, 5–12 × 2–4 cm, sinuate-pinnatifid, semi-amplexicaul, bluish-green, variegated white, spiny along margins and on veins. Flowers bright yellow, in terminal solitary; sepals oblong, prickly on back, horned at apex; petals obovate. Capsules *c.* 3.5 × 2 cm, oblong-elliptic, prickly. Seeds blackish-brown, many, deeply reticulate-scrubulate.

Flowering & Fruiting: Throughout the year.

Common along the streams, sandy soils in open wastelands.

Distribution: India (almost throughout the country), naturalized weed in many parts of the world, particularly in subtropical regions.

Specimens examined: Sonanadi WLS, R. Manikandan 125547 (BSD); Below Vatanvasa, H.C. Pande 220782 (LWG).

Uses: The yellow sap is used in the treatment of scabies and seeds emetic and narcotic used in medicine; root chewed in leucorrhoea and root decoction used as warmicide.

Notes: Plant is highly poisonous and seeds yield an oil. It is native of Central America (Mexico), naturalised as weed elsewhere.

2. *Fumaria* L.

Fumaria indica (Hausskn.) Pugsley, J. Linn. Soc. Bot. 44: 313. 1919; Blatter & al., J. Bomb. Nat. Hist. Soc. 34 (3): 6676. 1933; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 521. 2018; Mastakar & al., A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 77. 2020. *F. vaillantii* var. *indica* Hausskn., Flora. 56: 443. 1873. *F. parviflora sensu* Burkill, List. Fl. Pl. Baluch.: 7. 1956 (Rep. ed.), *non* Lam. 1788. *F. parviflora* ssp. *vaillantii* (Lois.) Hook.f. & Thomson, Fl. Ind. 1: 238. 1955, *p.p.*; Hook.f., *l.c.* 128, *p.p.*

Herb, delicate, much branched, leafy, diffuse, glaucous, glabrous, to 30 cm long. Leaves petioled to subsessile, 3–10 x 2–5 cm, much dissected, 2–3-pinnatisect or decompound; pinnae often ternately lobed with each deeply lobuled into linear ultimate segments. Flowers white or pale pinkish, in 6–12-flowered, leaf-opposed racemes; bracts linear, submembranous; sepals minute, lacinate-dentate, membranous; petal with very short suborbicular, slightly oblong and obscurely downcurved spur. Fruits *c.* 2 mm across, suborbicular, somewhat rugose when dried and with 2 obscure apical pits; seed 1, brownish.

Flowering & Fruiting: March–June.

Occasional along river bed side near deciduous forests.

Distribution: India (almost throughout the country), Afghanistan, C. Asia, Pakistan; introduced elsewhere.

Specimens examined: Below Vatanvasa, T.S. Rana, B. Datta & H.C. Pande 220178 (LWG).

5. BRASSICACEAE (= CRUCIFERAE)

- 1a. Plants terrestrial; stems flexuose..... 1. **Cardamine**
1b. Plants aquatic; stems creeping..... 2. **Nasturtium**

1. *Cardamine* L.

Cardamine flexuosa With., Arn. Brit. Pl. (ed. 3) 3: 578–579. 1976; Hajra & H.J. Chowdhery, B.D. Sharma & al., Fl. India 2: 110. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 75. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 544. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 78. 2020. *C. hirsuta* var. *sylvatica sensu* Hook.f. & T. Anderson in Hook.f., Fl. Brit. India 1: 138. 1872, *non* Link. 1803. *C. hirsuta* subsp. *flexuosa* (With.) F.B. Forbes & Hemsl., J. Linn. Soc., Bot. 3(152): 43. 1886. *C. hirsuta* var. *flexuosa* (With.) Hook.f. & T. Anderson, *l.c.* *C. scutata* subsp. *flexuosa* (With.) H. Hara, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 6(2): 59. 1952; R.D. Gaur, Fl. Distr. Garhwal: 193. 1999.

Herb, annual or biennial, to 30 cm high; stems flexuose, simple or sparsely branched, with fibrous roots on short rootstock. Leaves basal hardly or scarcely rosulate, orbicular, sinuate-dentate to lobed along the margins; cauline leaves similar to basal ones. Flowers white, in racemes, sepals oblong, smaller than corolla;

petalsspathulate, $\approx$ 4.5 mm long; stamens 6; filaments 2–3 mm long, anthers ovate. Fruits elliptic-oblong, obtuse, with ovoid-compressed, yellow seeds.

Flowering & Fruiting: April–August.

Occasional on moist shady places, along ditches and streamsides.

Distribution: India (Himalayas), Bangladesh, Bhutan, China, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam.

Uses: Leaves occasionally used as pot herb.

Notes: It is a native of Europe; naturalized in Australia and North and South America and included on the authority of Samir Sinha (2001).

2. *Nasturtium* R. Br. *nom. cons.*

Nasturtium officinale R. Br., Aiton, Hort. Kew. ed. 2, 4: 110. 1812; Hook.f. & T. Anderson in Hook.f., Fl. Brit. India 1: 133. 1872; Hajra & H.J. Chowdhery in B.D. Sharma & N.P. Balakr. & al., Fl. India 2: 125. 1993; R.D. Gaur, Fl. Distr. Garhwal: 195. 1999; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 583. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 98. 2020. *Sisymbrium nasturtium-aquaticum* L., Sp. Pl.: 657. 1753. *Rorippa nasturtium-aquaticum* (L.) Hayek, Sched. Fl. Stir. Exs 3–4: 22. 1905; P.C. Pant, Fl. Corbett Natl. Park: 37. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 77. 2007.

Herb, perennial, aquatic, floating, creeper, to 80 cm high; stems procumbent, branched, green, glabrous or rarely simple hairs, with rooting at nodes. Leaves basal petioled, lyrate-pinnate with 1–5 leaflets; upper sessile, 5–9 leaflets, suborbicular or broadly cordate, auricled at base, entire to sinuate-toothed along the margins. Flowers white, 10–25-flowered, lax, in racemes. Silique $\approx$ 2 × 0.25 cm oblong, subcylindrical, often slightly upcurved, glabrous, faintly veined, with many seeds.

Flowering & Fruiting: April–May.

Occasional along river side and moist sandy places.

Distribution: India (Himalayas), Temperate Asia, Europe; widely naturalized elsewhere.

Specimens examined: Below Vatanvasa forest, *Hussian* & *Pande* 218736 (LWG).

Uses: Young plant taken as green vegetables, supposed to be good for constipation and also used a vermifuge.

Cultivated species:

1. ***Brassica juncea*** (L.) Czern. & Coss., Consp. Fl. Chark.: 8. 1859; Hook.f., & T. Anderson in Hook.f., Fl. Brit. India 1: 157. 1872; Hajra & al. in B.D. Sharma & N.P. Balakr., Fl. India 2: 134. 1993; R.D. Gaur, Fl. Distr. Garhwal: 191. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 74. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 540. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 106. 2020. *Sinapsis juncea* L., Sp. Pl.: 668. 1753. *Lai, Laya*

Herb, erect, annual, to 8.5 cm high; branches glabrous. Leaves lower radical, oblong-lanceolate, lyrate-pinnatifid; upper ones smaller, more or less sessile, narrowly lanceolate, with toothed margins. Flowers yellow, in racemes. Fruit a silique, $\approx$ 4.5 cm long, beaked, 2-valved. Seeds globose, uniseriate.

Flowering & Fruiting: March–May.

Commonly cultivated for its seeds are an efficient substitute for black mustard and yield edible oil; seed powder given as an emetic.

2. **Brassica nigra** (L.) Koch. in Röhl., Deustchl. Fl. ed. 3, 4 (ed. W.D.J. Koch): 713. 1833; Hook.f. & T. Anderson in Hook.f., Fl. Brit. India 1: 156. 1872; Hajra & al. in B.D. Sharma & N.P. Balakr., Fl. India 2: 136. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 74. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 540. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 1: 107. 2020. *Sinapis nigra* L., Sp. Pl.: 668. 1753.

Herb, annual, erect. Leaves pinnatifid to pinnatisect, entire along margins. Flowers bright yellow, ebracteate, in branched racemes. Fruits oblong, beaked.

Flowering & Fruiting: September–December.

Commonly cultivated for its fruits.

3. **Brassica oleracea** L. var. **botrytis** L., Sp. Pl.: 667. 1753; R.D. Gaur, Fl. Distr. Garhwal: 191. 1999. *B. oleracea* L. var. *capitata* L., Sp. Pl.: 667. 1753; Hajra & al. in B.D. Sharma & N.P. Balakr., Fl. India 2: 137. 1993; R.D. Gaur, Fl. Distr. Garhwal: 191. 1999; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 540. 2018 *Phulgobhi*

Herb, slender, annual, to 40 cm high. Leaves alternate, lyrate-pinnatifid, nerves prominent. Flowers white, dense in corymbs.

Flowering & Fruiting: Almost throughout the year.

Cultivated for its leaves which is used as vegetable.

3a. **Brassica oleracea** L. var. **capitata** L., Sp. Pl.: 667. 1753; Hajra & al. in B.D. Sharma & N.P. Balakr., Fl. India 2: 137. 1993; R.D. Gaur, Fl. Distr. Garhwal: 191. 1999; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 540. 2018. *Bandh-gobhi*

Herb, to 35 cm high; stems condensed until flowering. Leaves densely packed into a subglobose head; nerves prominent. Flowers yellow. Siliqua cylindrical, 1-seeded.

Flowering & Fruiting: Almost throughout the year.

Cultivated for its leaves which is used as vegetable.

4. **Raphanus caudatus** L., Mant. Pl.: 95. 1767; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 107. 2020. *R. sativus* var. *caudatus* (L.) Hook.f. & Anderson, Fl. Brit. India 1: 166. 1872; Hajra & al. in B.D. Sharma & N.P. Balakr., Fl. India 2: 146. 1993; R.D. Gaur, Fl. Distr. Garhwal: 196. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 77. 2007. *R. caudatus* L., Mant. Pl. 1: 95. 1767. *Singri*

Herb, annual with white globose or sphere-shaped tap root. Leaves pinnatifid, ovate or oblong-lanceolate, entire or crenate-dentate or lobed along margins. Flowers yellow, in racemes. Siliqua ellipsoid.

Flowering & Fruiting: October–March.

Cultivated as vegetable. Adjoining villages of the Sanctuary.

4a. **Raphanus sativus** var. **sativus** L., Sp. Pl.: 669. 1753; Hook.f., & T. Anderson in Hook.f., Fl. Brit. India 1: 166. 1872; Hajra & al. in B.D. Sharma & N.P. Balakr., Fl. India 2: 146. 1993; R.D. Gaur, Fl. Distr. Garhwal: 196. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 77. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 603. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 107. 2020. *Muli*

Herb, annual, with white or red, spindle-shaped tap root. Leaves pinnatifid, ovate or oblong-lanceolate, entire or crenate-dentate or lobed along margins. Flowers yellow, in racemes. Siliqua oblong-ellipsoid.

Flowering & Fruiting: October–May.

Cultivated as vegetable. Adjoining villages of the Sanctuary.

6. CAPPARACEAE (=CAPPARIDACEAE)

- 1a. Herb; flowers in racemes 1. **Cleome**
 1b. Small trees; flowers in corymbs 2. **Crateva**

1. **Cleome** L.

Cleome viscosa L., Sp. Pl.: 672. 1753; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 170. 1872; P.C. Pant, Fl. Corbett Natl. Park: 37. 1986; Sundararagh. in B.D. Sharma & N.P. Balakr., Fl. India 2: 317. 1993; R.D. Gaur, Fl. Distr. Garhwal: 188. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 78. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 612. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 113. 2020. *Polanisia icosandra* (L.) Wight & Arn., Prodr. Fl. Ind. Orient.: 22. 1834; Wight, Icon. Pl. Ind. Orient.: t. 2. 1838. *Jakhiya*

Herb, annual, erect, glandular-pubescent, to 65 cm high. Leaves petioled, 3–5-foliolate; leaflets to 3 x 2 cm, elliptic-obovate, acute or obtuse at apex. Flowers yellow, in leafy racemes; sepals glandular-pubescent outside; petals clawed. Siliqua c. 7 x 0.3 cm, cylindric, hairy, striate, tapering at both ends. Seeds subglobose with faint concentric ribs and strong cross ribs, dark brown.

Flowering & Fruiting: October–July.

Occasional in open places and fallow fields.

Distribution: India (almost throughout the tropical regions), tropical regions of the world.

Specimens examined: Way to Halduparao, R. *Manikandan* 124921 (BSD); R. *Manikandan* 125596.

Uses: Seed a popular condiment of the region used as *Zeera* and seed paste applied externally on rheumatic arthritis and leaf juice is dropped in otorrhoea and leaf paste with butter applied on wounds.

2. **Crateva** L.

Crateva adansonii DC. subsp. **odora** (Buch.-Ham.) Jacobs, Blumea 12(2): 198–199. 1964; P.C. Pant, Fl. Corbett Natl. Park: 37. 1986; Sundararagh. in B.D. Sharma & N.P. Balakr., Fl. India 2: 322. 1993 R.D. Gaur, Fl. Distr. Garhwal: 188. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 78. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 608. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 113. 2020. *C. odora* Buch.-Ham., Trans. Linn. Soc. London 15: 118. 1827. *C. tapia* subsp. *odora* (Buch.-Ham.) S.M. Almeida, Fl. Savantwadi 1: 44. 1990. *C. roxburghii* R. Br., Denham & Clapperton, Narr. Trav. Disc. Afr. App.: 224. 1826. *C. religiosa* var. *roxburghii* (R. Br.) Hook.f., & Thomson, Fl. Brit. India 1: 172. 1872. *Barne, Burna* [Plate-5e]

Small trees, deciduous, to 9 m high. Leaves petioled, trifoliolate, lateral leaflets asymmetrical; leaflets 4.5–10 x 2.5–5 cm, obovate or lanceolate, acuminate at apex, attenuate with oblique at base, membranous, entire along margins, venation prominent. Flowers whitish-yellow, 10–25-flowered, in corymbs, on leafy twigs; sepals ascending, petaloid; petals claw, equalling calyx. Berries *c.* 4 cm across, globose, woody, smooth, orange-yellow or reddish-brown. Seeds broadly ellipsoid, smooth.

Flowering & Fruiting: December–March.

Common along river banks in deciduous forests and found associated with *Bauhinia racemosa*, *Homonoia riparia*, etc.

Distribution: India (throughout tropical regions of the country), Myanmar, Pakistan, Sri Lanka.

Specimens examined: Way to Phakhro, R. *Manikandan* 125709 (BSD).

Uses: Leaves as fodder, wood is used for agricultural implements, drums, models. Fruits edible, often pickled. Leaves and barks used in treatment of bronchitis, skin diseases and urinary disorders.

Notes: Jacobs (Blumea 12: 188. 1964) has laid stress on leaf coloration, texture and venation in segregating *C. magna* (syn. *C. nurvala*) from *C. religiosa*.

7. FLACOURTIACEAE

- 1a. Armed trees 2. **Flacourtia**
1b. Unarmed trees 1. **Casearia**

1. *Casearia* Jacq.

Casearia tomentosa Roxb., Fl. Ind. (Ed. Carey) 2: 421. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 2: 593. 1879; R.L. Mitra in B.D. Sharma & N.P. Balakr., Fl. India 2: 397. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 78. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 626. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 121. 2020. *Anavinga lanceolata* Lam., Encycl. 1: 148. 1783, *non Casearia lanceolata* Miq., Linnaea 18: 753. 1844. *Casearia elliptica* Willd., Sp. Pl. ed. 4, 2(1): 628. 1799, *nom. illeg.* (including type of *Anavinga lanceolata* Lam., 1783); Wight, Icon. Pl. Ind. Orient.: t. 1849. 1852; P.C. Pant, Fl. Corbett Natl. Park: 38. 1986; R.D. Gaur, Fl. Distr. Garhwal: 167. 1999. *Guidonia tomentosa* (Roxb.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 46(2): 92. 1877. *Chilla*, *Chillak*

Small trees, to 7 m high; stems and branches lenticelled, bark ash coloured, tomentose on young parts. Leaves petioled, 5.6–14 x 2.5–5.6 cm, ovate, elliptic-lanceolate, acute at apex, rounded and asymmetrical at base, tomentose, entire or serrulate along margins. Flowers greenish-white, in short axillary clusters; tepals deeply lobed, 4 x 2.5 mm, elliptic, obtuse. Capsules *c.* 3 x 1 cm, ellipsoid, 3-valved. Seeds arillate.

Flowering & Fruiting: June–January.

Occasional in moist deciduous forests.

Distribution: India (Himalaya, S. India), Myanmar, Nepal, Sri Lanka.

Specimens examined: Vatanvasa, H.C. Pande 220792 (IWG); Way to Halduparao, R. *Manikandan* 124929, 124896 (BSD).

2. *Flacourtia* Comm. ex L' Her.

Flacourtia indica (Burm.f.) Merr., Interpr. Rumph. Herb. Amboin.: 377. 1917; P.C. Pant, Fl. Corbett Natl. Park: 38. 1986; R.L. Mitra in B.D. Sharma & N.P. Balakr., Fl. India 2: 406. 1993; R.D. Gaur, Fl. Distr. Garhwal: 168. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 79. 2007; Pusalkar & S.K. Srivast., Fl.

Uttarakhand 1: 627. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 121. 2020. *Gmelina indica* Burm.f., Fl. Indica: 132, t. 39, f. 5. 1768. *Flacourtia ramontchi* L' Her., Stirp. Nov. 3: 59, t. 30. 1785; Hook.f., & Thomson in Hook.f., Fl. Brit. India 1: 193. 1872. *F. sepiaria* Roxb., Pl. Coromandel 1: 48, t. 68. 1795. Kandai, Kangu

Shrubs or small trees, to 6 m high, usually armed; spines scattered on trunk, often branched, deciduous, glabrous. Leaves petioled, 2–10.5 x 1–4.2 cm, obovate-ovate, acute to acuminate, sometimes emarginate at apex, crenate-serrate along margins. Flowers greenish-yellow, in axillary branched cymes; male flowers: sepals ovate, hairy within; female flowers: ovary globular, incompletely 5-locular, with 5 radiating styles, slightly connate at base. Berries c. 1.2 x 0.8 cm, ellipsoid, ribbed, dark purple or red with age.

Flowering & Fruiting: February–June.

Occasional in deciduous forests.

Distribution: India (almost throughout the tropical regions), tropical and subtropical regions of Africa, Asia, Pacific islands.

Specimens examined: Hathipani, Pant 13769; Way to Halduparao, R. Manikandan 124874, 124806, 124881, 125710 (BSD).

Uses: Fruits are edible, leaves used as fodder, decoction of fruits given in hepatitis fever and diarrhoea, leaves and bark paste applied on wounds.

8. POLYGALACEAE

1. *Polygala* L.

- 1a. Flowers yellow; caruncle with three appendages.....2. *P. crotalarioides*
 1b. Flowers pink; caruncle with two appendages.....1. *P. arvensis*

1. ***Polygala arvensis*** Willd., Sp. Pl. ed. 4, 3(2): 876. 1802; P.C. Pant, Fl. Corbett Natl. Park: 38. 1986; R.N. Banerjee in B.D. Sharma & N.P. Balakr., Fl. India 2: 460, f. 87. 1993; R.D. Gaur, Fl. Distr. Garhwal: 361. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 79. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 636. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 126. 2020. *P. chinensis* auct. non L. 1753; A.W. Benn. in Hook.f., Fl. Brit. India 1: 204. 1872, *p.p.*; Adema, Blumea 14: 269, f. 15. 1966. Mirdoi, Sanjivani

Herb, diffuse, to 15 cm high. Leaves sessile, 1.2–3 x 0.5–0.8 cm, elliptic or oblanceolate, mucronate at apex, pubescent; lateral veins indistinct. Flowers yellow, few, in short lateral racemes; sepals 5-lobed, unequal, outer 3 lobes ovate, inner 2 lobes winged, oblique, pubescent; petals 3, lateral, orbicular, connate with keel; style hooked at apex. Capsules asymmetric, ciliate. Seeds oblong, winged with minute appendages, brownish-black.

Flowering & Fruiting: July–December.

Occasional in open grass fields and in disturbed areas.

Distribution: India (almost throughout tropical regions of the country), tropical Asia, Australia.

Specimens examined: On way to Halduparao, R. Manikandan 125621 (BSD).

Uses: The roots used as febrifuge; plant decoction given in paralysis.

2. ***Polygala crotalarioides*** Buch.-Ham. ex DC., Prodr. 1: 327. 1824; A.W. Benn. in Hook.f., Fl. Brit. India 1: 201. 1872; P.C. Pant, Fl. Corbett Natl. Park: 38. 1986; R.N. Banerjee in B.D. Sharma & N.P. Balakr.,

Fl. India 2: 466. 1993; R.D. Gaur, Fl. Distr. Garhwal: 361. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 79. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 637. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 126. 2020.

Herb, perennial, villous, erect, to 30 cm high. Leaves subsessile, 1–4.5 x 0.3–1.8 cm, obovate-elliptic, obtuse, obtuse or subacute at apex, acute at base, densely villous beneath; lateral veins indistinct. Flowers pink, in lateral, rarely terminal racemes; sepal 5, unequal, upper twice as large as lower ones; inner ones obovate-elliptic, many nerved; petals shorter than keel, with crested, outer 3 lobes subequal, inner 2 lobes winged, usually petaloid. Capsules c. 4 mm across, orbicular, emarginate, glabrous, winged with ciliate. Seeds oblong, pilose; strophiole trilobed, 3-appendiculate.

Flowering & Fruiting: September–December.

Common in open grasslands and in moist places.

Distribution: India (Himalaya, C & N.E. India), China, Laos, Myanmar, Nepal, Pakistan, Thailand.

Specimens examined: On way to Mundiapani, R. *Manikandan* 124856 (BSD); Samir Sinha (2001).

9. CARYOPHYLLACEAE

- 1a. Leaves suborbicular or deltoid-ovate; bracts membranous..... 1. **Drymaria**
 1b. Leaves linear-lanceolate; bracts scarious 2. **Polycarpaea**

1. **Drymaria** Schult.

Drymaria diandra Blume, Bijdr., Fl. Ned. Ind.: 62. 1825; Majumdar in B.D. Sharma & N.P. Balakr., Fl. India 2: 533, f. 108. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 80. 2007; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 132. 2020. *D. cordata* (L.) Schult. in Roem. & Schult., Syst. Veg. ed. 15 bis. 5: 406. 1819; Edgew. & Hook.f., in Hook.f., Fl. Brit. India 1: 244. 1874; P.C. Pant, Fl. Corbett Natl. Park: 38. 1986; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 660. 2018. *Holosteum cordatum* L., Sp. Pl. 1: 88. 1753. *Drymaria cordata* subsp. *diandra* (Blume) J.D. Duke, Ann. Missouri Bot. Gard. 48: 253. 1961; Majumdar, Bull. Bot. Surv. India 10: 294. 1969; R.D. Gaur, Fl. Distr. Garhwal: 127. 1999. *Pithpapa*

Herb, annual, prostrate, slender. Leaves opposite, to 2 x 1.2 cm, suborbicular or deltoid-ovate, rounded at apex, truncate or obtuse at base, glabrous, palmately, 3–5-nerved; stipules lacerate with filiform segments. Flowers white, in axillary or terminal, slender, dichotomously branched cymes; bracts lanceolate, membranous; sepals elliptic-lanceolate, scarious; petals bifid, narrowed into a claw at base. Capsules 2–3-valved. Seeds 10–15, compressed, granulate, brown.

Flowering & Fruiting: September–December.

Common in moist shade places and along streams.

Distribution: India (almost throughout the country), Africa, America, Asia, Mexico, Pacific Islands, West Indies.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122441 (BSD); Samir Sinha (2001).

2. **Polycarpaea** Lam. *nom. cons.*

Polycarpaea corymbosa (L.) Lam., Tabl. Encycl. 4: 129. 1797; Wight, Icon. Pl. Ind. Orient. t. 712. 1843; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 245. 1874; Majumdar in B.D. Sharma & N.P. Balakr., Fl. India 2: 549. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 81. 2007; Pusalkar & S.K. Srivast., Fl.

Uttarakhand 1: 674. 2018; Mastakar & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 135. 2020. *Achyranthes corymbosa* L., Sp. Pl.: 205. 1753.

Herb, annual, to 25 cm high, dichotomously branched, white-tomentose. Leaves sessile, 4–15 x 1–2 mm, linear-lanceolate, many per node, whorled; stipules $\approx$ 5 mm long. Flowers white or brownish-red, many, in densely branched, terminal cymes; bracts scarious, silvery white-brown, lanceolate, acute; petals shorter than sepals. Capsules 3-valved. Seeds few, obovoid, tuberculate, light brown.

Flowering & Fruiting: September–December.

Occasional on open stony soil areas.

Distribution: India (almost throughout the tropical areas), Africa, America, Tropical Asia, Australia.

Notes: Included on the authority of Samir Sinha (2001).

10. PORTULACACEAE

Portulaca L.

Portulaca oleracea L., Sp. Pl.: 445. 1753; Dyer in Hook.f., Fl. Brit. India 1: 246. 1874; R. Geesink, Blumea 17: 292. 1969; P.C. Pant, Fl. Corbett Natl. Park: 39. 1986; Vasudeva Rao in B.D. Sharma & Sanjappa, Fl. India 3: 4, f. 1. 1993; R.D. Gaur, Fl. Distr. Garhwal: 123. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 83. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 716. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 144. 2020. *Luniya*

Herb, succulent, prostrate, to 25 cm long. Leaves subsessile, subopposite and often whorled, 8–20 × 5–10 mm, obovate, notched at apex, attenuate at base; venation obscure. Flowers yellow, in terminal or axillary cymose clusters; sepals 2, basally connate, often persistent; petals 5–6, notched at apex, fugacious. Capsules $\approx$ 5 mm long, globose. Seeds many, brown, tuberculate.

Flowering & Fruiting: Throughout the year.

Common weed in open moist places and along roadsides.

Uses: Leaves and young branches are cooked and eaten as green vegetable.

Distribution: India (almost throughout the country), warm temperate, tropical and subtropical regions throughout the world.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124935 (BSD); Samir Sinha (2001).

Cultivated species:

Portulaca grandiflora Hook., Bot. Mag. n.s. 3: t. 2885. 1880; Bailey, Man. Cult. Pl.: 364, f. 6. 1949; Vasudeva Rao in B.D. Sharma & Sanjappa, Fl. India 3: 3. 1993; R.D. Gaur, Fl. Distr. Garhwal: 123. 1999. *P. pilosa* L. subsp. *grandiflora* (Hook.) R. Geesink, Blumea 17: 297. 1969 & in Steenis, Fl. Males., Ser. 1, Spermat. 7: 131. 1971; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 83. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 715. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 145. 2020.

Herb, prostrate or ascending. Leaves terete, scattered. Flowers yellow, pink or white. Capsules ovoid-conical. Seeds minute, tuberculate, reniform.

Flowering & Fruiting: Throughout the year.

Cultivated as ornamental herb.

11. TAMARICACEAE

Tamarix L.

Tamarix dioica Roxb. ex Roch, Nov. Pl. Ind. Or.: 185. 1821; Dyer in Hook.f., Fl. Brit. India 1: 249. 1874; P.C. Pant, Fl. Corbett Natl. Park: 39. 1986; R.D. Gaur, Fl. Distr. Garhwal: 171. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 83. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 723. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 146. 2020. *T. dioica* Roxb., Hort. Beng.: 22. 1814, *nom. nud.* *T. longe-pedunculata* Blatt. & Hallb., J. Ind. Bot. 1: 86. 1919. *Jbau*

Shrub with reddish-bark, entirely glabrous, dioecious, to 2.5 m high. Leaves vaginate, abruptly acuminate, 1.5–3 mm long, with a broad whitish margin. Flowers purple or purplish-pink, subsessile, in simple or loosely compound racemes; bracts semiamplexicaul, triangular, acuminate; sepals 5, broadly ovate or orbicular, entire, obtuse; petals 5, free, obovate, entire, obtuse; stamens 5, filaments filiform, inserted in between notches of the disc; styles 3 as long as the ovary or slightly shorter, exserted. Ovary triquetrous, to 1.5 mm long, absent in male flowers.

Flowering & Fruiting: April–November.

Distribution: India (almost throughout the country), Afghanistan, Bangladesh, China, Iran, Myanmar, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

12. HYPERICACEAE

Hypericum Thunb.

Hypericum japonicum Thunb., Syst. Veg. (ed. 14): 702. 1784; Dyer in Hook.f., Fl. Brit. India 1: 250. 1874; P.C. Pant, Fl. Corbett Natl. Park: 39. 1986; R.D. Gaur, Fl. Distr. Garhwal: 147. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 84. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 731. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 149. 2020. *Brathys japonica* (Thunb.) Wight, Ill. Ind. Bot. 1: 113. 1838. *B. laxa* Blume, Mus. Bot. 2: 19. 1856. *Hypericum chinense* Osbeck., Dagb. Ostind. Resa: 244. 1757, *nom. utique rej.* *H. japonicum* var. *thunbergii* (Franch. & Sav.) R. Keller, Bull. Herb. Boissier, sér. 2, 8: 185. 1908. *H. laxum* (Blume) Koidz., Bot. Mag. (Tokyo) 40(474): 344. 1926. *H. thunbergii* Franch. & Sav., Enum. Pl. Jap. 2(2): 300. 1878.

Herb, annual, erect to decumbent or prostrate and rooting at base, to 45 cm long. Leaves sessile, 0.4–1.8 cm × 0.1–0.4 mm, ovate-triangular or elliptic, cordate-amplexicaul at base, margin entire, obtuse to rounded at apex, papery, glaucous beneath, glandular; veins 1–7. Flowers pale to bright yellow, 30-flowered, in terminal; bracts and bracteoles lanceolate-subulate to leaf-like; sepals free, erect, narrowly oblong or elliptic, subequal; petals obovate to oblong or elliptic; stamens 5–30, irregular. Capsule c. 6 × 2.5 mm, cylindric to globose, usually slightly shorter than to slightly exceeding calyx. Seeds straw-yellow, testa finely linear-scalariform.

Flowering & Fruiting: March–November.

Grows wet places, ditches, marshes, grasslands, waste places.

Distribution: India (N & S India), SE Australia, Bhutan, Cambodia, China, Indonesia, Japan, S. Korea, Laos, Malaysia, Myanmar, Nepal, Pacific islands, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

13. DIPTEROCARPACEAE**Shorea** Roxb. ex C. F. Gaertn.

Shorea robusta Gaertn., Suppl. Carp.: 48. 1805; Dyer in Hook.f., Fl. Brit. India 1: 306. 1874; P.C. Pant, Fl. Corbett Natl. Park: 38. 1986; K.P. Janardh. in B.D. Sharma & Sanjappa, Fl. India 3: 237, f. 62. 1993; R.D. Gaur, Fl. Distr. Garhwal: 143. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 84. 2007; D.D. Pramanick & Mastakar in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 107. 2020.

Sal [Plate-5f]

Tree, deciduous, with spreading crown, to 40 m high; bark gray to dark reddish-brown, becoming fissured and flaky, wood hard; branchlets densely buff scabrous-pubescent; stipules fugacious, lanceolate. Leaves petioled 2, 8–40 × 4.5–25 cm, ovate to oblong, obtuse to cordate at base, acuminate at apex, thinly leathery, midvein prominent. Flowers creamy-yellow or with a pink stripe, subsessile, on branches racemose, secund forming panicles; bracts caducous, minute; sepals ovate, subequal, densely buff pubescent; petals strongly contorted, linear; stamens many. Samara with unequal wings, 3 longer, 2 smaller, spatulate, sparsely pubescent; nut ovoid.

Flowering & Fruiting: February–July.

Frequent in deciduous forests.

Distribution: India (Andhra Pradesh, Bihar, from Western to Eastern regions, Himalayas, Madhya Pradesh, Orissa, West Bengal), Bhutan, China.

Specimens observed: Observed almost throughout the sanctuary, but collected due to vegetative condition.

Uses: Wood yields high class timber, used for various purposes; tannin from bark and leaves; fatty oil from seeds for cooking and lightening; leaves used as plate; aromatic resin useful in diarrhea, dysentery and in gonorrhea, also used as incense.

Notes: It is a host for the lac insect.

14. MALVACEAE

- 1a. Epicalyx absent.....6. **Sida**
 1b. Epicalyx present..... 2
- 2a. Trees; epicalyx segments winged.....4. **Kydia**
 2b. Herbs or undershrubs; epicalyx segments wingless.....3
- 3a. Calyx spathaceous.....1. **Abelmoschus**
 3b. Calyx not as above.....4
- 4a. Carpels half as many as style branches.....8. **Urena**
 4b. Carpels as many as style branches.....5
- 5a. Style 1; stigmas lobed.....7. **Thespesia**
 5b. Styles 5-many; stigmas simple.....6
- 6a. Fruit a capsule.....3. **Hibiscus**
 6b. Fruit a schizocarp, breaking into mericarps.....7
- 7a. Seeds more than 2 in each mericarp.....2. **Abutilon**

7b. Seed 1 in each mericarp.....5. **Malvastrum**

1. **Abelmoschus** Medik.

- 1a. Bracteoles 4–5, oblong-lanceolate.....2. *A. manihot*
 1b. Bracteoles 10–15, filiform.....1. *A. crinitus*

1. **Abelmoschus crinitus** Wall., Pl. Asiat. Rar. 1: 39, t. 44. 1830; P.C. Pant, Fl. Corbett Natl. Park: 40. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 70, 14. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 302, f. 84. 1993; R.D. Gaur, Fl. Distr. Garhwal: 156. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 85. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 748. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 165. 2020. *A. cancellatus* (Roxb.) Voigt, Hort. Calc.: 119. 1845. *A. hainanensis* Hu, Fl. China Fam. 153: 37, t. 18, f. 1. 1955. *Bamia cancellata* Wall., Cat. n. 1920. 1829, *nom. nud.* B. *crinita* Wall., Cat. no. 1922. 1829, *nom. nud.* *Hibiscus cancellatus* Roxb. (Hort. Beng. 51. 1814. *nom. nud.*), Fl. Ind. ed. Carey. 3: 20. 1832, *non* L.f. 1781; Mast. in Hook.f., Fl. Brit. India 1: 342. 1874. *H. crinitus* (Wall.) G. Don, Gen. Syst. 1: 380. 1831. Kamlyā

Herb, erect, perennial, to 1.5 m high; stem branched, simple, stellate hairy or hirsute, with roots usually tuberous. Leaves petioled, angular or 5–7-lobed, 10–15 × 9.5–13.5 cm, orbicular or broadly ovate, cordate at base, coarsely serrate to dentate, simple or stellate usually hirsute; stipules linear to filiform. Flowers yellow, with purple spot in centre, in axillary solitary; epicalyx segments 10–16, linear; sepals to 2.5 cm long; petals obovoid; staminal column c. 2 cm long. Capsule c. 4.5 cm across, ovoid to globular, simple and stellate pubescent, hirsute. Seeds globular or reniform, black, rusty tomentose or glabrous.

Flowering & Fruiting: December–March.

Rare in secondary growth at forest edges near moist deciduous forests.

Distribution: India (almost throughout the country), South Asia, China, Java, Malaysia, Philippines.

Specimens examined: Way to Rathuadhab, T.S. Rana, B. Datta & H.C. Pande 220244 (LWG).

2. **Abelmoschus manihot** (L.) Medik., Malvenfam.: 46. 1787; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 750. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 166. 2020. *Abelmoschus manihot* L. ssp. *tetraphyllus* Borss. Waalk., Blumea 14: 97. 1966; P.C. Pant, Fl. Corbett Natl. Park: 40. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 75. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 306. 1993; R.D. Gaur, Fl. Distr. Garhwal: 157. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 85. 2007. Jangli bhendi [Plate-5g]

Herb, annual or perennial, to 2 m high; stem and branches with long simple-hispid hairs. Leaves petioled, palmately 5–9-lobed or sometimes pinnately lobed, 7.5–18 × 1–6 cm, oblong-lanceolate, margin robustly, obtusely serrate, sparsely long hispid on both surfaces; stipules linear-lanceolate. Flowers yellow with purple center, in solitary or subapical and forming terminal raceme; epicalyx 4 or 5, ovate-lanceolate, sparsely long hispid; sepals spathaceous, minutely 5-lobed, nearly entire, longer than epicalyx, puberulent, caducous at fruiting; petals to 7 cm across; staminal column to 2.5 cm long; stigma purple-black, spatulate-disk-shaped. Capsules c. 5 × 3 cm, ovoid-ellipsoid, densely hirsute. Seeds many, reniform.

Flowering & Fruiting: August–October.

Grasslands, streamsides, margins of farms.

Distribution: India (almost throughout the country), China, Nepal, Philippines, Thailand.

Specimens examined: Almost throughout the sanctuary, R. *Manikandan* 124992 (BSD).

2. *Abutilon* Mill.

Abutilon indicum (L.) Sweet, Hort. Brit.: 54. 1826; Mast. in Hook.f., Fl. Brit. India 1: 326. 1874; Borss. Waalk., Blumea 14: 170. 1966; P.C. Pant, Fl. Corbett Natl. Park: 40. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 87. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 266. 1993; R.D. Gaur, Fl. Distr. Garhwal: 158. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 85. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 755. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 167. 2020. *Sida indica* L., Cent. Pl. 2: 26. 1756. *Kanghe, Kanghi*

Herb or undershrub, to 1 m high; branches velvety-tomentose to glabrescent. Leaves petioled, 1.5–6 × 1–5.5 cm, orbicular-ovate, cordate at base, often shallowly trilobed, crenate-dentate along margins, acute to acuminate at apex, characeous. Flowers yellow-orange, axillary, solitary; sepals much shorter than corolla. Schizocarps globular; mericarps c. 1.5 cm long, stellate-pubescent. Seeds brownish-black.

Flowering & Fruiting: December–March.

Common in open situations and along river bank sides and on sandy soils near deciduous forests.

Distribution: India (almost throughout the country), Bhutan, Cambodia, China, Indonesia, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Uses: Stem yields a coarse fibre, decoction of leaves and bark given in fever and dysentery.

Notes: Included on the authority of Samir Sinha (2001).

3. *Hibiscus* L., *nom. cons.*

Hibiscus lobatus (J.A. Murr.) Kuntze, Revis. Gen. Pl. 3: 19. 1898; Borss. Waalk., Blumea 14: 77. 1966; P.C. Pant, Fl. Corbett Natl. Park: 40. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 133, f. 27. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 336, f. 95. 1993; R.D. Gaur, Fl. Distr. Garhwal: 160. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 85. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 763. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 169. 2020. *Solandra lobata* J.A. Murr., Commentat. Soc. Reg. Sci. Goetting 6: 20, t. 1. 1785. *Hibiscus solandra* L' Her., Stirp. Nov. 1: 103, t. 49. 1788; Mast. in Hook.f., Fl. Brit. India 1: 336. 1874.

Herb, annual, erect, to 85 cm high. Leaves petioled, 2–8 × 1.5–7 cm, upper leaves linear-lanceolate, acute to acuminate at apex; lower leaves trilobed, linear, ovate-orbicular, serrate-crenate along margins. Flowers white, lax, in axillary or terminal racemes; epicalyx segments 6–8, deciduous; sepals deeply 5-lobed. Capsules c. 1.2 × 0.5 cm, oblong, beaked, sparsely pubescent. Seeds black, minutely tuberculate.

Flowering & Fruiting: August–October.

Common in open situations and along roadsides near deciduous forests.

Distribution: India (almost throughout the country), Africa, Bhutan, China, Madagascar, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122510 (BSD).

4. *Kydia* Roxb.

Kydia calycina Roxb., Pl. Coromandel 3: 11, t. 215. 1819; Wight, Icon. Pl. Ind. Orient. tt. 879–880. 1844–45; Mast. in Hook.f., Fl. Brit. India 1: 348. 1874; Borss. Waalk., Blumea 14: 146. 1966; P.C. Pant, Fl. Corbett Natl. Park: 41. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 159. 1988; T.K.

Paul in B.D. Sharma & Sanjappa, Fl. India 3: 344. 1993; R.D. Gaur, Fl. Distr. Garhwal: 161. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 766. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 171. 2020.

Pulao, Pula [Plate-5h]

Tree, to 35 m high; bark mucilaginous, stellate-tomentose. Leaves petioled, 4.5–15 × 5–16 cm, ovate-orbicular, with angular lobes, cordate at base; palmately 7-nerved, with nectary on veins, glaucous beneath. Flowers white, in axillary or terminal panicles, with dense tomentum; epicalyx segments 4–6, spathulate-oblong, persistent, spreading in fruits; sepals triangular; petals spathulate, emarginate, fimbriate along margins. Capsules c. 5 mm across, globose. Seeds small, reniform-ellipsoid, brown.

Flowering & Fruiting: September–January.

Occasional in moist deciduous forests.

Distribution: India (almost throughout the country), Bhutan, China, Myanmar, Nepal, Pakistan, N. Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124866 (BSD); T.S. Rana, B. Datta & H.C. Pande 220880 (LWG).

Uses: After removal of the bark it looks quite similar to teak (*Tectona grandis*) wood. Wood is soft and a non-structural timber. Bark paste applied on body swellings. The pulp has been tried for paper. The leaves and bark make a good fodder for elephant.

5. *Malvastrum* A. Gray, *nom. cons.*

Malvastrum coromandelianum (L.) Garcke, Bonplandia 5: 295. 1857; Borss. Waalk., Blumea 14: 152. 1966; P.C. Pant, Fl. Corbett Natl. Park: 41. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 180, f. 39. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 277, f. 75. 1993; R.D. Gaur, Fl. Distr. Garhwal: 162. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 744. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 172. 2020. *Malva coromandeliana* L., Sp. Pl.: 687. 1753. *Malvastrum tricuspidatum* (R. Br. ex Ait.f.) A. Gray, Smithsonian Contr. Knowl. 3: 16. 1852; Mast. in Hook.f., Fl. Brit. India 1: 321. 1874. *Suchi*

Herb, erect, woody, to 35 cm high; stems strigose, with simple, 4-armed stellate hairs. Leaves petioled, to 5 × 3 cm long, ovate to ovate-lanceolate, rounded to truncate at base, serrate to dentate along margins, 5-nerved. Flowers yellow, axillary solitary or in clusters on leafy terminal spikes; epicalyx 3, linear-lanceolate, scattered with 4-armed stellate hairs; sepals to 1 cm long, longer than epicalyx, triangular, acute at apex; petals obliquely obovate. Schizocarps c. 2 mm long, globular; mericarps 10–14, included in calyx, with dorsal bristles 3, awned. Seeds in each mericarp, reniform.

Flowering & Fruiting: June–December.

Occasional in open waste places.

Distribution: India (almost throughout the country), China, Japan, Myanmar, Pakistan, Sri Lanka, Vietnam. It is a native of South America, naturalized elsewhere

Specimens examined: Sonanadi WLS, R. *Manikandan* 124836, 125719 (BSD).

Uses: Stem yields a fibre; leaf decoction given in dysentery and leaf paste applied on wounds.

Notes: Included on the authority of Samir Sinha (2001).

6. *Sida* L.

- 1a. Trailing herbs.....2. *S. cordata*
 1b. Erect herbs.....2
 2a. Leaves cordate at base.....3. *S. cordifolia*
 2b. Leaves cuneate to truncate at base.....1. *S. acuta*

1. ***Sida acuta*** Burm.f., Fl. Indica: 147. 1768; Borss. Waalk., Blumea 14: 186. 1966; P.C. Pant, Fl. Corbett Natl. Park: 41. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 202, f. 49. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 281, f. 76. 1993; R.D. Gaur, Fl. Distr. Garhwal: 163. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 778. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 173. 2020. *S. carpinifolia sensu* Mast. in Hook.f., Fl. Brit. India 1: 323. 1874, *p.p. non* L.f., 1781. *Karenti*

Herb, woody, erect, nearly glabrous. Leaves subsessile, 1–7.5 × 0.5–2 cm, elliptic-lanceolate or ovate-oblong, serrate along margins, trinerved, sparsely stellate hairy on both surfaces. Flowers yellow, in axillary solitary; epicalyx segments 10, ciliate, persistent; pedicels equal to or longer than petioles, jointed above middle; sepals triangular, acute; petals 8–10 mm across. Mericarps 6–10. Seeds to 2 mm long, dark brown, triangularly ovoid.

Flowering & Fruiting: September–December.

Common in waste places and along road sides.

Distribution: India (almost throughout the country), Bhutan, Cambodia, China, Laos, Nepal, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124933, 125718 (BSD); Samir Sinha (2001).

Uses: The whole plant is used as a broom stick by tribals; stem yields coarse fibre; leaves diuretic, root extract given in leucorrhoea.

Notes: This species can be easily recognized by having pair of stipules in which one is 3-nerved, other 1-nerved.

2. ***Sida cordata*** (Burm.f.) Borss. Waalk., Blumea 14: 182. 1966; P.C. Pant, Fl. Corbett Natl. Park: 41. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 206, f. 50. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 283, f. 77. 1993; R.D. Gaur, Fl. Distr. Garhwal: 163. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 779. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 173. 2020. *Melochia cordata* Burm.f., Fl. Indica: 143. 1768. *Sida humilis* Cav., Diss. 5: 277, t. 134, f. 2. 1788; Mast. in Hook.f., Fl. Brit. India 1: 322. 1874. *S. humilis* var. *veronicifolia* (Lam.) Mast. in Hook.f., *l.c.* 322. *S. veronicifolia* Lam., Encycl. 1: 5. 1783.

Herb, slender, trailing, rooting at nodes, sparsely pubescent or glabrous, often slightly viscid. Leaves petioled, to 5 × 4 cm, ovate-orbicular, cordate at base, crenate-dentate along margins; acute to acuminate at apex, 5–7-nerved from base. Flowers pale yellow, axillary solitary; pedicels longer than petioles, jointed above middle; sepals triangular-subulate with spreading setaceous hairs; petals *c.* 1 cm across. Mericarps tetrahedral with rounded angles. Seeds ovoid, glabrous, brownish-black.

Flowering & Fruiting: July–December.

Occasional in moist shade places near scrub and deciduous forests.

Distribution: India (almost throughout the country), Philippines, Sri Lanka, Thailand; Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124823, 125580, 125634, 125723 (BSD).

Uses: The whole plant is used in native medicine.

Notes: It can easily be recognized by its trailing or semi-prostrate habit.

3. ***Sida cordifolia*** L., Sp. Pl.: 684. 1753; Mast. in Hook.f., Fl. Brit. India 1: 324. 1874; Borss. Waalk., Blumea 14: 199. 1966; P.C. Pant, Fl. Corbett Natl. Park: 41. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 207. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 285. 1993; R.D. Gaur, Fl. Distr. Garhwal: 164. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 780. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 173. 2020.

Lal khareti

Undershrub, to 1 m high; branches velutinous to tomentose or densely pubescent, with an unpleasant smell. Leaves petioled, 0.5–5.5 × 0.5–4.5 cm, ovate or oblong-orbicular, shallowly cordate at base, crenate-dentate along margins, rounded or acute at apex, 5–7-nerved, velvety-tomentose. Flowers pale yellow to nearly white, axillary solitary; pedicels longer than petioles, jointed above middle; sepals triangular, densely pubescent outside; petals to 1.5 cm across, ciliate at base. Mericarps 8–10, flattened-trigonus. Seeds flattened, reniform, brown.

Flowering & Fruiting: September–December.

Occasional in sandy soils and open situations.

Distribution: India (almost throughout the country), Africa, South America, Bhutan, China, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand; Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124906, 122416 (BSD).

Uses: Seeds powder given in dyspepsia; roots astringent, diuretic and tonic.

Notes: It can easily be known by its schizocarp having 8–10 flattened-trigonus mericarps each with 2 long retorsely hairy awns.

7. ***Thespesia*** Sol. ex Correa, *nom. cons.*

Thespesia lampas (Cav.) Dalzell in Dalzell & A. Gibson, Bombay Fl.: 19. 1861; Mast. in Hook.f., Fl. Brit. India 1: 345. 1874; Borss. Waalk., Blumea 14: 116. 1966; P.C. Pant, Fl. Corbett Natl. Park: 42. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 222, f. 58. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 350, f. 98. 1993; R.D. Gaur, Fl. Distr. Garhwal: 164. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 785. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 175. 2020. *Hibiscus lampas* Cav., Diss. 3: 154, t. 56, f. 2. 1787; Wight, Icon. Pl. Ind. Orient.: t. 5. 1838.

Ban-kapasi [Plate-6g]

Shrub, to 2.5 m high; young twigs densely stellate-tomentose. Leaves petioled, 5–12 × 4–8 cm, orbicular-triangular, ovate, often trilobed, truncate or cordate at base, acute to acuminate at apex, 5-nerved, lower surface densely stellate-tomentose, with nectary at base of midrib. Epicalyx 5, subulate. Flowers yellow with dark purple center, axillary solitary or in racemes by reduction of leaves; pedicels jointed above middle; sepals teeth to 2 mm long; petals obovate, densely stellate-tomentose without. Capsules *c.* 2.5 × 1.7 cm, ovoid-globose, glabrescent, dehiscent into 5 valves. Seeds *c.* 5 mm long, obovoid, angular, black.

Flowering & Fruiting: September–February.

Common under light cover in moist deciduous forests.

Distribution: India (almost throughout the country), E. Africa, China, Indonesia, Laos, Nepal, Philippines, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122437 (BSD).

Uses: Stems yields good fibre; root decoction given in gonorrhoea.

Notes: Earlier workers treated *Thespesia lampas* under the genus *Hibiscus* L. Exell & Hillcoat (Cont. Fl. Mozamb. 2: 58. 1954) reinstated the genus *Azanza* Alef. on the basis of connate style appearing as monostylus and transferred *Thespesia lampas* to *Azanza*. Subsequently Borssum (*l.c.*) after the study of a wide range of material from Malaysia treated this taxon with a distinct sectional status on the basis of presence of nectary in midrib, connate style and dehiscent capsule.

8. *Urena* L.

***Urena lobata* L.**, Sp. Pl.: 692. 1753; Mast. in Hook.f., Fl. Brit. India 1: 329. 1874; Borss. Waalk., Blumea 14: 138. 1966; P.C. Pant, Fl. Corbett Natl. Park: 42. 1986; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 228, f. 59. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 380, f. 109. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 86. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 787. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 175. 2020.

Chatkura, Unga, Van bhinda

Undershrub, to 2 m high. Leaves petioled, to 7.5 × 7.5 cm, ovate-broadly orbicular, cuneate to subcordate at base, entire or shallowly lobed, triangular. Epicalyx segments 2.5–8 × 1–2.5 mm, linear-lanceolate, appressed or spreading at maturity. Flowers pink with purple center, axillary solitary or in clusters of 2–3; sepals tubular-campanulate, ovate; petals to 1.5 cm long. Schizocarps globular, covered with glochidia. Seeds reniform, glabrescent.

Flowering & Fruiting: June–December.

Occasional along roadsides and in secondary formations near moist deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Cambodia, China, Indonesia, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam; Pantropical.

Specimens examined: Vatanwasa-Halduparao, R. *Manikandan* 124877 (BSD).

Uses: Flower expectorant; root paste applied on body pain and in rheumatism.

Cultivated species:

1. ***Abelmoschus esculentus* (L.) Moench.**, Methodus: 617. 1794; Borss. Waalk., Blumea 14: 100. 1966; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 71. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 385. 1993; R.D. Gaur, Fl. Distr. Garhwal: 157. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 85. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 753. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 176. 2020. *Hibiscus esculentus* L., Sp. Pl.: 696. 1753; Mast. in Hook.f., Fl. Brit. India 1: 343. 1874.

Undershrub; branches with short stiff hairs or glabrescent. Leaves variable in shape, cordate at base. Epicalyx 7–10. Flowers yellow with dark purple center. Capsules 5–10 cm long. Seeds c. 4.5 mm long, glabrous, dark brown, warty.

Flowering & Fruiting: Throughout the year.

Native of Asia. Widely cultivated for its fruits which are used as vegetable.

2. **Hibiscus rosa-sinensis** L., Sp. Pl.: 694. 1753; Mast. in Hook.f., Fl. Brit. India 1: 344. 1874; Borss. Waalk., Blumea 14: 72. 1966; T.K. Paul & M.P. Nayar in M.P. Nayar & al., Fasc. Fl. India 19: 150. 1988; T.K. Paul in B.D. Sharma & Sanjappa, Fl. India 3: 391. 1993; R.D. Gaur, Fl. Distr. Garhwal: 160. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 86. 2007; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 176. 2020.

Shrub. Leaves ovate or ovate-lanceolate, tapering at base, serrate-dentate along margins, glabrous. Epicalyx lanceolate. Flowers red, solitary. Capsules globose, rarely formed.

Flowering & Fruiting: Throughout the year.

Introduced to India from Mauritius.

15. BOMBACACEAE

Bombax L.

Bombax ceiba L., Sp. Pl.: 511. 1753; P.C. Pant, Fl. Corbett Natl. Park: 42. 1986; M.P. Nayar & M.C. Biswas in B.D. Sharma & Sanjappa, Fl. India 3: 398, f. 111. 1993; R.D. Gaur, Fl. Distr. Garhwal: 155. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 87. 2007; D.D. Pramanick & M.C. Biswas in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 177. 2020. *B. malabaricum* DC., Prodr. 1: 479. 1824; Mast. in Hook.f., Fl. Brit. India 1: 349. 1874. *Salmali*, *Semal* [Plate-6a]

Tree, to 30 cm high, deciduous; often armed with prickles. Leaves petioled, digitately 5–7-foliolate; leaflets 5–15 × 1.5–4.2 cm, acute at base, entire along margins, caudate to acuminate at apex. Flowers deep red, 10–15 cm across, solitary, in pairs or clustered near ends of leaflets branches; sepals cupuliform, woolly within. Capsules c. 12 cm long, ovoid-oblong, velvety, 5-locular. Seeds numerous, ovoid, packed with white cotton.

Flowering & Fruiting: September–March.

Fairly common in deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka.

Uses: Tender fruits are eaten by tribals; gums and exudations are used in medicine. Cotton is used in filling pillows, beds, etc.

16. STERCULIACEAE

1a. Trees..... 1. **Firmiana**
1b. Herbs or shrubs..... 2

2a. Flowers bright red, distinctly bilabiate2. **Helicteres**
2b. Flowers yellow, not as above.....3. **Waltheria**

1. **Firmiana** Marsili

Firmiana fulgens (Wall. ex Mast.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 3: 97. 1893; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 179. 2020. *F. pallens* (Wall. ex King) F.V. Muell., Vict. Nat. 3: 48. 1866; Stearn in Blatter & Millard, Beaut. Ind. Tr. ed. 2: 79. 1954; P.C. Pant, Fl. Corbett Natl. Park: 43. 1986. *Sterculia pallens* Wall. ex King, J. Asiat. Soc. Bengal. 60(2): 73. 1891;

Parker, For. Fl. Punjab: 43. 1956. *Erythropsis pallens* (Wall. ex King) Ridley, Kew Bull. 1934: 215. 1934. *Sterculia fulgens* Wall. ex Mast. in Hook.f., Fl. Brit. India 1: 360. 1874. *Firmiana fulgens* (Wall. ex Mast.) Corner, Wayside Trees Malaya 1: 610. 1940, *p.p.*; Kosterm., Reinwardia 4: 293. 1957; Malick in B.D. Sharma & Sanjappa, Fl. India 3: 422. 1993; R.D. Gaur, Fl. Distr. Garhwal: 153. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 87. 2007. [Plate-6b]

Tree, deciduous, to 10 m high. Leaves petioled, palmately 3–5-lobed, 8–16 × 10–18 cm, broadly ovate, deeply cordate at base, obtuse or acute to acuminate at apex. Flowers orange-red, in panicles on old wood; sepals tube funnel-shaped, stellate-tomentose; petal absent; stamens 10, filaments short. Follicles 5, stipitate, c. 10 × 4 cm, ovate-oblong, glabrous, strongly nerved, membranous or papery. Seeds ovoid, usually 2, smooth, compressed.

Flowering & Fruiting: February–May.

Occasional in deciduous forests.

Distribution: India (N. W. Himalaya), Asia, Nepal and elsewhere.

Specimens examined: Vatanwasa-Halduparao, R. *Manikandan* 122589, 125609, 122306 (BSD).

Uses: Bark yield a strong coarse fibre; a white gum exudes from the bark, used in indigenous medicines as tonic; seeds are edible; leaves provide excellent fodder.

2. *Helicteres* L.

Helicteres isora L., Sp. Pl.: 963. 1753; Wight, Icon. Pl. Ind. Orient.: t. 180. 1839; Mast. in Hook.f., Fl. Brit. India 1: 365. 1874; P.C. Pant, Fl. Corbett Natl. Park: 43. 1986; Malick in B.D. Sharma & Sanjappa, Fl. India 3: 426. 1993; R.D. Gaur, Fl. Distr. Garhwal: 153. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 87. 2007; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 179. 2020.

Marorphali [Plate-6c]

Shrub, to 3 m high; branches sparsely stellately pubescent. Leaves petioled, 5–13.5 × 3–10 cm, elliptic-obovate, obliquely cordate at base, irregularly crenate-serrate along margins, scabrous above, acute to subacuminate at apex, palmately 3–5-ribbed. Flowers bright red, reflexed, distinctly bilabiate, in axillary clusters of 2–6 together or sometimes solitary. Follicles 5, beaked, spirally twisted, stellate-tomentose. Seeds numerous, angular, wrinkled.

Flowering & Fruiting: July–October.

Common near edges of forest clearings and undergrowth in deciduous forests.

Distribution: India (almost throughout the country), N. Australia, Bhutan, Cambodia, China, Indonesia, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Morghatty-Phakrow, R. *Manikandan* 122593, 125755, 122502, 124912 (BSD).

Uses: The fruits are highly medicinal especially in diarrhea and spasmodic pain; stem yields strong coarse fibre.

3. *Waltheria* L.

Waltheria indica L., Sp. Pl.: 673. 1753; Mast. in Hook.f., Fl. Brit. India 1: 374. 1874; Malick in B.D. Sharma & Sanjappa, Fl. India 3: 473, f. 131. 1993; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 184. 2020.

Herb, woody, to 1 m high, stellate-tomentose, terete. Leaves $2.5-5 \times 2-3.5$ cm, ovate-elliptic, cordate or rounded at base, crenate-serrate along margins, acute at apex, softly woolly on both surfaces. Flowers yellow, in axillary or terminal fascicles; sepals $c.$ 4 mm long, lobes triangular-subulate; petals 5 mm across. Capsules $c.$ 3 mm across, obconical, 2-valved. Seeds $c.$ 1.5 mm long, solitary, wrinkled or smooth, black.

Flowering & Fruiting: September–December.

Common in almost throughout the sanctuary.

Distribution: India (almost throughout the country), Pantropical.

Specimens examined: Rathuadhab-Vatanvasa, R. *Manikandan* 125643 (BSD).

17. TILIACEAE

- 1a. Shrubs or small trees 2. **Grewia**
 1b. Herbs 2
 2a. Leaves ovate to ovate-oblong 1. **Corchorus**
 2b. Leaves rhomboid to lanceolate 3. **Triumfetta**

1. **Corchorus** L.

Corchorus olitorius L., Sp. Pl.: 529. 1753; Mast. in Hook.f., Fl. Brit. India 1: 397. 1874; P.C. Pant, Fl. Corbett Natl. Park: 43. 1986; P. Daniel & Chandrab. in B.D. Sharma & Sanjappa, Fl. India 3: 487. 1993; R.D. Gaur, Fl. Distr. Garhwal: 149. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 87. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 804. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 186. 2020.

Herb, erect, annual, to 30 cm high. Leaves petioled, $3-6.5 \times 2-3.5$ cm, ovate to ovate-oblong, rounded at base, serrate-dentate along margins, acute to acuminate at apex. Flowers yellow, in leaf opposed or extra-axillary cymes; sepals caudate-acuminate; petals oblong-spathulate, pubescent on claw. Capsules $c.$ 5 cm long, glabrous, 8–10-ribbed, transversely partitioned in between valves. Seeds trigonous, black.

Flowering & Fruiting: September–December.

Occasional in open moist places and along roadsides in dry deciduous forests.

Distribution: India (almost throughout the country), widely distributed throughout tropics.

Specimens examined: Halduparao-Vatanwasa, R. *Manikandan* 122359 (BSD); Samir Sinha (2001).

2. **Grewia** L.

- 1a. Large trees 2. *G. elastica*
 1b. Shrubs or small trees 2
 2a. Leaves ovate to orbicular or obovate to suborbicular 3
 2b. Leaves oblong-lanceolate 3. *G. multiflora*
 3a. Small shrubs, with woody underground stem, to 1.5 m high 4. *G. sapida*
 3b. Shrubs or small trees, to 7 m high 1. *G. asiatica*

1. **Grewia asiatica** L., Mant. Pl. 1: 122. 1767; DC., Prodr. 1: 511. 1824; Mast. in Hook.f., Fl. Brit. India 1: 386. 1874; P. Daniel & Chandrab. in B.D. Sharma & Sanjappa, Fl. India 3: 494. 1993; R.D. Gaur, Fl. Distr. Garhwal: 149. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 87. 2007; Pusalkar & S.K. Srivast., Fl.

Uttarakhand 1: 807. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 186. 2020. *G. hainesiana* Hole, Ind. For. 43: 316. 1917. *G. subinaequalis* DC., Prodr. 1: 511. 1924.

Dhaman, Phavsai

Shrub or small tree, to 7 m high; stems and young shoots stellate tomentose, with greyish-white to brown bark. Leaves petioled, 5–15 × 4.5–14 cm, broadly ovate to almost orbicular, obliquely shallow cordate at base, serrate along margins, acute to obtuse at apex, greyish-tomentose beneath, scabrous above; stipules narrowly oblique-lanceolate or falcate, stellate hairy. Flowers orange-yellow, in axillary clusters or cymes; bracts linear-lanceolate; sepals oblong, hairy outside, glabrous within, acute; petals oblong, claw, irregularly lobed; stamens numerous, filaments orange-yellow, turning purplish; stigma indistinctly 4-lobed. Drupe c. 1 cm across, subglobose, mostly entire or obscurely 2-lobed, hairy, dark purple.

Flowering & Fruiting: March–September.

Occasional in deciduous forests

Distribution: India (tropical regions of the country), Pakistan and other tropical countries. A native of south India, now widely cultivated.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124865, 125756 (BSD); Samir Sinha (2001).

Uses: The pleasant squash is prepared from the fruit pulp by mixing it with sugar and used as an astringent, stomachic and cooling agent. The leaves are applied on pustular eruptions. The stem bark is said to be used in refining sugar, for making ropes.

2. ***Grewia elastica*** A.L. Juss., Ann. Mus. Natl. Hist. 4: 93. 1804; P. Daniel & Chandrab. in B.D. Sharma & Sanjappa, Fl. India 3: 497. 1993; R.D. Gaur, Fl. Distr. Garhwal: 151. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 88. 2007; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 187. 2020. *G. elastica* Royle, Illustr. Bot. Himal. 1: 104. t. 22. 1834; Parker, For. Fl. Punj. ed. 3.: 49. 1956; P.C. Pant, Fl. Corbett Natl. Park: 44. 1986. *G. asiatica* var. *vestita* Mast. in Hook.f., Fl. Brit. India 1: 387. 1874; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 809. 2018. *G. vestita* Wall., Cat. 1105. 1814, *nom nud*.

Kath-bhemal [Plate-6d]

Tree, deciduous, to 8 m high; young twigs stellate hairy, older branches glabrous, dark brown. Leaves petioled, 5–7-costate, unlobed or faintly 3-lobed towards apex, 5–15 × 4–8 cm, ovate-elliptic, obtuse or subcordate at base, margin serrate, acuminate at the apex, scabrous, stellate hairy on nerves above, soft greyish-tomentose below or almost glabrous; stipules linear, hairy. Flowers yellow, 2–4-flowered, axillary cymes; bracts subulate, smaller than stipules; sepals linear-oblong or somewhat elliptic, stellate hairy outside; petals oblong, glabrous, basal gland sometimes absent; stamens numerous. Drupes c. 5 mm across, globose or obscurely 2-lobed, fleshy.

Flowering & Fruiting: March–October.

Grows in deciduous forests.

Distribution: India (Himalaya, N.E. India, C. & S. India), Bangladesh, Myanmar, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

3. ***Grewia multiflora*** Juss., Ann. Mus. Natl. Hist. Nat. 4: 89. 1804. *G. didyma* Roxb. ex G. Don, Gen. Hist. 1: 549, descr. 1831; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 188. 2020. *G. disperma* Rottler ex Spreng., Syst. Veg. (ed. 16) 2: 579. 1825; P.C. Pant, Fl. Corbett Natl. Park:

44. 1986. *G. glabra* Blume, Bijdr. Fl. Ned. Ind. 3: 115. 1825; Mast. in Hook.f., Fl. Brit. India 1: 393. 1874. *G. serrulata* DC., Prodr. 1: 510. 1824; R.D. Gaur, Fl. Distr. Garhwal: 151. 1999; P. Daniel & Chandrab. in B.D. Sharma & Sanjappa, Fl. India 3: 509, f. 138. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 88. 2007.

[Plate-6e]

Shrub and small tree, deciduous, to 2.5 m high; stems much branched, sparsely stellate, glabrescent. Leaves petioled, oblong-lanceolate, 6.5–18 × 2.5–4.5 cm, base cuneate or broadly cuneate, margin serrulate, apex long acuminate, papery, glabrous or very sparsely hairy adaxially, simple and stellate hairs, lateral veins 5–6 pairs; stipule filiform, caducous. Flowers creamy yellow, 3-flowered, in axillary 2–3 cymes, sparsely stellate; bracts subulate; sepals to 1.3 × 0.5 cm, densely yellow-brown pubescent abaxially; petals lanceolate. Drupes 4-lobed, glabrous, exocarp united.

Flowering & Fruiting: July–October.

Common along streams near dry deciduous forests.

Distribution: India (almost throughout the country), Australia, China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125575, 122394, 125617 (BSD).

Uses: Stem yields strong fibre; fruits edible.

4. ***Grewia sapida*** Roxb. ex DC., Prodr. 1: 512. 1824; Roxb., Fl. Ind. 2: 590. 1832; Mast. in Hook.f., Fl. Brit. India 1: 3 87. 1874; Brandis, Ind. Trees: 98. 1906; P.C. Pant, Fl. Corbett Natl. Park: 44. 1986; P. Daniel & Chandrab. in B.D. Sharma & Sanjappa, Fl. India 3: 508. 138. 1993; R.D. Gaur, Fl. Distr. Garhwal: 150. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 88. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 812. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 188. 2020.

Phalsa

Small shrub, with woody underground stem, to 1.5 m high; young shoots stellate pubescent. Leaves petioled, 2.8–6.5 × 2–3 cm, ovate or obovate to suborbicular, cuneate at base, margins serrate, obtuse to acute at the apex, subglabrous or sub scabrous above, 5–7-nerved; stipules linear-lanceolate. Flowers yellow, 3–5-flowered, in axillary cymes, stellate hairy; bracts small; sepals linear-oblong, acute; petals oblong, entire, obtuse. Drupes c. 6 mm across, subglobose, somewhat faintly 4-lobed, fleshy.

Flowering & Fruiting: April–May.

Occasional in moist deciduous forests.

Distribution: India (Himalaya), S.E. Asia, Myanmar, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124822 (BSD); Samir Sinha (2001).

Uses: The fruit containing sweet pulp is edible.

3. ***Triumfetta*** L.

Triumfetta rhomboidea Jacq., Enum. Syst. Pl.: 22. 1760; Mast. in Hook.f., Fl. Brit. India 1: 395. 1874; P.C. Pant, Fl. Corbett Natl. Park: 45. 1986; P. Daniel & Chandrab. in B.D. Sharma & Sanjappa, Fl. India 3: 520. 1993; R.D. Gaur, Fl. Distr. Garhwal: 152. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 88. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 818. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 190. 2020.

Bhora

Herb, perennial, to 1.2 m high. Leaves rhomboid to lanceolate, often lower leaves 5–7.5 cm across, simple and stellately hairy; upper leaves shortly petiolate, sparsely pubescent. Flowers bright yellow, in leaf opposed cymes or racemes on branch endings; sepals 5, free, dorsally appendage near apex; petals glandular at base. Capsules $\approx$ 5 mm across, globose, indehiscent, hooked bristles, glabrous except at base.

Flowering & Fruiting: September–January.

Common in open moist places and along roadsides in deciduous forests.

Distribution: India (almost throughout the country), throughout the Tropics.

Specimens examined: Way to Adnala, R. *Manikandan* 1223341 (BSD); Samir Sinha (2001).

18. GERANIACEAE

Geranium L.

Geranium ocellatum Cambess., Jacq., Voy. Bot. 4: 33, t. 38. 1835; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 433. 1874; C.L. Malhotra in Hajra & al., Fl. India 4: 75, f. 25. 1997; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 89. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 842. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 202. 2020. *G. mascatense* Boiss., Diagn. Pl. Orient. Nov. Ser. 1 (1): 59. 1842; Raizada, Suppl. Fl. Upper Gangetic Plain: 36. 1976.

Herb, annual, to 30 cm high; stems prostrate, diffuse, slender, glandular-hairy. Leaves petioled, opposite or ternate, palmately 5–7-lobed, to 4.5×5 cm, suborbicular or reniform, obtuse or acute at apex; stipules lanceolate or subulate, hairy. Flowers rose with purple eye; bracts linear-lanceolate; sepals apiculate, glandular-hairy, ciliate; petals obovate, about twice as long as calyx, ciliate, with to 1.4 cm long beak. Mericarps transversely rugose; seed minutely reticulate, acute.

Flowering & Fruiting: March–May.

Fairly common in moist shady places (1000–1600 m).

Distribution: India (Himalaya, N.E India), Afghanistan, Africa, W Asia, China, Nepal, Pakistan.

Specimens examined: On way to Vatanvasa, R. *Manikandan* 125697, 122495 (BSD).

19. MALPIGHIACEAE

- 1a. Climbing shrubs; leaves ovate1. **Aspidopterys**
 1b. Lianas; leaves elliptic-lanceolate2. **Hiptage**

1. *Aspidopterys* A. Juss.

Aspidopterys wallichii Hook.f., Flora of British India 1: 421. 1874; P.C. Pant, Fl. Corbett Natl. Park: 45. 1986; R.C. Srivast. in Hajra & al., Fl. India 4: 12. 1997; R.D. Gaur, Fl. Distr. Garhwal: 359. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 89. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 828. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 197. 2020. *A. nutans* var. *wallichii* (Hook.f.) Nied., Arbeiten Bot. Inst. Königl. Lyceums Hosianum Braunsberg 6: 11. 1915.

Jugter [Plate-6f]

Climbing shrub, branches slender, white-woolly. Leaves petioled, $8-17 \times 2.5-6$ cm, ovate, rounded or subcordate at base, acute or acuminate at apex, glabrous above, densely silky-white tomentose beneath; white-tomentose. Flowers buds oblong or obovate, white or creamy-yellow, articulate slightly below middle from base, in lax, terminal panicles; sepals ovate, glabrous; petals obovate; filaments to 2 mm long. Ovary white-

woolly; styles $\approx$ 3 mm long; stigma capitate. Samaras $\approx$ 4.5×3.5 cm, orbicular-oblong to ovate, rounded at base, retuse at apex, pale grey, ecristate; carpophore to 3.5 mm long.

Flowering & Fruiting: August–March.

Rare in hedges and open forests near moist deciduous forests.

Distribution: India (Himalaya-Punjab, Uttarakhand). Endemic.

Specimens examined: On way to Halthikhurh, Way to Adnala R. *Manikandan* 125637, 122530, 122501, 122574 (BSD).

2. *Hiptage* Gaertn.

Hiptage benghalensis (L.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 136. 1874; P.C. Pant, Fl. Corbett Natl. Park: 45. 1986; R.C. Srivast. in Hajra & al., Fl. India 4: 14, f. 4. 1997; R.D. Gaur, Fl. Distr. Garhwal: 360. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 89. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 829. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 198. 2020. *Banisteria benghalensis* L., Sp. Pl.: 427. 1753. *Hiptage madablota* Gaertn., Fruct. Sem. Pl. 2: 169, t. 116, fig. 4. 1790, *nom. superfl. & illegit.* for *Banisteria tetraptera* Sonnerat (1782); Hook.f., Fl. Brit. India 1: 418. 1874.

Extensive woody climber; young branchlets pubescent. Leaves shortly petioled, $5-16.5 \times 2.5-7$ cm, elliptic-lanceolate, coriaceous, rounded to acute at base, acuminate at apex, shining above, sparsely pubescent beneath, usually with 2 glands beneath near base. Flowers creamy white, throat yellowish, in terminal racemes or panicles, softly pubescent; sepals gland convex, elliptic-oblong, dark coloured, lobes obtuse, pubescent; petals clawed, unequal, reflexed, fimbriate along margins. Fruits of 1–3 samaras, unequally 3-winged, pubescent.

Flowering & Fruiting: August–December.

Occasional in moist deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Thailand, Vietnam. Native of Eastern India, naturalised elsewhere.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125693 (BSD); Samir Sinha (2001).

Uses: Stem used as fuel; leaves used in skin diseases.

20. OXALIDACEAE

- 1a. Trailing herb; leaves palmately trifoliate2. ***Oxalis***
 1b. Erect herbs; leaves not as above 1. ***Biophytum***

1. *Biophytum* DC.

- 1a. Leaflets obovate; flowers upto 7 in umbels1. *B. reinwardtii*
 1b. Leaflets orbicular-ovate; flowers more than 7 in umbels.....2. *B. umbraculum*

1. ***Biophytum reinwardtii*** (Zucc.) Klotzsch. in Peters, Reise Mossamb. Bot. 1: 85. 1862; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 437. 1874; P.C. Pant, Fl. Corbett Natl. Park: 45 1986; Manna in Hajra & al., Fl. India 4: 236. 1997; R.D. Gaur, Fl. Distr. Garhwal: 383. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 90. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 850. 2018; D.D. Pramanick & al. in A.A. Mao

& S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 223. 2020. *Oxalis reinwardtii* Zucc., Abh. Akad. Muench. 1: 274. 1829–30. [Plate-6h]

Herb, annual, to 30 cm high; stems slender, simple, appressed-scattered hairy. Leaves 3–6 cm long; leaflets 3–12 pairs, terminal leaflets 8–14 × 4–7 mm, obovate, oblique at base, apiculate at apex, membranous; nerves many, slender. Peduncles longer or slightly shorter than leaves. Flowers yellow, in 3–7-flowered umbels; sepals lanceolate, acute, sparsely pubescent; petals to 9 mm long, cuneate, thrice as long as calyx. Capsules glabrous. Seeds with spiral tubercles.

Flowering & Fruiting: August–December.

Infrequent in moist places and along roadsides, near deciduous forests.

Distribution: India (almost throughout the country), China, Indo-Malesia.

Specimens examined: On way to Halduparao, R. *Manikandan* 125509 (BSD).

2. **Biophytum umbraculum** Welw., Apont. 55: 590. 1859. *B. sensitivum* (L.) DC., Prodr. 1: 690. 1824; Manna in Hajra & al., Fl. India 4: 238, f. 57. 1997; R.D. Gaur, Fl. Distr. Garhwal: 383. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 90. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 851. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 224. 2020. *Oxalis sensitiva* L., Sp. Pl. 1: 434. 1753. *Biophytum apodiscias* (Turcz.) Edgew. & Hook.f., Fl. Brit. India 1(2): 437. 1874. *Oxalis petersii* Edgew. & Hook.f., *l.c.*

Herb, annual, with simple stem, slender, with dense recurved trichomes especially apically, to 30 cm high. Leaves with sparse recurved trichomes, rachis slender, leaflets 4–10 pairs, blades orbicular-ovate, 2.5–8 × 2.5–5 mm, with basal one smallest, base almost symmetric to asymmetric. Flowers yellow or orange, many-flowered, in sessile umbels; bracts lanceolate, as long as pedicels; sepals narrowly lanceolate, pedicels shorter than the length of the calyx. Capsule $\approx 3 \times 2$ mm, ellipsoid-obovoid.

Flowering & Fruiting: August–November

Occasional in open places near deciduous forests.

Distribution: India (almost throughout the country), tropical Africa, Indonesia, Madagascar, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122376 (BSD); Samir Sinha (2001).

2. **Oxalis** L.

Oxalis corniculata L., Sp. Pl.: 435. 1753; Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 436. 1874; P.C. Pant, Fl. Corbett Natl. Park: 46. 1986; Manna in Hajra & al., Fl. India 4: 242. 1997; R.D. Gaur, Fl. Distr. Garhwal: 384. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 90. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 853. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 224. 2020.

Trailing, perennial Herb, rooting at nodes, often with woody rootstock. Leaves with long petioles, palmately trifoliate; leaflets 1–2 × 1.2–2.5 cm, obcordate, membranous, pubescent, notched at apex. Flowers yellow, in simple umbels; sepals appressed-pubescent outside, obtuse; petals oblong, narrowed to base, as long as calyx. Capsules ≈ 1.5 cm long, cylindric, narrowed at apex, 5-angled and beaked, many-seeded. Seeds ovoid, transversely striate.

Flowering & Fruiting: Throughout the year.

Frequent weed along road sides and waste places.

Distribution: India (almost throughout the country), Bhutan, China, Japan, Korea, Malaysia, Myanmar, Nepal, Pakistan, Russia, Thailand; almost cosmopolitan.

Specimens examined: Vatanvasa, H.C. Pande 220758 (LWG).

Uses: Leaves and young shoots are cooked and eaten as green vegetable by tribals. The leaves have acidic taste and are used as a flavouring agent of curries in place of tamarind.

Cultivated species:

Oxalis dehradunensis Raizaida, Suppl. Fl. Gangetic Plain: 37. 1976; Manna in Hajra & al., Fl. India 4: 246, f. 62. 1997; R.D. Gaur, Fl. Distr. Garhwal: 384. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 90. 2007; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 224. 2020. *O. latifolia auct. pl. non* Kunth, 1821; K.M. Matthew, Rec. Bot. Surv. India 20: 57. 1969.

Herb, annual, rootstock bulbous. Leaves trifoliolate, broadly deltoid, subsessile. Flowers pink, in umbels. Capsules ovoid-cylindrical.

Flowering & Fruiting: May–November.

Weed in gardens.

21. BALSAMINACEAE

Impatiens L.

Impatiens balsamina L., Sp. Pl.: 938. 1753; Hook.f., Fl. Brit. India 1: 453. 1874; Vivek. & al. in Hajra & al., Fl. India 4: 123. 1997; R.D. Gaur, Fl. Distr. Garhwal: 387. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 90. 2007; J.R.N. Dessai & Janarth., Rheede 21: 60, f. 20. 2011; Gogoi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 206. 2020.

Herb, erect, branched, succulent, to 60 cm high; nodes, internodes, petioles and pedicels reddish. Leaves petioled, alternate, 9.5–12.5 × 1–2.5 cm, elliptic-lanceolate or broadly oblanceolate, acute to acuminate at apex, decurrent into a glandular petioles, serrate along margins, glabrous beneath except on nerves; main nerves 6–9 pairs. Flowers pink, 2–3-flowered fascicles, in axils of leaves, spur to 3 cm long; pedicels slender, c. 2 cm long; sepals small, median saccate; petals orbicular-retuse, horned. Capsules c. 1.5 cm long, ellipsoid, densely silky-hairy. Seeds black, shining.

Flowering & Fruiting: September–December.

Frequent as hedge plant in cultivated fields and an escape in open places.

Distribution: India (almost throughout the country), tropical and sub-tropical regions of India, China, Malaya, Pakistan, Sri Lanka; introduced in Turkey and S. Europe.

Specimens examined: Sonanadi WLS, R. Manikandan 122521 (BSD).

22. RUTACEAE

- | | | |
|-----|---------------------|-----------|
| 1a. | Plants armed..... | 2 |
| 1b. | Plants unarmed..... | 4 |
| 2a. | Leaves simple..... | 2. Citrus |

- 2b. Leaves tri to many foliolate.....3
- 3a. Leaves trifoliate; petioles inconspicuously winged.....1. **Aegle**
- 3b. Leaves many foliolate; petioles distinctly winged.....5. **Naringi**
- 4a. Leaflets equal at base.....3. **Glycosmis**
- 4b. Leaflets unequal at base.....4. **Murraya**

1. **Aegle** Correa, *nom. cons.*

Aegle marmelos (L.) Correa, Trans. Linn. Soc. London 5: 223. 1800; Hook.f., Fl. Brit. India 1: 516. 1875; P.C. Pant, Fl. Corbett Natl. Park: 46. 1986; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 264. 1997; R.D. Gaur, Fl. Distr. Garhwal: 377. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 91. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 883. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 225. 2020. *Crateva marmelos* L., Sp. Pl.: 444. 1753. *Bel*

Tree, deciduous, to 10 m high; branches glabrous or grey-pubescent, armed. Leaves petioled, alternate, pinnately trifoliate; leaflets 4.5–6.5 × 1.5–4.5 cm, elliptic-lanceolate, obtusely acuminate at apex, chartaceous, slightly crenate along margins. Flowers greenish-white, fragrant, in axillary panicles, to 8 cm long; sepals 4–5; petals imbricate, c. 1.2 cm long. Fruits c. 6.5 cm across, globose to subglobose, smooth, with grey or yellowish rind, woody, 8–15-celled, pulps orange coloured, many-seeded.

Flowering & Fruiting: January–May.

Occasional in dry deciduous forests.

Distribution: India (almost throughout the country), Indo-China, Myanmar, Pakistan.

Specimens examined: Halduparao FRH, R. *Manikandan* 124884 (BSD).

Uses: The pulp fruits are edible and also applied to cure swellings.

2. **Citrus** L.

Citrus medica L., Sp. Pl.: 782. 1753; Hook.f., Fl. Brit. India 1: 514. 1875; P.C. Pant, Fl. Corbett Natl. Park: 46. 1986; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 284. 1997; R.D. Gaur, Fl. Distr. Garhwal: 379. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 886. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 227. 2020.

Jamir [Plate-7a]

Shrub or small tree; branches with c. 4 cm long spines, purplish when young. Leaves short petioled, simple or rarely 1-foliate; blade elliptic to ovate-elliptic, 6–15 × 3–6.5 cm, margin serrate, apex rounded, obtuse or rarely mucronate. Flowers white, fragrant, bisexual, 1–12-flowered; petals 5, to 2 cm long; stamens 30–50. Ovary cylindric; style long and thick; stigma clavate. Fruit pale yellow, elliptic to subglobose, surface coarse; pericarp white to pale yellow, acidic to slightly sweet, fragrant. Seeds small, with smooth seed coat.

Flowering & Fruiting: May–October.

Commonly cultivated for its rind, often growing as an escape.

Distribution: India (Himalaya, C & N.E. India), China, Indo-Malaysia.

Specimens examined: Vatanvasa, H.C. Pande 220835 (LWG); Vatanvasa R. *Manikandan* 125707 (BSD).

3. **Glycosmis** Correa

Glycosmis pentaphylla (Retz.) DC., Prodr. 1: 538. 1824; Hook.f., Fl. Brit. India 1: 499. 1875, *p.p.*; P.C. Pant, Fl. Corbett Natl. Park: 47. 1986; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 343. 1997; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 891. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 229. 2020. *Limonia pentaphylla* Retz., Observ. Bot. 5: 24. 1788. *L. arborea* Roxb., Pl. Coromandel 1: 60. 1798. *Glycosmis arborea* (Roxb.) DC., *l.c.*; V. Naray., Rec. Bot. Surv. India 14: 20, f. 6. 1940; R.D. Gaur, Fl. Distr. Garhwal: 380. 1999. *Glycosmis cochinchinensis sensu p.p. non* (Lour.) Pierre ex Engl., 1896. *Ban nimbu* [Plate-7b]

Shrub or small tree, glabrescent, to 5 m high. Leaves 1–7-foliolate, alternate, odd pinnate; leaflets 5–16 × 4–6.5 cm, elliptic-oblong, obtuse, acute or obtusely acuminate at apex, crenate-serrate along margins, subcoriaceous. Flowers white, in axillary panicles, longer than rachis; sepals deltoid, ciliate; petals broadly oblong or obovate. Berries *c.* 8 mm across, globose.

Flowering & Fruiting: February–April.

Occasional in moist deciduous forests.

Distribution: India (Himalayas, NE India, South India), Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, NW Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124860 (BSD).

Uses: Fruits edible; root infusion used as febrifuge and twigs used as tooth sticks.

4. **Murraya** L.

- 1a. Leaflets crenate along margins; berries subglobose1. *M. koenigii*
1b. Leaflets entire along margins; berries ovoid 2. *M. paniculata*

1. **Murraya koenigii** (L.) Spreng., Syst. Veg. (ed. 16) 2: 315. 1825; Hook.f., Fl. Brit. India 1: 503. 1875; P.C. Pant, Fl. Corbett Natl. Park: 47. 1986; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 351. 1997; R.D. Gaur, Fl. Distr. Garhwal: 380. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 893. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 231. 2020. *Bergera koenigii* L., Mant. Pl. 2: 563. 1771; Wight, Icon. Pl. Ind. Orient. t. 13. 1838. *Gadhipatha* [Plate-7c]

Shrub or small tree, unarmed, to 5 m high; branches brownish, lenticelled. Leaves alternate, odd-pinnate; leaflets 15–23, subopposite or alternate, 3.5–6 × 1–2.5 cm, elliptic-ovate, oblique at base, crenate along margins, obtusely acuminate at apex. Flowers greenish-white, in terminal corymbose cymes; sepals deeply lobed; petals free, glabrous. Berries *c.* 8 mm across, subglobose, rough with pitted glands.

Flowering & Fruiting: December–March.

Infrequent in moist deciduous forests, generally cultivated for its aromatic leaves.

Distribution: India (Himalayas, NE India), Bhutan, China, Laos, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125688 (BSD).

Uses: The green leaves are eaten raw in dysentery and are commonly used for flavouring curries.

2. **Murraya paniculata** (L.) Jack, Malay. Misc. 1: 31. 1820; P.C. Pant, Fl. Corbett Natl. Park: 47. 1986; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 352, f. 92. 1997; R.D. Gaur, Fl. Distr. Garhwal: 381. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 895. 2018;

D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 231. 2020. *Chalcas paniculata* L., Mant. Pl. 1: 68. 1767. *Murraya exotica* L., Mant. Pl. 2: 563. 1771 (as '*Murraea*'); Hook.f., Fl. Brit. India 1: 502. 1875. [Plate-7d]

Shrub, to 5 m high, unarmed, evergreen; bark yellowish-white, branches slender. Leaves 5–7-foliolate, imparipinnate; leaflets 3.5–8 × 1–3 cm, elliptic-ovate, oblique at base, pale green, entire along margins, acuminate at apex, coriaceous. Flowers white, fragrant, sometimes solitary or in axillary corymbose cymes; sepals deeply lobed; petals c. 2 cm long, oblong, free, puberulous without. Berries c. 1.5 × 0.5 cm, ovoid, tapering at apex, glabrous.

Flowering & Fruiting: March–December.

Common in moist deciduous forests especially along streams.

Distribution: India (almost throughout the country), Australia, Bhutan, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, SW Pacific islands, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Way to Adnala, R. *Manikandan* 122339 (BSD); Sona river bank, H.C. Pande 220796.

Uses: It is also cultivated as an ornamental hedge plant; twigs as tooth sticks; leaf powder used in cough and cold.

5. **Naringi** Adans.

Naringi crenulata (Roxb.) Nicolson in C.J. Saldanha & Nicolson, Fl. Hassan Distr.: 387. 1976; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 302, f. 79. 1997; R.D. Gaur, Fl. Distr. Garhwal: 381. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 896. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 231. 2020. *Limonia crenulata* Roxb., Pl. Coromandel 1: 60, t. 86. 1795. *L. acidissima sensu* Hook.f., Fl. Brit. India 1: 507. 1875, *non* L. 1762. [Plate-7e]

Tree, to 15 m high, armed; evergreen with fissured bark. Leaves alternate, 3–7-foliolate, pinnately compound; leaflets 2–4.5 × 0.8–2 cm, elliptic to elliptic-lanceolate, acute at base, obtuse and minutely emarginate at apex. Flowers white, few-flowered, in axillary or terminal umbellate cymes, to 2.5 cm long, pubescent. Berries c. 8 mm across, ovoid, bluish-black. Seeds c. 5 mm across, subglobose, pale orange.

Flowering & Fruiting: November–January.

Common in moist deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, China, Indo-China, Java, Myanmar, Pakistan, Sri Lanka, Thailand.

Specimens examined: Halduparao, R. *Manikandan* 124910, 124930 (BSD).

Uses: Stem used as walking sticks; fruit edible; fruit pulp considered as an antidote to snake-bite.

Cultivated species:

1. **Citrus limon** (L.) Burm.f., Fl. Indica: 173. 1768; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 282. 1997; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 888. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 235. 2020.

C. medica L. var. *limon* L., Sp. Pl.: 782. 1753. *C. medica* var. *limonum* (Wight & Arn.) Hook.f., Fl. Brit. India 1: 515. 1875. *C. jambhiri* Lushing. *apud* Krishnamurthi *Citrus* 323. 1965; R.D. Gaur, Fl. Distr. Garhwal: 378. 1999.
Jambiri

Shrub, armed. Leaves elliptic-ovate or ovate-lanceolate, crenate-serrate along margins; petioles margined. Flowers white to reddish-purple, solitary or in condensed racemes. Fruits ovoid or oblong, yellow on ripe, pulp acidic.

Flowering & Fruiting: April–October.

Cultivated for its fruits, which used for lime juice and as pickles.

Native of S. E. Asia; cultivated throughout India and other tropical and Subtropical countries.

2. **Citrus maxima** (Burm.f.) Merr., Interpr. Rumph. Herb. Amboin.: 46. 1917; K.N. Nair & M.P. Nayar in Hajra & al., Fl. India 4: 283. 1997; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 92. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 888. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 235. 2020. *Aurantium maximum* Burm.f., Rumph., Herb. Amboin.: 16. 1755. *Citrus grandis* Osbeck, Dagbok. Ostind. Resa: 98. 1757; R.D. Gaur, Fl. Distr. Garhwal: 378. 1999. *C. decumana* L., Syst. Nat. ed. 12. 2: 508. 1767 *nom. illeg.*; Hook.f., Fl. Brit. India 1: 516. 1875.

Small tree, armed or unarmed. Leaves ovate-oblong, emarginate at apex; petioles broadly winged. Flowers white, solitary or in clusters. Fruits c. 15 cm across, globular or oblate, pale yellow when ripe.

Flowering & Fruiting: May–November.

Widely cultivated for its nutritive and refrigerant fruits; leaves are used in epilepsy and convulsive cough.

Probably a native of S.E. Asia and cultivated in India and various other subtropical countries.

23. BURSERACEAE

Garuga Roxb.

Garuga pinnata Roxb., Pl. Coromandel 3: 5, t. 208. 1811; Wight, Icon. Pl. Ind. Orient. tt. 1594 & 1595. 1850; A.W. Benn. in Hook.f., Fl. Brit. India 1: 528. 1875; Kalkman, Blumea 7: 468. 1953; P.C. Pant, Fl. Corbett Natl. Park: 47. 1986; Chithra & A.N. Henry in Hajra & al., Fl. India 4: 448. 1997; R.D. Gaur, Fl. Distr. Garhwal: 368. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 910. 2018; D.D. Pramanick & Mastakar in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 241. 2020.
Kharpat

Tree, deciduous, to 10 m high; branches glabrescent. Leaves petioled, compound, 15–30 cm long; leaflets 5–12 × 2–4.5 cm, elliptic-lanceolate, oblique at base, crenate-serrate along margins, acuminate at apex, pubescent beneath. Flowers yellow, in much branched, axillary, tomentose panicles; petals free, linear-spathulate, pubescent. Drupes c. 2 cm across, greenish-yellow, black when dry, irregularly globular, fleshy with 1–5 rugose, 1-seeded pyrenes.

Flowering & Fruiting: February–June.

Common in moist deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Cambodia, Laos, Myanmar, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

24. MELIACEAE

Toona (Endl.) Roem.

Toona ciliata M. Roem. var. **hexandra** (Wall.) Bahadur, Monogr. Gen. Toona: 93. 1988; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 918. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 247. 2020. *Cedrela hexandra* Wall. ex Roxb., Fl. Ind. (Eds. Carey & Wall.) 2: 425. 1824. *Toona hexandra* (Wall. ex Roxb.) M. Roem., Fam. Nat. Syn. Monogr. 1: 136. 1846; R.D. Gaur, Fl. Distr. Garhwal: 376. 1999. *T. ciliata* M. Roem., *l.c.* 139. 1846; P.C. Pant, Fl. Corbett Natl. Park: 47. 1986; S.S. Jain & Bennet in Hajra & al., Fl. India 4: 504. 1997; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007. *Cedrela toona* Roxb. ex Rottler & Willd., Ges. Naturf. Freunde Berlin Neue Schriften 2: 198. 1803; Bedd., Fl. Sylv. S. India t. 10. 1869; Hiern in Hook.f., Fl. Brit. India 1: 568. 1875. *Tun* [Plate-7f]

Tree, deciduous, to 25 m high. Leaves abruptly pinnate; leaflets 4–8 pairs, subopposite, 4.5–12.5 × 1.8–5 cm, ovate-lanceolate, upper side usually larger than lower, cuneate-acute, inequilateral at base, acuminate at apex. Flowers white, in axillary or terminal panicles, drooping; sepals ovate, ciliate; petals oblong, obtuse at apex; stamens 5, free. Capsules 3 × 1.5 cm, ovoid, 5-angled, with thick central column. Seeds many, wings membranous.

Flowering & Fruiting: December–March.

Occasional in moist deciduous forests.

Distribution: India (almost throughout the country), E Australia, Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, W. Pacific Islands, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125698, 122321 (BSD); Way to Halduparao, R. *Manikandan* 124809 (BSD)

Notes: This genus with free stamens is often treated under Flindersiaceae.

Cultivated species:

1. **Azadirachta indica** A. Juss., Mem. Mus. Hist. Nat. Paris 19: 221, t. 13, f. 5. 1830; S.S. Jain & Bennet in Hajra & al., Fl. India 4: 478. 1997; R.D. Gaur, Fl. Distr. Garhwal: 375. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 913. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 243. 2020. *Melia azadirachta* L., Sp. Pl.: 385. 1753; Hiern in Hook.f., Fl. Brit. India 1: 544. 1875.

Tree, to 20 m high. Leaves petioled, imparipinnately compound, crowded near branch endings, ovate-lanceolate. Flowers white, in panicles. Drupes c. 1.5 cm long, ovoid. Seed solitary.

Flowering & Fruiting: March–June.

Common throughout the country, also widely cultivated; Bhutan, Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124903, 125551, 125747 (BSD).

Uses: Wood used for construction, furniture; leaves and fruits used as an antiseptic, skin diseases; branchlets as tooth sticks.

2. **Melia azadirachta** L., Sp. Pl.: 384. 1753; Hiern in Hook.f., Fl. Brit. India 1: 544. 1875; S.S. Jain & Bennet in Hajra & al., Fl. India 4: 494. 1997; R.D. Gaur, Fl. Distr. Garhwal: 375. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 915. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 251. 2020.

Tree, to 15 m high. Leaves imparipinnate compound, ovate-lanceolate, inequilateral at base. Flowers whitish-purple, in panicles. Drupes ellipsoid-globose. Seeds ellipsoid.

Flowering & Fruiting: March–August.

Specimens examined: Vatanvasa, B. Datta & H.C. Pande 220796

Planted in gardens and along roadsides.

25. CELASTRACEAE

- 1a. Climbing shrubs; petals ovate-oblong; seeds arillate 2. **Celastrus**
 1b. Shrubs; petals orbicular; seeds exarillate 1. **Cassine**

1. **Cassine** L.

Cassine albens (Retz.) Kosterm., Gard. Bull. Singapore 39: 178. 1986; R.D. Gaur, Fl. Distr. Garhwal: 328. 1999; Ramam. in N.P. Singh & al., Fl. India 5: 80. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 931. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 258. 2020. *Schrebera albens* Retz., Observ. Bot. 6: 25. t. 3. 1791. *Mangifera glauca* Rottb., Nye Saml. Kongel. Danske Vidensk. Selsk. Skr. 2: 534, t. 4, f. I. 1783. *Cassine glauca* (Rottb.) Kuntze, Revis. Gen. Pl. 1: 114. 1891; P.C. Pant, Fl. Corbett Natl. Park: 48. 1986. *Elaeodendron glaucum sensu* M.A. Lawson in Hook.f., Fl. Brit. India 1: 623. 1875, *p.p. non* Pers. 1805. *Dhebri*

Shrub, to 4 m high. Leaves petioled, 4.5–12.5 × 3–6.5 cm, ovate to ovate-elliptic, deeply crenate along margins, acute at apex, subcoriaceous. Cymes shorter than leaves. Flowers greenish-white; sepals 4–5, orbicular, margins membranous; petals 2–2.5 mm long, spreading, orbicular, glabrous. Drupes c. 8 mm across, 1-seeded, obovoid, apiculate. Seeds exarillate.

Flowering & Fruiting: February–July.

Occasional in deciduous forests.

Distribution: India (almost throughout the country), Malaysia, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 125727 (BSD).

Uses: Crushed leaves used to accelerate sneezing and smoke in epilepsy, snake bite.

2. **Celastrus** L.

Celastrus paniculatus Willd., Sp. Pl. ed. 4, 1(2): 1125. 1798; M.A. Lawson in Hook.f., Fl. Brit. India 1: 617. 1875; Ding Hou in Steenis, Fl. Males., Ser. 1, Spermat. 6: 25. 1962; P.C. Pant, Fl. Corbett Natl. Park: 48. 1986; R.D. Gaur, Fl. Distr. Garhwal: 328. 1999; Ramam. in N.P. Singh & al., Fl. India 5: 87, f. 18. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 932. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 259. 2020.

Climbing shrub; branches lenticelled, glabrescent. Leaves alternate, $6.5\text{--}13.5 \times 5\text{--}8.5$ cm, obovate-ovate or broadly elliptic, crenate or subentire along margins, obtuse to acuminate at apex, membranous to subcoriaceous. Flowers greenish-white, in terminal, ≈ 15 cm long panicles; sepals short, ciliate; petals spreading, ≈ 3 mm long, ovate-oblong, glabrous. Capsules ≈ 7.5 mm across, subglobose, 3-valved, bright yellow when ripe. Seeds 1–6, enclosed in fleshy, crimson aril.

Flowering & Fruiting: August–December.

Occasional in moist deciduous forests.

Distribution: India (almost throughout the country), Australia, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pacific islands, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125548 (BSD); Samir Sinha (2001).

26. RHAMNACEAE

- 1a. Tendrils present.....2
- 1b. Tendrils absent.....3
- 2a. Inflorescence racemose or paniculate; disc lobed; fruit winged.....1. **Gouania**
- 2b. Inflorescence umbellate; disc entire; fruit wingless.....2. **Helinus**
- 3a. Leaves palmately veined.....4. **Ziziphus**
- 3b. Leaves pinnately veined.....3. **Ventilago**

1. **Gouania** Jacq.

Gouania leptostachya DC., Prodr. 2: 40. 1825; Lawson in Hook.f., Fl. Brit. India 1: 643. 1875; P.C. Pant, Fl. Corbett Natl. Park: 49. 1986; Ramam. in N.P. Singh & al., Fl. India 5: 174, f. 34. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 52. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 951. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 268. 2020. *G. leptostachya* Fern.-Vill., Fl. Filip. (ed. 3), 4(13A): 49. 1880, *nom. illeg.* *G. tiliaefolia* Lam., Encyl. 3: 5. 1789; R.D. Gaur, Fl. Distr. Garhwal: 348. 1999.

Climbing shrub, young branches glabrous or sparsely pilose. Leaves petioled, $4.5\text{--}9 \times 2.2\text{--}5$ cm, ovate or ovate-oblong, cordate at base, crenate-serrate along margins, acuminate at apex, papery, glabrous or sparsely hairy, veins prominent beneath; stipules lanceolate, caducous or persistent. Flowers white, 1- or few-flowered, clustered, in axillary cymose racemes, terminal cymose panicles; sepals ovate-triangular, acuminate; petals obovate, hooded, as long as stamens, clawed at base; disk distinctly pentagonous, antisepalous; styles short, 3-fid. Capsules ≈ 1.2 cm across, crowned with persistent sepals tube, 3-winged, dehiscing into 3 subrounded winged mericarps. Seeds brownish, shiny, obovoid.

Flowering & Fruiting: August–December.

Forests, often climbing on trees, thickets; low to middle elevations.

Distribution: India (Andaman & Nicobar Islands, Himalayas, C & N.E. India), Bhutan, China, Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. Pande 220295 (LWG).

2. **Helinus** Meyer ex Endl.

Helinus lanceolatus Wall. ex Brandis, For. Fl.: 574. 1874; Lawson in Hook.f., Fl. Brit. India 1: 644. 1875; P.C. Pant, Fl. Corbett Natl. Park: 49. 1986; R.D. Gaur, Fl. Distr. Garhwal: 348. 1999; Ramam. in N.P. Singh & al., Fl. India 5: 179. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 953. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 268. 2020. *Gouania lanceolata* Wall., Cat. No.: 4273. 1831, *nom. nud.* *Jhum laguli*

Climbing shrub, with unbranched tendrils; branches ribbed, smooth, younger parts slightly hairy. Leaves petioled, 2.5–6.5 × 1–2.5 cm, lanceolate; stipules minute, dark brown. Flowers pale yellow, 3–9-flowered, in axillary umbellate cymes; sepals acuminate, keeled within, hypanthium; petals spatulate, folded; disc glabrous, margin thin, free, unlobed; styles 3, with recurved stigmas. Capsules *c.* 7 mm across, splitting into 3 cocci. Seeds plano-convex, shining, dark brown.

Flowering & Fruiting: Almost throughout the year.

Distribution: India (Western Himalayas, N.E. India), Pakistan.

Uses: Leaf powder and crushed stem used to intoxicate fishes and also used as fodder.

Notes: Included on the authority of Samir Sinha (2001).

3. *Ventilago* Gaertn.

Ventilago denticulata Willd., Ges. Naturf. Freunde Berlin Neue Schriften 3: 417. 1801; S.P. Banerjee & P.K. Mukh., Indian Forester 96: 209. 1970; P.C. Pant, Fl. Corbett Natl. Park: 49. 1986; Bhandari & Bhansali in M.P. Nayar & al., Fasc. Fl. India 20: 82. 1990; R.D. Gaur, Fl. Distr. Garhwal: 351. 1999; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 217. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 968. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 270. 2020. *V. calyculata* Tul., Ann. Sci. Nat. 4, 8: 124. 1857; M.A. Lawson in Hook.f., Fl. Brit. India 1: 631. 1875. *Kalibel*

Straggler; stems extensive. Leaves alternate, 4.5–12 × 2.5–8 cm, elliptic-oblong or ovate, oblique or rounded at base, crenate-serrate along margins, acute to acuminate at apex, pubescent beneath, pinnately veined. Flowers white or greenish-white, in paniculate spikes, densely pubescent; sepals tomentose without; petals emarginate, clawed. Fruits *c.* 4 cm long, wings rounded at apex, pubescent. Nuts subglobose, fruiting sepals enveloping more than half.

Flowering & Fruiting: October–March.

Rare in moist deciduous forests.

Distribution: India (almost throughout the country), Bhutan, China, Nepal, Thailand, Vietnam.

Specimens examined: Halduparao, R. *Manikandan* 124804, 124937 (BSD).

Uses: Stem as coarse fibre; root paste with mustard oil massaged in paralytic affected parts.

4. *Ziziphus* Mill.

- 1a. Shrubs 2. *Z. nummularia*
 1b. Small trees or stragglers 2
 2a. Small tree; leaves elliptic-ovate to orbicular, crenate along margins 1. *Z. mauritiana*
 2b. Stragglers; leaves elliptic or orbicular, crenate-serrate along margins 3. *Z. xylopyrus*

1. **Ziziphus mauritiana** Lam., Encycl. 3: 319. 1789; P.C. Pant, Fl. Corbett Natl. Park: 49. 1986; Bhandari & Bhansali in M.P. Nayar & al., Fasc. Fl. India 20: 99. 1990; R.D. Gaur, Fl. Distr. Garhwal: 352. 1999; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 233. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 271. 2020. *Z. jujuba sensu* Gaertn., Fruct. Sem. Pl. 1: 203. 1788, *non* Mill. 1768; M.A. Lawson in Hook.f., Fl. Brit. India 1: 632. 1875. Ber

Small tree, to 5 m high, armed; branchlets tomentose. Leaves $2-6.5 \times 1.5-3.5$ cm, elliptic-ovate to orbicular, slightly oblique at base, crenate along margins, rounded at apex, glabrous above, fulvous-tomentose beneath, coriaceous, 3–5-nerved. Flowers greenish-yellow, in sessile or short peduncled clustered cymes; sepals keeled within; petals cucullate, clasping antepetalous stamens. Drupes *c.* 7 mm across, globose, glabrous, fleshy, yellow or orange when ripe.

Flowering & Fruiting: March–November.

Infrequent along river banks.

Distribution: India (almost throughout the country), Afghanistan, Africa, Australia, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Bellanala and Morghatty area, R. *Manikandan* 124819 (BSD).

Uses: Fruits are edible.

2. **Ziziphus nummularia** (Burm.f.) Wight & Arn., Prodr. Fl. Penins. Ind. Or.: 162. 1834; Lawson in Hook.f., Fl. Brit. India 1: 633. 1875; Bhandari & Bhansali in M.P. Nayar & al., Fasc. Fl. India 20: 102. 1990; R.D. Gaur, Fl. Distr. Garhwal: 352. 1999; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 235. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 973. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 272. 2020. *Rhamnus nummularia* Burm.f., Fl. Ind.: 61. 1763. *Ziziphus rotundifolia* Lam., Encycl. Meth. Dot. 3: 319. 1789. Ajaber, Bboo, Kamtak.

Shrub, bushy, with divaricating branches, to 5 m high; young branches puberulous, grey, spines in unequal pairs, bigger straight, smaller recurved. Leaves subsessile, $1-2 \times 0.5-2$ cm, ovate-orbicular to orbicular-elliptic, base rounded to subcordate, entire or serrate along margins, apex obtuse apiculate or mucronate, densely velvety tomentose beneath, nerves prominent. Flowers cream-coloured or yellow, in axillary clusters; sepals ovate-lanceolate, pubescent; petals longer than stamens; disc 10-lobed, pitted; styles 2, united. Drupes *c.* 1 cm across, globose, reddish-brown or black when ripe, 2-celled, 2-seeded.

Flowering & Fruiting: March–June.

Distribution: India (almost throughout the country), Afghanistan, Iran, Iraq, Pakistan, Palestine.

Uses: The branches are often used for fencing the fields, the leaves are threshed out and used as fodder. Fruit is edible. Leaves also applied in scabies and boils.

Notes: Included on the authority of Samir Sinha (2001).

3. **Ziziphus xylopyrus** (Retz.) Willd., Sp. Pl. ed. 4, 1(2): 1104. 1798; M.A. Lawson in Hook.f., Fl. Brit. India 1: 634. 1875; P.C. Pant, Fl. Corbett Natl. Park: 50. 1986; Bhandari & Bhansali in M.P. Nayar & al., Fasc. Fl. India 20: 112. 1990; R.D. Gaur, Fl. Distr. Garhwal: 352. 1999; Bhandari & Bhansali in N.P. Singh & al., Fl. India 5: 243, f. 54. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007; Pusalkar & S.K. Srivast., Fl.

Uttarakhand 1: 977. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 273. 2020. *Rhamnus xylopyrus* Retz., Observ. Bot. 2: 11. 1781. Kathber

Small tree or straggling shrub, to 6 m high, armed. Leaves $3-7.5 \times 1.8-4$ cm, elliptic or orbicular, obliquely subcordate at base, crenate-serrate along margins, rounded at apex, tomentose beneath. Flowers yellow, in axillary cymes, pubescent; sepals keeled within; petals cucullate. Drupes ≈ 2 cm across, globose, 2 or 3-seeded, hard and woody, pubescent.

Flowering & Fruiting: March–October.

Grows in deciduous forests.

Distribution: India (almost throughout the country), Nepal, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

27. VITACEAE

- 1a. Inflorescence bearing forked tendrils.....1. **Ampelocissus**
- 1b. Inflorescence without tendrils.....2

- 2a. Flowers unisexual; stigma 4-lobed..... 4. **Tetrastigma**
- 2b. Flowers bisexual; stigma obscure.....3

- 3a. Leaves simple; berries usually 1-seeded.....2. **Cissus**
- 3b. Leaves compound; berries 2–4-seeded.....3. **Parthenocissus**

1. **Ampelocissus** Michx.

Ampelocissus divaricata (Wall. ex M.A. Lawson) Planch., J. Vigne Amer. 8: 375. 1884 & in DC., Monogr. Phan. 5: 378. 1887; P.C. Pant, Fl. Corbett Natl. Park: 50. 1986; R.D. Gaur, Fl. Distr. Garhwal: 354. 1999; B.V. Shetty & P. Singh in N.P. Singh & al., Fl. India 5: 251. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 979. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 273. 2020. *Vitis divaricata* Wall. ex M.A. Lawson in Hook.f., Fl. Brit. India 1: 657. 1875. *Pan laguli* [Plate-7g]

Climbing shrub, slender; branches deep-striate, scarcely woody, tomentose. Leaves petioled, 3–5-foliolate, pedate, lateral leaflets oblique, terminal leaflets $8-18 \times 3.5-8.5$ cm, elliptic-lanceolate or ovate, cuneate to rounded at base, crenate-dentate along margins with teeth subspinulose, acuminate at apex, membranous, grayish-red or white woolly tomentose beneath. Flowers red, divaricate, in umbellate-cymes; sepals cupular; petals slightly curved at tip; disc short, thin, covering base of ovary; stigma sessile. Berries globose-ellipsoid, ≈ 1 cm across, 1–4-seeded; seeds oblong-ellipsoid, finely rugose.

Flowering & Fruiting: June–December.

Evergreen forests, between 750–1800 m.

Distribution: India (Andhra Pradesh, Arunachal Pradesh, Bihar, Bhutan, Himachal Pradesh, Madhya Pradesh, Orissa, Tamil Nadu, Uttar Pradesh), Indo-China, Nepal.

Specimens examined: On way to Halduparao, R. *Manikandan* 124873 (BSD).

2. **Cissus** L.

Cissus adnata Roxb., Fl. Ind. 1: 423. 1820 & ed. 2, 1: 405. 1832; P.C. Pant, Fl. Corbett Natl. Park: 50. 1986; B.V. Shetty & P. Singh in N.P. Singh & al., Fl. India 5: 279. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 96. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 985. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 275. 2020. *Vitis adnata* (Roxb.) Wall. ex M.A. Lawson in Hook.f., Fl. Brit. India 1: 649. 1875, *p.p.* *Bhatia-lot, Down-rang*

Climbing shrub; branches subterete, striate, woody, pubescent, with stout, branched tendrils. Leaves petioled, 4.5–12 × 4–9 cm, ovate, truncate to cordate at base, bristly-serrate along margins, acute-acuminate at apex, dense pubescent beneath; stipules glabrous. Flowers creamy yellow, in umbellate cymes, bracteolate; sepals cupular, truncate, hairy; petals oblong, acute, hooded, hairy; disc 4-notched, conspicuous, covering ovary; style stout; stigma minute. Berries *c.* 5 mm across, obovoid, black, 1-seeded. Seeds obovoid, oblique, tessellated, with angular facets on either side of longitudinally encircling ridged raphe.

Flowering & Fruiting: July–January.

Occasional on bushes near deciduous forests.

Distribution: India (Arunachal Pradesh, Assam, Manipur, Mizoram, Meghalaya, Orissa, Sikkim, Tripura, West Bengal), Australia, Bangladesh, Indo-China, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka.

Specimens examined: On way to Halduparao, R. *Manikandan* 125552 (BSD).

3. **Parthenocissus** Planch.

Parthenocissus semicordata (Wall.) Planch. in DC., Monogr. Phan. 5: 451. 1887; R.D. Gaur, Fl. Distr. Garhwal: 355. 1999; B.V. Shetty & P. Singh in N.P. Singh & al., Fl. India 5: 302. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 992. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 277. 2020. *Vitis semicordata* Wall. in Roxb., Fl. Ind. 2: 481. 1824. *Ampelopsis himalayana* Royle, Illustr. Himal. Bot.: 149. 1835. *Vitis neilgherriensis* Wight, Pl. Ind. Orient. 3: t. 965. 1845. *V. anamalayana* Bedd., Trans. Linn. Soc. 25: 213. 1865; M.A. Lawson in Hook.f., Fl. Brit. India 1: 656. 1875. *V. himalayana* (Royle) Brandis, For. Fl.: 100. 1874; M.A. Lawson in Hook.f., *l.c.* 655. *Parthenocissus himalayana* (Royle) Planch. in DC., Monogr. Phan. 5: 450. 1887. *P. cuspidifera* Planch. in DC., Monogr. Phan. 5: 451. 1887. *Vitis himalayana* (Royle) Brandis var. *semicordata* (Wall.) M.A. Lawson in Hook.f., *l.c.* 656. *Laduli*

Large climbing shrub; branches rough, furrowed, hispid-pubescent or glabrous, with branched tendrils. Leaves petioled, 3-foliolate, lateral leaflets oblique, terminal leaflets 7.5–18 × 4–10 cm, ovate-obovate, cuneate or rounded at base, acuminate at apex, cuspidate-serrate along margins, glabrous or hispid-pubescent beneath on nerves. Flowers yellowish-green or reddish-brown, on leaf-opposed or terminal, lax, divaricate cymes; sepals angular, truncate to irregularly 5-lobed, glabrous; petals oblong, hooded, with linear bifid appendage at tip, glabrous; stamens minute; style stout; stigma subcapitate. Berries *c.* 7 mm across, subglobose. Seeds keeled, with an elliptic chalazal knot.

Flowering & Fruiting: June–October.

Common on bushes near moist deciduous forests.

Distribution: India (Himachal Pradesh, Meghalaya, Nagaland, Sikkim, Uttar Pradesh, West Bengal), Bhutan, Nepal, Pakistan.

Specimens examined: On way to Halduparao, R. *Manikandan* 122315 (BSD); Samir Sinha (2001).

4. **Tetrastigma** (Miq.) Planch.

Tetrastigma campylocarpum (Kurz) Planch. in DC., Monogr. Phan. 5: 437. 1887; P.C. Pant, Fl. Corbett Natl. Park: 50. 1986; B.V. Shetty & P. Singh in N.P. Singh & al., Fl. India 5: 311. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 995. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 278. 2020. *Vitis campylocarpa* Kurz, J. As. Soc. Bengal 41: 302. 1872; M.A. Lawson in Hook.f., Fl. Brit. India 1: 657. 1875. *Tetrastigma alciorne* Haines, Kew Bull.: 67. 1920. *Vitis alciorne* (Haines) Haines., Bot. Bihar, Orissa 1: 205. 1921. *Vitis parkei* Gagnep. ex Osm., For. Fl. Kumaon: 120. 1927.

Climbing shrub; bark rough, corky, branches terete, with simple tendrils. Leaves petioled, 3–6-foliolate, elliptic to obovate, 7.5–15 × 4–8 cm, cuneate at base, distant-serrate along margins, abruptly acuminate at apex, leathery, glabrous. Flowers greenish-yellow, lax, subcorymbose cymes; sepals cupular, truncate, rusty pubescent; petals slightly incurved at tip, rusty pubescent. Ovary conical; stigma sessile, 4-lobed. Berries c. 1 × 0.8 cm, oblong-ovoid, reddish-black, 1 or 2-seeded. Seeds oblong-ellipsoid, mucronate, transversely striate on sides.

Flowering & Fruiting: November–May.

Occasional on bushes near moist deciduous forests.

Distribution: India (Andaman & Nicobar Islands, Assam, Bihar, Mizoram, Sikkim, Uttar Pradesh, West Bengal), Bangladesh, China, Myanmar.

Specimens examined: On way to Halduparao, R. *Manikandan* 122528 (BSD); Samir Sinha (2001).

Cultivated species:

Vitis vinifera L., Sp. Pl.: 202. 1753; M.A. Lawson in Hook.f., Fl. Brit. India 1: 652. 1875; R.D. Gaur, Fl. Distr. Garhwal: 358. 1999; B.V. Shetty & P. Singh in N.P. Singh & al., Fl. India 5: 324. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 97. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1004. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 279. 2020.

Climbers, stout. Leaves ovate or suborbicular, 3–5-lobed, cordate at base, dentate along margins; tendrils simple or forked. Flowers greenish, in umbels. Berries oblong, succulent, variable in shape, size, colour and taste.

Flowering & Fruiting: November–May.

It is probably a native of S.E. Europe to W. India. Cultivated for its edible fruits.

28. LEEACEAE

Leea Royen ex L.

Leea asiatica (L.) Ridsdale in Manilal, Bot. & Hist. Hort. Malab.: 189. 1980; R.D. Gaur, Fl. Distr. Garhwal: 353. 1999; B.D. Naithani in N.P. Singh & al., Fl. India 5: 330, f. 72. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 97. 2007; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 280. 2020. *Phytolacca asiatica* L., Sp. Pl.: 474. 1753. *Leea crispa* Royen ex L., Syst. Nat. ed. 12. 2: 627. 1767 & Mant. Pl. 1: 124. 1767; M.A. Lawson in Hook.f., Fl. Brit. India 1: 665. 1875; Ridsdale, Blumea 22: 88. 1974. *L. herbacea* Buch.-Ham., Trans. Linn. Soc. London 14: 228. 1823. *L. aspera* Edgew., Trans. Linn. Soc.

London 20: 36. 1846; M.A. Lawson in Hook.f., *L.c. L. edgeworthii* Santapau, Rec. Bot. Surv. India 16: 54. 1953 (16: 46, ed. 3, 1967). *L. pumila* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 302. 1872; M.A. Lawson in Hook.f., *L.c.* 665. [Plate-7h]

Shrub, to 2 m high; stems often fluted and crisped or winged. Leaves 1-pinnate; leaflets $6.5\text{--}19.5 \times 3\text{--}8.5$ cm, elliptic-oblong or ovate, rounded or truncate to cordate at base, serrate along margins, acuminate at apex, pubescent beneath; lateral nerves 10–16 pairs, with 4–6 nerves from base. Flowers greenish-white, in axillary or leaf opposed, much branched, trichotomous cymes, pubescent; sepals 5, short; petals valvate; staminal tube deeply bifid. Berries ≈ 8 mm across, depressed-globular, purplish-black when ripe, 5–6-lobed, smooth.

Flowering & Fruiting: June–September.

Occasional as undergrowth in moist deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Cambodia, China, Laos, Nepal, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. Manikandan 122451 (BSD).

29. SAPINDACEAE

- 1a. Climbers; petals present1. **Cardiospermum**
 1b. Trees; petals absent 2. **Schleichera**

1. **Cardiospermum** L.

Cardiospermum halicacabum L., Sp. Pl.: 366. 1753; Hiern in Hook.f., Fl. Brit. India 1: 670. 1875; S.K. Mukerjee, J. Econ. Taxon. Bot. 1: 80. 1980; P.C. Pant, Fl. Corbett Natl. Park: 51. 1986; R.D. Gaur, Fl. Distr. Garhwal: 363. 1999; P.C. Pant in N.P. Singh & al., Fl. India 5: 356. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 97. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1004. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 282. 2020. *Kanphuti*

Slender climbing herb, perennial; stems sulcate, pubescent. Leaves alternate, biternate; leaflets $3\text{--}6.5 \times 1.2\text{--}3$ cm, ovate-lanceolate, terminal leaflets acuminate at apex, coarsely dentate along margins, glabrescent. Flowers white, ≈ 4 mm across, in axillary corymbose, tendriferous cymes; sepals in 2 opposite pairs, outer pairs smaller; petals 4, unequal, with basal scales on inner side. Capsules $\approx 2.2 \times 2$ cm, subglobose or trigonous, depressed, pyriform, membranous, winged. Seeds globose, with a hilum at base.

Flowering & Fruiting: July–December.

Common in open situations, fallow fields and hedges in moist deciduous forests.

Specimens examined: Sonanadi WLS, R. Manikandan 125622 (BSD).

Distribution: India (almost throughout the country), Tropical and subtropical Africa, America, China, Malacca, Pakistan, Sri Lanka.

Uses: The leaves are used as green vegetable and also used in native medicine especially for rheumatism.

Notes: Included on the authority of Samir Sinha (2001).

2. **Schleichera** Willd., *nom. cons.*

Schleichera oleosa (Lour.) Oken, Allg. Naturgesch. 3(2): 1341. 1841; Merr., J. Arnold Arbor. 31: 284. 1950; P.C. Pant, Fl. Corbett Natl. Park: 51. 1986; R.D. Gaur, Fl. Distr. Garhwal: 365. 1999; P.C. Pant in N.P. Singh & al., Fl. India 5: 384. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 97. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1009. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 285. 2020. *Pistacia oleosa* Lour., Fl. Cochinch. 2: 615. 1790. *Schleichera trijuga* Willd., Sp. Pl. ed. 4, 4(2): 1096. 1806; Hiern in Hook.f., Fl. Brit. India 1: 681. 1875. *Kusum*

Tree, to 20 m high. Leaves alternate, paripinnate, young leaves reddish; leaflets 2–4 pairs, opposite, rarely subopposite, sessile, 6.5–16.5 × 2.5–6 cm, oblong-lanceolate, rounded rarely cuneate at base, obtuse to acute at apex, coriaceous; lateral veins 15–18 pairs, prominent. Flowers greenish-white, in fascicled on interrupted branched racemes; sepals cupular, acute, 5-lobed, hairy outside; petals absent. Drupes c. 1.7 × 2 cm, subglobose, crustaceous, smooth or with spiny projections. Seeds 1 or 2, with fleshy aril.

Flowering & Fruiting: March–June.

Common in moist deciduous forests.

Distribution: India (almost throughout tropical regions of the country), Indo-China, Malesia, Myanmar, Sri Lanka, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122599, 125748, 125754, 124934 (BSD).

Uses: Mesocarps are eaten by Jenukuruba tribals.

Notes: In the middle of the summer season, young leaves sprout which are reddish and it was observed that the Langurs were feeding on it. Also c. 1 cm across galls were often seen on the leaves.

30. ACERACEAE

Acer L.

Acer oblongum Wall. ex DC., Prodr. 1: 593. 1824; Hiern. in Hook.f., Fl. Brit. India 1: 693. 1975; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1016. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 287. 2020. *A. discolor* Hort. ex Rehder in Bailey, Stand. Cycl. Hort. 1: 201. 1914, *non* Maxim. *A. nepalense* Hort. ex Pax, Bot. Jahrb. 7: 208. 1886. *A. oblongifolium* Hort. ex Dippel, Handb. Laubh. 2: 410. 1892.

Tree, evergreen, to 15 m high; bark smooth to wrinkled, with buttressed at base. Leaves petioled, ovate-lanceolate, acuminate, 5–18 × 2–8 cm, glabrescent, reddish when young, glaucous beneath; nerves pinnate, base rounded to subacute. Flowers pentamerous, greenish-white, in corymbose, on leafy terminal and lateral shoots; sepals linear, acute, pubescent; petals narrowly lanceolate; stamens 8, inserted on disc. styles free. Samaras glabrous, c. 3 cm long, wings veined, divergent, constricted at base; nutlets gibbous, locules white-pubescent inside.

Flowering & Fruiting: February–March.

Occasional along the streams near moist deciduous forests.

Distribution: India (Himalaya), China, Pakistan.

Specimens examined: Khanda-Rathuadhab, R. *Manikandan* 122534 (BSD); Rathuadhap-Mundiapani H.C. Pande 220829 (LWG).

Uses: Wood is used in making farming implements.

31. SABIACEAE

Sabia Colebr.

Sabia paniculata Edgew. ex Hook.f. & Thomson, Fl. India 1: 211. 1855; Hook.f., Fl. Brit. India 2: 3. 1876; P.C. Pant, Fl. Corbett Natl. Park: 51. 1986; R.D. Gaur, Fl. Distr. Garhwal: 80. 1999; S.C. Majumder in N.P. Singh & al., Fl. India 5: 419. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 98. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1031. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 290. 2020.

Bakalpata

Evergreen, woody climber. Leaves petioled, oblong or oblong-ovate to sub lanceolate, 7.5–20 × 2.5–7 cm, base acute to rounded, apex acute, glabrous, nerves 5–7 pairs. Cymes solitary, axillary but often arranged in a thyrsoid inflorescence; sepals ovate, densely pubescent, ciliate; petals oblong, sometime oblong-ovate; stamens to 2.7 mm long; filaments flattened, 1–1.75 mm long; pistil to 1.75 mm long; ovary glabrous. Droplets globular to obovoid.

Flowering & Fruiting: June–August.

In shady and swampy localities, mainly between 250–1400 m.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Nagaland, Sikkim, Uttar Pradesh, West Bengal), Myanmar, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

32. ANACARDIACEAE

- 1a. Leaves compound.....2. **Lannea**
 1b. Leaves simple.....2
- 2a. Stamens more than corolla lobes; fruits on hypocarp.....4. **Semecarpus**
 2b. Stamens as many as or fewer corolla lobes; fruits not on hypocarp.....3
- 3a. Flowers hermaphrodite; styles 3–6.....1. **Buchanania**
 3b. Flowers polygamous; style 1.....3. **Mangifera**

1. Buchanania Spreng.

Buchanania lanzan Spreng., J. Bot. (Schr.) 2: 234. 1802; R.D. Gaur, Fl. Distr. Garhwal: 369. 1999; D. Chandra & Mukh. in N.P. Singh & al., Fl. India 5: 443, f. 93. 2000; Karthik. & al., Flow. Pl. India-Dicot. 1: 77. 2009; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 291. 2020. *B. cochinchinensis* (Lour.) Almeida, Fl. Maharashtra 1: 287. 1996; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 98. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1035. 2018. *B. latifolia* Roxb., Fl. Ind. (Ed. Carey) 2: 385. 1832; Hook.f., Fl. Brit. India 2: 23. 1876; P.C. Pant, Fl. Corbett Natl. Park: 52. 1986. *Kathbbilawa* [Plate-8a]

Tree, to 20 m high; young branches silky-tomentose. Leaves 8.5–18 × 5–9.5 cm, broadly oblong, rounded at base, obtuse or retuse at apex, glabrous above, densely white-tomentose beneath; lateral nerves 12–15 pairs. Flowers white, in terminal, c. 18 cm long panicles; petals c. 4 mm across, imbricate. Drupes c. 1.2 cm across, subglobose, lenticular, reddish-purple when ripe, stone hard.

Flowering & Fruiting: December–March.

Common in dry and moist deciduous forests.

Specimens examined: On way to Halduparao to Kanekal, R. *Manikandan* 124863, 125741 (BSD).

Uses: It gives a copious gum and the kernels of the seeds are eaten.

Notes: Almeida (*l.c.*) made a new combination for this species based on *Toluifera cochinensis* Lour., the genus *Toluifera* Lour. is not valid i.e., *nom. illeg.* and it is treated as *Loureira* Meisn. which belongs to the family Rutaceae.

2. *Lannea* A. Rich., *nom. cons.*

Lannea coromandelica (Houtt.) Merr., J. Arnold Arbor. 19: 353. 1939; P.C. Pant, Fl. Corbett Natl. Park: 52. 1986; R.D. Gaur, Fl. Distr. Garhwal: 370. 1999; D. Chandra & Mukh. in N.P. Singh & al., Fl. India 5: 463, f. 99. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 99. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 79. 2009; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1038. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 293. 2020. *Dialium coromandelicum* Houtt., Nat. Hist. 2, 2: 39, t. 5, f. 2. 1774. *Odina nodier* Roxb., Fl. Ind. (Ed. Carey) 2: 293. 1832; Hook.f., Fl. Brit. India 2: 29. 1876.

Jhigan [Plate-8b]

Trees, deciduous, to 20 m high; bark ash-coloured, young branchlets stellate-tomentose. Leaves imparipinnate, clustered at end of branchlets; leaflets 5–7, subsessile, 4.5–10.5 × 2.5–6 cm, ovate-elliptic, rounded at base, acuminate at apex, glabrous above, stellate-pubescent beneath. Flowers creamy-yellow, in terminal, c. 16 cm long panicles; petals c. 1 mm across, imbricate. Drupes c. 1.2 × 0.5 cm, compressed, reniform, ripens red. Seeds irregularly pitted.

Flowering & Fruiting: January–June.

Common in moist dense deciduous forest.

Distribution: India (almost throughout the country), SE Asia, Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125722 (BSD).

3. *Mangifera* L.

Mangifera indica L., Sp. Pl.: 200. 1753; Hook.f., Fl. Brit. India 2: 13. 1876; P.C. Pant, Fl. Corbett Natl. Park: 52. 1986; R.D. Gaur, Fl. Distr. Garhwal: 370. 1999; D. Chandra & Mukh. in N.P. Singh & al., Fl. India 5: 446. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 99. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 80. 2009; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1039. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 297. 2020. *Aam*

Tree, evergreen, to 30 m high; branches glabrous. Leaves crowded at apex of branches, 10.5–22.5 × 3.5–6 cm, linear-oblong or elliptic-lanceolate, abruptly acuminate at apex, coriaceous; lateral nerves 18–26 pairs. Flowers white, in terminal panicles, c. 25 cm long, minutely pubescent, polygamous; petals imbricate with glandular crest within. Drupes 4–10 cm long, obliquely pyriform or obovoid, fleshy, stone compressed, fibrous, hard.

Flowering & Fruiting: December–April.

Frequent along streams in moist deciduous forests.

Distribution: India (almost throughout the country), tropical regions worldwide.

Specimens examined: Rathuadhab-Sandikhal, T.S. Rana & Party 220821 (LWG).

Uses: The fruits are edible and also prepared for pickles. Fruits are eaten by almost all wild herbivorous animals.

4. *Semecarpus* L.f.

Semecarpus anacardium L.f., Suppl. Pl.: 182. 1781; Hook.f., Fl. Brit. India 2: 30. 1876; P.C. Pant, Fl. Corbett Natl. Park: 52. 1986; R.D. Gaur, Fl. Distr. Garhwal: 373. 1999; D. Chandra & Mukh. in N.P. Singh & al., Fl. India 5: 500, f. 111. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 99. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 83. 2009; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1052. 2018; D.D. Pramanick & al. in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 295. 2020. *Bhilawa* [Plate-8c]

Tree, to 10 m high; branches brown-tomentose. Leaves $6.5-28 \times 4.5-12.5$ cm, ovate to elliptic-oblongate, obtuse to acute at apex, glabrous above, grey-tomentose beneath; nerves 12–18 pairs. Flowers greenish-white, in terminal, tomentose panicles; petals imbricate, ≈ 5 mm long. Drupes $\approx 3 \times 2.5$ cm, subglobose, ripens yellowish to orange-black, glabrous, seated on a fleshy receptacle, with acrid resin.

Flowering & Fruiting: May–November.

Occasional in moist deciduous forests.

Distribution: India (almost throughout the country except temperate regions), Africa, Australia, China, Indo-Malesia.

Specimens examined: On way to Halduparao, R. *Manikandan* 125566, 124853 (BSD).

Notes: The pericarp of the drupe gives a marking ink and the hypocarp is edible. The sap or white latex is poisonous, which cause severe injuries.

33. MORINGACEAE

Moringa Adanson

Moringa oleifera Lam., Encycl. 1(2): 398. 1785; Verdc., Kew Bull. 40: 7. 1985; B.P. Uniyal in N.P. Singh & al., Fl. India 5: 516, f. 115. 2000; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 99. 2007; Pusalkar & S.K. Srivast., Fl. Uttarakhand 1: 1056. 2018; Uniyal in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 297. 2020. *M. pterygosperma* Gaertn., Fruct. Sem. Pl. 2: 314. 1791; Hook.f., Fl. Brit. India 2: 45. 1876.

Sobajna [Plate-8d]

Large tree; branches pubescent. Leaves usually tripinnate; leaflets 3–11, sparsely tomentose above, glabrous beneath, to 2.4×1.8 cm; terminal larger than the laterals, obovate, oblique sided at base, rounded at tip, laterals elliptic. Flowers ≈ 2.5 cm across; sepals tubular, hairy, lobes petaloid, linear-lanceolate, reflexed; petals white, anterior erect, others reflexed; stamens 5; filaments villous at base. Ovary oblong; style cylindric. Fruits to 45 cm long, 9-ribbed when young, 3-angled on maturity. Seeds winged.

Flowering & Fruiting: February–June.

Distribution: India (almost throughout the country), tropical region of the world.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125560 (BSD).

Uses: Leaves and fruits are very bitter and used in medicine; gum is also obtained. Seeds yield Ben oil, used as lubricant and in perfume industry.

34. FABACEAE (= PAPILIONACEAE)

- | | |
|--|-------------------|
| 1a. Leaves even-pinnate..... | 2 |
| 1b. Leaves odd-pinnate..... | 3 |
| 2a. Twiners; leaflets 1-paired; seeds red with black spot..... | 1. Abrus |
| 2b. Erect herbs; leaflets many paired; seeds not as above..... | 24. Zornia |

3a. Plants usually covered with appressed, centrifixed hairs.....	12. Indigofera
3a. Plants covered with basifixed hairs or glabrous.....	4
4a. Leaflets with striate venation.....	21. Tephrosia
4b. Leaflets with reticulate venation.....	5
5a. Joints of pod folded on one another	22. Uraria
5b. Joints of pod not folded on one another.....	6
6a. Anthers dimorphic, alternately long and short.....	7
6b. Anthers uniform.....	8
7a. Twiners; pods bristly.....	14. Mucuna
7b. Herbs or shrubs; pods glabrous or pubescent.....	6. Crotalaria
8a. Leaflets 5 or more.....	9
8b. Leaflets 1 or 3.....	11
9a. Leaflets alternate or subopposite.....	7. Dalbergia
9b. Leaflets opposite.....	10
10a. Trees; pods wingless	17. Pongamia
10b. Woody climbers; pods winged.....	13. Milletia
11a. Plants armed; stipels gland-like.....	10. Erythrina
11b. Plants unarmed; stipels subulate or absent.....	12
12a. Leaves gland dotted beneath.....	13
12b. Leaves glabrous or pubescent beneath.....	15
13a. Flowers sessile or subsessile, in dense racemes or heads	11. Flemingia
13b. Flowers pedicelled, solitary or in pairs or lax racemes.....	14
14a. Ovules usually 2.....	19. Rhynchosia
14b. Ovules 3 to more.....	4. Cajanus
15a. Leaves simple or digitately trifoliolate.....	16
15b. Leaves pinnately trifoliolate.....	17
16a. Calyx scarious; joints of pods turgid.....	2. Alysicarpus
16b. Calyx herbaceous; joints of pods flat.....	8. Desmodium
17a. Standard petals more than 2.5 cm long.....	3. Butea
17b. Standard petals less than 2.5 cm long.....	18
18a. Lateral leaflets much smaller, often moving.....	5. Codariocalyx
18b. Lateral leaflets not moving.....	19
19a. Bracts large, leafy, concealing the flowers.....	16. Phyllodium
19b. Bracts smaller, not as above.....	20
20a. Styles hairy.....	21
20b. Styles glabrous.....	22

- 21a. Stigma terminal; ovules few.....9. **Dolichos**
 21b. Stigma oblique; ovules many.....23. **Vigna**
- 22a. Pedicels filiform, more than 5 mm long.....15. **Ougeinia**
 22b. Pedicels stout, less than 5 mm long.....24
- 23a. Twining or climbing shrub; roots tuberous; flowers whitish-blue or purple.....18. **Pueraria**
 23b. Twining or climbing herb; roots not tuberous; flowers pinkish or reddish.....20. **Shuteria**

1. **Abrus** Adans.

Abrus fruticosus Wight & Arn., Prodr. Fl. Ind. Orient.: 1: 236. 1834; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 335. 2020. *A. melanospermus* Hassk., Cat. Hort. Bot. Bogor. 282. 1844; Sud. Kumar & P.V. Sane, Legum. South Asia: 129. 2003. *A. pulchellus* Wall. ex Thwaites, Enum. Pl. Zeyl. 91. 1859; Baker in Hook.f., Fl. Brit. India 2: 176. 1876; P.C. Pant, Fl. Corbett Natl. Park: 54. 1986; Sanjappa, Legum. India: 74. 1992; R.D. Gaur, Fl. Distr. Garhwal: 253. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 99. 2007. [Plate-8e]

Climbing shrub, perennial, deciduous, to 4 m long; stem slender, glabrous, with many branchlets. Leaves petioled; leaflets 9–14 pairs, oblong or oblong-obovate, 0.5–2.5 × 0.3–0.8 cm, base subrounded, margins entire, apex obtuse or truncate, mucronate, glabrous above, hairy on the lower surface. Flowers pink, in axillary fascicles emerging from the rachis of racemes; sepals campanulate, glabrous, teeth 4; petals longer than sepal, vexillum ovate with falcate wings; stamens 9. Pods thin, flat, oblong-falcate, c. 7.5 × 1.4 cm, white hairy, dehiscent, 4–12-seeded; seeds compressed, elliptic or ovoid, blackish-brown or black.

Flowering & Fruiting: September–December.

Common along edges of hill slopes hanging on bushes up to 1200 m.

Distribution: India (Andaman, Himachal Pradesh to Eastern Himalaya, North India to South India, Gujrat to West Bengal), S. Africa, Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122435 (BSD); Samir Sinha (2001).

2. **Alysicarpus** Desv.

Alysicarpus vaginalis (L.) DC., Prodr. 2: 353. 1825; Baker in Hook.f., Fl. Brit. India 2: 158. 1876; P.C. Pant, Fl. Corbett Natl. Park: 54. 1986; Sanjappa, Legum. India: 81. 1992; R.D. Gaur, Fl. Distr. Garhwal: 255. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 187. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 340. 2020. *Hedysarum vaginale* L., Sp. Pl.: 746. 1753. *H. cylindricum* Lam., Encycl. 6: 400. 1805. *Alysicarpus cylindricus* (Lam.) Desv., Ann. Linn. Soc. Paris 4: 301. 1826.

Herb, annual, prostrate or decumbent or erect, to 35 cm high; stems terete, glabrous or minutely hairy. Leaves petioled, ovate-oblong or ovate-lanceolate to suborbicular, 0.5–6.5 × 0.4–2.2 cm, base subcordate to rounded, margins entire, apex acute to obtuse, glabrous above, minutely hairy on nerves beneath; stipules linear-lanceolate. Flowers purple or yellowish tinged with pink, in lax racemes; sepals 3–5 mm long, teeth linear; petals 5–6 mm long, wings flat, feathery. Pods oblong, cylindrical, straight, to 2.5 cm long, 6–9-jointed, cuneate at apex, glabrous at maturity, yellowish-brown; seeds 4–6, subspherical, rusty-brown, smooth.

Flowering & Fruiting: September–October

Common on road side areas, grassy and waste places, river beds up to 1400 m.

Distribution: India (Bihar, Gujrat, Jammu & Kashmir to NE India, Karnataka, Maharashtra, Manipur, Meghalaya, North India to South India, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh), Africa, Bangladesh, China, Myanmar, Nepal, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125568, 122352 (BSD).

3. *Butea* Roxb. ex Willd.

Butea monosperma (Lam.) Taubert in Engler & Prantl, Pflanzenfam. 3(3): 366. 1894; P.C. Pant, Fl. Corbett Natl. Park: 55. 1986; Sanjappa, Legum. India: 98. 1992; R.D. Gaur, Fl. Distr. Garhwal: 257. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 319. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 348. 2020. *Erythrina monosperma* Lam., Encycl. Meth. 2: 391. 1788. *Butea frondosa* Roxb., Pl. Coromandel 1: 22, t. 21. 1795; Baker in Hook.f., Fl. Brit. India 2: 194. 1876. *Dhak, Tesu, Palas.*

Tree, deciduous, to 15 m high, with irregular branches, tomentose with rough bark. Leaves petioled, pinnately trifoliate; terminal leaflets broadly ovate, 12–24 × 10–18 cm, obtuse or retuse; lateral leaflets obliquely ovate, obtuse, smaller than terminal leaflets, glabrous; stipules small, deciduous. Flowers bright red, tinged with orange, fascicled, in axillary or terminal racemes; bracts and bracteoles velvety, small; sepals velvety on both outer and inner side, teeth deltoid; petals silky-pubescent on the upper surface; vexillum ovate, acute. Pods pendulous, to 20 × 5 cm, two valved, silky; seeds 1 at the apex, stalk.

Flowering & Fruiting: March–April.

Common in lower reaches of submontane forest areas, along road side places up to 1300 m.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal), Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Vatanvasa, H.C. Pande 220795

Uses: Leaves are used as fodder for buffaloes and in making eating plates. The gum is used in treating indigestion and as tonic. Flowers are used in treating blood related problems.

Notes: Included on the authority of Samir Sinha (2001).

4. *Cajanus* DC.

- 1a. Climbing shrubs; terminal leaflets rhomboid1. *C. crassus*
1b. Climbing herbs; terminal leaflets elliptic-ovate or ovate-obovate 2. *C. scarabaeoides*

1. ***Cajanus crassus*** (Prain & King) Van der Maesan., Agric. Univ. Wageningen Pap. 85 (4): 105. 1985; Sanjappa, Legum. India: 100. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 321. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 349. 2020. *Cajanus volubilis* (Prain & King) R.D. Gaur, Fl. Distr. Garhwal: 259. 1999. *Atylosia mollis* Benth. ex Miq., Pl. Jungh.: 343. 1852; Baker in Hook.f., Fl. Brit. India 2: 213. 1876. *A. crassa* Prain & King, J. Asiat. Soc. Beng. 66 (2): 45. 1897. *A. volubilis* (Blanco) Gamble, Fl. Pres. Madras 1: 369. 1918; P.C. Pant, Fl. Corbett Natl. Park: 54. 1986.

Climbing or twining shrub, perennial, stout; branches densely hairy, hairs brown. Leaves petioled, lateral ones ovate-elliptic, terminal one rhomboid, 4–7.5 × 2–5.2 cm, base subrounded or cuneate, margins

entire, apex acuminate, glabrous above, densely pubescent with yellow to orange on the nerves beneath; stipules lanceolate, persistent. Flowers yellow on shortly pedunculate, hairy racemes or panicles; bracts acute; sepals glandular-viscid pubescent; teeth ovate-triangular, acute, upper two connate; vexillum ovate-obovate; wings feathery. Pods roundish at apex, $c. 5 \times 1.5$ cm, shortly hairy, glandular-punctate; seeds subspherical, brown.

Flowering & Fruiting: February–April.

Rare in forest edges along road side open places and ravines.

Distribution: India (Arunachal Pradesh, Bihar, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal), Indo-China, Malaysia, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

2. **Cajanus scarabaeoides** (L.) du Petit-Thou., Dict. Sci. Nat. 6: 617. 1817(as '*scarabaeoide*'); Van der Maesen, Agric. Univ. Wageningen Pap. 85 (4): 183. 1985; Sanjappa, Legum. India: 103. 1992; R.D. Gaur, Fl. Distr. Garhwal: 259. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 323. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 350. 2020. *Dolichos scarabaeoides* L., Sp. Pl.: 726. 1753. *Cantharospermum pauciflorum* Wight & Arn., Prodr.: 255. 1834. *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungh.: 242. 1852; Baker in Hook.f., Fl. Brit. India 2: 215. 1876; P.C. Pant, Fl. Corbett Natl. Park: 54. 1986.

Climbing, perennial herb, to 2 m long with thick, woody rootstock and rusty-brown branches. Leaves petioled; leaflets elliptic-ovate or ovate-obovate, $1.5-4 \times 1-2.5$ cm, base cuneate, margins entire, apex acute, glabrous above, pubescent on nerves beneath; stipules linear-lanceolate, hairy. Flowers yellow, pedunculate, on shortly corymbose axillary racemes; sepals 5–7 mm long, teeth linear, hairy; petals 6–9 mm long; vexillum rounded at apex; wing feathery; keel incurved. Pods flat, oblong, beaked, glandular-hairy, 1.5–2.5 cm long, constricted at joints, golden-grey, glandular; seeds oblong-ovoid, 2–5, blackish-brown.

Flowering & Fruiting: May–October.

Common in forest edges along rocky-grassy places as under growth up to 1500 m.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Gujrat, Haryana, Jammu & Kashmir, Maharashtra, Orissa, Puducherry, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), W. Africa, S.E. Asia, Australia, Bangladesh, Bhutan, Indo-China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122392 (BSD); Samir Sinha (2001).

5. **Codariocalyx** Hassk.

Codariocalyx motorius (Houtt.) H. Ohashi, J. Jap. Bot. 40: 367. 1965; R.D. Gaur, Fl. Distr. Garhwal: 261. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 193. 2003; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 357. 2020. *Hedysarum motorium* Houtt., Nat. Hist. 2. 10: 246. 1779. *Desmodium gyrans* (L.f.) DC., Prodr. 2: 326. 1825; Baker in Hook.f., Fl. Brit. India 2: 174. 1876. *D. motorium* (Houth.) Merr., J. Arn. Arb. 19: 345. 1938; P.C. Pant, Fl. Corbett Natl. Park: 58. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007. [Plate-8f]

Herb or undershrub, perennial, erect, to 1.5 m high; stems branched, glabrous, reddish-brown. Leaves petioled, 1–3-foliolate; leaflets elliptic-oblong or oblong-lanceolate, $3.5-12.5 \times 0.5-3.5$ cm, base obtuse, apex

subrounded or acute, glabrous above, appressed hairy beneath; stipules linear-lanceolate, deciduous. Flowers bluish or pink, in axillary or terminal racemes; bracts and bracteoles ovate, acuminate, ribbed, pubescent, deciduous; sepals to 2 cm long, teeth lanceolate, densely villous; petals to 1.5 cm long, vexillum ovate-elliptic; keel incurved. Pods stipitate, falcate, 2.5–4 cm long, distinctly jointed, pubescent when young, glabrous at maturity; seeds 6–10, brown.

Flowering & Fruiting: July–November.

Rare on hill slopes in sandy soils up to 2600 m.

Distribution: India (Arunachal Pradesh, Gujrat, N.E. India, Jammu & Kashmir, Kerala, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, West Bengal), Australia, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124996 (BSD).

Notes: The lateral two leaflets are early caducous and always moving in air, so it is called as Indian telegraph plant.

6. *Crotalaria* L.

- 1a. Leaves trifoliolate; pods pubescent 4. *C. medicaginea*
 1b. Leaves simple; pods glabrous 2
- 2a. Undershrubs; stems glabrous 6. *C. spectabilis*
 2b. Herbs; stems silky pubescent 3
- 3a. Stems erect or prostrate; vexillum ovate-oblong 5. *C. prostrata*
 3b. Stems trailing or procumbent; vexillum obovate-oblong or suborbicular 4
- 4a. Stipules wing like; sepals bilipped 1. *C. alata*
 4b. Stipules minute or absent; sepals regular 5
- 5a. Leaves sessile, linear to elliptic-oblong or oblanceolate, apex mucronate 2. *C. albida*
 5b. Leaves subsessile, linear-lanceolate to oblong-lanceolate, apex acute 3. *C. calycina*

1. ***Crotalaria alata*** Buch.-Ham ex D. Don, Prodr. Fl. Nepal.: 241. 1825; Baker in Hook.f., Fl. Brit. India 2: 69. 1876; P.C. Pant, Fl. Corbett Natl. Park: 55. 1986; Sanjappa, Legum. India: 116. 1992; R.D. Gaur, Fl. Distr. Garhwal: 262. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 141. 2003; A.A. Ansari, *Crotalaria* in India: 61. 2008; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 358. 2020. *Crotalaria sagitticaulis* Wall., Cat. no. 5357. 1831–32, *nom. nud.* *C. bialata sensu* Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007, *non* Schrank. 1819. *C. alata* Roxb., Hort. Beng.: 98. 1814 & Fl. Ind. 3: 274. 1832 *nom. illeg.* *Gburua Jhar* [Plate-8g]

Herb, erect or spreading, to 80 cm high; stems terete, branched, silky-pubescent, with stipular wings; branches zig-zag. Leaves simple, nearly sessile, elliptic-lanceolate to obovate-elliptic, 3.5–8 × 1.5–4.5 cm, base subrounded or oblique, apex acute to obtuse with mucro, appressed hairy on both surfaces with trichomes. Flowers yellow, 3–6 in terminal or leaf-opposed racemes; bracts ovate-lanceolate; sepals bilipped, teeth lanceolate; petals obovate-orbicular, vexillum suborbicular, wings oblong, feathery, keel ovate, apically with a long twisted beak. Pods linear-oblong, up to 4 cm long, glabrous; seeds up to 30, reniform, smooth, brown.

Flowering & Fruiting: July–October.

Rare along open hill slopes up to 1600 m. Some times occurs in dry Pine forest areas.

Distribution: India (Jammu & Kashmir to Eastern Himalaya, North India to South India, Gujrat to West Bengal), S.E. Asia, Bhutan, China, Nepal.

Specimens examined: Rathuadhab, R. *Manikandan* 125742 (BSD); Samir Sinha (2001).

Uses: Leaves are used as green manure.

2. ***Crotalaria albida*** Heyne ex Roth., Nov. Pl. Sp.: 333. 184; Baker in Hook.f., Fl. Brit. India 2: 71. 1876; P.C. Pant, Fl. Corbett Natl. Park: 55. 1986; Sanjappa, Legum. India: 116. 1992; R.D. Gaur, Fl. Distr. Garhwal: 262. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 141. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007; A.A. Ansari, *Crotalaria* in India: 153. 2008; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 358. 2020. *C. montana* Roxb., Fl. Ind. 3: 265. 1832.

Herb, perennial, erect or procumbent, to 40 cm high; stems terete, much branched, suffrutescent with a short woody base, silky-pubescent. Leaves sessile, linear to elliptic-oblong or oblanceolate, 1–5.5 × 0.5–1.2 cm, base obtuse, margins entire, apex mucronate, glabrous above, silky pubescent beneath. Flowers yellow, many in terminal racemes; bracts setaceous; sepals 5-toothed, teeth lanceolate, silky brown; petals obovate-orbicular, vexillum obovate-oblong or suborbicular, wings oblong, keel ovate, ciliate, beaked. Pods sessile obovate-oblong, to 1.5 cm long, glabrous, brown; seeds reniform, smooth, blackish-brown.

Flowering & Fruiting: April–October.

Rare on along the roadsides and shady places near deciduous forests.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir, North India to South India, Gujrat, West Bengal), Bhutan, China, Indo Malaysia, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125630 (BSD); Samir Sinha (2001).

Uses: Leaves are used to remove constipation.

3. ***Crotalaria calycina*** Schrank, Pl. Rar. Hort. Monac.: t. 12. 1817; Baker in Hook.f., Fl. Brit. India 2: 72. 1876; P.C. Pant, Fl. Corbett Natl. Park: 56. 1986; Sanjappa, Legum. India: 118. 1992; R.D. Gaur, Fl. Distr. Garhwal: 263. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 143. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007; A.A. Ansari, *Crotalaria* in India: 82. 2008.

Herb, annual, erect, hairy, to 70 cm high; stems usually branched near base, densely silky-hairy. Leaves subsessile, linear-lanceolate to oblong-lanceolate, 2.5–7.5 × 0.3–1.2 cm, base cuneate, apex acute, glabrous above, densely pilose beneath; stipules minute. Flowers pale yellow, in lax, terminal racemes; bracts lanceolate, hairy; sepals densely hairy, teeth lanceolate; petals equalling or shorter to calyx, vexillum obovate-oblong, hairy; wing obovate-oblong, keel obovate, with spirally twisted beak. Pods sessile, oblong, to 3 cm long, glabrous; seeds 20–35, reniform, smooth, pale-brown.

Flowering & Fruiting: September–December.

In moist grassy hill slopes, wasteland, up to 1500 m.

Distribution: India (Arunachal Pradesh, Assam, Jammu & Kashmir, Central India to South India, Meghalaya), Africa, Asia, Australia, China, Nepal, Pakistan, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

4. ***Crotalaria medicaginea*** Lam., Encycl. 2: 201. 1786; Baker in Hook.f., Fl. Brit. India 2: 81. 1876; P.C. Pant, Fl. Corbett Natl. Park: 56. 1986; Sanjappa, Legum. India: 124. 1992; R.D. Gaur, Fl. Distr. Garhwal:

264. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 148. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104.2007; A.A. Ansari, Crotalaria in India: 302. 2008; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 362. 2020. *C. virgata* Mart., Denk Schr. Acad. Muench. 6: 157. 1820. *C. procumbens* Roxb. ex Roxb., Fl. Ind. 3: 278. 1832.

Herb, perennial, erect to diffused, to 40 cm high; stems terete, hairy, with woody root stock. Leaves petioled, 3-foliolate; leaflets oblong-obovate or oblanceolate, $0.6-1.2 \times 4-9$ mm, base cuneate, apex obtuse, emarginate or mucronate, glabrous above, hairy beneath, entire at margins; stipules linear. Flowers yellow, terminal racemes; sepals lobed, campanulate, lobes acute, longer than tube, pubescent; petals ≈ 6 mm long, vexillum orbicular, glabrous, keel petals ovate-oblong, twisted. Pods sessile, subglobose, ≈ 5 mm long, hairy, beaked; seeds 2 or more, yellowish-brown.

Flowering & Fruiting: September–February.

Rare along the roadsides near deciduous forests

Distribution: India (almost throughout the country), Afghanistan, Australia, Bangladesh, China, Indonesia, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124824, 125587 (BSD); Samir Sinha (2001).

5. **Crotalaria prostrata** Rottl. ex Willd., Enum. Hort. Berol.: 744. 1809; Baker in Hook.f., Fl. Brit. India 2: 67. 1876; P.C. Pant, Fl. Corbett Natl. Park: 56. 1986; Sanjappa, Legum. India: 127. 1992; R.D. Gaur, Fl. Distr. Garhwal: 264. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 157. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007; A.A. Ansari, Crotalaria in India: 195. 2008; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 365. 2020. *C. prostrata* Roxb., Fl. Ind. 3: 270. 1832.

Herb, annual, trailing or decumbent, to 50 cm high; stems terete, branched from base, silky-tomentose. Leaves subsessile, oblong or oblong-lanceolate to suborbicular, $0.5-3.8 \times 0.4-1.6$ cm, base rounded to subcordate, apex obtuse, hairy on both surfaces; exstipulate. Flowers yellow, 3–4 in leaf opposed, axillary racemes; sepals lobes linear, densely pubescent; petals slightly exerted, vexillum ovate-oblong, emerginate, keel petals beaked, twisted. Pods linear-oblong, to 1.8 cm long, glabrous; seeds reniform, yellowish-brown.

Flowering & Fruiting: March–November.

Common on grassy slopes, crop fields, up to 2000 m.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), China, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125701 (BSD); Samir Sinha (2001).

6. **Crotalaria spectabilis** Roth, Nov. Pl. Sp.: 341. 1821; Sanjappa, Legum. India: 130. 1992; R.D. Gaur, Fl. Distr. Garhwal: 265. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 160. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007; A.A. Ansari, Crotalaria in India: 284. 2008. *C. sericea* Retz., Obs. Bot. 5: 26. 1788, *non* Burm.f. 1768; Baker in Hook.f., Fl. Brit. India 2: 75. 1876; P.C. Pant, Fl. Corbett Natl. Park: 56. 1986. *C. leschenaultia* DC., Prodr.: 186. 1834; Baker in Hook.f., Fl. Brit. India 2: 76. 1876.

Undershrub, annual-biennial, erect, to 1.2 m high; stems branched, fistular, glabrous. Leaves petioled, obovate or oblanceolate to oblong-lanceolate, $3-17.5 \times 1.5-8.5$ cm, base obtuse or cuneate, entire at margins,

glabrous above, apex acute or mucronate, silky-pubescent beneath; stipules leafy, lanceolate, acute, amplexicaule. Flowers yellow, many-flowered, in long terminal racemes; bracts leafy; bracteoles 2, acute; calyx lobes 5, ovate-lanceolate, sparsely pubescent; petals exserted; vexillum suborbicular, emerginate, obtuse, glabrous, keel petals falcate, beaked, twisted. Ovary sessile, oblong, glabrous. Pods oblong, to 4.5 cm long, blackish-brown, glabrous, beaked; seeds 15–30, cordiform, deep brown.

Flowering & Fruiting: September–November.

Common on moist, grassy slopes, road side areas, up to 2000 m.

Distribution: India (Arunachal Pradesh, Assam, Jammu & Kashmir, Madhya Pradesh, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), Nepal, Pakistan, Thailand. Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122590, 122508 (BSD); Samir Sinha (2001).

7. *Dalbergia* L.f.

- 1a. Leaflets upto 5, acuminate to cuspidate at apex; stamens 9 3. *D. sissoo*
 1b. Leaflets more than 5, emarginate or obtuse at apex; stamens 10 2

- 2a. Leaflets upto 17; flowers dull white-pinkish 1. *D. lanceolaria*
 2b. Leaflets more than 17; flowers purple-violet 2. *D. serica*

1. ***Dalbergia lanceolaria*** L.f., Suppl. Pl. Syst. Veg.: 316. 1781; Baker in Hook.f., Fl. Brit. India 2: 235. 1876; P.C. Pant, Fl. Corbett Natl. Park: 57. 1986; Sanjappa, Legum. India: 136. 1992; R.D. Gaur, Fl. Distr. Garhwal: 266. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 169. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 370. 2020. *D. frondosa* Roxb. ex DC., Prodr. 2: 417. 1825; Roxb. Fl. Ind. 3: 228. 1832. *D. zeylanica* Roxb., Fl. Ind. 3: 228. 1832. *Takoli* [Plate-8h]

Tree, deciduous, to 25 m high. Leaves petioled; leaflets 11–17, obovate or elliptic-ovate, 2.8–5 × 2.2–3 cm, base subrounded, apex emarginate or obtuse, subcoriaceous, glabrous above, glaucous beneath, membranous. Flowers dull white to pinkish, unilaterally arranged on axillary or terminal panicles; sepals lobed; upper lobe obtuse, lower lobes longer and acute, silky-pubescent; petals with wing feathery, keel beaked, shorter than wing; stamens 10 (5+5). Pods oblong, flat, c. 8 cm long, narrowed at both ends, glabrous; seeds 2 or 3, subspherical, embossed in pods.

Flowering & Fruiting: April–October.

Common on outer forest areas along plains, slopes and river banks.

Distribution: India (Assam, Bihar, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), Bangladesh, Bhutan, China, Myanmar, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122588 (BSD).

2. ***Dalbergia serica*** G. Don, Gen. Syst. 2: 375. 1832; P.C. Pant, Fl. Corbett Natl. Park: 57. 1986; Sanjappa, Legum. India: 140. 1992; R.D. Gaur, Fl. Distr. Garhwal: 266. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 174. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 371. 2020. *D. hircina* Buch.-Ham. ex Benth. in Miq., Pl. Jungh.: 256. 1852; Baker in Hook.f., Fl. Brit. India 2: 236. 1876. *D. stenocarpa* Kurz, J. Asiat. Soc. Bengal 44: 245. 1875; Baker in Hook.f., l.c. 238.

Tree, deciduous, to 20 m high; bark with grayish, smooth; stems branched, glabrous. Leaves petioled; leaflets 17–25, ovate to obovate or elliptic, $2-4.5 \times 1-3.2$ cm, base subrounded to obtuse, apex emarginate or obtuse, subcoriaceous, tomentose on both surfaces. Flowers purple-violet, in axillary congested panicles; sepals 2–5 mm long, lobed, glabrous; upper lobe short, obtuse, shorter than lower; petals with wing feathery, keel beaked, shorter than wing; stamens 10 (5+5). Pods oblong, flat, thin, to 3.5 cm long, narrowed at apex, glabrous; seeds 2–4, subspherical.

Flowering & Fruiting: March–August.

Common in tropical to subtropical forest areas along hill slopes, river banks, up to 1800 m.

Distribution: India (Arunachal Pradesh, Meghalaya, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh, West Bengal), Bhutan, Nepal.

Specimens examined: Pokhro-Hathikhund, Sonanadi WLS, R. *Manikandan* 125625, 125534, 122311, 125608 (BSD).

3. **Dalbergia sissoo** Roxb., Fl. Ind. 3: 223. 1832; Baker in Hook.f., Fl. Brit. India 2: 231. 1876; P.C. Pant, Fl. Corbett Natl. Park: 57. 1986; Sanjappa, Legum. India: 140. 1992; R.D. Gaur, Fl. Distr. Garhwal: 266. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 174. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 371. 2020. *Sbisoo*

Tree, deciduous, to 20 m high; bark with pale-grey, rough; stems branched, glabrous, young parts downy. Leaves petioled; leaflets 3–5, obovate to orbicular or elliptic-orbicular, $3.5-6.5 \times 3-6$ cm, base rounded, apex acuminate to cuspidate, subcoriaceous, chartaceous, glabrous on both surfaces, glaucous. Flowers creamy-yellow, in axillary or subterminal, congested panicles; sepals lobed, pubescent, lobes linear-lanceolate, equal; petals to 8 mm long, wing feathery, keel beaked; stamens 9 (5+4). Pods strap-shaped, oblong, to 6.5 cm long, narrowed at both ends, glabrous; seeds 1–4, ovoid to subspherical.

Flowering & Fruiting: March–September.

Common in tropical to subtropical forest areas along gentle hill slopes, open valleys, plains, river banks, up to 1670 m.

Distribution: India (Arunachal Pradesh, Bihar, Delhi, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), Afghanistan, Bangladesh, Bhutan, Iran, Iraq, Myanmar, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

8. **Desmodium** Desv., *nom.cons.*

- 1a. Leaves simple 2
- 1b. Leaves trifoliolate 3
- 2a. Stems terete; pods 6–8 jointed, hooked hairy, blackish-brown 1. *D. gangeticum*
- 2b. Stems angled; pods 4–6 jointed, densely hairy, gray 6. *D. velutinum*
- 3a. Herbs; stems diffuse, prostrate or spreading 4
- 3b. Undershubs; stems erect or decumbent 5
- 4a. Leaflets obovate to suborbicular; stipules foliaceous, cordate-lanceolate 5. *D. triflorum*

4b. Leaflets elliptic or oblong-ovate to suborbicular; stipules not as above, linear 4. *D. microphyllum*

5a. Stems decumbent; flowers violet or blue 2. *D. heterocarpon*

5b. Stems erect; flowers creamy-white or pinkish-white, tinged with blue 3. *D. laxiflorum*

1. ***Desmodium gangeticum*** (L.) DC., Prodr. 2: 327. 1825; Baker in Hook.f., Fl. Brit. India 2: 168. 1876; P.C. Pant, Fl. Corbett Natl. Park: 58. 1986; Sanjappa, Legum. India: 153. 1992; R.D. Gaur, Fl. Distr. Garhwal: 269. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 199. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 376. 2020. *Hedysarum gangeticum* L., Sp. Pl.: 346. 1753. *Desmodium maculatum* (L.) DC., Prodr. 2: 327. 1825.

Herb or undershrub, perennial, erect to suberect; stems branched, base woody, angular, hairy. Leaves petioled, simple, ovate-lanceolate or elliptic to suborbicular, $2.5-8.5 \times 2-4.5$ cm, base subrounded, glabrous above, pubescent beneath, entire at margins; apex acute to acuminate, stipules linear, hairy. Flowers yellow to purple, in axillary or terminal racemes; sepals hairy; teeth linear, longer than tube; petals to 6 mm long, vexillum to 6 mm long, glabrous, wings pilose, keel incurved. Pods oblong-falcate, to 3.5 cm long, 6–8 jointed, indented, hooked hairy, blackish-brown, apiculate.

Flowering & Fruiting: April–November.

Common in forest areas along shady, grassy slopes, foot tracks, riverine areas up to 1400 m.

Distribution: India (Andaman & Nicobar Islands, Arunachal Pradesh, Jammu & Kashmir, Maharashtra, Meghalaya, Nagaland, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), Africa, Australia, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 124849, 122523 (BSD); Samir Sinha (2001).

2. ***Desmodium heterocarpon*** (L.) DC., Prodr. 2: 337. 1825; P.C. Pant, Fl. Corbett Natl. Park: 58. 1986; Sanjappa, Legum. India: 154. 1992; R.D. Gaur, Fl. Distr. Garhwal: 269. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 200. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007. *Hedysarum heterocarpon* L., Sp. Pl.: 747. 1753. *Desmodium polycarpum* (Poir) DC., Prodr. 2: 334. 1825; Baker in Hook.f., Fl. Brit. India 2: 171. 1876. *D. trichocaulon* DC., Prodr. 2: 335. 1825. *Grona heterocarpa* (L.) H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 112. 2018; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 387. 2020.

Undershrub, perennial, decumbent, to 50 cm high; stems copiously branched with spreading hairs, numerous from thick, woody, rootstock. Leaves petioled, trifoliate; leaflets orbicular-ovate to elliptic-oblong or obovate, $0.8-4.5 \times 0.5-3.5$ cm, base obtuse, apex obtuse, glabrous above, appressed grayish, hairy beneath; stipules linear-lanceolate, pubescent. Flowers violet or blue, in axillary or subterminal racemes; bracts 3–4 mm long; sepals pubescent, teeth equal to tube; petals to 5 mm long, vexillum emarginate, wings pubescent. Pods oblong, stipitate, to 2.8 cm long, 5–8-jointed, hairy, brown.

Flowering & Fruiting: August–October.

Common in forest areas along grassy slopes in moist areas up to 2600 m.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Sikkim, Uttar Pradesh), Afghanistan, Australia, Bhutan, China, Indo-Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 125584 (BSD); Samir Sinha (2001).

3. **Desmodium laxiflorum** DC., Ann. Sci. Nat. Paris ser. 4: 100. 1825 & Prodr. 2: 335. 1825; Baker in Hook.f., Fl. Brit. India 2: 164. 1876; Sanjappa, Legum. India: 156. 1992; R.D. Gaur, Fl. Distr. Garhwal: 269. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 201. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007. *D. diffusum* DC., Ann. Sci. Nat. Paris 1, 4: 100. 1825. *D. macrophyllum* Desv., Mem. Soc. Linn. Paris 4: 306. 1825. *Hedysarum recurvatum* Roxb., Fl. Ind.: 358. 1832. *Desmodium recurvatum* (Roxb.) Wight. & Arn., Prodr.: 226. 1834. *Sobmaea laxiflora* (DC.) H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 162. 2018; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 425. 2020.

Undershrub, perennial, erect, to 1.5 m high; stems woody, young branches angular, pubescent. Leaves petioled, 3-foliolate; leaflets elliptic-ovate or elliptic-lanceolate, $3.5-12.5 \times 1.8-4.8$ cm, terminal leaflet larger, base cuneate to subrounded, glabrous above, pubescent beneath, entire at margins, apex acute; stipules linear, acuminate at apex. Flowers creamy-white or pinkish-white, tinged with blue, in axillary or terminal, lax racemes; bracts linear 2–4 mm long; sepals hairy; teeth minutely larger than tube; petals 3–4 mm long; vexillum glabrous; wing feathery. Pods sessile, oblong-falcate, thin, to 4 cm long, 4–10 jointed, pubescent, brown.

Flowering & Fruiting: August–October.

Common in forest areas along shady, grassy slopes in moist areas up to 2200 m.

Distribution: India (Andaman & Nicobar Islands, Arunachal Pradesh, Jammu & Kashmir, North to South India), Bhutan, Bangladesh, China, Indonesia, Malayasia, Myanmar, Nepal, Pakistan.

Specimens examined: Way to Adnala, R. *Manikandan* 122337, 122526 (BSD)

4. **Desmodium microphyllum** (Thunb.) DC., Prodr. 2: 337. 1825; P.C. Pant, Fl. Corbett Natl. Park: 58. 1986; Sanjappa, Legum. India: 157. 1992; R.D. Gaur, Fl. Distr. Garhwal: 269. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 201. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007. *Hedysarum microphyllum* Thunb., Fl. Jap. 284. 1784. *D. parviflorum* DC., Prodr. 2: 334. 1825; Baker in Hook.f., Fl. Brit. India 2: 174. 1876. *Meibomia microphylla* (Thunb.) Kuntze, Rev. Gen. Pl. 1: 198. 1891. *Leptodesmia microphylla* (Thunb.) H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 186. 2018; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 400. 2020.

Herb, perennial, diffuse, spreading, to 50 cm long; stems trigonus branched from base, pubescent, with woody root stocks. Leaves petioled, trifoliolate; leaflets elliptic or oblong-ovate to suborbicular, $2-9 \times 2-6$ mm, base notched, apex obtuse, mucronate, glabrous above, pubescent beneath, midrib prominent; stipules linear, pubescent. Flowers pink or purple, in axillary or subterminal racemes; bracts linear-lanceolate, acute; sepals campanulate, teeth longer than tube, hairy; petals to 6 mm long, vexillum pubescent, keel shortly beaked. Pods sessile, oblong, to 1.3 cm long, 3–4 jointed, pubescent, indented, apiculate, brown.

Flowering & Fruiting: March–October.

Common in forest edges along grassy slopes on dry places up to 3000 m.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir, Japan, North to South India), Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124893, 125572 (BSD).

5. **Desmodium triflorum** (L.) DC., Prodr. 2: 334. 1825; Baker in Hook.f., Fl. Brit. India 2: 173. 1876; P.C. Pant, Fl. Corbett Natl. Park: 59. 1986; Sanjappa, Legum. India: 163. 1992; R.D. Gaur, Fl. Distr. Garhwal:

271. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 207. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007. *Hedysarum triflorum* L., Sp. Pl.: 749. 1753. *Desmodium triflorum* var. *minus* & var. *villosum* Wight & Arn., Prodr. Fl. Ind. Or.: 229. 1834. *Meibomia triflora* (L.) Kuntze, Rev. Gen. Pl. 1: 197. 1891 incl. vars. & formas. *Grona triflora* (L.) H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 117. 2018; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 388. 2020.

Herb, perennial, prostrate to spreading, to 60 cm long; stems many from the thick, woolly base, often rooting at nodes; young parts pubescent to hairy. Leaves petioled, 3-foliate; leaflets obovate to suborbicular 2–6 × 2–5 mm, base rounded, apex notched, glabrous above, hairy or glabrescent on nerves beneath; stipules foliaceous, cordate-lanceolate, acuminate, hairy. Flowers purplish-blue, few, in axillary, leaf opposed fascicles; sepals teeth longer than tube, linear acute, hairy; petals vexillum ovate, emarginate. Pods sessile, linear, flat, to 1.3 cm long, 3–5-jointed, intended at lower sutures, minutely hairy.

Flowering & Fruiting: September–November.

Common in forest areas, moist, grassy slopes, up to 2400 m.

Distribution: India (Arunachal Pradesh, Bihar, Jammu & Kashmir, Meghalaya, Nagaland, Punjab, Sikkim, Uttar Pradesh), Afghanistan, Africa, America, Australia, Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125583, 124894, 122385 (BSD); Samir Sinha (2001).

6. ***Desmodium velutinum*** (Willd.) DC., Prodr. 2: 328. 1825; P.C. Pant, Fl. Corbett Natl. Park: 59. 1986; Sanjappa, Legum. India: 165. 1992; R.D. Gaur, Fl. Distr. Garhwal: 271. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 208. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 378. 2020. *Hedysarum velutinum* Willd., Sp. Pl. 3: 117. 1803. *Desmodium latifolium* DC., Prodr. 2: 327. 1825; Baker in Hook.f., Fl. Brit. India 2: 168. 1879. *Meibomia velutina* (Willd.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.

Undershrub, perennial, deciduous, erect, to 1.2 m high; stems terete, woody, branched, brown, hairy. Leaves petioled, ovate to obovate or suborbicular, 4–12 × 3.5–7.5 cm, base subcordate or truncate, mucronate, hairy on both surfaces, margins sinuate or undulate, apex obtuse, subcoriaceous; lateral nerves 4–6 pairs; stipules ovate-lanceolate, short. Flowers pink to purple, in axillary or terminal racemes; bracts setaceous; sepals tubular, pubescent; petals 3–5 mm long; vexillum ovate, emarginate. Pods sessile, to 2.5 cm long, 4–6-jointed, densely hairy, indented at lower suture, gray.

Flowering & Fruiting: August–November.

Common in mixed forest areas, scrub jungles, grassy slopes, up to 1300 m.

Distribution: India (Arunachal Pradesh, Bihar, Jammu & Kashmir, South India, Meghalaya, Nagaland, Punjab, Sikkim, Uttar Pradesh), Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Taiwan, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125638, 122410, 122422, 122522 (BSD).

9. **Dolichos** L.

Dolichos trilobus L., Sp. Pl.: 726. 1753; Verdc., Taxon 17: 170. 1968 & Kew Bull. 24: 422. 1970; Sanjappa, Legum. India: 167. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 332. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 378. 2020. *Dolichos falcatus* Klein ex Willd., Sp. Pl. 3: 1047. 1802; Baker in Hook.f., Fl. Brit. India 2: 211. 1876, *p.p.*

Trailing Herb, annual or perennial, to 1.5 m long; stems terete, branched; young branchlets glabrous or pubescent. Leaves petioled, trifoliolate; leaflets ovate-rhomboid to obovate or suborbicular, trilobed, 3.2–6.5 × 2.5–5.5 cm, base cuneate, pubescent on both surfaces, margins entire, apex obtuse, subcoriaceous; stipules ovate-lanceolate, hairy. Flowers yellow, in axillary, erect racemes; sepals campanulate, pubescent; petals yellow, vexillum ovate, emerginate. Pods subcylindric, to 6.5 cm long, falcate, densely pubescent, greenish-brown; seeds 6–12, brown.

Flowering & Fruiting: July–November.

Occasional along the roadsides near deciduous forests.

Distribution: India (Assam, Himachal Pradesh, South India, Meghalaya, Sikkim, West Bengal), Africa, Bhutan, China, Malaysia, Myanmar, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 125725 (BSD).

10. **Erythrina** L.

Erythrina suberosa Roxb., Fl. Ind. 3: 253. 1832; Baker in Hook.f., Fl. Brit. India 2: 158. 1876; P.C. Pant, Fl. Corbett Natl. Park: 59. 1986; Sanjappa, Legum. India: 173. 1992; R.D. Gaur, Fl. Distr. Garhwal: 273. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 340. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 106. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 381. 2020. *E. suberosa* Roxb. var. *sublobata* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 158. 1876. *E. suberosa* Roxb. var. *glabrescens* (Prain) Parker, Ind. For. 56: 647. 1925. *E. glabrescens* (Prain) Parker, Ind. For. 56: 647. 1925. *Pbarai*

Tree, to 6 m high; stems much branched, branches prickly with greyish-brown bark. Leaves petioled, trifoliolate; leaflets 3–10 × 1.5–7.5 cm, ovate-orbicular, subrounded to subcordate at base, rounded at apex, membranous, hairy on both surfaces; lateral nerves 4–6 pairs; stipules ovate-lanceolate. Flowers scarlet red, with long prickly-pedunculate, in axillary or subterminal spicate-racemes; sepals campanulate, pubescent; teeth short; petals oblong, wings smaller than keel. Pods c. 15 cm long, oblong, turgid, curved, velvety when young; seeds 2–5, glaucous, smooth.

Flowering & Fruiting: April–August.

Scattered on forest margins along downwards slopes, river beds up to 1500 m.

Distribution: India (Bihar, Delhi, Gujrat, Jammu & Kashmir, S. India, Punjab, Sikkim, West Bengal), China, Myanmar, Nepal, Sri Lanka.

Specimens examined: Vatanvasa, T.A. Rana & Party 220221 (LWG); Samir Sinha (2001).

11. **Flemingia** Roxb. ex Ait. & Ait.f., *nom.cons.*

- 1a. Leaves cuneate-acuminate at base; bracts lanceolate 1. *F. macrophylla*
 1b. Leaves subcordate at base; bracts concave 2. *F. strobilifera*

1. **Flemingia macrophylla** (Willd.) Kuntze ex Merr., Philippine J. Sci. Bot. 5: 130. 1910; P.C. Pant, Fl. Corbett Natl. Park: 60. 1986; Sanjappa, Legum. India: 176. 1992; R.D. Gaur, Fl. Distr. Garhwal: 275. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 343. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 106. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 383. 2020. *Crotalaria macrophylla* Willd., Sp. Pl. 3: 982. 1803. *Moghania macrophylla* (Willd.) Kuntze, Rev. Gen. Pl. 1: 199. 1981. *Flemingia nana* Roxb., Fl. Ind. 3: 339. 1832. *F. congesta* Roxb. var. *semialata* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 229. 1876.

Shrub, perennial, erect, to 1.3 m high; stems branched, young branches terete or triangular, silky-pubescent, brown. Leaves with slightly winged petiole, trifoliate, $4.5-10 \times 2-5$ cm, ovate-obovate to elliptic-lanceolate, cuneate to acute at base, acuminate at apex, subcoriaceous, glabrous above, grey-silky beneath; lateral nerves 6–7 pairs, prominent; stipules ovate-lanceolate, acute-cuspidate, caducous. Flowers purple with red streaks, sessile, dense, in axillary racemes or in fascicles; bracts lanceolate, silky-brown above; sepals densely covered with appressed silky hairs; petals oblong, keel oblong, obtuse, wings elliptic; ovary elliptic, hairy. Pods $\approx$ 1.2 cm long, oblong; seeds 2, black.

Flowering & Fruiting: September–November.

Common in deciduous forests along grassy slopes, way sides up to 2000 m.

Distribution: India (Arunachal Pradesh, Bihar, Jammu & Kashmir, S. India, Madhya Pradesh, Punjab, Sikkim, Uttar Pradesh, West Bengal), Australia, Bangladesh, China, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 124844 (BSD).

Notes: Leaves are used as fodder; paste of roots are useful in treating ulcers and swellings.

2. **Flemingia strobilifera** (L.) Ait. & Ait.f., Hort. Kew. ed. 2, 4: 350. 1812; Baker in Hook.f., Fl. Brit. India 2: 228. 1876; P.C. Pant, Fl. Corbett Natl. Park: 60. 1986; Sanjappa, Legum. India: 178. 1992; R.D. Gaur, Fl. Distr. Garhwal: 276. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 345. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 106. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 384. 2020. *Hedysarum strobiliferum* L., Sp. Pl.: 764. 1753. *Flemingia affinis* Persl., Bot. Bemerk.: 59. 1844. *Flemingia fruticulosa* Wall. ex Benth. in Miq., Pl. Jungh. 245. 1852. *F. bracteata* (Roxb.) Wight, Icon. Pl. Ind. Orient. 1: 14, t. 268. 1840; Gaur, l.c. 274; Uniyal & al., l.c. *Hedysarum bracteatum* Roxb., Fl. Ind. 3: 351. 1832. *Flemingia strobilifera* var. *bracteata* (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 227. 1876. *Moghania bracteata* (Roxb.) L., Amer. J. Bot. 31(4): 225. 1944. Veer-brat

Shrub, perennial, erect, to 1.5 m high; stems with terete branches, velvety at apex, hairy. Leaves petioled, $6.5-13.5 \times 3.5-5.5$ cm, ovate-lanceolate to oblong-lanceolate, subcordate at base, acute-acuminate at apex, subcoriaceous, glabrous above, pubescent on nerves beneath; lateral nerves 6–9 pairs; stipules linear-lanceolate, persistent. Flowers purple or pale-white, in axillary or terminal racemes; bracts concave, papery, hairy; sepals teeth lanceolate, longer than tube; petals vexillum orbicular, glabrous, auriculate; keel beaked; wings feathery, narrower than keel; ovary ovoid-oblong, pubescent. Pods $\approx$ 1.2 cm long, elliptic-oblong, turgid, pubescent; seeds 2, blackish-brown.

Flowering & Fruiting: July–November.

Common in forests along slopes, grassy areas, near crop fields up to 2700 m.

Distribution: India (Arunachal Pradesh, Gujrat, Himalayas, Jammu & Kashmir, Karnataka, Madhya Pradesh, Meghalaya, Tamil Nadu, Uttar Pradesh, West Bengal), Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, W. Indies.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122436 (BSD).

12. *Indigofera* L.

- 1a. Herb; leaves simple 2. *I. linifolia*
 1b. Undershrub or shrub; leaves compound 1. *I. cassioides*

1. ***Indigofera cassioides*** Rottl. ex DC., Prodr. 2: 225. 1825; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 392. 2020. *I. pulchella sensu* Baker in Hook.f., Fl. Brit. India 2: 101. 1876, *non* Roxb. 1814. *I. arborea* Roxb., Hort. Bengal.: 57. 1814. *I. elliptica* Roxb., Fl. Ind. (ed. 1832) 3: 380. 1832. *I. leptostachya* DC., Prodr. 2: 225. 1825. *I. violacea* Roxb., Fl. Ind. (ed. 1832) 3: 380. 1832.

Undershrub or shrub, erect, young branches pubescent, to 1.5 cm high. Leaves imparipinnately compound, leaflets 11–21, oblong to elliptic, 1–2.5 × 0.7–1.2 cm, obtuse, truncate to slightly retuse, apiculate at apex, pubescent on both sides; stipules c. 4 mm long, deciduous. Flowers bright pink, fading to violet, in 5–17 cm long raceme, covered with sterile scales at the base; bracts ovate to lanceolate, caducous; sepals cup c. 3 mm long, teeth subequal; petals standard broadly ovate, glabrous, base clawed, apex obtuse; wings 8–9.5 mm, base auriculate and clawed, margin ciliate; keel outside apically hairy, very shortly spurred, margin ciliate. Fruit c. 4 × 0.4 cm, cylindrical, straight, glabrous, dehiscent, 8–12-seeded.

Flowering & Fruiting: March–May.

Occasional on open fields and along roadsides near deciduous forests.

Distribution: India (almost throughout the country), China, Indo-China, Myanmar, Pakistan, Siam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125741 (BSD); Samir Sinha (2001).

2. ***Indigofera linifolia*** (L.f.) Retz., Obs. Bot. 4: 29. 1786; Baker in Hook.f., Fl. Brit. India 2: 92. 1876; P.C. Pant, Fl. Corbett Natl. Park: 61. 1986; Sanjappa, Legum. India: 192. 1992; R.D. Gaur, Fl. Distr. Garhwal: 279. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 281. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 107. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 395. 2020. *Hedysarum linifolium* L.f., Suppl.: 331. 1781. *Indigofera roxburghii* Tausch, Flora 14: 671. 1832.

Herb, annual, erect or prostrate, to 40 cm high; stems terete, much branched, pubescent, brown. Leaves petioled, simple, 1.5–3 × 0.3–0.8 cm, linear-elliptic or obovate-oblong, rounded, mucronate at apex, cuneate to rounded at base, pubescent on both surfaces; stipules triangular, pubescent. Flowers red, many-flowered, in axillary racemes; bracts linear; sepals campanulate, pubescent, teeth linear, equal; petals longer than calyx, vexillum ovate, hairy, keel longer than wing. Ovary subglobose, glabrous. Pods globose, beaked, silky-white. Seed 1, pitted, deep brown.

Flowering & Fruiting: August–October.

Common in forest areas, grassy slopes, river banks up to 1600 m.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir, South India), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125647, 122546, 122444 (BSD); Samir Sinha (2001).

13. *Millettia* Wight & Arn.

Millettia extensa Benth., Pl. Jungh.: 249. 1842; Baker in Hook.f., Fl. Brit. India 2: 109. 1876; P.C. Pant, Fl. Corbett Natl. Park: 61. 1986; Sanjappa, Legum. India: 212. 1992; R.D. Gaur, Fl. Distr. Garhwal: 285. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 305. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 405. 2020. *Pongamia macrophylla* Grah. in Wall., Cat. 5892. 1831–32, *nom. nud.* *Otosema extensa* Benth. in Miq., Pl. Jungh. 249. 1852. *Millettia auriculata* Baker ex Brandis, For. Fl. India: 138. 1874. *M. macrophylla* (Roxb.) Kurz, J. Asiat. Soc. Bengal 45: 276. 1876, *non* Benth. 1848.

Climbing shrub, perennial, robust, to 3 m long; stems woody, branched; bark greyish-brown or yellowish-brown, tomentose. Leaves petioled, trifoliolate; leaflets oblong-obovate or obovate, 5–15 × 3–7 cm, cuneate at base, entire along the margins, acute or obtuse at apex, densely hispid; adpressed hairy on both the surfaces; stipules lanceolate, 0.5–1 cm long. Flowers bluish-white, white or pinkish, in 12–28 cm long, axillary racemes; sepals 2–3 mm long, teeth triangular, small; petals *c.* 8 mm long. Pods oblong, flat, 12–18 cm long, yellowish-brown, velvety; seeds 3–5.

Flowering & Fruiting: March–October.

Scarce hill slopes, climbing on trees in forests, up to 2000 m.

Distribution: India (Assam, Bihar, Jammu & Kashmir, Madhya Pradesh, Orissa, Sikkim), Bhutan, Cambodia, China, Myanmar, Nepal, Pakistan.

Specimens examined: Halduparao-Vatanwasa, R. *Manikandan* 122358, 125585, 122519 (BSD); Samir Sinha (2001).

14. *Mucuna* Adans.

- 1a. Pods oblong 1. *M. nigricans*
 1b. Pods linear 2. *M. pruriens* var. *utilis*

1. ***Mucuna nigricans*** (Lour.) Stend. Nomencl. Bot. ed 2, 2: 163. 1841; P.C. Pant, Fl. Corbett Natl. Park: 63. 1986; Sanjappa, Legum. India: 217. 1992; R.D. Gaur, Fl. Distr. Garhwal: 286. 1999; 217. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 355. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 408. 2020. *Citta nigricans* Lour., Fl. Cochinch.: 456. 1790.

Climbing shrub, robust, to 10 m long; stems woody, dextrose, branched; bark greyish-brown, tomentose. Leaves petioled, trifoliolate; leaflets elliptic-ovate, obovate, 5.5–12.5 × 3.5–6.5 cm, acutminate at apex, subrounded, margins entire, adpressed hairy on both the surfaces; stipules linear, 5–8 mm long. Flowers violet or purple, in axillary, pendulous racemes; sepals teeth triangular; petals 4.5–5.5 cm long. Pods oblong, plaited, scabrid, 10–15 cm long, rusty-brown, with pungent-itching hairs; seeds 3–5, blackish-brown.

Flowering & Fruiting: October–March.

Common in hill slopes, climbing on trees in mixed forests, up to 1800 m.

Distribution: India (Andaman & Nicobar Islands, Assam, Bihar, Jammu & Kashmir to Arunachal Pradesh, Mizoram, Sikkim, Uttar Pradesh, West Bengal), Bangladesh, China, Myanmar, Nepal.

Specimens examined: On way to Ramnagar to Kalagarh, Hussian & Pande 218709 (LWG); Samir Sinha (2001).

2. **Mucuna pruriens** (L.) DC. var. **utilis** (Wall. ex Wight) Baker ex Bruck., Ann. Jard. Britenz. 11: 187. 1893; Sanjappa, Legum. India: 217. 1992; R.D. Gaur, Fl. Garhwal: 286.1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 355. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 408. 2020. *M. utilis* Wall. ex Wight, Icon. Pl. Ind. Or. 1: t. 280. 1840. *M. capitata* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 255. 1834, *nom. illeg. hom.*; Baker in Hook.f., Fl. Brit. India 2: 187. 1876; P.C. Pant, Fl. Corbett Natl. Park: 63. 1986.

Climbing shrub, with sparse long fine spreading hairs. Leaves petioled, trifoliate, terminal one smaller; lateral often markedly larger than terminal, to 20 cm long. Flowers purplish, sparse or dense soft adpressed hairs, in racemes; sepals with dense long pale hairs. Pod young green, linear, irregularly swollen around seeds, to 2 cm wide in parts, densely covered with silky hairs, with 1 or 2 prominent ribs. Seeds up to 8, white, light yellow-brown or black, sometimes with streaks or spots.

Flowering & Fruiting: October–March.

Common in hill slopes, climbing on trees in mixed forests, up to 1800 m.

Distribution: India (Assam, Bihar, Himalayas, Jammu & Kashmir to Sikkim, Uttar Pradesh, West Bengal), Asia, Bangladesh, Nepal, Sri Lanka.

Uses: It is used for food, herbage, and green fertilizer.

Notes: This is very similar to proper variety but distinctive in the misshapen silky-hairy legume entirely lacking irritant bristles and the lateral leaflets, which are often much larger than the terminal one. Included on the authority of Samir Sinha (2001).

15. **Ougeinia** Benth.

Ougeinia oojeinensis (Roxb.) Hochr., Ann. Cons. Jard. Bot. Geneve B. & 14: 51. 1909; Sanjappa, Legum. India: 224. 1992; R.D. Gaur, Fl. Distr. Garhwal: 286. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 213. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 413. 2020. *Dalbergia oojeinensis* Roxb., Fl. Ind. 3: 220. 1832. *Ougeinia delbergioides* Benth. in Miq., Pl. Jungh. 216. 1852; Baker in Hook.f., Fl. Brit. India 2: 161. 1876. *Desmodium oojeinense* (Roxb.) Ohashi, Ginkgoana 1: 117. 1973; P.C. Pant, Fl. Corbett Natl. Park: 59. 1986. *Sandan*

Tree, deciduous, to 15 m high; bark with greyish-brown. Leaves petioled, 3-foliate; leaflets elliptic-ovate to suborbicular or obovate, 4.5–12.5 × 2.5–8.5 cm, base subrounded to cuneate, apex acute to subrounded, coriaceous, glabrous above, pubescent on nerves beneath. Flowers whitish-pink or pale-pink, in short, fascicled racemes; bracts to 2 mm long; sepals pubescent, dark reddish, upper 2 teeth connate; petals to 1.2 cm long. Pods oblong-falcate, flat, thin, to 9 cm long, jointed, whitish-brown; seeds subspherical, brown.

Flowering & Fruiting: February–June.

Common in hill slopes, in deciduous forests, up to 1500 m.

Distribution: India (Assam, Bihar, Jammu & Kashmir, South India, Meghalaya, Uttar Pradesh, West Bengal), Nepal, Pakistan.

Specimens examined: Halduparao-Vatanwasa, R. *Manikandan* 124802 (BSD).

Uses: Fodder and timer yielding species.

16. *Phyllodium* Desv.

Phyllodium pulchellum (L.) Desv., Mem. Soc. Linn. Par. 4: 324. 1826; Ohashi, Ginkgoana 1: 276. 1973; P.C. Pant, Fl. Corbett Natl. Park: 63. 1986; Sud. Kumar & P.V. Sane, Legum. South Asia: 214. 2003; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 415. 2020. *Hedysarum pulchellum* L., Sp. Pl.: 747. 1753. *Desmodium pulchellum* (L.) Benth., Fl. Hongk.: 83. 1861; Baker in Hook.f., Fl. Brit. India 2: 162. 1876; Meeuwen, Reinwardtia 6: 256. 1962; Sanjappa, Legum. India: 160. 1992; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007. *Meibomia pulchella* (L.) Kuntze, Rev. Gen. Pl. 1: 197. 1891. *Phyllodium pulchellum* L., Desv., J. Bot. Agric. 2, 1: 124, t. 5. f. 24. 1813. [Plate-9a]

Undershrub, perennial, scandent, to 80 cm high; stems much branched, branchlets triangular, pubescent. Leaves petioled, trifoliolate; leaflets ovate-elliptic or lanceolate, terminal leaflet larger, 2.5–12.5 × 2–6.5 cm, base cuneate, apex retuse, almost glabrous above, pubescent beneath; stipules linear-lanceolate. Flowers white, enclosed in persistent leaf like glabrous bract, in terminal or axillary racemes; sepals teeth shorter than tube; petals to 7 mm long, vexillum emerginate. Pods stipitate, to 0.8 cm long, 1–2-jointed, indented, hairy.

Flowering & Fruiting: July–December.

Common in sal forests along grassy lands up to 1400 m.

Distribution: India (Himalaya, Uttarakhand to Meghalaya), China, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122417 (BSD); Samir Sinha (2001).

17. *Pongamia* Vent., *nom.cons.*

Pongamia pinnata (L.) Pierre, Fl. For. Cochinch.: t. 385. 1899; Sanjappa, Legum. India: 230. 1992; R.D. Gaur, Fl. Distr. Garhwal: 289. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007. *Cytisus pinnata* L., Sp. Pl.: 741. 1753. *Pongamia glabra* Vent., Jard. Malm. 1: 28. 1803; Baker in Hook.f., Fl. Brit. India 2: 240. 1876. *Millettia pinnata* (L.) Panigrahi in Panigrahi & Murti, Fl. Bilaspur 1: 210. 1989; Sud. Kumar & P.V. Sane, Legum. South Asia 306. 2003. *Kainja*

Tree, evergreen, to 12 m high; branches spreading, glabrous. Leaves petioled, subcoriaceous, imparipinnate; leaflets usually, 7–11, elliptic or ovate-oblong, 4–9.5 × 2.5–5 cm, base acute, apex acuminate, glabrous on both surfaces; stipules small, caducous. Flowers bluish-white, tinged with violet or pink, in axillary racemes; raceme shorter than leaf; sepals pubescent. Pods obliquely oblong, compressed, woody, to 5 cm long, indehiscent; seeds 1 or 2, flat.

Flowering & Fruiting: March–June.

Rare in hill slopes, up to 1800 m.

Distribution: India (Assam, Jammu & Kashmir to Arunachal Pradesh, Karnataka, Uttar Pradesh, Madhya Pradesh, Meghalaya, Tamil Nadu), Australia, Bangladesh, Malaysia, Myanmar, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

18. **Pueraria** DC.

Pueraria tuberosa (Roxb. ex Willd.) DC., Prodr. 2: 240. 1825; Baker in Hook.f., Fl. Brit. India 2: 197. 1876; P.C. Pant, Fl. Corbett Natl. Park: 63. 1986; Sanjappa, Legum. India: 235. 1992; R.D. Gaur, Fl. Distr. Garhwal: 290. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 365. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 418. 2020. *Hedysarum tuberosum* Roxb. ex Willd., Sp. Pl. 3: 1197. 1803. *Siralu, Kudzu* [Plate-9b]

Twining or climbing shrub, to 2 m long; stems branched, grey-pubescent, with tuberous roots. Leaves petioled, 3-foliolate, appear at flowering; leaflets ovate to obovate-rhomboid, $7.5-15.5 \times 4-10.5$ cm, base cordate, apex acuminate, glabrous above, adpressedly pubescent beneath; stipules lateral. Flowers whitish-blue or purple, in axillary, pale-grey tomentose racemes; sepals reddish-brown tomentose, teeth unequal, shorter than tube; petals to 1 cm long. Pods oblong-linear, flat, hairy; hairs silky-brown; seeds reddish-brown.

Flowering & Fruiting: March–June.

Common on hill slopes along forest edges up to 1800 m.

Distribution: India (Bihar, Jammu & Kashmir to Arunachal Pradesh, N. India to S. India, Kerala, Madhya Pradesh, West Bengal), Nepal, Pakistan.

Specimens examined: Jorkhatty, R. *Manikandan* 124918 (BSD); Samir Sinha (2001).

19. **Rhynchosia** Lour., *nom. cons.*

Rhynchosia minima (L.) DC., Prodr. 2: 385. 1825; Baker in Hook.f., Fl. Brit. India 2: 223. 1876; P.C. Pant, Fl. Corbett Natl. Park: 64. 1986; Sanjappa, Legum. India: 237. 1992; R.D. Gaur, Fl. Distr. Garhwal: 291. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 367. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 420. 2020. *Dolichos minimus* L., Sp. Pl.: 726. 1753. *Rhynchosia laxiflora* Camb. in Jacq., Voy. Bot.: 44, t. 54. 1844.

Trailing or twining herb, perennial, to 50 cm long; stems branched at base, pubescent. Leaves petioled, 3-foliolate; leaflets ovate-cordate, $1.1-3.5 \times 0.8-2.8$ cm, base rounded to subcordate, apex acute to obtuse, mucronate, glabrous above, adpressedly pubescent beneath; stipules ovate-lanceolate. Flowers yellow, in axillary, hairy racemes; bracts ovate-lanceolate; sepals brown-tomentose, teeth longer than tube; petals to 8 mm long. Pods oblong-falcate, to 2 cm long, glabrous; seeds 2, brown.

Flowering & Fruiting: July–October.

Common on hill slopes on bushes, along grassy areas up to 1500 m.

Distribution: India (Jammu & Kashmir to Arunachal Pradesh, N. India to S. India), Bhutan, Myanmar, Nepal, Pakistan, Sri Lanka. Pantropical.

Specimens examined: Way to Adnala, R. *Manikandan* 122338 (BSD).

20. **Shuteria** Wight & Arn., *nom. cons.*

Shuteria vestita (Wall.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 207. 1834. *Glycine involucrata* Wall., Pl. Asiat. Rar. 3: 22. t. 241. 1832. *Shuteria involucrata* (Wall.) Wight & Arn., Prodr. Fl. Indiae Or. 207. 1834; P.C. Pant, Fl. Corbett Natl. Park: 64. 1986; Sanjappa, Legum. India: 245. 1992; R.D. Gaur, Fl. Distr. Garhwal: 293. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 372. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007. *S. vestita* Wight & Arn. var. *involucrata* (Wall.) Baker in Hook.f., Fl. Brit. India 2: 182. 1876.

Twining or climbing herb, annual or perennial, to 8 m long; stems slender, branched, sparsely hairy. Leaves petioled, trifoliolate, ovate-elliptic to oblong, $2-4 \times 1-2.5$ cm, base subrounded, apex rounded or retuse, mucronate, subcoriaceous, glabrous above, subglabrous-pale beneath; stipules ovate. Flowers pinkish or reddish, many, in axillary fascicled racemes; sepals teeth linear, equal; petals to 9 mm long. Pods linear-oblong, flat, to 3.5 cm long, rusty-brown, hairy; seeds 5–7, brown.

Flowering & Fruiting: October–March.

Common in open grassy slopes, along road side areas up to 1800 m.

Distribution: India (Jammu & Kashmir to Arunachal Pradesh, North to Central & South India, Punjab), Bhutan, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Way to Halduparao-Kanekal, R. *Manikandan* 124876 (BSD).

21. *Tephrosia* Pers.

- 1a. Undershrub; stems angular; seeds 10–151. *T. candida*
 1b. Herb; stems terete; seeds 5–9 2. *T. purpurea*

1. ***Tephrosia candida*** (Roxb.) DC., Prodr. 2: 249. 1825; Baker in Hook.f., Fl. Brit. India 2: 111. 1876; P.C. Pant, Fl. Corbett Natl. Park: 65. 1986; Sanjappa, Legum. India: 256. 1992; R.D. Gaur, Fl. Distr. Garhwal: 295. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 311. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 111. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 430. 2020. *Robina candida* Roxb., Fl. Ind. 3: 327. 1832. *Ban neel, Van tor*

Undershrub, perennial, erect, to 2 m high; stems angular, branched, velvety-pubescent. Leaves imparipinnate, petioled; leaflets 17–25, elliptic-oblong or elliptic-lanceolate, $3.5-8 \times 0.5-1.4$ cm, base cuneate to subrounded, apex acute, mucronate, glabrous above, silky-hairy beneath; stipules ovate-lanceolate. Flowers purple or bluish, in axillary, pedunculate racemes or clusters; bracts lanceolate; sepals 6–8 mm long, pubescent, teeth acute, shorter than tube; petals to 2 cm long, vexillum obovate or rounded, wings feathery; keel longer than vexillum. Pods oblong, curved at apex, silky-brown, pubescent; seeds 10–15, reniform, brown.

Flowering & Fruiting: September–November.

Common on grassy hill slopes, way sides.

Distribution: India (Arunachal Pradesh, Gujrat, Jammu & Kashmir, Madhya Pradesh, Sikkim, Tamil Nadu, West Bengal), Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Tephrosia purpurea*** (L.) Pers., Syn. Pl.: 329. 1807; Baker in Hook.f., Fl. Brit. India 2: 112. 1876; P.C. Pant, Fl. Corbett Natl. Park: 65. 1986; Sanjappa, Legum. India: 258. 1992; R.D. Gaur, Fl. Distr. Garhwal: 295. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 313. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 111. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 431. 2020. *Cracca purpurea* L., Sp. Pl.: 752. 1753. *Gelega purpurea* L., Sp. Pl. ed. 2, 2: 1063. 1753. *Tephrosia wallichii* Grah. ex Fawc. & Rendle, J. Bot. 55: 35. 1917. *T. hamiltonii* J.R. Drum. ex Gamble, Fl. Pres. Madras: 320. 1918.

Herb, annual or perennial, erect, to 40 cm high; stems terete, branched, pale-pubescent. Leaves petioled, imparipinnate; leaflets 9–13, oblong-obovate or oblanceolate, $0.7-1.2 \times 0.4-0.8$ cm, base cuneate,

apex obtuse to subrounded, mucronate, glabrous above, pubescent beneath; stipules triangular. Flowers 5–8 mm long, bluish-pink or purple, many, in leaf opposed, axillary racemes; bracts lanceolate; sepals 3–4 mm long, pubescent, teeth acute, longer than tube; petals to 6 mm long. Pods oblong, slightly curved at apex, to 5.5 cm long, pale-brown, thinly hairy; seeds 5–9, reniform, brown.

Flowering & Fruiting: September–November.

Common on open dry, sandy, rocky hill slopes, way sides up to 1500 m.

Distribution: India (Jammu & Kashmir to Arunachal Pradesh, Sikkim, West Bengal, Madhya Pradesh, Tamil Nadu, Gujrat, Punjab, West Bengal), Australia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125613, 125739, 125576 (BSD); Samir Sinha (2001).

22. *Uraria* Desv.

- 1a. Flowers pink or blue; pods 1–3 jointed 1. *U. lagopodioides*
 1b. Flowers purple; pods 5–7 jointed 2. *U. lagopus*

1. ***Uraria lagopodioides*** (L.) Desv., Mem. Soc. Linn. Paris 4: 309. 1826; P.C. Pant, Fl. Corbett Natl. Park: 65. 1986; Sanjappa, Legum. India: 268. 1992; R.D. Gaur, Fl. Distr. Garhwal: 298. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 218. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 112. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 436. 2020. *Hedysarum lagopodioides* L., Sp. Pl.: 1198. 1753. *Uraria lagopodioides* (Burm.f.) DC., Prodr. 2: 324. 1825; Baker in Hook.f., Fl. Brit. India 2: 156. 1876.

Herb or undershrub, perennial, erect, to 80 cm high; stems woody branched, with stiff, scabrid-pubescent. Leaves petioled, 1–3-foliolate; leaflets ovate or elliptic, 1.5–7.5 × 1–4.5 cm, base subrounded, apex obtuse, mucronate, glabrous above; pubescent beneath; stipules narrowed. Flowers pinkish or blue, fascicled, in axillary, densely hairy racemes; bracts to 1.8 cm long, ciliated; sepals pubescent; petals equal or slightly longer than calyx. Pods 1.5–3 cm long, 1–3 jointed, glabrous.

Flowering & Fruiting: August–November.

Common on open dry places, up to 1500 m.

Distribution: India (Himachal Pradesh to Sikkim, N.E. India, Orissa, Tamil Nadu), Australia, Bhutan, China, Malaysia, Myanmar, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Uraria lagopus*** DC., Ann. Sci. Nat. 4: 100. 1823; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 358. 2020. *U. neglecta* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 382. 1897. *U. lagopus* DC. var. *neglecta* (Prain) H. Ohashi, Fl. E. Himalaya 70. 1975. *U. aequilobata* Hosok., J. Soc. Trop. Agric. 4: 202. 1932. *U. hamosa* (Roxb.) Wall. ex Wight & Arn. var. *formosana* Matsum., J. Coll. Sci. Imp. Univ. Tokyo 12: 411. 1900. *U. fujianensis* Y.C. Yang & P.H. Huang, Bull. Bot. Res., Harbin 1(3): 11–12. 1981. *U. longibracteata* Y.C. Yang & P.H. Huang, *l.c.* 14–16.

Herb, erect or subshrub; stems densely gray-yellow tomentose and spreading pubescent. Leaves petioled, pinnately 3-foliolate, sometimes 1-foliolate; leaflet blades ovate, orbicular, or oblong, terminal one 1.5–6 × 1.2–4.5 cm, base broadly cuneate, rounded, or slightly cordate, apex rounded or emarginate, mucronate. Flowers purple, in terminal and axillary racemes, densely hairy with gray-yellow spreading glandular

hairs; sepals 5, narrowly triangular, subequal; petals standard obovate, base cuneate, apex rounded; wings and keel auricular-oblong. Pods 5–7-jointed, slightly compressed, glabrous.

Flowering & Fruiting: September–November.

Grows on hillslopes, roadsides and along field margins.

Distribution: India (Himalaya), Bangladesh, China, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

23. *Vigna* Savi

- 1a. Leaves acute at apex; pods pubescent 1. *V. radiata*
 1b. Leaves obtuse at apex; pods glabrouscent 2. *V. trilobata*

1. ***Vigna radiata*** (L.) Wilczek, Fl. Congo Belge 6: 386. 1954; P.C. Pant, Fl. Corbett Natl. Park: 65. 1986; Sanjappa, Legum. India: 275. 1992; R.D. Gaur, Fl. Distr. Garhwal: 302. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 381. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 113. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 446. 2020. *Phaseolus radiatus* L., Sp. Pl.: 725. 1753. *P. mungo* L. var. *radiatus* (L.) Baker in Hook.f., Fl. Brit. India 2: 203. 1876. *P. aureus* Roxb., Fl. Ind. Ed. Carey 3: 297. 1832. Moong

Suberect or twining herb, annual, to 40 cm long; stems branched, angular with brown spreading hairs. Leaves petioled, trifoliate; leaflets ovate-rhomboid or ovate, 4.5–7 × 2.5–5.5 cm, membranous, base subrounded, apex acute, sparsely pubescent on both surfaces; stipules peltate, ovate. Flowers yellow, 6–12, in axillary racemes; sepals bilipped, hairy; teeth acute, short; petals to 1.3 cm long. Pods linear, subcylindric, to 8.5 cm long, turgid, hairy; seeds oblong, green.

Flowering & Fruiting: April–September.

Commonly cultivated; rarely as escape in hill slopes, near crop fields up to 2000 m.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125562, 122414 (BSD); Samir Sinha (2001).

Uses: Important pulse crop.

2. ***Vigna trilobata*** (L.) Verdc., Taxon 17: 172. 1968; P.C. Pant, Fl. Corbett Natl. Park: 66. 1986; Sanjappa, Legum. India: 270. 1992; R.D. Gaur, Fl. Distr. Garhwal: 303. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 382. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 113. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 440. 2020. *Dolichos trilobatus* L., Mant. 1: 101. 1767. *Phaseolus trilobatus* (L.) Schreb., Nov. Act. Acad. Caes. Leop. Carol. Germ. Nat. Currois 4: 132. 1770; *sensu* Baker in Hook.f., Fl. Brit. India 2: 201. 1876, *non* Baill., 1883. Moth, Mugum

Suberect or twining herb, annual, diffuse, to 20 cm long; stems branched, angular, pubescent or glabrous. Leaves petioled, trifoliate; leaflets trilobed, orbicular-obovate or rhomboid-ovate, 2–5 × 1–3.5 cm, membranous, base subrounded, apex obtuse, glabrous above, pubescent on nerves beneath; stipules ovate-lanceolate. Flowers yellow, in dense, erect, hairy racemes; sepals bilipped, hairy, teeth short; petals 6–7 mm long. Pods stalked, linear-oblong, subcylindric, to 5 cm long, turgid, glabrous; seeds oblong, 6–12, brown.

Flowering & Fruiting: August–November.

Uncommon in river side areas, grassy localities, near crop fields up to 2300 m.

Distribution: India (Himachal Pradesh to Arunachal Pradesh, Tamil Nadu, Karnataka, Madhya Pradesh, Orissa, Maharashtra, Sikkim), Bangladesh, Bhutan, Myanmar, Nepal, Pakistan, Sri Lanka.

Uses: Cultivated also for fodder.

Notes: Included on the authority of Samir Sinha (2001).

24. *Zornia* Gmel.

Zornia gibbosa Span., Linnaea 15: 192. 1841; P.C. Pant, Fl. Corbett Natl. Park: 66. 1986; R.D. Gaur, Fl. Distr. Garhwal: 304. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 138. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 113. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 441. 2020. *Z. diphylla* auctt. non (L.) Pers. 1807; Hook.f., Fl. Brit. India 2: 147. 1876, *p.p.* *Z. angustifolia* Sm. in Rees, Cyclop. 39: 200. 1819 *nom. illeg.* *Z. graminea* Span., Linnaea 15: 192. 1841. *Dwipat*

Herb, annual, prostrate or ascending, to 20 cm high; stems thin, branched at base, many, glabrous or pubescent. Leaves petioled, 2-foliate; leaflets lanceolate to linear-lanceolate, $0.6-3 \times 0.3-0.7$ cm, base cuneate, apex acute-acuminate, glabrous above, glandular-punctate beneath; stipules lanceolate. Flowers greenish-white, 3–15, in racemes; bracts foliaceous, black dotted, enclosing the flowers; sepals upper two teeth united, ciliate; petals to 7 mm long. Pods compressed, 2–5 jointed, indehiscent, scabrid, bristly, pale-brown.

Flowering & Fruiting: August–September.

Common in mild hill slopes, grassy localities, wasteland, up to 2800 m.

Distribution: India (Assam, Bihar, Jammu & Kashmir to Arunachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu), Australia, Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125514, 122324, 122384 (BSD); Samir Sinha (2001).

Uses: Roots are sedative, given to children to increase sleep. Plant extract is reported to be used in colic pain and indigestion.

Cultivated species:

1. ***Cicer arietinum*** L., Sp. Pl.: 738. 1753; Baker in Hook.f., Fl. Brit. India 2: 176. 1876; Sanjappa, Legum. India: 113. 1992; R.D. Gaur, Fl. Distr. Garhwal: 260. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 140. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 99. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 442. 2020. *Chickepea*, *Chana*, *Chandaka*.

Herb, erect or ascending to 60 cm high; stems tetragonus, much branched from base, glandular-hairy. Leaves imparipinnately compound, subsessile; leaflets oblong or oblanceolate-ovate, glandular-pubescent on both surfaces. Flowers pinkish or bluish, axillary, solitary. Pods oblong, turgid, glandular-pubescent; seeds 1–4, wrinkled at maturity, rusty-brown.

Flowering & Fruiting: April–December.

Cultivated as cold seasonal crop, rare as an escape.

Distribution: India (Jammu Kashmir to Tamil Nadu), Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

2. **Lablab purpureus** (L.) Sweet, Hort. Brit. Edit 1: 481. 1827; Sanjappa, Legum. India: 199. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 349. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 108. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 443. 2020. *Dolichos lablab* L., Sp. Pl.: 725. 1753; Baker in Hook.f., Fl. Brit. India 2: 209. 1876. *Sema*

Twining herb, perennial or annual, to 50 cm long; stems weak, branches hairy. Leaves petioled, trifoliolate; leaflets 3.5–10.5 × 2.5–8.5 cm, ovate-obovate or suborbicular, subrounded at base, acuminate at apex, glabrous above, pubescent on nerves beneath; stipules lanceolate, reflexed. Flowers reddish-purple or white, in axillary racemes; bracts 3–4 mm long; sepals bilipped; petals to 1.5 cm long. Pods $\pm$ 10 cm long, subtergoid or flat, oblong, glabrous.

Flowering & Fruiting: March–November.

Widely cultivated in the tropics.

Uses: Pods are edible.

3. **Phaseolus vulgaris** L., Sp. Pl.: 723. 1753; Baker in Hook.f., Fl. Brit. India 2: 200. 1876; Sanjappa, Legum. India: 228. 1992; R.D. Gaur, Fl. Distr. Garhwal: 287. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 359. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 444. 2020. *French bean, Palas bean, Rajmah, Semi*

Twining to climbing herb, annual or biennial, to 80 cm long; stems terete or angular, hairy. Leaves trifoliolate, elliptic-cordate or ovate-cordate, base rounded, apex caudate-acuminate, glabrous or pubescent on both surfaces. Flowers white or pink, 1–3, in axillary racemes. Pods oblong-lanceolate, turgid, 5–12 cm long, pale-green; seeds white or brown, smooth.

Flowering & Fruiting: February–December.

Cultivated, often found as an escape.

Uses: Pods and seeds are edible.

4. **Pisum sativum** L., Sp. Pl.: 727. 1753; Baker in Hook.f., Fl. Brit. India 2: 181. 1876; Sanjappa, Legum. India: 229. 1992; R.D. Gaur, Fl. Distr. Garhwal: 288. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 418. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 445. 2020.

Trailing or climbing herb, annual, to 90 cm long; stems angular, glabrous. Leaves petioled, ending in branched tendrils, leaflets 4–6, elliptic-ovate or obovate, base subcordate, apex apiculate, glabrous or pubescent on both surfaces; stipules foliaceous, ovate-elliptic. Flowers white or purple, axillary racemes. Pods oblong-falcate, turgid, 3; seeds 4–8, rounded, pale-brown.

Flowering & Fruiting: September–March.

Cultivated or as an escape, up to 2800 m.

Uses: Pods and seeds are edible.

5. **Vicia faba** L., Sp. Pl.: 737. 1753; Baker in Hook.f., Fl. Brit. India 2: 179. 1876; Sanjappa, Legum. India: 269. 1992; R.D. Gaur, Fl. Distr. Garhwal: 300. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 419. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 113. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 446. 2020. *Bankla, Seochana*

Herb, annual, erect; stems tetra angular, deeply grooved, glabrous or pubescent. Leaves petioled, leaflets 2–6, elliptic or ovate-oblong, base subrounded, apex obtuse, mucronate, sparsely pubescent beneath; stipules ovate-hastate. Flowers white or purple-white, in axillary or subterminal racemes. Pods oblong, cylindric, pubescent; seeds 3–7, white.

Flowering & Fruiting: March–April.

Cultivated for its as vegetable; rarely as an escape.

Uses: Pods and seeds are edible.

35. CAESALPINIACEAE

- 1a. Plants armed.....4. **Guilandina**
- 1b. Plants unarmed..... 2
- 2a. Leaves simple.....1. **Bauhinia**
- 2b. Leaves compound.....6
- 3a. Trees.....2. **Cassia**
- 3b. Herbs or undershrubs or shrubs.....10
- 4a. Herbs.....3. **Chamaecrista**
- 4b. Undershrubs or shrubs.....5. **Senna**

1. **Bauhinia** L.

- 1a. Woody climbers 4. *B. vahlii*
- 1b. Trees 2
- 2a. Leaves size below 10 cm long 3
- 2b. Leaves size above 10 cm long 4
- 3a. Flowers in paniculate racemes 1. *B. malabarica*
- 3b. Flowers in corymbose racemes 2. *B. racemosa*
- 4a. Flowers yellow with red spots on veins, in terminal, corymbose panicles 3. *B. semla*
- 4b. Flowers white to purple, in lateral racemes 5. *B. variegata*

1. **Bauhinia malabarica** Roxb., Fl. Ind. (ed. 2) 2: 321. 1832; Baker in Hook.f., Fl. Brit. India 2: 277. 1878; P.C. Pant, Fl. Corbett Natl. Park: 66. 1986; R.D. Gaur, Fl. Distr. Garhwal: 243. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007. *Amli, Amlosa, Khatwa* [Plate-9d]

Tree, to 8 m high; branches angular; bark pale brown. Leaves petioled, suborbicular, broader than long, 4–10 × 6–11.5 cm, coriaceous, apex cut halfway to the middle, base cordate to truncate, margin entire, sparsely pubescent above, glabrous beneath. Flowers pale white, in terminal, shortly peduncled, paniculate

racemes; bracts triangular, deciduous; sepals tube to 4 mm long, limb 5-cleft, brown, pubescent; petals spathulate, to 1.2 cm long, glabrous; stamens 10, all fertile, unequal, somewhat united at base. Pods straight, stalked, $15-22 \times 1.7-2.3$ cm, flat, many-seeded; fruiting stalk 3.5–4 cm long.

Flowering & Fruiting: August–May.

Common, usually in tropical deciduous forests associated with *Shorea robusta*, cultivated as ornamental plant.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, China, Malayasia, Myanmar, Nepal, Pakistan, Philippines.

Specimens examined: Sonanadi WLS, R. *Manikandan* 115728, 125728 (BSD); Samir Sinha (2001).

Uses: Branches have fodder value; leaves are eaten as vegetables; wood used as fuel.

2. **Bauhinia racemosa** Lam., Encycl. 1: 390. 1785; Baker in Hook.f., Fl. Brit. India 2: 276. 1878; P.C. Pant, Fl. Corbett Natl. Park: 66. 1986; R.D. Gaur, Fl. Distr. Garhwal: 244. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 328. 2020. *Jhanjora, Kandlao, Papri*

Tree, to 10 m high, deciduous; branches sparsely pubescent; bark dark bluish-brown. Leaves petioled, ovate-orbicular, broader than long, $2-5 \times 2.5-7$ cm, coriaceous, apex cut near to the middle, base cordate, margin entire, pubescent beneath, 7–9-veined. Flowers pale white, in terminal, leaf-opposed, corymbose racemes; bracts subulate, deciduous; sepals tube ≈ 2.5 mm long, limb 5-toothed, reflexed; petals oblanceolate, glabrous; stamens 10, all fertile, unequal, united at base; stigma sessile. Pods falcate, turgid, to 15×2 cm, irregularly reticulate, glabrous; seeds 12–20, compressed, red-brown.

Flowering & Fruiting: March–February.

Common, along river banks and drier parts of exposed forests, to 1600 m in Shiwalik hills; cultivated as ornamental plant.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125744 (BSD); Vatanvasa- Haldu Parao, H.C. Pande 220856(LWG); Samir Sinha (2001).

Uses: Wood is used as fuel; fibres obtained from bark is used to make ropes; barks, leaves and fruits are medicinal; an important tree in social forestry.

3. **Bauhinia semla** Wunderlin, Taxon 25: 362. 1976, *p.p.*; P.C. Pant, Fl. Corbett Natl. Park: 67. 1986; R.D. Gaur, Fl. Distr. Garhwal: 244. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 329. 2020. *B. retusa* Buch.-Ham. ex Roxb., Fl. Ind. ed. 2, 2: 322. 1832, *auct. non* Poir. (1811); Baker in Hook.f., Fl. Brit. India 2: 279. 1878

Quiral, Semlu, Semla

Tree, to 20 m high, deciduous; bark dark brown. Leaves petioled, suborbicular, broader than long, $9-15 \times 9.5-16$ cm, coriaceous, base cordate, margin entire, apex retuse, sparsely pubescent beneath, 9–11-veined. Flowers yellow with red spots on veins, in terminal, corymbose panicles; bracts small, deciduous; sepals 4–5 mm long, nearly split to base into 2–3 segments; petals obovate, clawed, pubescent; stamens 10, 3 fertile, rest sterile, unequal; style produced; stigma large. Pods oblanceolate, flat, to 15×3.5 cm, hard, glabrous, deep red; seeds smooth, dark brown.

Flowering & Fruiting: September–March.

Common, throughout the Siwalik tracts and in outer Himalaya, to 1800 m.

Distribution: India (throughout except Jammu & Kashmir, Kerala, Northeastern states), Bangladesh, Nepal, Pakistan.

Uses: Wood is used as timber and fuel; gums obtained from bark used medicinally; leaves as fodder, an important tree in social forestry.

Notes: Included on the authority of Samir Sinha (2001).

4. **Bauhinia vahlii** Wight & Arn., Prodr. Fl. Ind. Orient. : 297. 1834; Baker in Hook.f., Fl. Brit. India 2: 279. 1878; P.C. Pant, Fl. Corbett Natl. Park: 67. 1986; R.D. Gaur, Fl. Distr. Garhwal: 244. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007. *Phanera vahlii* Benth., Pl. Jungh. 2: 263. 1852; R.K. Gupta, Fl. Nainital.: 107. 1968. *Malu, Malijhan, Taur* [Plate-9c]

Large woody climber, to 40 m long, evergreen; branchlets velvety pubescent, often terminating in a pair of revolute tendrils. Leaves petioled, variable, 10–45 × 8–48 cm, subcoriaceous, base cordate, margin entire, apex shallowly to deeply cut, glabrous above, densely pubescent beneath, 11–15-veined. Flowers pale white to yellowish white, in terminal, corymbose racemes; bracts lanceolate, caducous, basal, woolly pubescent; bracteoles small, at or just above pedicel, woolly pubescent; sepals tube 5–8 mm long, limb splitting into 2 lobes, densely rusty pubescent; petals obovate, obtuse, shortly clawed, white-canescens; stamens 10, 3 fertile, rest sterile, unequal; style long. Pods woody, flat, to 32 × 7 cm, rusty pubescent; seeds 8–12, suborbicular, flat, dark brown.

Flowering & Fruiting: April–November.

Frequent, tropical and subtropical Sal forests, also pine forests in Siwalik tracts, to 1800 m.

Distribution: India (throughout except north eastern states), Bangladesh, Nepal, Pakistan, Sri Lanka.

Specimens examined: Almost throughout the Sanctuary, R. *Manikandan* 124875, 122429, 125711 (BSD).

Uses: Wood as fuel; fibres obtained from bark variously used to bind mats and temporary huts; leaves as occasional fodder, also made into plates, cups, grain storage-sacs; seeds used as tonic and aphrodisiac; roasted seeds are eaten.

5. **Bauhinia variegata** L., Sp. Pl.: 375. 1753; Baker in Hook.f., Fl. Brit. India 2: 284. 1878; P.C. Pant, Fl. Corbett Natl. Park: 67. 1986; R.D. Gaur, Fl. Distr. Garhwal: 245. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 329. 2020. *Guiral, Kachnar*

Tree, to 20 m high, deciduous; bark dark brown. Leaves petioled, as broad as long, sometimes broader, suborbicular, 6–14 × 7–15 cm, subcoriaceous, base cordate, margin entire, apex cut halfway to the middle, glabrous, 9–11-veined. Flowers white to purple, in lateral racemes; bracts ovate, caduceous; sepals turbinate, tube 1.5–3 cm long, limb spathaceous, apex 5-toothed, externally pubescent; petals obovate or oblong, obtuse; stamens 10, 3–5 fertile, rest sterile, unequal; style long; stigma minute. Pods slightly falcate, flat, to 30 × 2.5 cm, dark brown, glabrous; seeds 10–15.

Flowering & Fruiting: February–July.

Rare on hill slopes and elsewhere, to 1200 m.

Distribution: India (throughout), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

Uses: Wood used for making agricultural implements, light weight constructions; bark is tonic and useful in skin diseases, also used for tanning; leaves as fodder; flowers as vegetables; dried buds are used in dysentery, piles, diarrhoea and worms; roots are antidote to snake bite; an important tree in social forestry.

Notes: Included on the authority of Samir Sinha (2001).

2. *Cassia* L.

***Cassia fistula* L.**, Sp. Pl. 1: 377. 1753; Baker in Hook.f., Fl. Brit. India 2: 261. 1878; P.C. Pant, Fl. Corbett Natl. Park: 68. 1986; R.D. Gaur, Fl. Distr. Garhwal: 247. 1999; V. Singh, Monogr. Ind. Subtr. Cassiinae: 25. f. 1. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 323. 2020. *Amaltas, Kirala*

Tree, to 20 m high; branchlets pubescent. Leaves petioled; leaflets 3–8 pairs, ovate-elliptic or elliptic-lanceolate, 8–18 × 4–7 cm, base subcuneate, margin entire, apex acute or subacuminate with mucro point, densely pubescent beneath; stipules deltoid, acute, pubescent, deciduous. Flowers yellow, in axillary, many-flowered, pendulous racemes; bracts ovate, pubescent, caducous; bracteoles linear, caduceous; sepals ovate-oblong, obtuse, pubescent; petals obovate, acute to obtuse, pubescent, sessile or shortly clawed; stamens 10, all fertile, unequal; filaments straight to curved; anthers sagittate at base; styles subglabrous; stigma sublateral, punctiform. Pods cylindric, to 55 × 2.5 cm, terete, pendulous, glabrous, black; seeds ovate.

Flowering & Fruiting: Almost throughout the year

Common in tropical to subtropical deciduous forests; also cultivated as ornamental.

Distribution: India (throughout the country), Tropical Africa, Asia, Australia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122498 (BSD).

Uses: Timber is used for making household and agricultural equipments, also provides fuel and charcoal; bark used for tanning, also possess tonic and anti-dysenteric properties; leaves used in skin diseases; fruit is used as analgesic and antipyretic.

3. *Chamaecrista* Moench.

- 1a. Leaflets in 2 pairs, obovate-suborbicular; seeds 5–8, rhomboid1. *C. absus*
 1b. Leaflets in 3–25 pairs, linear-oblong; seeds 8–12, obovate-oblong2. *C. pumila*

1. ***Chamaecrista absus* (L.) Irwin & Barneby**, Mem. New York Bot. Gard. 35(2): 664. 1982; V. Singh, Monogr. Ind. Subtr. Cassiinae: 55. f.7. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 305. 2020. *Cassia absus* L., Sp. Pl. 1: 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 265. 1878; P.C. Pant, Fl. Corbett Natl. Park: 67. 1986; R.D. Gaur, Fl. Distr. Garhwal: 246. 1999. *Chaaksee*

Herb, annual, erect, to 75 cm high; branches clothed with glandular setae and fine pubescence. Leaves petioled; leaflets in 2 pairs, obovate to suborbicular, 1.8–3 × 0.8–2 cm, base oblique, margin entire, apex mucronate, gland-dotted, pubescent on both surfaces; stipules linear, acute, recurved, persistent. Flowers yellow, pedicelled, in terminal and leaf-opposed racemes; bracts broadly ovate; bracteoles 2, linear-subulate; sepals oblong-ovate, obtuse, membranous, glandular pubescent outside; petals broadly obovate, rounded, narrowed at base to form a claw; stamens 4–5; filaments straight; styles glabrous; stigma ciliate. Pods strap-shaped, 2–4 × 0.5–0.6 cm, compressed, shortly beaked, pubescent; seeds 5–8, rhomboid.

Flowering & Fruiting: July–December.

Common, as undergrowth in dry deciduous forests and wastelands in wet and shady habitats.

Distribution: India (throughout except north-eastern states), Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122371 (BSD).

Uses: The leaves are used as purgative, remedy for cough, asthma and bronchitis; decoction of seeds is used to purify blood, to cure ring worms and eye diseases.

2. **Chamaecrista pumila** (Lam.) V. Singh, J. Econ. Taxon. Bot. 16(3): 600. 1992 & Monogr. Ind. Subtr. Cassiinae: 84. f. 15. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 306. 2020. *Cassia pumila* Lam., Encycl. Meth. Bot. 1(2): 651. 1785; Baker in Hook.f., Fl. Brit. India 2: 266. 1878; P.C. Pant, Fl. Corbett Natl. Park: 68. 1986; R.D. Gaur, Fl. Distr. Garhwal: 248. 1999. [Plate-9e]

Herb or undershrub, erect or prostrate, to 60 cm high; branches pubescent. Leaves petioled; leaflets in 3–25 pairs, linear-oblong, 5–13 × 1.5–3 mm, chartaceous, base oblique, margin entire, apex aristate, ciliolate, glabrescent on veins beneath; stipules lanceolate, aristate-acuminate, ciliate. Flowers yellow, solitary or 1–3, in supra-axillary; bracts lanceolate, acuminate; bracteoles linear, acute, persistent; sepals lanceolate, acuminate, externally pubescent; petals elliptic-obovate, acute, narrowed at base to form a claw; stamens 5, all fertile; filaments equal, glabrous; styles glabrous; stigma peltate, ciliate. Pods strap-shaped, c. 4 × 0.3 cm, slightly falcate, sparsely pubescent; seeds 8–12, obovate-oblong.

Flowering & Fruiting: August–December.

Common, usually in grassy habitats of wastelands and along waysides, to 2300 m.

Distribution: India (throughout except northeastern states and West Bengal), Tropical Africa, Tropical Asia.

Specimens examined: Morghatty, R. *Manikandan* 125530, 125642 (BSD).

Uses: Seeds yield a high quality gum and also possess purgative properties.

4. **Guilandina** L.

Guilandina bonduc L., Sp. Pl. 1: 381. 1753; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 308. 2020. *Caesalpinia bonduc* (L.) Roxb., Fl. Ind. (Ed. Carey) 2: 362. 1832; Hattink, Reinwardtia 9: 17. 1974; P.C. Pant, Fl. Corbett Natl. Park: 67. 1986; R.D. Gaur, Fl. Distr. Garhwal: 245. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007. *C. bonducella* (L.) Fleming, Asiat. Res. 11: 159. 1810, *nom. illeg.*; Baker in Hook.f., Fl. Brit. India 2: 254. 1878. *Guiral, Kanja, Karaunj*

Large rambling shrub, to 12 m high; branches grey-downy, laden with recurved prickles. Leaves petioled, to 40 cm long; stipules 2-fid; pinnae 6–8 pairs; leaflets opposite, in 6–10 pairs, elliptic-oblong, 1–3 × 0.8–1.3 cm, membranous, base somewhat truncate, margin entire, apex obtuse, mucronate, glabrous above, downy beneath. Flowers yellow, in simple or paniculate racemes; bracts linear-lanceolate, apex slightly recurved; sepals rusty tomentose; petals oblanceolate, obtuse; stamens 10, free; styles filiform. Pods oblong, to 8 × 5 cm, coriaceous, dehiscent, with numerous prickles; seeds 2 or 3, ovoid, shining black.

Flowering & Fruiting: August–December.

Frequent, in warmer parts on exposed hill slopes and near habitation, generally in abandoned places.

Distribution: India (almost throughout the country), Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Rathuadhab-Mundiapani, R. *Manikandan* 124938, 124962 (BSD); Samir Sinha (2001).

Uses: Seeds used in colic, intermittent fever and disturbed menstruation; cotyledons used as substitute of quinine.

5. *Senna* Mill.

- 1a. Tree; leaflets upto 15 pairs 3. *S. siamea*
 1b. Herb or undershrub; leaflets upto 5 pairs 2

- 2a. Young branches ridged; leaflets ovate, acute at apex 2. *S. occidentalis*
 2b. Young branches not ridged; leaflets obovate, mucronate at apex 3

- 3a. Petals elliptic; pods terete, slightly falcate; seeds obovate 1. *S. obtusifolia*
 3b. Petals narrowly ovate; pods linear-cylindric, seeds rhomboid 4. *S. tora*

1. ***Senna obtusifolia*** (L.) Irwin & Barneby, Mem. New York Bot. Gard. 35(1): 252. 1982; V. Singh, Monogr. Ind. Subtr. Cassiinae: 164. f. 36. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 115. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 316. 2020. *Cassia obtusifolia* L., Sp. Pl. 1: 377. 1753; P.C. Pant, Fl. Corbett Natl. Park: 68. 1986. *C. tora sensu* Benth., Trans. Linn. Soc. London 27: 532. 1871, *p.p.*, *auct. non* L. (1753); Baker in Hook.f., Fl. Brit. India 2: 263. 1878, *p.p.*

Banarb, Chakwar, Chakunda, Panwar

Herb or undershrub, to 1.5 m high; young branches pubescent. Leaves petioled; leaflets 3 pairs, obovate, 2–5 × 0.8–3 cm, base cuneate, margin entire, apex rounded, mucronate, pubescent; stipules linear, sparsely pubescent. Flowers yellow or orange, pedicelled, in axillary, 1–2-flowered racemes; bracts ovate-lanceolate, acute, ciliate; sepals ovate, obtuse, pubescent outside; petals elliptic, subacute, base oblique; stamens 10, 7 fertile, 3 sterile, unequal; styles incurved; stigma oblique, ciliate. Pods terete, $c. 20 \times 0.5$ cm, turgid, slightly falcate, pubescent; seeds obovate.

Flowering & Fruiting: August–April.

Grows on wastelands and forest margins, to 1500 m.

Distribution: India (throughout except north-eastern states), naturalized in tropics.

Specimens examined: Halduparao-Kanekal, R. *Manikandan* 124879 (BSD); Samir Sinha (2001).

Uses: The tender leaves, twigs and pods are cooked as vegetables. The plants are used as a warm remedy in gout, sciatica and joint pains. Leaves are also administered internally in vomiting, stomach ache and headache.

2. ***Senna occidentalis*** (L.) Link, Handbuch 2: 140. 1831; V. Singh, Monogr. Ind. Subtr. Cassiinae: 170, f. 37. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 115. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 316. 2020. *Cassia occidentalis* L., Sp. Pl. 1: 377. 1753; Baker in Hook.f., Fl. Brit. India 2: 262. 1878; P.C. Pant, Fl. Corbett Natl. Park: 68. 1986; R.D. Gaur, Fl. Distr. Garhwal: 248. 1999.

Chakunda, Kasaundi, Taror [Plate-9f]

Herb or undershrub, to 2 m high; young branches ridged, pubescent. Leaves petioled; leaflets in 3–5 pairs, ovate, 3–8 × 1.2–3.5 cm, base cuneate, margin entire, apex acute, ciliate, glabrous, sometimes glandular

beneath; stipules ovate-lanceolate, acute. Flowers yellow, pedicelled, in axillary, 2–4-flowered racemes; bracts ovate-lanceolate, caudate-acuminate, deciduous; sepals ovate, obtuse, glabrescent; petals obovate, subequal, rounded, base attenuate; stamens 10(7+3), unequal; anthers straight to falcate; stigma hooded. Pods linear, to 18×1 cm, compressed, straight or slightly falcate, septate, brown; seeds obovate.

Flowering & Fruiting: Throughout the year.

Grows in wastelands, near habitations, road sides and forest margins, to 1500 m.

Distribution: India (throughout except north-eastern states), Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125578, 122415 (BSD); Vatanvasa forest, Hussian & Pande 220286 (LWG).

Uses: It possesses purgative, tonic, febrifugal, expectorant and diuretic properties. The tender leaves and pods are cooked as vegetables, which are considered prophylactic against leucorrhoea; roots used in snake-bite and leaves in skin diseases.

3. **Senna siamea** (Lam.) Irwin & Barneby, Mem. New York Bot. Gard. 35(1): 98. 1982; V. Singh, Monogr. Ind. Subtr. Cassiinae: 193. f. 42. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 115. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 317. 2020. *Cassia siamea* Lam., Encycl. Meth. Bot. 1(2): 648. 1785; Baker in Hook.f., Fl. Brit. India 2: 264. 1878; Gaur, Fl. Garhwal: 248. 1999.

Tree, to 20 m high; branches spreading, pubescent. Leaves petioled; leaflets in 4–15 pairs, elliptic-oblong or obovate-oblong, $3-7 \times 0.8-2$ cm, subcoriaceous, apex rounded or emarginate, base unequal, margin entire, glaucous above, pubescent beneath, glands absent; stipules linear-subulate or acicular, pubescent, caducous. Flowers yellow, in terminal corymbose panicles; bracts solitary, spatulate, caducous; sepals ovate-orbicular, externally pubescent; petals orbicular to obovate, rounded, sessile to shortly clawed; stamens 10, all fertile, unequal; styles glabrous; stigma punctiform. Pods strap-shaped, flat, to 25×1.5 cm, dehiscent, pubescent; seeds 20–30, oblong, flat, light brown.

Flowering & Fruiting: Throughout the year

Common, found in forests, also along road sides and planted in botanic gardens.

Distribution: India (throughout except western states), Pantropical.

Specimens examined: Vatanvasa, B. *Datta* & H.C. *Pande* 220893 (LWG).

Uses: Can be used for afforestation in degraded soil.

4. **Senna tora** (L.) Roxb., Fl. Ind. ed. 2, 2: 340. 1832; V. Singh, Monogr. Ind. Subtr. Cassiinae: 222. f. 49. 2001; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 116. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 318. 2020. *Cassia tora* L., Sp. Pl. 1: 376. 1753; Baker in Hook.f., Fl. Brit. India 2: 263. 1878, *p.p.*; P.C. Pant, Fl. Corbett Natl. Park: 68. 1986; R.D. Gaur, Fl. Distr. Garhwal: 249. 1999.

Chakunda, Panvarb

Herb or undershrub, to 1.5 m high; branchlets spreading. Leaves petioled; leaflets in 3 pairs, obovate or obovate-oblong, $2.5-5.5 \times 1.8-3.5$ cm, apex obtuse-mucronate, base oblique, ciliolate, sparsely pubescent; glands $c.$ 3.2 mm long, linear-cylindric, between lowest 2 pairs of leaflets; stipules linear, ciliate. Flowers yellow, in axillary, solitary, peduncled racemes; bracts $c.$ 4 mm long, linear, acute, fugacious; sepals narrowly ovate, obtuse, externally pubescent; petals narrowly ovate, standard retuse at apex; stamens 10(7+3),

subequal; anthers rounded at top; stigma truncate, ciliate. Pods linear-cylindric, to 16×0.6 cm, straight or slightly curved, beaked, glabrescent; seeds many, rhomboid, prominently veined.

Flowering & Fruiting: July–January.

Common, gregariously found in wastelands, along roads, rails and as undergrowth in forests, to 1550 m.

Distribution: India (throughout), Pantropical.

Specimens examined: Halduparao-Kanekal, R. *Manikandan* 124880 (BSD).

Uses: The leaves are used as a substitute for tea and also taken with jaggery in the early morning as a remedy for migraine; seeds are laxative; root-paste is applied as an antidote for snake-bite and scorpion-sting. The roots also possess purgative and anthelmintic properties.

Cultivated species:

1. **Delonix regia** (Boger ex Hook.) Raf.-Sch., Fl. Tellur. 2: 92. 1837; R.D. Gaur, Fl. Distr. Garhwal: 249. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 324. 2020. *Poinciana regia* Bojer ex Hook. in Bot. Mag. 56: 5, t. 2884. 1829; Baker in Hook.f., Fl. Brit. India 2: 260. 1878. *Gulmohar*

Tree, to 18 m high, deciduous; branches forming umbrella shaped crown. Leaves bipinnate, feathery; leaflets in 15–25 pairs, oblong, membranous, base somewhat truncate, margin entire, apex obtuse, glabrous above, pubescent beneath, sessile. Flowers red or orange-red, pedicelled, in simple, terminal, corymbose racemes. Pods oblong, flat, dehiscent; seeds 4–8, ovoid, compressed.

Flowering & Fruiting: April–December.

Common near habitation and on forest edges.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Myanmar, Nepal, Pakistan, Sri Lanka.

Uses: Widely cultivated as ornamental plant.

2. **Peltophorum pterocarpum** (DC.) Backer ex K. Heyne, Nutt. Pl. Ned.- Ind. (ed. 2) 2: 755. 1927; Sanjappa, Legum. India 33. 1992; Sanjappa in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 311. 2020. *Inga pterocarpa* DC., Prodr. 2: 441. 1825. *Caesalpinia ferruginea* Decne., Nouv. Ann. Mus. Hist. Nat. 3: 462. 1834. *Peltophorum ferrugineum* (Decne.) Benth., Fl. Austral. 2: 279. 1864; Baker in Hook.f., Fl. Brit. India 2: 257. 1878.

Tree, to 20 m high. Leaves bipinnate; leaflets 8–22 pairs. Flowers golden-yellow, in panicles. Pods ellipsoid-oblong, flat, dark-brown. Seeds 1–4.

Flowering & Fruiting: January–June.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Myanmar, Nepal, Pakistan, Sri Lanka.

Notes: Rathuadhap, B. Datta & H.C. Pande 220358 (LWG). It is a native of Australia. Planted along roadsides.

3. **Tamarindus indica** L., Sp. Pl. 1: 34. 1753; Baker in Hook.f., Fl. Brit. India 2: 273. 1878; R.D. Gaur, Fl. Distr. Garhwal: 250. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 114. 2007; Sanjappa in A.A. Mao

& S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 335. 2020. *T. officinalis* Hook. in Bot. Mag. 77: t. 4563. 1851. *Imli* [Plate-9g]

Tree, to 20 m high, with dense crown; bark grayish-white. Leaves paripinnate, leaflets 10–12 pairs, oblong or oblong-lanceolate, apex obtuse, base rounded, margin entire, glabrous, sessile. Flowers yellowish-orange, zygomorphic, pedicelled, in terminal racemes. Pods oblong, pulpy, slightly falcate, wall crustaceous, subcompressed; seeds rectangular, compressed, shining black.

Flowering & Fruiting: Throughout the year.

Occasionally planted on road side and in wastelands.

Distribution: India (throughout the country), Africa, Bangladesh, Bhutan, Nepal, Pakistan, Sri Lanka.

Notes: Seen near Hathikhund FRH and included on the authority of Samir Sinha (2001).

Uses: Wood useful for several purposes; fruit edible and medicinally used as laxative and refrigerant.

36. MIMOSACEAE

- 1a. Shrubs 3. **Mimosa**
1b. Trees 2

- 2a. Stems armed 1. **Acacia**
2b. Stems unarmed 2. **Albizia**

1. **Acacia** Mill.

- 1a. Rambling climber 2
1b. Tree 3
2a. leaflets 10–30 pairs; seeds 5–10 4. *A. torta*
2b. Leaflets 30–50 pairs; seeds 8–14 2. *A. pennata*
3a. Stems c. 18 m high; leaflets 30–45 pairs 1. *A. catechu*
3b. Stems c. 6 m high; leaflets 6–12 pairs 3. *A. pseudoeburnea*

1. **Acacia catechu** (L.f.) Willd., Sp. Pl. 4(2): 1079. 1806; Baker in Hook.f., Fl. Brit. India 2: 295. 1878; P.C. Pant, Fl. Corbett Natl. Park: 69. 1986; Sanjappa, Legum. India: 38. 1992; R.D. Gaur, Fl. Distr. Garhwal: 236. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 82. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 116. 2007. *Mimosa catechu* L.f., Suppl. Plant. Syst. Veg. 439. 1781. *Gaitri, Katha, Khadira, Khair*

Tree, medium sized deciduous, to 18 m high; bark pale ashy to dark brown sometimes partly brackish; prickles pseudo-stipular, in pairs below petioles. Rachis to 15 cm long, with gland between uppermost pair of pinnae, lowest gland is comparatively large from others c. 0.2 × 0.1 cm. Pinnae 10–30 pairs. Leaflets 30–45 pairs, linear, glabrous, sessile, subacute. Flowers pale yellow or creamy-white with green flower buds, in axillary, solitary or fascicled, in long spikes. Pods smooth, flat, 4–8 × 1.2–2 cm, thin, sometimes constricted, stalked, dehiscent, 3–6-seeded.

Flowering & Fruiting: April–March.

Common on alluvial soils, often associated with *Shisham*.

Distribution: India (throughout India except Andaman & Nicobar Islands, Dadra & Nagar Haveli, Daman & Diu, Goa, Gujarat, Lakshadweep, Manipur, Meghalaya, Mizoram, Nagaland, Tripura), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125618 (BSD).

Uses: The wood is highly valued for its hardness, durability and ants resistant; also use as fuel and considered to produce quality charcoal; used in digestive and respiratory diseases. Bark used in bronchitis, diarrhea, dysentery and menstrual disorders.

2. ***Acacia pennata*** (L.) Willd., Sp. Pl., ed. 4: 1090. 1806; Baker in Hook.f., Fl. Brit. India 2: 297. 1878, *p.p.*; P.C. Pant, Fl. Corbett Natl. Park: 69. 1986; Sanjappa, Legum. India: 42. 1992; R.D. Gaur, Fl. Distr. Garhwal: 238. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 94. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 116. 2007. *Mimosa pennata* L., Sp. Pl.: 522. 1753. *Agla, Rigad*

Large rambling climber, to 25 m high; branches armed with short, recurved prickles, usually in 4–5 rows. Leaves petioled; rachis with gland between upper 2–3 pairs of pinnae; pinnae 10–18 pairs, 4–10 cm long; leaflets in 30–50 pairs or more, 3–5 × 0.5–1.4 mm, linear, oblique, ciliate along margins. Flowers white in globose, pedunculated terminal panicles; petals slightly longer than calyx. Pods straight, strap-shaped, stalked, to 15 × 1 cm, 8–14 seeded, glabrous, dehiscent.

Flowering & Fruiting: August–December.

Frequent, in the subtropical forests, to 1500 m.

Distribution: India (Throughout except Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Yanam), Tropical Africa, Bangladesh, Bhutan, Malay Islands, Myanmar, Sri Lanka, Thailand.

Use: Wood used as fuel; bark used as an antidote to snake bite.

Notes: Included on the authority of Samir Sinha (2001).

3. ***Acacia pseudoeburnea*** Drumm., Kew Bull. 1922: 185. 1922; P.C. Pant, Fl. Corbett Natl. Park: 69. 1986; Sanjappa, Legum. India: 43. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 94. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 116. 2007. *Kikar, Pahari-Kikar*

Moderate sized deciduous tree, to 6 m high; bark pale grey; stipular spines straight; dark-brown, old ones whitish. Rachis glandular hairy; pinnae 1–6 pairs, 2.8–4 cm long. Leaflets 6–12 pairs, oblong, to 0.3 × 0.1 cm, coriaceous, glaucous, upper most pair with large gland. Flowers white, fragrant or pale yellow, in pedunculate globose heads; petals twice as long as calyx. Pods flat, linear, 7–12 × 0.5 cm, glabrous, shining, 5–10-seeded, shallowly constricted between the seeds.

Flowering & Fruiting: March–August.

Occasional, in submontane forests, to 1000 m.

Distribution: India (Bihar, Haryana, Jammu & Kashmir, Punjab, Rajasthan, Uttarakhand, Uttar Pradesh).

Notes: Included on the authority of Samir Sinha (2001).

4. ***Acacia torta*** (Roxb.) Craib in Bull. Misc. Inform. Kew 1915: 410. 1915; P.C. Pant, Fl. Corbett Natl. Park: 69. 1986; Sanjappa, Legum. India: 43. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 99. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 116. 2007. *Mimosa torta* Roxb., Fl. Ind. 2: 566. 1932. *A. pennata sensu* Baker in Hook.f., Fl. Brit. India 2: 297. 1878, *p.p. non* (L.) Willd. 1806. *Aila, Alay, Alia, Katnar*

Large rambling climber or tree spiny, perennial, to 16 m high; branches more or less 5-gonous. Leaves rachis 12–20 cm long, 5-channelled; bearing spines under surface; bark smooth, pale brown; pinnae 6–13 pairs, 4–12 cm long; leaflets 10–30 pairs, 4–6 × 2–3 mm, upper surface green, glabrous, lower glaucous, pubescent. Flowers white, pale-yellow in globose heads on terminal panicles; petals hardly twice as long as calyx. Pods thin, flat, to 15 × 2.5 cm, clothed with minute hairs when young, 5–10-seeded.

Flowering & Fruiting: August–April.

Occasional, found in sub-Himalayan tracts, throughout Bhabar and low valleys, to 1100 m.

Distribution: India (throughout except Dadra & Nagar Haveli, Delhi, Manipur, Meghalaya, Mizoram, Nagaland, Tripura), Pakistan, Thailand.

Notes: Included on the authority of Samir Sinha (2001).

2. *Albizia* Durazz.

- 1a. Leaflets 4–8 pairs; heads c. 4 cm across 1. *A. lebbeck*
 1b. Leaflets 5–15 pairs; heads c. 2 cm across 2

- 2a. Barks greyishbrown; rachis 10–20 cm long 2. *A. odoratissima*
 2b. Barks yellowish or greenish white bark; rachis 10–20 cm long 3. *A. procera*

1. ***Albizia lebbeck*** (L.) Benth. in Hook., London J. Bot. 3: 87. 1844; Baker in Hook.f., Fl. Brit. India 2: 298. 1878; P.C. Pant, Fl. Corbett Natl. Park: 70. 1986; Sanjappa, Legum. India: 56. 1992; R.D. Gaur, Fl. Distr. Garhwal: 239. 1999; Sud. Kumar & P.V. Sane, Legum. South Asia: 103. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 117. 2007. *Mimosa lebbeck* L., Sp. Pl. 1: 516. 1753. *Acacia lebbeck* (L.) Willd., Sp. Pl., ed. 4: 1066. 1806. *Kala-siris, Shirish, Siras, Siris, Sirisha* [Plate-9h]

Small deciduous tree, to 20 m high; with dark-grey bark. Leaves with 8–13 cm long rachis; gland near the base of petioles and one between uppermost pair of pinnae; pinnae 2–3 pairs, 8–12 cm long; leaflets 4–8 pairs, obliquely elliptic-oblong, 3–4 × 1.2–2 cm, obtuse or retuse, glabrescent, mid-rib near upper margins. Flowers greenish-white, greenish-yellow, shortly pedicelled, fragrant, on 5–10 cm long pedunculate heads, arranged in corymbose racemes or heads to 4 cm across; sepals funnel-shaped; petals twice as long as calyx. Pods flat, straw-coloured, to 30 × 4 cm, 6–10-seeded.

Flowering & Fruiting: April–November.

Locally common in open places, forest edges, submontane tracts, to 1200 m.

Distribution: India (throughout the country), Pantropical.

Specimens examined: Way to Adnala, R. *Manikandan* 122598 (BSD).

Uses: Woods used for making articles and furniture; leaves as fodder for cattle; seeds and barks used in diarrhea, dysentery, eye complaints and in piles; gums used in ulcer; flowers as bee-forage.

2. ***Albizia odoratissima*** (L.f.) Benth., London J. Bot. 3: 88. 1844; P.C. Pant, Fl. Corbett Natl. Park: 70. 1986; Sanjappa, Legum. India: 57. 1992; R.D. Gaur, Fl. Distr. Garhwal: 240. 1999; Kumar & Sane, Legumes South Asia Checkl.: 104. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 117. 2007. *Mimosa odoratissima* L.f., Suppl. Pl.: 437. 1781. *Acacia odoratissima* (L.f.) Willd., Sp. Pl., ed. 4: 1063. 1806. *Albizia odoratissima* var. *mollis* Benth. ex Baker in Hook.f., Fl. Brit. India 2: 299. 1878. *Bansa, Bassein, Kalasiras*

A deciduous tree, to 20 m high; bark greyish-brown. Leaves 2-pinnate; rachis 10–20 cm long; gland near the petioles and in between uppermost pair of pinnae; pinnae usually 4 pairs; leaflets 7–15 pairs, 1.5–2.6 × 0.5–1 cm, sparse-hairy beneath. Flowers pale yellow, fragrant, a terminal panicle, 2 cm across heads; sepals 1–1.5 mm long; petals 4–5 mm long, funnel-shaped. Pods reddish-brown, thin, flat, to 20 × 3 cm, 6–12 seeded.

Flowering & Fruiting: March–June.

Grows in deciduous forests of Shiwalik range, in moist localities.

Distribution: India (Andaman Islands, Assam, Bihar, Delhi, Gujarat, Karnataka, Kashmir, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Sikkim, Uttarakhand, Tamil Nadu, West Bengal), Bhutan, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Uses: Wood used for making several articles, cart-wheels and furniture; foliage lopped for fodder; barks used to poison fishes.

Notes: Included on the authority of Samir Sinha (2001).

3. **Albizia procera** (Roxb.) Benth., London J. Bot. 3: 89. 1844; Baker in Hook.f., Fl. Brit. India 2: 299. 1878; P.C. Pant, Fl. Corbett Natl. Park: 70. 1986; R.D. Gaur, Fl. Distr. Garhwal: 240. 1999; Sanjappa, Legum. India: 58. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 105. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 117. 2007. *Mimosa procera* Roxb., Pl. Coromandel 2: 12. 1799. *Acacia procera* (Roxb.) Willd., Sp. Pl., ed. 4: 1063. 1806. *Dun siris*, *Karab*, *Karabi*, *Kirmihi*, *Safed-siras*

A deciduous tree, to 30 m high; yellowish or greenish white bark. Leaves petioled, evenly 2-pinnate, 20–30 cm long rachis; gland near base of petioles; pinnae 2–5 pairs. Leaflets 5–15 pairs, obliquely ovate-oblong. Flowers yellowish-white, c. 1.5 cm across heads, arranged in solitary or 2–5 corymbosely racemes; sepals glabrous; petals twice as calyx. Pods brown, flat, to 15 × 2.5 cm, glabrous, 6–10-seeded.

Flowering & Fruiting: May–December.

Locally common, found in outer Himalayan tracts, in moist localities, to 800 m.

Distribution: India (Andaman, Arunachal Pradesh, Bihar, Delhi, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Nagaland, Odisha, Rajasthan, Uttarakhand, Uttar Pradesh, West Bengal), Australia, Malaysia, Myanmar, Philippines.

Uses: Bark used for tanning, to intoxicate fishes and for making cart-wheels, agricultural implements; seed powder used in gonorrhea; flowers as source of bee-forage.

Notes: Included on the authority of Samir Sinha (2001).

3. **Mimosa** L.

Mimosa himalayana Gamble, Bull. Misc. Inform. Kew 1920: 4. 1920; Sanjappa, Legum. India: 68. 1992; Sud. Kumar & P.V. Sane, Legum. South Asia: 120. 2003; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 117. 2007. *M. rubicaulis* subsp. *himalayana* (Gamble) H. Ohashi, Enum. Fl. Pl. Nepal 2: 126. 1979; P.C. Pant, Fl. Corbett Natl. Park: 70. 1986. *M. rubicaulis sensu* Baker in Hook.f., Fl. Brit. India 2: 291. 1878, *p.p.*, *auct. non* Lam. 1783. *Aila*, *Kingrei* [Plate-10a]

An erect or straggling prickly, deciduous shrubs, to 3 m high, armed with small, hooked spines. Leaves pinnately compound, 10–15 cm long, sensitive, petiolate. Leaflets in 6–14 pairs, linear, oblong, acute, with

bristle like gland between each pair. Flowers red or pink, turning to white, purplish, axillary, solitary or clustered, on 1 cm across heads; oblong-globular heads; sepals campanulate, shortly toothed; petals connate at the base; stamens exserted. Pods to 8×1.2 cm, linear-oblong, flat, spinous bristly; seeds 5–10.

Flowering & Fruiting: July–December.

Locally common in grassland and fallow fields, to 1500 m.

Distribution: India (almost throughout the country), Afghanistan, Bhutan, Nepal, Pakistan.

Specimens examined: Pokhro-Hathikund, R. *Manikandan* 125505 (BSD); Vatanvasa forest, H.C. Pande 218042 (LWG).

Uses: Charcoal is prepared from the wood, excellent plant for hedges; leaves are used for cough and cold, bronchitis and urinary complaints.

37. ROSACEAE

- 1a. Trees; flowers white3. **Pyrus**
1b. Herbs; flowers yellow2

- 2a. Leaf margins serrate; flowers in terminal, in racemes1. **Agrimonia**
2b. Leaf margins dentate; flowers in axillary, in solitary 2. **Fragaria**

1. **Agrimonia** L.

Agrimonia pilosa Ledeb. subsp. **japonica** var. **nepalensis** (D. Don) Nakai, Bot. Mag. Tokyo 47: 247.1933; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 117. 2007; Purohit in A.A. Mao & S.S. Dash, Fl. Pl. India Annot. Checkl. Dicot. 1: 447. 2020. *A. nepalensis* D. Don, Prodr. Fl. Nepal. 229. 1825. *A. eupatorium sensu* Hook.f., Fl. Brit. India 2: 361. 1878, *non*. L. 1753. [Plate-10b]

Herb, erect, perennial, to 1 m high; stems branched, sparsely pilose and pubescent, with short, usually tuberous rhizomes; stipules falcate, rarely ovate-lanceolate, foliaceous, margin sharply serrate or lobed. Leaves petioled, interruptedly pinnate; leaflets 3–4 pairs, unequal, alternate, $1.5-5 \times 1-2.5$ cm, obovate-elliptic or obovate-lanceolate, cuneate to broadly so at base, rounded to acute at apex, serrate along the margins, densely pubescent on veins beneath. Flowers yellow, in terminal racemes; bract triparted with linear segments; bracteoles ovate, entire or lobed; calyx lobes 5, triangular-ovate; corolla lobes oblong. Fruits $c. 8 \times 4$ mm, obovoid-conic, 10-ribbed, pilose, with prickles.

Flowering & Fruiting: May–September.

Common on hill slopes and in deciduous forests.

Distribution: India (Himalayas, N. India, Sikkim), Bhutan, China, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Vatanvasa, T.S. Rana & party 220256 (LWG).

2. **Fragaria** L.

Fragaria indica Andrews., Bot. Repos. 7: pl. 479. 1807; Hook.f., Fl. Brit. India 2: 343. 1878. *Duchesnea indica* (Andrews) Focke in Engler & Prantl, Nat. Pflanzenfam. 3(3): 33. 1888; R.K. Gupta, Fl. Nainital.: 119. 1968; P.C. Pant, Fl. Corbett Natl. Park: 70. 1986; R.D. Gaur, Fl. Distr. Garhwal: 222. 1999. *Potentilla indica* (Andrews) Wolf, Syn. Mitteleur Fl. 6(1): 661. 1904; Dikshit & Panigrahi, Family Rosaceae India 4: 133, f. 28, 29. 1998; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 120. 2007. *Bhium kaphal*, *Kaphlya* [Plate-10c]

Herb, perennial, to 50 cm high; rootstocks stout, slender. Leaves petioled, trifoliate; radical leaves longer than cauline leaves; stipules connate or adnate to petioles, with free auricles. Leaflets elliptic to obovate, 20–35 × 10–20 mm, apex rounded, margin dentate, base cuneate, pubescent. Flowers yellow, solitary, axillary; epicalyx obovate, apex toothed, sparsely pubescent; sepals ovate, acute, pubescent outside; petals obovate, apex emarginated; stamens many; styles lateral, as long as ovary; stigma swollen. Achenes smooth, glabrous.

Flowering & Fruiting: April–December.

Common, found in shady, moist slopes and alongside streams, to 2500 m.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Punjab, Rajasthan, Tamil Nadu, Uttarakhand, West Bengal), Afghanistan, N. America, Bhutan, China, Europe, Iran, Korea, Malaysia, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

3. *Pyrus* L.

Pyrus pashia Buch.-Ham. ex D. Don, Prodr. Fl. Nepal: 236. 1825; Hook.f., Fl. Brit. India 2: 374. 1878; R.K. Gupta, Fl. Nainital: 122. 1968; Ghora & Panigrahi, Family Rosaceae India 2: 400. 1995; R.D. Gaur, Fl. Distr. Garhwal: 228. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 122. 2007.

Mehal, Melu, Mole [Plate-10d]

Tree, to 15 m high; barks dark brown, lenticellate; branches sometimes with spines, young ones pubescent, becoming glabrous. Leaves petioled, simple, 3–5-lobed in young branches, ovate or ovate-lanceolate, 6–11 × 3–5 cm, base rounded or subcordate, margin serrate-crenate, apex acuminate, glabrous on both surfaces, later becoming glabrescent; stipules lanceolate, acuminate, pubescent inside, glabrous outside. Flowers white, few, in terminal corymb or umbellate cymes; bracts glabrous to pubescent. Hypanthium campanulate, pubescent; sepals deciduous, ovate or oblong-lanceolate, apex acuminate, base broad, entire, pubescent on both sides; petals obovate-orbicular, apex rounded, base shortly clawed, entire, glabrous; stamens in 2 series; filaments glabrous; styles free. Fruits globose, c. 2 cm across, yellowish-brown, black on ripening, speckled with white spots.

Flowering & Fruiting: November–March.

Common, found in open places, forest edges, rocky slopes, to 2500 m.

Distribution: India (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Uttarakhand, West Bengal), Afghanistan, China, Laos, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Specimens examined: Rathuadhap, *H.C. Pande* 220847 (LWG).

Uses: Wood used to make sticks; leaves and twigs as fodder; fruits edible and also used in digestive disorders; flowers useful in apiculture (Gaur, 1999).

4. *Rubus* L.

- 1a. Leaves 5–9-foliolate; flowers pink or purple2. *R. niveus*
 1b. Leaves 3-foliolate; flowers white.....1. *R. ellipticus*

1. ***Rubus ellipticus*** Sm. in Rees, Cyclop. 30: Rubus no. 16. 1819; Hook.f., Fl. Brit. India 2: 336. 1878; R.K. Gupta, Fl. Nainital: 114. 1968; P.C. Pant, Fl. Corbett Natl. Park: 71. 1986; R.D. Gaur, Fl. Distr. Garhwal: 230. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 123. 2007. *Hinsar, Hisalu* [Plate-10e]

Large shrub, to 2 m high; branches purplish-brown, with curved prickles and densely covered reddish-bristles, also with glandular hairs. Leaves petioled, imparipinnate, 3-foliolate; leaflets obovate or obovate-elliptic, $2.5\text{--}6.5 \times 2\text{--}5.5$ cm, base rounded, margin unevenly serrate, apex mucronate or truncate or acute, glabrous above, densely whitish tomentose beneath. Flowers white, few to many, in axillary or terminal, condensed racemes; bracts linear, pubescent; calyx cup cylindric, pubescent, sparsely bristly, lobes erect, broadly ovate, acute, entire, greyish-tomentose outside; petals obovate, apex rounded, base clawed; stamens numerous; filaments broad at base; styles glabrous. Fruits subglobose, *c.* 1.2 cm across, glabrous, yellow, drupelets crowded, pubescent at apex.

Flowering & Fruiting: March–June.

Common, found in forest slopes, monatne forests, forest edges, roadsides, to 2600 m.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Jammu & Kashmir, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal), Afghanistan, Bangladesh, Bhutan, China, Japan, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. Pande220747 (LWG); Sonanadi WLS, R. *Manikandan* 125686 (BSD).

Uses: Fruits are edible. Roots used as intoxicating ingredient in preparation of local beverages; flowers used in apiculture as bee-forage (Gaur, 1999).

2. **Rubus niveus** Thunb., Diss. Bot.-Med. Rubo 9, f. 3. 1813; R.K. Gupta, Fl. Nainital.: 115. 1968; P.C. Pant, Fl. Corbett Natl. Park: 71. 1986; R.D. Gaur, Fl. Distr. Garhwal: 231. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 124. 2007. R. *lasiocarpus* Sm. in Rees, Cyclop. 30: Rubus no. 6. 1819; Hook.f., Fl. Brit. India 2: 339. 1878.

Anchhu, Bhere, Bhera, Bheare, Kala Hinsalu, Kali Anchhi [Plate-10f]

Shrub, rambling or suberect, to 3 m long; branches with recurved prickles, purplish, glabrous. Leaves petioled, imparipinnate, 5–9-foliolate; leaflets ovate or ovate-elliptic, $1\text{--}7 \times 0.4\text{--}5$ cm, base deeply cuneate to truncate, margin incised-serrate, apex acute to acuminate, whitish-tomentose; stipules linear-lanceolate, apex caudate, pubescent. Flowers pink or purple, in axillary or terminal corymbose racemes; bracts linear-lanceolate, pubescent; calyx cup densely pubescent, lobes triangular-ovate, apex shortly acuminate, pubescent; petals ovate, base narrowed, glabrous; stamens numerous. Fruits globose, *c.* 7 mm across, glabrous, red; drupelets many, glabrous.

Flowering & Fruiting: July–October.

Common, found in gregarious patches in shady, moist slopes, usually in Oak forests, to 3000 m.

Distribution: India (Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Jammu & Kashmir, Sikkim, Uttarakhand, West Bengal), Bhutan, China, Japan, Myanmar, Nepal.

Specimens examined: Mundiapani, R. *Manikandan* 124927 (BSD); Samir Sinha (2001).

Uses: Fruits are edible; boiled fruits or extracts taken in dismenorrhoea; root juice used as an antidote for snake bite (Gaur, 1999).

38. COMBRETACEAE

1a. Undershrubs	2. Combretum
1b. Trees	2

- 2a. Flowers in head; fruits beaked1. **Anogeissus**
 2b. Flowers in spikes; fruits not beaked 3. **Terminalia**

1. **Anogeissus** Wall. ex Guill. & Perr.

Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill. & Perr., Fl. Seneg. tent. 1: 280. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 2: 450. 1878; Scott, Kew Bull. 33: 560. 1979; P.C. Pant, Fl. Corbett Natl. Park: 71. 1986; M. Gangop. & Chakrab., J. Econ. Taxon. Bot. 21: 288. 1997; R.D. Gaur, Fl. Distr. Garhwal: 318. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 130. 2007. *Conocarpus latifolius* Roxb. ex DC., Prodr. 3: 17. 1828. *Anogeissus latifolia* Wall., Cat. No. 40. 15. 1832, *nom. nud.* *A. latifolia* var. *glabra* C.B. Clarke in Hook.f., *l.c.* 450. *A. latifolia* var. *villosa* C.B. Clarke in Hook.f., *l.c.* *A. latifolia* var. *tomentosa* Haines, For. Fl. Chotanagpur: 364. 1910 & Bot. Bihar & Orissa 3: 355. 1955. *Bakli, Bankli, Dhauri, Dharwadi* [Plate-10g]

High deciduous tree, to 25 m high, bark smaller size with whitish-grey smooth, younger parts pubescent or glabrous. Leaves petioled, alternate or subopposite, broadly elliptic or ovate, 5–10 × 3–5 cm, apex obtuse or shortly retuse, coriaceous, pubescent when young, with 8–14 pairs of secondary nerves, prominent beneath. Flowers dense, in globose head; bracteole very minute, nearly rusty pubescent. Hypanthium c. 2 mm long, pubescent to glabrous, campanulate, limb globose, teeth small, broadly triangular; stamens exserted. Fruit almost glabrous, orbicular, c. 5 × 6 mm, laterally winged, long beaked, beak equal to or longer than main body of the fruit, yellowish-brown, crowded in a globose head.

Flowering & Fruiting: May–June.

Distribution: India (Himalaya, Punjab, throughout Central and South India), Pakistan, Sri Lanka.

Specimens examined: Way to hathikund, R. *Manikandan* 124803 (BSD); R. *Manikandan* 125591A (BSD).

Uses: The timber, called as axle wood, is used for making furniture, agricultural implements and in house building. Leaves are used for tanning and a gum extracted from it is used in calico printing.

2. **Combretum** Loebl.

Combretum nanum Buch.-Ham. in D. Don, Prodr. Fl. Nepal.: 219. 1825; DC., Prodr. 3.21. 1828; C.B. Clarke in Hook.f., Fl. Brit. India 2: 457. 1879; Parker, For. fl. Punjab 3: 242. 1956; P.C. Pant, Fl. Corbett Natl. Park: 72. 1986; M. Gangop. & Chakrab., J. Econ. Taxon. Bot. 21: 312. 1997; R.D. Gaur, Fl. Distr. Garhwal: 319. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 130. 2007.

Undershrub, decumbent; stem with much branched, to 60 cm high, with stout root-stocks, glabrous. Leaves petioled, opposite or alternate, elliptic ovate or obovate, 5–10 × 3–6.5 cm, shining, coriaceous, glabrous, minutely punctate on both sides; lateral nerves 3–4 pairs. Flowers white, 4-merous, in simple or branched, subterminal, solitary raceme; bracteoles linear-spathulate, caducous. Hypanthium sparsely glandular, punctate, limb funnel-shaped, villous inside, lobes 4, triangular, erect; petals 4, inserted on hypanthium, obovate, somewhat retuse; stamens 8, much exserted. Fruit pinkish-red, elliptic, c. 4 × 2.5 cm, with 4 broad papery wings.

Flowering & Fruiting: February–July.

Grows in dry pine or secondary scrub forests, up to 1200 m.

Distribution: India (Bihar, Himalayas, Madhya Pradesh, Orissa, Sikkim, Uttarakhand, Uttar Pradesh), Bangladesh, Bhutan, Myanmar, Nepal, Pakistan.

Specimens examined: Rathuadhab-Mundiapani, H.C. Pande 220785 (LWG); Samir Sinha (2001).

3. *Terminalia* L.

- 1a. Barks look like crocodile's skin; fruits winged3. *T. elliptica*
 1b. Barks not like crocodile's skin; fruits wingless.....2

- 2a. Barks ashy, often with a bluish ting; leaf base cuneate 1. *T. bellirica*
 2b. Barks pale greenish, gray and smooth; leaf base rounded or cordate2. *T. chebula*

1. ***Terminalia bellirica*** (Gaertn.) Roxb., Pl. Coromandal 2: 54. t. 198. 1805; Miq., Fl. Ind. Bat. 1, 1: 600. 1855; C.B. Clarke in Hook.f., Fl. Brit. India 2: 445. 1878; P.C. Pant, Fl. Corbett Natl. Park: 72. 1986; M. Gangop. & Chakrab., J. Econ. Taxon. Bot. 21: 338. 1997; R.D. Gaur, Fl. Distr. Garhwal: 320. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *Myrobalanus bellirica* Gaertn., Fruct. et Sem. Plant. 2: 90, t. 97 a–d. 1791. *Terminalia bellirica* var. *laurinoides* C.B. Clarke in Hook.f., Fl. Brit. India 2: 445. 1878. *T. punctata* Roth, Nov. Sp.: 381. 1821. *Behera* [Plate-10h]

Tree, deciduous, to 45 m high; bark ashy, often with a bluish ting. Leaves petioled, alternate or fascicled at end of branches, elliptic or elliptic obovate, 7.5–20 × 7–15 cm, base cuneate, margin entire, apex acute-acuminate or rounded, puberulous when young, glabrous on maturity, coriaceous, dotted. Flowers greenish-yellow, sessile, in axillary, loosely arranged spikes; upper male flowers, lower bisexual flowers; bracteoles minute caducous. Hypanthium densely tomentose outside, densely villous with long brown hairs inside, expanded upward in 5 recurved, triangular; stamens inserted, epigynous. Fruit obovoid, c. 2.5 cm across, covered with minute, pale pubescence, stone very thick, indistinctly 5-angled.

Flowering & Fruiting: April–December.

Distribution: India (Plains and lower hills throughout India, except western desert tracts), Myanmar, China, Malayan peninsula, Pakistan, Siam, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 124810 (BSD).

Uses: The wood is used for various purposes and the fruit constitute one of the *myrobalans* of commerce, it is used in dyeing and tanning. Native ink is prepared from it and also used in medicine. Oil is extracted from kernels and eaten by local tribes, fruits is eaten by all kind of animals.

2. ***Terminalia chebula*** Retz., Obs. Bot. 5: 31. 1789; Dalzell & Gibson, Bomb. Fl.: 91. 1861; C.B. Clarke in Hook.f., Fl. Brit. India 2: 446. 1878; P.C. Pant, Fl. Corbett Natl. Park: 72. 1986; M. Gangop. & Chakrab., J. Econ. Taxon. Bot. 21: 345, f. 19B. 1997; R.D. Gaur, Fl. Distr. Garhwal: 320. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *Myrobalanus chebula* Gaertn., Fruct. et Sem. Plant. 2: 90. t. 91. 1791. *M. gangetica* Kostel., Allg. Med. Pharm. F1. 4. 1797. *Terminalia gangetica* Roxb., Hort. beng. 33. 1814, *nom. nud.* *T. reticulata* Roth, Nov. Pl. Sp.: 381. 1821. *Haira*, *Har*, *Hararb*

Medium to large size tree, to 30 cm high; stem branched with crown spreading; bark pale greenish, gray and smooth. Leaves petioled, alternate to subopposite, elliptic-oblong or oblong, 7.5–15 × 2.5–7.5 cm, apex acute to obtuse, base rounded or cordate, usually unequal, covered with silky hairs when young, becoming glabrescent; penninerved. Flowers yellowish, all bisexual, in terminal spikes, rarely paniced, hispid; bracteoles linear, acute, pubescent, caducous; calyx tube glabrous outside, hairy within, teeth very short, broadly triangular. Drupe ellipsoid or obovoid, 2–3.5 cm long, obscurely 5-ribbed.

Flowering & Fruiting: April–June.

Occasional in lower hills and Shiwalik ranges, outer Himalaya, ascending 1500 m.

Distribution: India (Plains of Punjab, Outer Himalaya, Central India), Malayan peninsula, Myanmar, Pakistan, Siam, Sri Lanka.

Uses: The wood of black *myrobolam* is fairly hard and durable, fruit is used for dyeing and tanning, used in medicines especially for making Murabba and pickles.

Notes: Included on the authority of Samir Sinha (2001).

3. **Terminalia elliptica** Willd., Sp. Pl. ed. 4, 4(2): 969. 1806; M. Gangop. & Chakrab., J. Econ. Taxon. Bot. 21: 351, f. 21A. 1997. *T. alata* Hene ex Roth, Nov. Pl. Sp. 379. 1821; P.C. Pant, Fl. Corbett Natl. Park: 72. 1986; R.D. Gaur, Fl. Distr. Garhwal: 319. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *T. crenulata* Roth, *l.c.* 380. 1821. *Pentaptera tomentosa* Roxb. ex DC., Prodr. 3: 14. 1828. *P. coriacea* Roxb., Fl. Ind. ed. 1832, 2: 438. 1832. *Terminalia tomentosa* (Roxb. ex DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 314. 1834, *non* Mart. 1829; C.B. Clarke in Hook.f., Fl. Brit. India 2: 447. 1878. *T. coriacea* (Roxb.) Wight & Arn., *l.c.* 315. 1834, *non* Rottler ex Spreng. 1807. *T. tomentosa* var. *crenulata* (Roth) C.B. Clarke in Hook.f., *l.c.* 448. *T. tomentosa* var. *coriacea* (Roxb.) C.B. Clarke in Hook.f., *l.c.* 448. *T. alata* var. *nepalensis* Haines, Bot. Bihar & Orissa 3: 354. 1922; Uniyal & al., *l.c.* *Asaina, Asin, Sadar, Sain, Saj* [Plate-11a]

Tree, deciduous, to 20 m high; bark greyish-black with vertically deeply streaked and it looks like crocodile's skin, young parts rusty-pubescent. Leaves petioled, alternate or subopposite, elliptic-oblong or elliptic-obovate, 6.5–18.5 × 2.5–7.5 cm, base rounded, margin entire, rarely crenulate, apex acute or obtuse, glabrous or tomentose; 2-stalked or sessile, glands at lower midrib. Flowers bisexual, pale yellow, sessile, in erect, pubescent paniced spikes; bract lanceolate longer than the buds; calyx campanulate, with short triangular lobes, acute, hairy inside; petals absent. Drupes c 4.5 × 5.2 cm, globose or obovoid-oblong, dark brown or yellowish-red; 5 equal thick wings with horizontal straight venation.

Flowering & Fruiting: April–June.

Common in moist deciduous forests of lower, often associated with Sal forests.

Distribution: India (almost throughout plains, West, Central and South India), Myanmar, Nepal, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125526, 122355 (BSD).

Uses: The dark brown and streaked heart wood is largely used for building purposes and it makes excellent charcoal. The bark and fruit are used in tanning; the bark is also used in medicines. The leaves afford good fodder for cattle.

39. MYRTACEAE

Syzygium Gaertn., *nom. cons.*

- 1a. Hypanthium obconic or long pyriform; fruits ellipsoid to pot-shaped 1. *S. cumini*
 1b. Hypanthium hemispheric; fruits broadly ovoid 2. *S. nervosum*

1. **Syzygium cumini** (L.) Skeels, U.S. Dept. Agri. Bur. Pl. Industr. Bull. 248: 25. 1912; P.C. Pant, Fl. Corbett Natl. Park: 73. 1986; R.D. Gaur, Fl. Distr. Garhwal: 311. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *Myrtus cumini* L., Sp. Pl. 1: 471. 1753. *Eugenia cumini* (L.) Druce, Bot. Exch. Club Soc. Brit. Isles 3(5): 418. 1913(1914). *E. jambolana* Lam., Encycl. 3(1): 198–199. 1789; Hook.f., Fl. Brit. India 2: 499. 1879. *Syzygium jambolanum* (Lam.) DC., Prodr. 3: 259. 1828. [Plate-11b]

Tree, to 20 m high; branchlet grayish-white when dry, terete. Leaves petioled, broadly elliptic to narrowly elliptic, 5–12 × 2.5–7 cm, base broadly cuneate, rarely rounded, apex rounded to obtuse with short cuspidate, leathery, abaxially slightly pale when dry, adaxially brownish-green to blackish-brown and slightly glossy when dry, both surfaces with small glands, secondary veins numerous, intramarginal veins from margin. Flowers white or light purple, axillary on flowering branches or occasionally terminal, paniculate cymes. Hypanthium obconic or long pyriform; calyx lobes inconspicuous; petals 4, coherent, ovate and slightly rounded; stamens 3–4 mm long, equal to style. Fruit ellipsoid to pot-shaped, 1–2 cm long, red to black when mature, 1-seeded, with persistent calyx tube.

Flowering & Fruiting: March–September.

Grows in wastelands, streamsides, near secondary forests in plains, to 1200 m.

Distribution: India (almost throughout the country), Australia, Bhutan, China, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Specimens examined: Sonanadi WLS, *R. Manikandan* 125752, 122539, 122597 (BSD); Vatanvasa, *H.C. Pande* 220732 (LWG).

2. ***Syzygium nervosum*** DC., Prodr. 3: 260. 1828; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *Cleistocalyx operculatus* (Roxb.) Merr. & L.M. Perry, J. Arnold Arbor. 18(4): 337. 1937; P.C. Pant, Fl. Corbett Natl. Park: 73. 1986; R.D. Gaur, Fl. Distr. Garhwal: 311. 1999; Uniyal & al., *l.c. Eugenia operculata* Roxb., Fl. Ind. ed. 1832, 2: 486. 1832. *Syzygium operculatum* (Roxb.) Nied. in Engler & Prantl, Nat. Pflanzenfam. 3(7): 85. 1893. *Eugenia cerasoides* Roxb., *l.c.* 488. *Syzygium cerasoides* (Roxb.) Raizada, Ind. Forest. 84: 478. 1958.

Raj jamun

Tree, to 15 m high, many-branched; bark grayish-brown, thick; branchlets flattened, furrowed. Leaves petioled, oblong to elliptic, 6.5–15 × 2–7 cm, base broadly cuneate to slightly rounded, apex acute to acuminate, thinly leathery, both surfaces glandular punctate, secondary veins 9–13 on each side prominent, reticulate veins obvious. Flowers buds oval, many-flowered, in lateral on leafless branches, paniculate. Hypanthium hemispheric, not stipitate; calyptra with beaked at apex; petals obsolete; stamens 5–8 mm long. Fruit c 1.2 × 1.4 cm, broadly ovoid, violet to black when mature.

Flowering & Fruiting: March–July.

Grows along the river sides and near streams in moist mixed tropical to subtropical forests and also found under cultivation.

Distribution: India (Himachal Pradesh, NE states, Uttarakhand), Bangladesh, China, Indonesia, Malaysia, Myanmar, N Australia, Sri Lanka, Thailand, Vietnam.

Specimens examined: Vatanvasa-Mundiapani, *R. Manikandan* 124861 (BSD); Samir Sinha (2001).

Uses: Wood used for construction and agricultural implements; fruits edible and also used in diabetes; bark and leaves astringent.

Cultivated Species :

1. ***Eucalyptus camaldulensis*** Dehnhardt, Cat. Pl. Hort. Camald., ed. 2. 6, 20. 1832; R.D. Gaur, Fl. Distr. Garhwal: 312. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *E. rostrata* Cav., Icon. (Cavanilles) iv. 23. 1797; Uniyal & al., *l.c. E. rostrata* Schl., Linnaea 20: 655–656. 1847, *nom. illeg. hom. E. longirostris* F.V. Muell. ex Miq., Ned. Kruidk. Arch. 4: 125. 1856. *Safeda*

Tree, to 25 m high; bark dark gray, white, brown or red, smooth, exfoliating. Leaves opposite, broadly lanceolate or narrowly lanceolate, slightly twisted, thinly leathery, both surfaces with small black glands. Flowers buds ovoid, in axillary, simple umbels. Capsule subglobose, 5–6 mm across, disk broad; valves 3–5, exserted from hypanthium.

Flowering & Fruiting: January–March.

Planted mostly along the roadsides in plains, between 800–2500 m.

Distribution: India (Almost throughout country), Australia, China.

Specimens examined: Vatanvasa, *H.C. Pande* 220732 (LWG).

Notes: It is a native of Australia and many varieties of this species are cultivated in India.

2. **Psidium guajava** L., Sp. Pl.: 470. 1753; Duthie in Hook.f., Fl. Brit. India 2: 468. 1878 (as *guyava*); R.D. Gaur, Fl. Distr. Garhwal: 313. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 131. 2007. *Myrtus guajava* (L.) Kuntze, Revis. Gen. Pl. 3(3): 91. 1898. *Psidium pomiferum* L., Sp. Pl., ed. 2. 1: 672. 1762. *P. pyriferum* L., Sp. Pl., ed. 2. 1: 672. 1762, *nom. illeg.* *Guajava pyriferum* (L.) Kuntze, Revis. Gen. Pl. 1: 239. 1891. *Amrood, Mansala*

Medium sized tree, to 12 m high; bark gray, smooth, peeling in strips. Leaves oblong to elliptic, base rounded, apex acute to obtuse, leathery, veins prominent. Flowers white, solitary or 2–3-flowered, in cymes. Berry globose, ovoid or pyriform, c 3–8 cm across, with persistent calyx lobes at apex; flesh white or yellow; placenta reddish, well developed, fleshy. Seeds many.

Flowering & Fruiting: March–July.

Cultivated and sometimes naturalized.

Distribution: India (almost throughout the country), many tropical parts of the world.

Uses: Fruits edible, decoction of root bark given in diarrhoea; leaves chewed in throat infections and also tooth-ache. Wood is used in making agricultural equipments.

Notes: It is a native to tropical America and It has become naturalized in disturbed habitats in many tropical parts of the world.

40. LECYTHIDACEAE

Careya Roxb.

Careya arborea Roxb., Pl. Coromandel 3: 14, t. 218. 1819; C.B. Clarke in Hook.f., Fl. Brit. India 2: 511. 1879; P.C. Pant, Fl. Corbett Natl. Park: 73. 1986; Manna & D.C.S. Raju, Bull. Bot. Surv. India 36: 225. 1997; R.D. Gaur, Fl. Distr. Garhwal: 166. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007.

Kuma, Kumbi

Small to medium tree, deciduous, to 15 m high; bark dark grey. Leaves alternate, broadly obovate, oblong-obovate, 10–20 × 5.5–14 cm, cuneate or tapering at base, fleshy, crenate to denticulate along margins, rounded or obtuse to shortly acuminate at apex, coriaceous, glabrous. Flowers yellowish-white, large, few-flowered, sessile, in terminal condensed spikes at the ends of branches; bracts 3, unequal; calyx lobes ovate, obtuse at apex; corolla lobes free, fleshy, imbricate, elliptic, obtuse, caducous. Berries c 6.5 cm across, globose, green, crowned with persistent calyx, many-seeded.

Flowering & Fruiting: March–July.

Grows mostly in Sal forests of outer Himalaya and tropical deciduous forests, up to 800 m.

Distribution: India (Assam to Himachal Pradesh, Central and South India, Uttarakhand), Afganistan, Sri Lanka.

Specimens examined: Halduparao guest house, Near Kanekal R. *Manikandan* 124859, 124841 (BSD).

Uses: Wood is used for charcoal, fuel and construction. The bark used for making coarse fibre for cordage, ropes, sacking clothes and also for tanning and dyeing; fruits are edible.

41. MELASTOMATACEAE

1a. Leaves obtuse to subcordate at base; stamens 8; capsule urceolate 1. **Osbeckia**

1b. Leaves cuneate at base; stamens 3; capsule tubular 2. **Sonerila**

1. **Osbeckia** L.

Osbeckia stellata Buch.-Ham. ex Kew Gawl., Bot. Reg. 8: t. 674. 1822; R.D. Gaur, Fl. Distr. Garhwal: 317. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007. *O. paludosa* Craib, Bull. Misc. Inform. Kew 10: 262–263. 1916. *O. rostrata* D. Don, Prodr. Fl. Nepal: 221. 1825. *O. robusta* Craib, Notes Roy. Bot. Gard. Edinburgh 10(46): 54–55. 1917. *O. sikkimensis* Craib, l.c. 56–57. *O. crinita* Benth. ex C.B. Clarke in Hook.f., Fl. Brit. India 2: 517. 1879. [Plate-11c]

Herb or undershrub, to 2 m high; stem erect, angled, strigose or velutinous. Leaves petioled, opposite or ternate, oblong-lanceolate or ovate-lanceolate, 3.5–12 × 1.5–4.5 cm, stiffly papery, base obtuse to subcordate, margin entire and ciliate, apex acute or acuminate. Flower pink to purple, in terminal racemose or paniced cymose; bract 2, ovate, glabrous or sparsely strigose, margin ciliate. Hypanthium usually purple to dark purple, stellate trichomes on stalks; sepals 4, linear-lanceolate to subulate, margin ciliate, caduceus; petal 4, obovate, margin ciliate; stamens 8, inclined to one side; filaments equal to anther lengths. Capsule urceolate, contracted at middle, c. 1.8 × 0.8 cm, with rows of setiform, stellate trichomes on stalks, glabrous or basally setose, apically glabrous.

Flowering & Fruiting: July–December.

Grows in grassland on mountain slopes, sparse thickets, dry stony pastures, trailsides; 200–2300 m.

Distribution: India (N.E. India, Uttarakhand), Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122477(BSD).

2. **Sonerila** Roxb.

Sonerila erecta Jack, Malayan Misc. 1(5): 7. 1820. *S. cheliensis* H.L. Li, J. Arnold Arbor. 25(1): 36–37. 1944. *S. epilobioides* Stapf & King, J. Asiat. Soc. Bengal 69: 22. 1909. *S. shanlinensis* C. Chen, Bull. Bot. Res., Harbin 4(3): 66. 1984. *S. tenera* Royle, Ill. Bot. Himal. Mts 215, pl. 45, f. 2. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 2: 530. 1879; P.C. Pant, Fl. Corbett Natl. Park: 73. 1986; R.D. Gaur, Fl. Distr. Garhwal: 317. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007.

Herb, annual, to 18 cm high; stem slender, almost 4-sided, alate, with sparse spreading glandular trichomes. Leaves petioled, narrowly elliptic to ovate, 1–2.5 × 0.4–1.6 cm, membranous, abaxially scattered hirsute, base cuneate, margin serrulate with terminal seta, apex shortly acuminate. Flower pink to purple, 1–5-flowered, in terminal, scorpioid cymes; sepals broadly ovate-triangular, apex apiculate; petal oblong-elliptic, oblique, apex acute, with sparse glandular trichomes on ridge; stamen 3, subequal; filament as long as anther; anther broadly ovate, base forked. Capsule tubular, hypanthium sparsely glandular pilose, 6-ribbed.

Flowering & Fruiting: July–October.

Grows in forest margins, limestone hill sides, bamboo thickets, *Pinus* forests, grassy areas in trail sides, up to 1800 m.

Distribution: India (N India, Himalayas), China, Malaysia, Myanmar, Philippines, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125540 (BSD); Samir Sinha (2001).

42. LYTHRACEAE

- 1a. Trees; seeds winged2. **Lagerstroemia**
 1b. Herbs or shrubs; seeds wingless.....2
 2a. Herbs; stamens upto 83
 2b. Shrubs or undershrubs; stamens upto 124. **Woodfordia**
 3a. Flowers in cymes.....1. **Ammannia**
 3b. Flowers solitary or in spikes.....3. **Rotala**

1. **Ammannia** L.

Ammannia multiflora Roxb., Fl. Ind. 1: 447. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 2: 570. 1879; P.C. Pant, Fl. Corbett Natl. Park: 74. 1986; R.D. Gaur, Fl. Distr. Garhwal: 306. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007. *A. parviflora* DC., Prodr. 3: 78. 1828. *A. multiflora* var. *parviflora* (DC.) Koehne, Bot. Jahrb. Syst. 1: 248. 1880.

Herb, annual, to 65 cm high; stems with numerous, ascending, short branches. Leaves opposite, narrowly elliptic, broadly linear, or lanceolate-oblong, 1–2.5 × 0.3–1.2 cm, base attenuate to cordate. Flower pink to whitish, 3–7-flowered, dense, in axillary cymes; pedicellate; bracteoles linear, not reaching floral tube. Floral tube campanulate, 4-ribbed; sepals 4, deltate; petals 4, obovate, minute; stamen 4, rarely 6–8; style as long as ovary. Capsules red-brown or red-wine colored, c. 1.5 mm across, exserted.

Flowering & Fruiting: July–October.

Common in harvest fields and other wet places from 300–1200 m.

Distribution: India (almost throughout the plains), Asia, Australia, S. China, Taiwan, Tropics and subtropics of Africa.

Notes: Included on the authority of Samir Sinha (2001).

2. **Lagerstroemia** L.

Lagerstroemia parviflora Roxb., Pl. Coromandel 1: 47, t. 66. 1795; C.B. Clarke in Hook.f., Fl. Brit. India 2: 575. 1879; P.C. Pant, Fl. Corbett Natl. Park: 74. 1986; R.D. Gaur, Fl. Distr. Garhwal: 307. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007. *Adbuari*, *Dhaura*, *Dhauri*

Medium sized deciduous tree, to 10 m high; bark ash coloured, peeling off in large strips. Leaves petioled, elliptic-oblong or elliptic-lanceolate, 2.5–8.5 × 1.5–3.5 cm, entire along margins, acute to acuminate at apex, glabrous beneath, grayish-hairy and glaucous beneath, venation pinnate. Flowers white, in axillary or terminal paniced cymes; calyx base hoary-tomentose, tube hemisphere, lobes triangular, acute, with ring middle; petal oblong-ovate, with a long, slender claw. Capsules c. 3 × 2 cm, ellipsoid, 3–4-valved, appressed by calyx tube. Seeds with wings, c. 2.5 cm long, deep brown.

Flowering & Fruiting: February–October.

Grows in plains near dry deciduous forests, up to 1000 m.

Distribution: India (Almost throughout the country), Malaysia, Sri Lanka.

Specimens examined: Kanekal top, R. *Manikandan* 124862, 122382 (BSD).

Uses: Timber trees, wood is fairly durable, used for construction of building and agricultural implements.

3. *Rotala* L.

1a. Petal absent; stamens 2 or 3 2. *R. mexicana*

1b. Petals present; stamens 4 2

2a. Capsule ellipsoid, 2-valved.....1. *R. indica*

2b. Capsule globose, 4-valved.....3. *R. rotundifolia*

1. ***Rotala indica*** (Willd.) Koehne, Engler's Bot. Jahrb. 1: 172. 1881; P.C. Pant, Fl. Corbett Natl. Park: 75. 1986; R.D. Gaur, Fl. Distr. Garhwal: 308. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007. *Peplis indica* Willd., Sp. Pl. 2: 244. 1799. *Ammannia nana* Roxb., Fl. Ind. (ed. Carey). 1: 427. 1832. *A. peploides* Spreng., Syst. 1: 444. 1824; C.B. Clarke in Hook.f., Fl. Brit. India 2: 566. 1879.

Herb, annual, terrestrial or amphibious, to 40 cm high; stems creeping and branched at base, ascending or erect, terete to weakly 4-angled. Leaves decussate, obovate-elliptic or obovate-oblong, 5–15 × 3–7 mm, base cuneate, margin translucent to opaque, apex obtuse, white cartilaginous. Flowers pink, 4-merous, narrowly to broadly campanulate, 4-angled, in axillary spikes; bract like foliage leaves or distinctly smaller on axillary spikes; bracteoles linear, reaching sepals or longer; sepals 4, lanceolate-deltate; epicalyx absent; petals 4, minute, half as long as sepals; stamens 4; style as long as ovary, slightly exserted. Capsule ellipsoid, c. 1 mm across, slightly exserted, 2-valved. Seeds longer than broad.

Flowering & Fruiting: August–April.

Common in rice fields, along the streams and wet places, up to 1800 m.

Distribution: India (throughout the country), Africa, Bhutan, Cambodia, C. Asia, Europe, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, North America, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Rotala mexicana*** Schltdl. & Cham., Linnaea 5: 567. 1830; P.C. Pant, Fl. Corbett Natl. Park: 75. 1986; R.D. Gaur, Fl. Distr. Garhwal: 308. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007. *Ammannia pygmaea* Kurz ex Seem., J. Bot. 5: 376. 1867. *A. mexicana* (Schltdl. & Cham.) Baill., Hist. Pl.: 363. 1895. *Hypobrichia spruceana* Benth., Cat. Pl. Cub.: 106. 1866. *Rotala mexicana* var. *spruceana* (Benth.) Koehne, Fl. Bras. 13(2): 195. 1877.

Herb, annual, aquatic, amphibious or terrestrial, to 10 cm high; stems creeping, floating or erect and ascending, branching. Leaves 3–5-whorled; aerial leaves narrowly lanceolate to broadly linear, 5–10 × 1.5–2 mm, base narrow, apex truncate, often bicleft, submerged leaves linear. Flowers solitary, sessile, 4 or 5-merous, campanulate, translucent, in axillary; bracteoles linear, as long as floral tube; sepal 3 or 4; epicalyx absent; petals absent; stamens 2 or 3, included; style included, much shorter than ovary. Capsule c. 1 mm across, 2 or 3-valved.

Flowering & Fruiting: September–February.

Common in rice fields and wet places, up to 1200 m.

Distribution: India (throughout the country), China, Tropics and warm-temperate regions of the world.

Notes: Included on the authority of Samir Sinha (2001).

3. ***Rotala rotundifolia*** (Buch.-Ham. ex Roxb.) Koehne, Bot. Jahrb. Syst. 1: 175. 1880; P.C. Pant, Fl. Corbett Natl. Park: 75. 1986; R.D. Gaur, Fl. Distr. Garhwal: 308. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 132. 2007. *Ammannia rotundifolia* Buch.-Ham. ex Roxb., Fl. Ind. 1: 446. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 2: 566. 1879. *A. subspicata* Benth., London J. Bot. 1: 484. 1842.

Herb, perennial, to 30 cm high; stems creeping or floating, red-tinged. Leaves decussate, obovate-elliptic to orbicular or elliptic, 5–13 × 3.5–15 mm, base obtuse, apex obtuse. Flowers in 1–8 terminal, lax, emergent spikes; bracts distinctly smaller than foliage leaves; bracteoles slightly shorter than sepals, scarious; sepals 4; epicalyx absent; petals 4, bright rose, surpassing sepals; stamens 4; style included, shorter than ovary; stigma discoid. Capsules globose, c. 1.5 mm across, 4-valved.

Flowering & Fruiting: November–June.

Grows in marshes, streamsides, paddy fields, mountains, up to 2700 m.

Distribution: India (throughout the country), Bangladesh, Bhutan, China, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

4. ***Woodfordia*** Salisb.

Woodfordia fruticosa (L.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 40: 56. 1871; P.C. Pant, Fl. Corbett Natl. Park: 75. 1986; R.D. Gaur, Fl. Distr. Garhwal: 309. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 133. 2007. *Lythrum fruticosum* L. Syst. Nat., ed. 10, 2: 1045. 1759. *Grislea punctata* Buch.-Ham. ex Sm. in Rees, Cycl. xvii. n. 2. 1811. *Lythrum hunteri* DC., Prodr. 3: 83. 1828. *Woodfordia floribunda* Salib., Parad. Lond. 42. 1806; C.B. Clarke in Hook.f., Fl. Brit. India 2: 572. 1879. *Dhauila, Dhau* [Plate-11d]

Shrub or undershrub, to 4.5 m high; stems and branches pendulous, pubescent when young, becoming glabrous. Leaves lanceolate or ovate-lanceolate, 3–14 × 1–4 cm, leathery, abaxially sparsely to densely tomentose and orange to black glandular punctate, adaxially glabrous, base rounded to subcordate, apex acuminate. Flowers light red, red-orange, or deep red, in condensed axillary cyathiform; sepals oblong-ovate or deltate; epicalyx segments scarcely present; petals 6, thin, linear-lanceolate, as long as sepals; stamens 12, inserted above ovary base, long-exserted. Capsules elongate, elliptic. Seeds reddish-brown.

Flowering & Fruiting: January–May.

Common in forests and on open slopes, up to 1800 m.

Distribution: India (throughout the country), Bhutan, China, Indonesia, Laos, Myanmar, Nepal, Pakistan, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124887, 125545, 125692 (BSD).

43. PUNICACEAE

Cultivated species:

Punica granatum L., Sp. Pl.: 472. 1753; C.B. Clarke, Fl. Brit. India 581; Aitch., J. Linn. Soc. 18: 59. 1880; Talbot, For. Fl. 68. 1911 (under Lythraceae); Bailey, Stand. Cyclop. Hort. 2861. 1917; Nayyar, Gloss. Ind. Med. Pl. 207. 1956; R.D. Gaur, Fl. Distr. Garhwal: 313. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 133. 2007. *Anar, Dalmiya, Darim, Danoi*

Shrub or small tree, to 3 m high, glabrous. Leaves petioled, adaxially shiny, lanceolate, elliptic-oblongate or oblong, base attenuate, apex obtuse or mucronate. Flowers bright red-orange or pale yellow, campanulate-urceolate. Berries globose, 5–12 cm across, leathery, red to yellow-green or red-brown, crowned by persistent sepals, irregularly dehiscent. Seeds ruby-red, pink, or yellowish white.

Flowering & Fruiting: March–July.

Common in cultivated in plains and hill slopes, up to 2200 m.

Distribution: India (throughout the country), C. Asia, China, Europe.

Uses: The fruit is delicious to eat; the juice used as a tonic in fevers. Dried seeds are used for adding taste to certain foods. Bark of the root and wood is used as a vermifuge for tapeworms; also used for diarrhoea and dysentery; a number of dyes can be obtained from it; black writing ink is also made from it.

44. ONAGRACEAE

- 1a. Flowers yellow 1. **Ludwigia**
1b. Flowers rose to rose-purple 2. **Oenothera**

1. **Ludwigia** L.

- 1a. Undershrub; leaves linear to subovate; capsule slightly 4-angled 1. *L. octovalvis*
1b. Herb; leaves elliptic to narrowly elliptic; capsule terete..... 2. *L. prostrata*

1. **Ludwigia octovalvis** (Jacq.) P.H. Raven, Kew Bull. 15: 476. 1962 & Fl. Taiwan 3: 895. pl. 857. 1977; P.C. Pant, Fl. Corbett Natl. Park: 76. 1986; R.D. Gaur, Fl. Distr. Garhwal: 316. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 134. 2007; I.C. Barua, Rheede 20: 64, f. 4. 2010. *Oenothera octovalvis* Jacq., Enum. Syst. Pl.: 19. 1760. *Jussiaea angustifolia* Lam., Encycl. 3(1): 331. 1789. *J. octofila* DC., Prodr. 3: 57. 1828. *J. octonervia* Lam., Encycl. 3: 332, pl. 280, f. 1. 1789. *J. pubescens* L., Sp. Pl. (ed. 2): 555. 1762. *Ludwigia pubescens* (L.) Hara, J. Jap. Bot. 28 (10): 293. 1953.

Undershrub, robust, well branched, woody at base, to 3.5 m high; stems subglabrous, puberulent or densely villous. Leaves petioled, linear to subovate, 2.5–15 × 0.5–4.2 cm, narrowly or broadly cuneate at base, apex attenuate, veins distinct. Flowers yellow, in axillary or terminal solitary; sepals 4, ovate or lanceolate; petals broadly obovate or cuneate, emarginated; stamens 8, epipetalous, slightly raised discs, with white-hairy sunken nectary; style straight; stigma subglobose, shallowly 4-lobed. Capsule cylindrical, c. 4.5 × 0.8 mm, thick, terete, pale brown with 8 darker ribs, readily and irregularly loculicidal. Seeds pluriseriate, free, brown, rounded, minute, including inflated raphe equalling seed, evenly transversely ridged.

Flowering & Fruiting: January–December.

Grows in moist places, along the streams, swamps, ponds, and lakes, up to 1000 m.

Distribution: India (throughout the country except high altitude), Throughout the tropics and subtropics of the World.

Specimens examined: Sonanadi river bank, R. *Manikandan* 125542, 122388, 122471 (BSD); Samir Sinha (2001).

2. **Ludwigia prostrata** Roxb., Fl. Ind., ed. 1820, 1: 441. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 2: 588. 1879; P.C. Pant, Fl. Corbett Natl. Park: 76. 1986; R.D. Gaur, Fl. Distr. Garhwal: 316. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 134. 2007; I.C. Barua, Rheede 20: 68, f. 7. 2010. *Jussiaea prostrata* (Roxb.) H. Lév., Repert. Spec. Nov. Regni Veg. 8: 138. 1910. *Ludwigia fruticulosa* Blume, Bijdr. Fl. Ned. Ind. Fl. Ned. Ind. 17: 1133. 1826–27.

Herb, erect, annual or short-lived perennial, to 60 cm high; stem often red tinged, often branched, subglabrous. Leaves petioled, elliptic to narrowly elliptic, 1.2–12 × 0.3–2.5 cm, glabrous or with few hairs on veins, lateral veins conspicuous, submarginal vein inconspicuous, base narrowly cuneate, apex acute. Flowers yellow, tetramerous, in axillary and terminal solitary; sepals 4, deltate, glabrous; petals narrowly spatulate; stamens as many as sepals; style slender; stigma globose. Capsule pale brown, subcylindric, slightly 4-angled, c. 2.5 cm long, glabrous, thinly walled, readily and irregularly dehiscent. Seeds free, pale brown with darker specks or transverse fine stripes, raphe narrow, inconspicuous.

Flowering & Fruiting: June–November.

Grows in wet sites such as rice paddies, flood plains, streamsides; near sea level to 800 m.

Distribution: India (N India, Himalaya), Bhutan, China, Indonesia, Nepal, Philippines, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 122351 (BSD).

2. **Oenothera** L.

Oenothera rosea L' Her. ex Ait., Hort. Kew ed. 1. 2: 3. 1789; C.B. Clarke in Hook.f., Fl. Brit. India 2: 582. 1879; P.C. Pant, Fl. Corbett Natl. Park: 76. 1986; R.D. Gaur, Fl. Distr. Garhwal: 316. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 134. 2007. *Hartmannia rosea* (L' Her. ex Ait.) G. Don in Sweet, Hort. Brit. ed. 3. 236. 1839.

Herb, perennial, to 40 cm high; stems with well branched, ascending, densely strigillose, rarely mixed with sparse villous hairs. Leaves petioled, subentire or sinuate-pinnatifid, elliptic or rarely narrowly ovate, 2–5 × 1–2.5 cm, cuneate to attenuate at base, margin entire, acute to acuminate at apex. Flowers rose to rose-purple, opening near sunrise, mature buds erect; sepals as long as petals; petals obovate; style slender, straight; stigma surrounded by anthers. Capsule clavate, c. 3 cm long, tapering to sterile stipe-like portion, ridge on each valve prominent, valve narrowly winged. Seeds numerous, indistinct rows in each locule, oblong-obovoid to obovoid, finely granular, with dark spot at each end.

Flowering & Fruiting: April–September.

Grows in sandy to clay soils, along creeks or in low weedy places, 1000–2000 m.

Distribution: India (Himalaya, North India), USA, warmer regions of the world.

Notes: It can be easily distinguished from the others by its dense terminal spikes with yellow flowers, rhombic-obovate petals and arcuate-cylindric capsules. It is native of Peru, now widely introduced in several parts of the world. Included on the authority of Samir Sinha (2001).

45. **CARICACEAE**

Cultivated species:

Carica papaya L., Sp. Pl.: 1036. 1753; Mast. in Hook.f., Fl. Brit. India 2: 599. 1879; R.D. Gaur, Fl. Distr. Garhwal: 172. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 135. 2007. *Papeeta*

Dioecious, rarely monoecious, herbaceous tree with white milky juice; trunk with scars of fallen leaves. Leaves petioled, 30–60 cm long, deeply divided into several lobes, with acute apex. Flower creamy yellow, clusters, sessile, fragrant. Fruit large spherical or pyriform, $c 30 \times 15$ cm, turning yellow or orange with yellow or orange, flesh. Seeds black, many, wrinkled, each enclosed in gelatinous membrane, oval.

Flowering & Fruiting: Throughout the year.

Grows in plains and widely cultivated, up to 1700 m.

Distribution: India (throughout the country except high altitude), Throughout the tropical and subtropical countries of the world.

Uses: The ripe fruit is eaten raw, is stomachic, digestive and carminative. The milky juice of unripe fruit contains papain which has a wide range of medicinal application. It is also used in tenderizing meat, in tanning industry, for bating skins and hides and for degumming natural silk. The seeds are said to quench thirst and are also used as vermifuge.

Notes: It is a native of Tropical America.

46. CUCURBITACEAE

- 1a. Corolla lobes fimbriate 6. **Trichosanthes**
- 1b. Corolla lobes entire 2
- 2a. Male flowers without pistillode; anther cells conduplicate 2. **Diplocyclos**
- 2b. Male flowers with globose or subulate pistillode; anther cells straight 3
- 3a. Anther cells incurved or reflexed 5. **Solena**
- 3b. Anther cells straight 4
- 4a. Flowers with foliaceous bract on pedicels 4. **Momordica**
- 4b. Flowers without bract on pedicel 5
- 5a. Fruit a berry, subglobose 1. **Cucumis**
- 5b. Fruit a capsule, cylindrical or fusiform 3. **Luffa**

1. **Cucumis** L.

Cucumis maderaspatanus L., Sp. Pl. 2: 1012. 1753. *Mukia maderaspatana* (L.) M. Roem., Fam. Nat. Syn. Monogr. 2: 47. 1846; C.B. Clarke in Hook.f., Fl. Brit. India 2: 623. 1879; C. Jeffrey, Kew Bull. 34 (4): 794. 1980; P.C. Pant, Fl. Corbett Natl. Park: 77. 1986; R.D. Gaur, Fl. Distr. Garhwal: 180. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *Melothria maderaspatana* (L.) Cogn. in A. & C. DC., Monogr. Phan. 3: 623. 1881. *Bryonia cordifolia* L., Sp. Pl. 2: 1012. 1753. *Coccinia cordifolia* (L.) Cogn. in A. & C. DC., Monogr. Phan. 3: 623. 1881. *Bryonia scabrella* L.f., Suppl. Pl.: 424. 1782 (1781). *Mukia scabrella* (L.f.) Arn., J. Bot. 3: 276. 1841. *Ban Kakhri, Chirati, Gulya Kakhri*

Climbing or trailing herb, annual, monoecious, to 3 m long; stems bristly-hairy, with simple, filiform tendrils. Leaves petioled, sagittate, hastate, subtriangular to ovate, usually cordate, $1.5-10 \times 1.6-10.5$ cm, 5-lobed or simple, sinuate-dentate to irregularly lobulate-dentate, scabrid; middle lobe longest, triangular; lateral lobes ovate-triangular. Flowers yellow, pedicellate, in axillary cyme; sepals tubular, lobes ovate; petals longer

than sepals. Berries 1–7, subsessile, axillary, clustered, subglobose, scarlet, smooth, glabrous, bristly when young, *c.* 1 cm across. Seeds ovate, twice as long as broad.

Flowering & Fruiting: July–December.

Grows in waste places, grassy slopes and forest edges, up to 1000 m.

Distribution: India (Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Rajasthan, Tamil Nadu, Tripura, Uttarakhand), Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. Manikandan 124974, 122500 (BSD); Rathuadhap, H.C. Pande 220850 (LWG); Samir Sinha (2001).

Uses: Unripen fruit is given in malarial fever and urinary disorder; seed paste with warm water given to antiemitting.

2. *Diplocyclos* (Endl.) Post et Kuntze

Diplocyclos palmatus (L.) C. Jeffrey, Kew Bull. 15 (3): 352. 1962; C. Jeffrey, Kew Bull. 34: 801. 1980; R.D. Gaur, Fl. Distr. Garhwal: 177. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 135. 2007. *Bryonia palmata* L., Sp. Pl. 2: 1012. 1753, excl. syn. *Coccinia palmata* M. Roem., Synopsis peponiferarum: 93. 1846. *Diplocyclos palmatus* var. *walkeri* (Chakrav.) Babu, Herbac. Fl. Dehradun 198. 1977. *Bryonopsis laciniosa* (L.) Naudin var. *walkeri* Chakrav., Bull. Bot. Surv. India 17(1): 183. 1959. *Bryonia laciniosa sensu* C.B. Clarke in Hook.f., Fl. Brit. India 2: 622. 1789 *non* L. 1753. *Put-loguli*, Ban Kakri

Climbing herb; stems glabrous, thickened with white dotted on ridges. Leaves petioled, broadly ovate, 3.5–14.5 × 4–15 cm, linear-lanceolate to elliptic, glabrous. Flowers small, white or yellowish, male flowers 2–8, in sessile clusters, along with 5 female flowers in same axil; calyx tube smaller in male and larger in female, lobes smaller than tube; corolla of male larger than female. Fruit solitary or 2–5 in clusters, ovoid-subglobose, *c.* 2.5 cm across, with many seeds.

Flowering & Fruiting: August–October.

Grows in plains along the hedges and cultivated, up to 1200 m.

Distribution: India (almost throughout the country), NE Australia, Bhutan, China, Indonesia, Nepal, Pakistan, Papua New Guinea, Peninsular Malaysia, Philippines, South Japan, Sri Lanka, Thailand.

Specimens examined: Rathuadhap, H.C. Pande 220210 (LWG); Samir Sinha (2001).

Uses: Seeds used in local medicines for treatment of diabetes.

Notes: *Bryonia laciniosa* L. (Sp. Pl. 2: 1013. 1753) has been misapplied as synonyms under *Diplocyclos palmatus* L., but the former name refers to *Cayaponia laciniosa* (L.) C. Jeffrey (Kew Bull. 15(3): 346. 1962) that does not occur in India. Linnaeus (1753) erroneously equated syntypes of this plant with literature of a different genus and species from Asia.

3. *Luffa* Mill.

- 1a. Calyx tube pentagonal; petals obcordate 1. *L. acutangula*
 1b. Calyx tube broadly campanulate; petals obovate-cuneiform..... 2. *L. cylindrica*

1. ***Luffa acutangula*** (L.) Roxb., Fl. Ind. 3: 713. 1832; Cogn. in A. & C. DC., Monogr. Phan. 3: 459. 1881; C.B. Clarke in Hook.f., Fl. Brit. India 2: 615. 1879; Chakravarty, Rec. Bot. Survey India 17: 79. 1959; R.D. Gaur, Fl. Distr. Garhwal: 179. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *Cucumis acutangulus* L., Sp. Pl. 2: 1011. 1753. *Luffa amara* Roxb., Fl. Ind. 3: 715. 1832. *L. acutangula* var. *amara* (Roxb.)

C.B. Clarke in Hook.f., Fl. Brit. India 2: 615. 1879; Gaur, *l.c.*; Uniyal & al., *l.c.* *L. acutangula* f. *amara* (Roxb.) W.J.de Wilde & Duyfjes, Sandakania 17: 68. 2008. *L. hermaphrodita* Singh & Bhandari, Bailey 11(4): 136, f. 13. 1964. *Cucurbita umbellata* Willd., Sp. Pl., ed. 4(1): 608. 1805. *L. umbellata* (Willd.) M. Roem., Fam. Nat. Syn. Monogr. 2: 63. 1846. *L. kleinii* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 344. 1834.

Gudari, Jbinga, Kali tori

Climbing herb, annual, with mostly 3-fid subscabrous tendrils. Stems 5-angled, scabrous along ribs. Leaves petioled, pale green, roundish, palmately 5–7-lobed, 14–18 × 16–20 cm, glabrous. Flowers pale yellow, pedicellate; male flowers erect, 10–20-flowered, in axillary raceme; female flowers solitary in same axil; calyx tube pentagonal, slightly hairy, lobes equal to slightly longer than tube; petals obcordate, emarginate or not; stamens 3. Ovary 10-angled. Fruit c 30 × 10 cm, acutely 10-angled. Seeds black, 1.2 × 0.8 cm, rugose, emarginate.

Flowering & Fruiting: June–October.

Grows in thickets and forest margins on mountain slopes, between 2300–2500 m.

Distribution: India (throughout the country), Tropical Africa, Tropical America, Australia, China, Mascarene Isles, Pakistan, Russia, Yemen.

Specimens examined: Morghatty area, R. *Manikandan* 125624 (BSD).

Uses: The tender fruits are used as vegetable and fruit paste applied on the pelvic region of women, supposed to cause abortion.

2. ***Luffa cylindrica*** (L.) M. Roem., Fam. Nat. Syn. Monogr. 2: 63. 1846; Cogn. in A. & C. DC., Monogr. Phan. 3: 456. 1881; Chakravarty, Rec. Bot. Survey India 17: 75. 1959; C. Jeffrey, Kew Bull. 15(3): 355. 1962 & Fl. Trop. E. Afr. (Cucurbitaceae) 77, f. 10. 1967; R.D. Gaur, Fl. Distr. Garhwal: 179. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *Momordica cylindrica* L., Sp. Pl. 2: 1009. 1753. *Luffa aegyptiaca* Mill., Gard. Dict., ed. 8. Luffa no. 1. 1768; C.B. Clarke in Hook.f., Fl. Brit. India 2: 614. 1879. *L. sylvestris* Miq., Fl. Ned. Ind. 1: 665. 1855. *L. cylindrica* (L.) M. Roem. var. *minor* Chakrav., *nom. nud.* *L. aegyptiaca* f. *sylvestris* (Miq.) W.J.de Wilde & Duyfjes, Sandakania 17: 70. 2008.

Ghia Tori

Climbing or trailing herb, annual; stem 5-angled, finely hairy to glabrous, with slightly pubescent, 3–6-fid tendrils. Leaves petioled, palmately 5-lobed, dark green, orbicular-cordate, 8–25 × 8.5–26 cm, lobes triangular, lanceolate, margin entire or sinuate, acute-apiculate, scabrous. Flowers bright yellow, pedicellate; male flowers in axillary racemes, 15–20-flowered; female flowers in same axil as males; calyx tube short, broadly campanulate, slightly pubescent, lobes triangular-lanceolate, longer than tube; petals obovate-cuneiform, obtuse; stamens 3–5. Ovary cylindrical, finely appressed hairy. Fruit cylindrical, fusiform, c 50 × 10 cm, smooth. Seeds elliptic-ovoid, c 1.2 × 8 cm, dull black.

Flowering & Fruiting: April–October.

Grows in thickets and widely cultivated, up to 1800 m.

Distribution: India (Native and cultivated throughout the country), Africa, Tropical America, Asia, Egypt, Pakistan, Sudan, Yemen.

Specimens examined: Morghatty area, R. *Manikandan* 122527 (BSD).

Notes: There has been considerable discussion on whether the correct name for this species is *Luffa cylindrica* or *L. aegyptiaca*. The former view was held by Jeffrey (Kew Bull. 34: 789–809. 1980), while the latter was adopted by Schubert (Taxon, 24: 174, 1975) and Heiser and Schilling (Biotropica 20(3): 185–191, 1988).

Nicolson & al., (*An interpretation of Van Rheedee's Hortus malabaricus*. Regnum Vegetabile 119. 1988) discuss the issue and prefer *L. aegyptiaca*.

Uses: It is widely cultivated for its fruits which are used as vegetable. The mature fruit becomes bitter and unpalatable due to hardening of fibrovascular bundles forming loofah sponge which is used by village housewives for scrubbing and cleaning the utensils. Loofah sponges are also used for cleaning motor cars, glassware and for stuffing pillows, mattresses, saddles and shoulder pads. The tender fruit is considered diuretic and its juice is purgative. Mature seeds are bitter, emetic and cathartic.

4. *Momordica* L.

Momordica dioica Roxb. ex Willd., Sp. Pl. 4: 605. 1805; Roxb., Fl. Ind. 3: 709. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 2: 617. 1879; Chakravarty, Rec. Bot. Survey India 17: 91. 1959; R.D. Gaur, Fl. Distr. Garhwal: 180. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *M. balsamina* auctt. non Wight & Arn., Prodr. 349. 1834. *M. hispida* Dennst. ex Miq., Fl. Ind. Bat. 1, 1: 664. 1855. *M. renigera* Cogn. in A. & C. DC., Monogr. Phan. 3: 444. 1881. *M. roxburghii* G. Don, Syst. Gard. 3: 35. 1834. *M. sicyoides* DC., Prodr. 2: 312. 1828. *M. triloba* Wight, Herb. ex Steud., Nomencl. ed. 2. 11: 155. 1841. *M. tuberosa* Dennst. ex Miq., Fl. Ind. Bat. 1, 1: 664. 1855. *M. wallichii* Roem., Fam. 2: 58. 1846; Miq., Fl. Ind. Bat. 1, 1: 664. 1855.

Jangli Karela, Kakanra, Kirara, Dhar Karela, Kakrol

Climber, perennial, with unbranched, glabrous tendrils, dioecious and tuberous root. Leaves petioled, broadly ovate, membranous, 2.5–6 × 2–5 cm, glabrous on both sides, deeply 3–5-lobed, lobes triangular ovate or oblong, acute, with undulate or minutely remotely denticulate margin. Flowers yellow; male flowers on peduncles; bracts large, sessile, entire, glabrous, often ciliated or villous on both surfaces; calyx cucullate, suborbicular or reniform, partly enclosing flower; petals obtuse; female flower yellow, ebracteate or minutely bracteate peduncles; calyx lobes linear-lanceolate, villous; corolla similar to male flowers. Fruit ovoid or ellipsoid, 3–5 × 2–3.5 cm, yellow when mature, densely covered with soft spines, shortly beaked at apex. Seeds somewhat compressed, irregularly corrugated.

Flowering & Fruiting: July–October.

Distribution: India (Central India, Deccan plateau, Uttarakhand), Bangladesh, Myanmar, China, Nepal, Pakistan, Sri Lanka.

Uses: Fruits are often used as a vegetable. The seed kernels are used for the extraction of a semi-drying oil. The tuberous root is used in medicine. The roots of female plants are larger than those of the male and are preferred for medicinal uses. They are applied in bleeding piles and urinary complaints. The root paste is applied over the body as a sedative in fever.

5. *Solena* Lour.

Solena heterophylla Lour., Fl. Cochinch. 2: 514. 1790. *Melothria heterophylla* (Lour.) Cogn. in A. & C. DC., Monogr. Phan. 3: 618. 1881. *Bryonia rheedei* Blume, Bijdr. Fl. Ned. Ind. 15: 925. 1826. *Karivia rheedei* (Blume) M. Roem., Fam. Nat. Syn. Monogr. 2: 45. 1846. *Bryonia sagittata* Blume, Bijdr. Fl. Ned. Ind. 15: 925. 1826. *Zehneria umbellata* Thwaites, Enum. Pl. Zeyl.: 125. 1859; C.B. Clarke in Hook.f., Fl. Brit. India 2: 625. 1879 *p.p.* *Melothria ovata* Cogn. in Engler, Pflanzenr. IV. 275, 1 (Heft 66): 114. 1916. *Solena amplexicaulis sensu* R.D. Gaur, Fl. Distr. Garhwal: 180. 1999; *sensu* Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007, *non* (Lam.) Gandhi 1976.

Bankakra, Bankakhri, Bankundru.

Climber, perennial, dioecious; stems slender, sulcate, glabrous. Leaves variable, $4.5-8 \times 2-3.8$ cm, ovate, deltoid-ovate, entire or lobed, cordate or sagittate at base, distantly denticulate along margins, acute to acuminate at apex, scabrid above, glabrous beneath; calyx campanulate, 5-toothed, glabrous; corolla deeply partite, small, triangular, lobes acute. Berries 3×2 cm, oblong-ovoid, rostrate, ribbed, red when ripe. Seeds 3–4, grey, turgid, marginate.

Flowering & Fruiting: May–October.

Grows in mixed forests, thickets, grasslands, roadsides on mountain slopes, up to 2500 m.

Distribution India: India (widely distributed all over India), NE Afghanistan, Indonesia (Java), Myanmar, Nepal, Peninsular Malaysia, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. Manikandan 125604 (BSD).

Notes: De Wilde and Duyfjes (in Blumea 49: 69–81. 2004), *Solena* comprises three or four species while in the past, only one species, *S. amplexicaulis*, was recognized, which supposedly ranged from NE Afghanistan through India and Sri Lanka. Based on several vegetative and reproductive differences, De Wilde and Duyfjes instead recognize *S. amplexicaulis* from South India, *S. umbellata* from South India and Sri Lanka, and *S. heterophylla* with two subspecies, one from NE Afghanistan eastward, the other in N. India and east to China.

Uses: The roots and seeds given in digestive troubles; seed mixed with leaf extracy of Vasik, believed to cause abortion.

6. *Trichosanthes* L.

- 1a. Stems glabrous 1. *T. bracteata*
 1b. Stems puberulent or villous 2
 2a. Fruits cylindric, seeds oblong 2. *T. cucumerina*
 2b. Fruits oblong, seeds subglobose 3. *T. dioica*

1. ***Trichosanthes bracteata*** (Lam.) Voigt, Hort. Suburb. Calcutt. 58. 1845; P.C. Pant, Fl. Corbett Natl. Park: 77. 1986. *Modecca bracteata* Lam., Encycl. 4: 210. 1797. *Trichosanthes tricuspidata sensu* R.D. Gaur, Fl. Distr. Garhwal: 182. 1999; *sensu* Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007, *non* Lour. 1790. *T. palmata sensu* C.B. Clarke in Hook.f., Fl. Brit. India 2: 606. 1879, *non* Roxb. 1832. *Indrian, Lal Indrayan*

Climbing herb, annual; stems robust, branched, angular-striate, grooved, glabrous. Leaves petioled, broadly ovate-cordate, $10-12 \times 10.5-12.5$ cm, thinly leathery, shortly 3-lobed, lobes ovate-triangular, abaxially glabrous, adaxially deep green, hispidulous or punctate, margin undulate-denticulate, apex acute or shortly acuminate. Male flowers pedicellate, in raceme, on stout, striate and grooved, glabrous peduncle; bracts obovate-oblong, cucullate, both surfaces white squamose or pubescent, margin dentate, apex obtuse; calyx tube narrowly funnelform, segments narrowly lanceolate.

Flowering & Fruiting: August–December.

Grows in forests edges, disturbed areas, thickets on mountain slopes, up to 900 m.

Distribution: India (Peninsular India, Khasia Hills, Uttarakhand, West Bengal), China (Guizhou), Nepal ?

Specimens examined: Sonanadi WLS, R. Manikandan 124980, 122323, 125501, 122461 (BSD).

Notes: Jeffrey (Kew Bulletin 34: 789–809. 1980) and Lu & al. (*Flora of China*. Vol. 19. 2011) treat *Trichosanthes bracteata* as a synonym of *T. tricuspidata*, which ranges from China (Guizhou), Peninsular Malaysia,

Nepal, Thailand, to Vietnam, while Chakravarty (1982) recognized *T. bracteata* with two varieties, var. *bracteata* from throughout India, Myanmar, China, and Australia, and var. *tomentosa* (an illegitimate name here treated under *T. anaimalaiensis*) on the Andaman and Nicobar islands and in Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu, Tripura, Myanmar and Java. Another species concept is that of De Wilde & Duyfjes (*Flora of Thailand* 9, 4: 135. 2008; Cucurbitaceae in *Flora Malaysiana*, vol. 19. 2010) and further, Duyfjes & Pruesapan (*Thai Forest Bulletin, Botany* 32: 76–109. 2004) doubt the occurrence of *T. tricuspidata* in India. According to them, the species only occurs in Myanmar, Thailand and Vietnam, West Malaysia, and east to the Moluccas.

Uses: Roots and fruits medicinal, commonly used to relieve bronchitis, asthma, diabetes; root juice used as an emetic; seed paste applied externally on hoofs and mouth disease of cattle.

2. ***Trichosanthes cucumerina* L.**, Sp. Pl. 2: 1008. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 609. 1879; Chakravarty, Rec. Bot. Surv. Ind. 17(1): 31. 1959; P.C. Pant, Fl. Corbett Natl. Park: 77. 1986; R.D. Gaur, Fl. Distr. Garhwal: 182. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *T. anguina* L., Sp. Pl. 2: 1008. 1753; R.D. Gaur, *l.c.*; Uniyal & al., *l.c.* *Cucumis anguinus* L., Sp. Pl., ed. 10. 2: 1279. 1759. *Trichosanthes pachyrrhachis* Kundu, J. Bot. 77: 9. 1939. *T. brevibracteata* Kundu, J. Bot. 77: 10. 1939. *T. brevibracteata* Kundu var. *sublobata* Kundu, J. Bot. 77: 11. 1939. *T. brevibracteata* Kundu var. *longirostrata* Kundu, J. Bot. 77: 11. 1939. *T. cucumerina* L. var. *anguina* (L.) Haines, Bot. Bihar & Orissa: 388. 1922.

Chichinda, Jangli Chichinda

Climbing herb, annual, monoecious; stems slender, branched, angular, puberulent. Leaves petioled, suborbicular or orbicular-reniform, 7–15 × 5–16 cm, membranous, deeply 3–7-lobed, lobes usually obovate, abaxially densely puberulent, adaxially subglabrous, margin finely denticulate. Male flowers pedicellate, 8–15-flowered, in raceme, with puberulent peduncle; bracts minutely spreading, erect; calyx tube subcylindric, slightly dilated at apex, puberulent, segments reflexed. Female flowers solitary, on to 1 cm long peduncle; ovary narrowly fusiform, villous. Fruit very long, cylindric, c. 2 m long, smooth, sometimes contorted. Seeds oblong, finely rugulose, margin undulate.

Flowering & Fruiting: March–October.

Distribution: India (Cultivated throughout the country), Bangladesh, Bonin Isles, Malayasia, Myanmar, Pakistan, Philippines, Sri Lanka and tropical China through Malaysia into W, N, and NE Australia.

Uses: The fruit is eaten as vegetable. The roots and seeds are used medicinally for treating diarrhoea.

Notes: In 1959, Chakravarty synonymized *Trichosanthes pachyrrhachis* Kundu and *T. brevibracteata* Kundu under *T. cucumerina*, but his 1982 checklist omitted both names and included on the authority of Samir Sinha (2001).

3. ***Trichosanthes dioica* Roxb.**, Fl. Ind. 3: 701. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 2: 609. 1879; Chakravarty, Rec. Bot. Surv. India 17(1): 31. 1959; C. Jeffrey, Kew Bull. 34: 798. 1980; P.C. Pant, Fl. Corbett Natl. Park: 78. 1986; R.D. Gaur, Fl. Distr. Garhwal: 182. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *T. dioica* Roxb. var. *sagittifolia* Chakrav., Rec. Bot. Surv. India 17(1): 55. 1959.

Palwal, Parol, Petal

A dioecious climbing herb with bifid sulcate tendrils; stems villous and scabrous. Leaves petioled, 6.5–10 × 3.5–8 cm, ovate-oblong, subscabrous, cordate, sinuate-dentate, acute. Male flowers paired, puberulous, on peduncles; female flowers solitary on long peduncles; calyx-tube somewhat cylindric, broadened at apex,

villous, lobes linear; petals oblong, fimbriate; staminal filaments very short, anthers free. Fruit oblong, 5–12 × 2–6 cm, glabrous, orange-red, pointed at both ends. Seeds subglobose.

Flowering & Fruiting: June–October.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Punjab, Rajasthan, Uttar Pradesh, West Bengal), Bangladesh, Myanmar, Pakistan, Sri Lanka.

Uses: It is sometimes cultivated for its edible fruits.

Notes: Included on the authority of Samir Sinha (2001).

Cultivated species:

1. **Cucumis sativus** L., Sp. Pl.: 1012. 1753; C.B. Clarke, Fl. Brit. India: 620; Chakravarty, Rec. Bot. Surv. India 17: 105. 1959; C. Jeffrey, Kew Bull. 34: 794. 1980; R.D. Gaur, Fl. Distr. Garhwal: 175. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 135. 2007. *C. sativus* var. *sikkimensis* Hook.f., Bot. Mag. 102: t. 6206. 1876. *C. hardwickii* Royle, Ill. Bot. Himal. Mts. 220. t. 47. 1835; R.D. Gaur, *l.c.*; Uniyal & al., *l.c.* *C. sativus* L. f. *hardwickii* (Royle) W.J.de Wilde & Duyfjes, Sandakania 17: 58. 2008. *Elaroo, Kakree, Kheera, Khira*

Trailing or climbing herb, annual; stems angular, with scabridulous hairs. Leaves petioled, ovate, 10–15 × 12–18 cm, 3–8-lobed, lobes acute, hispidulous or scabridulous on both surfaces. Female flowers solitary or rarely fascicled. Fruit oblong, obscurely trigonous or cylindric, when young sparsely tuberculated or smooth, glabrous.

Flowering & Fruiting: Almost throughout the year.

Grows in plains along the hedges and widely cultivated, up to 1200 m.

Distribution: India (throughout the country except high altitude), Bhutan, China, Myanmar, Nepal, Thailand.

Uses: Fruits are edible; seeds added in sweet preparation; flowers useful in apiculture as bee forage. Decoction of root bark given in fever; seeds given in suppressed urination.

Notes: All evidence points to northern India (Ganges region) as the place where wild cucumbers were first cultivated and where wild populations still occur. Wild cucumbers can be distinguished from cultivated (feral) forms by their extremely bitter fruits. (Sebastian & al., 2010).

2. **Cucurbita maxima** Duch. ex Lam., Encycl. Meth. Bot. 2: 151. 1786; C.B. Clarke, Fl. Brit. India 2: 622. 1879; Chakravarty, Rec. Bot. Surv. India 17: 123. 1959; C. Jeffrey, Kew Bull. 34(4): 799. 1980; R.D. Gaur, Fl. Distr. Garhwal: 176. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 135. 2007. *Cucurbita maxima* var. *badagarensis* Mudaliar, J. Bombay Nat. Hist. Soc. 49: 242. 1950.

Climbing herb, annual. Leaves petioled, shallowly 5-lobed or subentire, coarsely hairy on both surfaces with hispidulous soft hairs, margin minutely dentate. Flowers faintly scented; sepals linear. Fruiting peduncle circular, striated, corky or spongy, not expanded at attachment. Fruit generally oval or rounded, bluntly ribbed, large, to 80 cm across, flesh yellow or reddish when ripe. Seeds white, brown or bronze, strongly marginate.

Flowering & Fruiting: August–January.

Grows in plains along the hedges and widely cultivated.

Distribution: India (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh), Pakistan and elsewhere.

Uses: It is probably South American in origin and cultivated for its young leaves, flowers and fruits which are used as vegetables. Seeds considered as antihelminthic.

47. BEGONIACEAE

Begonia L.

Begonia picta Sm., Exot. Bot. 2: 81, t. 101. 1804; C.B. Clarke in Hook.f, Fl. Brit. India 2: 638. 1879; P.C. Pant, Fl. Corbett Natl. Park: 78. 1986; R.D. Gaur, Fl. Distr. Garhwal: 184. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 136. 2007. *B. echinata* Royle, Illus. Bot. Himal. Mount. 313, t. 80. 1836. [Plate-11e]

Herb to 18 cm high, with rhizome. Leaves petioled, few, often blotched purple or variegated, 4–12 × 3.5–10 cm, broadly ovate, doubly serrate, base cordate, apex acuminate, upper leaf surface pilose, lower pilose on veins. Male flower pink, suborbicular to broadly ovate, obtuse, pubescent, on villous peduncles; inner segments oblong, pink-white; stamens numerous, monadelphous. Female flower: segments 5, ovate-oblong, pubescent on outer surface; styles 3, persistent; stigmas branched, twisted, papillose. Capsule pendulous, c. 2 cm long, 3-winged, pointing upwards, green, unequal, pubescent. Seeds brown, oval.

Flowering & Fruiting: August–October.

Grows in moist shady locations, on rocks and banks, up to 2800 m.

Distribution: India (Himalayas, Karnataka, Sikkim, Uttarakhand).

Specimens examined: Sonanadi WLS, R. *Manikandan* 124955, 122349, 122445, 122378 (BSD).

48. MOLLUGINACEAE

Mollugo L.

Mollugo pentaphylla L., Sp. Pl.: 89. 1753; P.C. Pant, Fl. Corbett Natl. Park: 78. 1986; R.D. Gaur, Fl. Distr. Garhwal: 125. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 137. 2007. *M. stricta* L., Sp. Pl. ed. 2: 131. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 663. 1879. *M. trifolia* Schult., Mant. 2: 471. 1771.

Herb, annual, to 25 cm high; stems and branches slender, glabrous. Leaves cauline and radical, pseudo-verticillate, 1.2–4 × 0.5–1.5 mm, elliptic-lanceolate; sepals elliptic-ovate; stamens 5, antisepalous; filaments dilated at base, anthers basifixed, dehiscing longitudinally. Ovary subglobose, c. 1.5 mm across, Fruit c. 9 mm across, membranous. Seed minute, many, granulate, dark brown.

Flowering & Fruiting: September–October.

Grows in moist wet sandy places and along the streams up to 2300 m.

Distribution: India (Himalayas, N & S. India), China, Fiji, Japan, Malayan Peninsula, Sri Lanka, W. Pakistan.

Specimens examined: Vatanvasa, H.C. Pande 220806 (LWG); Sonanadi WLS, R. *Manikandan* 122354 (BSD); Samir Sinha (2001).

Uses: It is used in Medicine and also the leaves are used as a pot herb.

49. APIACEAE (= UMBELLIFERAE)

1a. Leaves sessile1. ***Bupleurum***

- 1b. Leaves petioled2
- 2a. Creeping herbs; flowers white2. **Centella**
- 2b. Erect herbs; flowers yellow3. **Peucedanum**

1. **Bupleurum** L.

Bupleurum hamiltonii N.P. Balakr., J. Bombay Nat. Hist. Soc. 63: 328. 1967; P.C. Pant, Fl. Corbett Natl. Park: 79. 1986; P.K. Mukh. & Constance, Umbelliferae India: 56. 1993; R.D. Gaur, Fl. Distr. Garhwal: 395. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 138. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 103. 2009. *B. tenue* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 182. 1825; C.B. Clarke in Hook.f., Fl. Brit. India 2: 677. 1879 (*not* Salisbury, 1796).

Herb annual or biennial, to 85 cm high; stems tinged purple, much branched throughout, branches slender, ascending, base without fibrous remnant sheaths, thin, woody, branched root. Leaves sessile, oblong-lanceolate or linear, 2.5–8 × 0.4–0.8 cm, base slightly narrow, sometimes punctate with oil glands. Flowers yellow-green, pedicellate, 5–11-flowered, in profusely branched, umbels numerous, lax; bracts 4, lanceolate or elliptic, unequal, 5–7-nerved; rays 2–7, unequal, very slender; bracteoles 5, lanceolate or elliptic, trinerved, apex apiculate, equaling or slightly longer than flowers; petals suborbicular, midvein dark. Stylopodium low-conic. Fruit brown, broad-ovoid or ellipsoid, *c.* 2.5 × 1.5 mm, ribs pale yellow, prominent, vittae 1 in each furrow.

Flowering & Fruiting: September–October.

Grows along the forest margins, mountain slopes, grasslands, sunny slopes, shady wet places, dry stony areas, up to 2800 m.

Distribution: India (Jammu & Kashmir, N. India, Sikkim, Uttarakhand), Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Uses: It is said to be having medicinal value.

Notes: Included on the authority of Samir Sinha (2001).

2. **Centella** L.

Centella asiatica (L.) Urban in Mart. & Eichl., Fl. Bras. 11: 287. 1879; P.C. Pant, Fl. Corbett Natl. Park: 79. 1986; P.K. Mukh. & Constance, Umbelliferae India: 15. 1993; C.D.K. Cook, Aquat. Wetl. Pl. India 44, f. 26 a–c. 1996; R.D. Gaur, Fl. Distr. Garhwal: 396. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 138. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 105. 2009. *Hydrocotyle asiatica* L., Sp. Pl.: 234. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 2: 669. 1879. *Brahmi Buti*

Herb creeping, spreading, perennial; stems creeping, rooting at the nodes, glabrous to finely pubescent, with perennial rootstock. Leaves petioled, simple, reniform, dorsal surface with minute hair clusters, margin repand, bases sheathing. Flowers white, glabrate to finely arachnoid, 2–4-flowered, in umbels; involucre bracts 2, ovate; calyx teeth obsolete. Stylopodium depressed, purplish; styles short. Fruit ovate to orbicular, *c.* 3 mm long, primary ridges prominent, secondary forming a network, vittae not distinct.

Flowering & Fruiting: April–September.

Grows in wet and damp places in plains and foothills of Himalayas, to 2000 m.

Distribution: India (Uttarakhand), Africa, Tropical America, China, Japan, Pacific Islands, W. Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122506 (BSD); Samir Sinha (2001).

Uses: It is used in indigenous medicine for skin diseases.

3. *Peucedanum* L.

Peucedanum dhana Buch.-Ham. ex C.B. Clarke in Hook.f., Fl. Brit. India 2: 709. 1879; P.C. Pant, Fl. Corbett Natl. Park: 79. 1986; P.K. Mukh. & Constance, Umbelliferae India: 216. 1993; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 139. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 114. 2009.

Herb, to slender, to 60 cm high; stems few branched, glabrous, with stout tap root. Leaves petioled, clustered, pinnately or ternately parted, oblong or lanceolate-elliptic, cuneate at base, entire, acute at apex, cauline leaves few, reduced, sheaths slightly dilated. Flowers yellow, in terminal and lateral umbels; involucre bracts 3–6, linear to lanceolate; rays 5–10, unequal; calyx teeth obsolete, stylopodium low conical; petals ovate, narrower, inflexed apex. Fruit subquadrate to elliptic, $\approx 8 \times 5$ mm, glabrous, dorsal ribs filiform to obscure, lateral thick, vittae 1 to several in intervals, 2×6 on commissure.

Flowering & Fruiting: June–October.

Grows in grassy fields and moist shady hillslopes, up to 3000 m.

Distribution: India (Andhra Pradesh, Uttarakhand, Uttar Pradesh), Bangladesh, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

50. ALANGIACEAE

Alangium Lam.

- 1a. Leaves broadly ovate; flowers white; fruits ovoid or ellipsoid 1. *A. chinensis*
 1b. Leaves oblong to oblong-lanceolate; flowers cream coloured; fruits subglobose 2. *A. salviifolium*

1. ***Alangium chinensis*** (Lour.) Harms., Ber. Deuts. Bot. Ges. 15: 24. 1897; T.S. Rana & al., Fl. Tons Valley 178, f. 15. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 142. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 67. 2009. *Stylidium chinensis* Lour., Fl. Cochinch. 221. 1790. *Marlea begoniaefolia* Roxb., Pl. Coromandel 3: 80, t. 283. 1819; C.B. Clarke in Hook.f., Fl. Brit. India 2: 743. 1879.

Tree, deciduous, to 12 m high. Leaves petioled, $5-15 \times 4.5-14$ cm, broadly ovate, rounded or subcordate, often oblique at base, entire along the margins, acuminate at apex, 5–7-palmately veined, dark green with shining above. Flowers white, in axillary, dichotomous cymes; calyx tube often sulcate, somewhat turbinate; corolla lobes 6–8, ligulate; stamens equal to corolla lobes. Fruits ≈ 8 mm long, ovoid or ellipsoid, glabrous, dark purple.

Flowering & Fruiting: May–October.

Common throughout the area near mixed deciduous forests (1600–2500 m).

Distribution: India (Himalaya, North India), E Africa, Asia, SE Bhutan, China, Nepal.

Specimens examined: Halduparao-Morghatty, R. *Manikandan* 125705, 124941, 124922 (BSD).

2. ***Alangium salviifolium*** (L.f.) Wang. in Engler, Pflanzenr. IV. 220b (Heft 41): 9, f. 2A–E. 1910; S.K. Mukerjee, Bull. Bot. Surv. India 10: 330. 1968; P.C. Pant, Fl. Corbett Natl. Park: 79. 1986; R.D. Gaur, Fl. Distr. Garhwal: 321. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 142. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 67. 2009. *Grenia salviifolia* L.f., Suppl. Pl. 409. 1782. *Alangium decapetalum* Lam., Encycl. 1(1): 174. 1783. *A. salviifolium* subsp. *decapetalum* (Lam.) Wang. in Engler, Pflanzenr. IV. 220b (Heft 41): 11. 1910.

A. tomentosum Lam., Encycl.1(1): 174. 1783. *A. lamarckii* Thwaites, Enum. Pl. Zeyl.133. 1859; C.B. Clarke in Hook.f., Fl. Brit. India 2: 741. 1879. *Akola, Ankora, Kuilu Ghaut*

Shrub or tree, deciduous, to 20 m high; branchlets sometimes spinescent, tomentose to glabrescent. Leaves petioled, oblong to oblong-lanceolate, 6.5–16 × 2–6.8 cm, papery to subleathery, glabrescent, base cuneate, margin entire, apex obtuse. Flowers cream-colored, fragrant, sessile, often clusters of 4–8 flowers, usually fewer, sometimes solitary, on densely rusty tomentose peduncles; calyx lobes 5–10, toothed; petals 4–6, basally swollen and apically obtuse, outside tomentose; stamens 10–30; filaments apically geniculate, bearded. disk lobed; style glabrous; stigma capitate. Drupe subglobose, c. 2.5 × 1.5 cm, red when ripe.

Flowering & Fruiting: March–September.

Grows in Tropical mixed forests to subtropical forests, below 1200 m.

Distribution: India (almost throughout the plains), Cambodia, China, Indonesia, Laos, Malaysia, Nepal, Philippines, SE Africa, Sri Lanka, Thailand, Vietnam.

Specimens examined: Pakhro-Morghatty, R. *Manikandan* 124914, 124941, 124922 (BSD).

Uses: Wood used for agricultural implements, poles, yokes, etc.; the aromatic, bitter root bark used in fever, skin diseases and anthelmintic in folk medicines; fruits edible.

51. RUBIACEAE

- | | |
|--|--------------------------|
| 1a. Lianas | 14. Uncaria |
| 1b. Herbs, shrubs or trees | 2 |
| 2a. Plants armed | 3 |
| 2b. Plants unarmed | 4 |
| 3a. Berries ellipsoid | 2. Catunaregam |
| 3b. Berries globose | 3. Ceriscoides |
| 4a. Shrubs or trees | 5 |
| 4b. Herbs | 7 |
| 5a. Leaves elliptic-oblong or ovate | 13. Spermadictyon |
| 5b. Leaves elliptic-lanceolate | 6 |
| 6a. Flowers solitary or in axillary fascicles; calyculus present | 4. Coffea |
| 6b. Flowers in panicles or corymbos; calyculus absent | 11. Pavetta |
| 7a. Fruit a capsule | 8 |
| 7b. Fruit a schizocarp | 8. Knoxia |
| 8a. Inflorescence usually axillary | 9 |
| 8b. Inflorescence usually terminal | 10 |
| 9a. Trees | 7. Hymenodictyon |
| 9b. Herbs | 9. Oldenlandia |
| 10a. Calyx lobes 4 | 11 |
| 10b. Calyx lobes 5 | 13 |

- 11a. Leaf base attenuate12. **Spermacoce**
 11b. Leaf base acute-obtuse 12
- 12a. Calyx lobes ovate; corolla lobes ovate-lanceolate1. **Argostemma**
 12b. Calyx lobes triangular- lanceolate; corolla lobes linear-oblong6. **Hedyotis**
- 13a. Trees 14
 13b. Herbs or subshrubs10. **Ophiorrhiza**
- 14a. Flowers white, in panicles15. **Wendlandia**
 14b. Flowers brownish yellow, in globose heads5. **Haldina**

1. **Argostemma** Wall.

Argostemma sarmentosum Wall. in Roxb., Fl. Ind. ed, 2: 324. 1824; Hook.f., Fl. Brit. India 3: 42. 1880; P.C. Pant, Fl. Corbett Natl. Park: 81. 1986; R.D. Gaur, Fl. Distr. Garhwal: 529. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007.

Herb, perennial, fleshy, erect, with globose-tuberous rootstocks; stems with thread-like runners arising from the axil of lower pair of leaves, erect. Leaves sessile or subsessile, lower pair of leaves remote from others, caducous, upper 2 pairs well developed, orbicular-elliptic or broadly obovate, obtuse at apex. Flowers white, in 2–3-flowered, umbel or at times solitary; bracts ovate, acute; calyx tube hairy, lobes ovate, triangular, acute; corolla lobes ovate-lanceolate, rotate; style slender; stigma capitate. Capsule bivalve, with minute seeds.

Flowering & Fruiting: July–October.

Grows in moist and shady places in deciduous forests, below 1200 m.

Distribution: India (Himalaya), Bhutan, Meghalaya, Myanmar.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122373, 122379, 122446 (BSD).

2. **Catunaregam** (Thunb.) Tirveng.

Catunaregam spinosa (Thunb.) Tirveng., Bull. Mus. Nation. Hist. Nat. (Paris) 3e Ser. no 521, Bot. 35: 13. 1978 & Taxon 27: 515. 1978; Verdc., Kew Bull. 41: 44. 1986; R.D. Gaur, Fl. Distr. Garhwal: 530. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007. *Gardenia spinosa* Thunb., *Gardenia* 7: 16, t. 2, f. 4. 1780. *Gardenia dumetorum* Retz., *Observ. Bot.* 2: 14. 1781. *Randia dumetorum* (Retz.) Poir. in Lam., *Encycl. Suppl.* 2: 829. 1812; Hook.f., Fl. Brit. India 3: 110. 1880. *Xeromphis spinosa* (Thunb.) Keay, Bull. Jard. Bot. Brux. 28: 37. 1958; P.C. Pant, Fl. Corbett Natl. Park: 84. 1986. [Plate-11f]

Shrubs or small trees, to 6 m high, stems armed with strong, straight spines, lateral branches suppressed. Leaves 3–4-clustered, 3.2–6.5 × 2.5–4.2 cm, elliptic-obovate, attenuate at base, obtuse to subacute at apex, pubescent; densely hirsute on nerves at early stage. Flowers white, turning yellow with age, fragrant, axillary solitary or in fascicles at ends of leaf bearing branches; calyx cupular, lobes short, obovate; corolla lobes 5, suborbicular, obtuse; stamens 5, exserted. Berries c. 3.5 cm across, ellipsoid. Seeds flat, embedded in pulp.

Flowering & Fruiting: September–January.

Common in dry deciduous forests.

Distribution: India (almost throughout the country), Africa, Cambodia, China, Indonesia, Kashmir, Laos, Madagascar, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Way to Jorkhatty, R. *Manikandan* 125708 (BSD).

Uses: Fruits are used as fish-poison.

Notes: *Catunaregam* Wolf a validly published generic name (1776) based on Rheede's *Katu Naregam* has been overlooked or ignored. Having priority and being congeneric with *Xeromphis* Raf. (1838) it has been re-established by Tirvengadam (*l.c.*).

3. *Ceriscoides* (Hook.f.) Tirveng.

Ceriscoides turgida (Roxb.) Tirveng., Bull. Mus. Nation. Hist. Nat. (Paris), 3e Ser. no 521, Bot. 35: 15. 1978; R.D. Gaur, Fl. Distr. Garhwal: 531. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007. *Gardenia turgida* Roxb., Fl. Ind. (Ed. Carey) 2: 577. 1832; Hook.f., Fl. Brit. India 3: 118. 1880; P.C. Pant, Fl. Corbett Natl. Park: 82. 1986. *G. turgida* var. *montana* (Roxb.) Hook.f., *l.c.* *G. montana* Roxb., Fl. Ind. (Ed. Carey) 1: 709. 1832. Kharar

Shrub or small tree, to 8 m high; bark bluish-grey, smooth, with spines. Leaves obovate, 6.8–12.5 × 3.4–6 cm, tapering at base, obtuse to acute at apex, coriaceous, velvety-tomentose beneath; stipules amplexicaul. Flowers dimorphic: male flowers in fascicles; stamens 5, included; female flowers solitary, with long calyx lobes. Berries c. 4.2 cm across, globose, woody. Seeds smooth.

Flowering & Fruiting: July–December.

Rare in deciduous forests.

Distribution: India (Himalaya, Western Ghats & Eastern Ghats), Indo-China, Myanmar, Sri Lanka, Thailand.

Specimens examined: Way to Jorkhatty, R. *Manikandan* 124891 (BSD).

4. *Coffea* L.

Coffea benghalensis B. Heyne ex Schult., Syst. Veg. (ed. 15 bis) 5: 200. 1819; Hook.f., Fl. Brit. India 3: 153. 1880; P.C. Pant, Fl. Corbett Natl. Park: 81. 1986; R.D. Gaur, Fl. Distr. Garhwal: 532. 1999; A.P. Davis & al., Bot. J. Linn. Soc. 152: 501. 2006; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007. *Psilanthus benghalensis* (B. Heyne ex Schult.) J.-F. Leroy, Bull. Mus. Natl. Hist. Nat., B, Adansonia, sér. 43(3): 252. 1981.

Evergreen shrub, to 10 m high. Leaves 6.5–18 × 3–7.2 cm, elliptic-lanceolate, cuneate at base, abruptly acuminate at apex. Flowers white, turning brown, fragrant, in axillary clusters. Berries c. 1.2 cm long, red when ripe. Seeds 2, flattened along adjacent faces.

Flowering & Fruiting: December–March.

Grows in moist shady places near deciduous forests.

Distribution: India (Subtropical Himalaya, NE India), Bhutan, Myanmar.

Notes: Included on the authority of Samir Sinha (2001).

5. *Haldina* Ridsdale

Haldina cordifolia (Roxb.) Ridsdale, Blumea 24: 361. 1978; R.D. Gaur, Fl. Distr. Garhwal: 534. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007. *Nauclea cordifolia* Roxb., Pl. Coromandel 1: 40, t. 53. 1796. *Adina cordifolia* (Roxb.) Hook.f. ex Brandis, For. Fl. 263, t. 33. 1874; Hook.f., Fl. Brit. India 3: 24. 1880; P.C. Pant, Fl. Corbett Natl. Park: 80. 1986. Haldan

Tree, to 25 m high; young branchlets pubescent; bark thick, grey, rough. Leaves crowded at ends of branchlets, 4.5–18.5 × 3.5–15 cm, ovate-orbicular, cordate at base, abruptly acuminate at apex, glabrous or pubescent. Flowers brownish-yellow, in terminal, globose heads; calyx tube angled, cupular, lobes 5, shorter than tube; corolla tube funnel-shaped, lobes 5, oblong; stamens 5, near limb. Capsules $\approx$ 5 mm long, pubescent.

Flowering & Fruiting: August–November.

Occasional in deciduous forests.

Distribution: India (almost throughout the country), Cambodia, China, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124864, 122412 (BSD).

6. *Hedyotis* L.

1a. Stems erect 2. *H. gracilis*
1b. Stems prostrate or diffuse 2

2a. Corolla lobes oblong; capsules globose 1. *H. corymbosa*
2b. Corolla lobes lanceolate; capsules ovoid 3. *H. verticillata*

1. ***Hedyotis corymbosa*** (L.) Lam., Tabl. Encycl. 1: 272. 1792; R.S. Rao & Hemadri, Indian Forester 99: 375. 1973; P.C. Pant, Fl. Corbett Natl. Park: 82. 1986; Sivar. & Biju, Taxon 39: 671, t. 10. 1990; R.D. Gaur, Fl. Distr. Garhwal: 534. 1999; R. Dutta & Deb, Taxon. Rev. Ind. Subcont. *Hedyotis* 149, pl. 48 (A–F). 2004; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007. *Oldenlandia corymbosa* L., Sp. Pl.: 119. 1753; Hook.f., Fl. Brit. India 3: 64. 1880; C.D.K. Cook, Aquat. Wetl. Pl. India: 337, f. 344 c–e. 1996.

Herb, ascending, spreading or prostrate; stems reddish, to 40 cm long. Leaves whorled, subsessile, 1.2–3.5 × 0.35 cm, linear-lanceolate, acute at apex, glabrous, recurved and scabrous along margins. Flowers white, solitary or in axillary pairs; calyx tube truncate; corolla lobes 4, oblong; stamens 4, inserted below middle of corolla tube. Capsules $\approx$ 3.5 mm across, globose, loculicidal, crown flat with persistent calyx lobes.

Flowering & Fruiting: October–November.

Occasional amidst grasses.

Distribution: India (almost throughout the country), Africa, America, Asia, Pacific region.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124895, 122430 (BSD); Samir Sinha (2001).

2. ***Hedyotis gracilis*** Wall. in Roxb., Fl. Ind. ed. Carey & Wall. 1: 371. 1824; P.C. Pant, Fl. Corbett Natl. Park: 82. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007. *Kobautia gracilis* (Wall.) DC., Prodr. 4: 430. 1830; R.D. Gaur, Fl. Distr. Garhwal: 536. 1999. *Oldenlandia gracilis* (Wall.) Hook.f., Fl. Brit. India 3: 68. 1880. *Hedyotis stricta* Wall., Asiat. Res. 13: 369. 1820 (*non* Smith 1811). *H. fusca* Buch.-Ham. ex D. Don, Prodr. Fl. Nep.: 134. 1825.

Herb, erect, annual, sparingly branched, to 30 cm high; stems glabrous. Leaves sessile or subsessile, opposite, linear, 5–8 cm × 1.5–4 mm, obtuse or acute-acuminate, glabrous; stipules truncate, ending in one or two subulate appendages. Flowers in terminal elongated cymes, branched above; spreading in flower and erect in fruit; calyx $\approx$ 3 mm long, lobes triangular-subulate, $\approx$ 1.5 mm long; corolla dull brown; tube slender, 10–12 mm long; lobes linear-oblong, obtuse. Capsule obovoid, or ellipsoid, glabrous, 4–6 mm long.

Flowering & Fruiting: January–June.

Grows on grassy fields in deciduous forests

Distribution: India (Himalaya), Myanmar, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

3. **Hedyotis verticillata** (L.) Lam., Tabl. Encycl. 1: 271. 1792; P.C. Pant, Fl. Corbett Natl. Park: 83. 1986; R.D. Gaur, Fl. Distr. Garhwal: 535. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007. *Oldenlandia verticillata* L., Mant. Pl. 1: 40. 1767. *Hedyotis hispida* Retz., Observ. Bot. 4: 23. 1786. *Oldenlandia hispida* (Retz.) Poir., Encycl., Suppl. 4: 536. 1816. *Scleromitron hispidum* (Retz.) Korth., Ned. Kruidk. Arch. 2: 155. 1851.

Herb, diffusely branched, often decumbent, to 30 cm high; stems subterete or 4-angled, sparsely to densely hispidulous. Leaves petioled, 2.5–6 × 0.3–1.5 cm, narrowly elliptic or linear-lanceolate, acute to obtuse at base, margins often revolute, acute or acuminate at apex, glabrescent; thinly leathery. Flowers white, funnel form, many-flowered, in axillary, glomerulate to congested-cymose; bracts linear to lanceolate; calyx densely hispidulous, lobes lanceolate to triangular, ciliolate; corolla lobes lanceolate, outside glabrous except lobes; stemans exserted. Fruit capsular, ovoid, 2–3 × 1.5–2 mm, loculicidal across top, with calyx lobes; seeds numerous, pale brown, angled.

Flowering & Fruiting: March–November.

Occasional in thickets on foothills, roadsides, sparse forests.

Distribution: India (Himalaya), Bangladesh, Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand, Vietnam.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 122380 (BSD); Samir Sinha (2001).

7. **Hymenodictyon** Wall., *nom. cons.*

Hymenodictyon orixense (Roxb.) Mabb., Taxon 31: 66. 1982; P.C. Pant, Fl. Corbett Natl. Park: 83. 1986; Deb, J. Econ. Taxon. Bot. 13: 679, f. 3. 1989; R.D. Gaur, Fl. Distr. Garhwal: 536. 1999; Razafim. & B. Bremer, Bot. J. Linn. Soc. 152: 375. 2006; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007. *Cinchona orixensis* Roxb., Med. Facts Observ. 6: 152. 1793. *C. excelsa* Roxb., Pl. Coromandel 2: 3, t. 106. 1799. *Benteka rheedei* Roem. & Schult., Syst. Veg. ed. 15 bis. 4: 706–707. 1819. *Hymenodictyon excelsum* (Roxb.) Wall. in Roxb., Fl. Ind. (Eds. Carey & Wall.) 2: 149. 1824; Wight, Icon. Pl. Ind. Orient. 1: t. 79. 1838; Hook.f., Fl. Brit. India 3: 35. 1880. *H. utile* Wight, Icon. Pl. Ind. Orient. 1: t. 80. 1834. *H. rheedei* (Roem. & Schult.) M.R. Almeida & S.M. Almeida, J. Bombay Nat. Hist. Soc. 83: 223. 1987.

Tree, to 18 m high. Leaves crowded at ends of branchlets, 5.5–22 × 3.5–10.5 cm, elliptic-oblong or ovate, attenuate at base, with 2.6–8 cm long petioles, abruptly acuminate at apex, membranous, pubescent on both sides. Flowers greenish-white, fragrant, pedicelled, in fascicles on thyrsoid panicles; bracts 2, leafy; calyx truncate, lobes 5, puberulous without; corolla lobes 5, tube slightly longer than lobes; stamens 5, inserted. Capsules $\pm$ 2.3 × 0.8 cm, ellipsoid-obovoid, dehiscent, brown with white granules, 4-locular. Seeds many, flat with membranous wing.

Flowering & Fruiting: August–March.

Common in moist deciduous forests.

Distribution: India (almost throughout the country), Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. Pande 220147 (LWG).

8. *Knoxia* L.

Knoxia sumatrensis (Retz.) DC., Prodr. 4: 569. 1830; R. Bhattacharjee & Deb, J. Econ. Taxon. Bot. 6: 89. 1985; R.D. Gaur, Fl. Distr. Garhwal: 536. 1999. *Spermacoce sumatrensis* Retz., Observ. Bot. 4: 23. 1786. *Knoxia corymbosa* Willd., Sp. Pl. ed. 4, 1: 582. 1798; P.C. Pant, Fl. Corbett Natl. Park: 83. 1986. *K. mollis* R. Br. in Wall., Numer. List no. 820. 1829; Mabb. in Manilal, Bot. Hist. Hort. Malab. 85. 1980; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007.

Herb, perennials, to 90 cm high; stems sparsely to densely tomentose. Leaves petioled, $4.5-10.5 \times 0.8-2$ cm, linear-lanceolate, attenuate at base, acute at apex, pubescent on both sides. Flowers purplish-pink, in terminal, lax, paniculate cymes; calyx lobes 4, much shorter than tube, triangular; corolla lobes 4, broadly elliptic; stamens 4, inserted. Fruits small, quadrangular, oblong-ellipsoid.

Flowering & Fruiting: May–November.

Occasional in amidst grasslands.

Distribution: India (almost throughout the country), Australia China, Indonesia, Japan, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

9. *Oldenlandia* L.

Oldenlandia nudicaulis Roth, Nov. Pl. Sp.: 95. 1821; Hook.f., Fl. Brit. India 3: 70. 1880. *Hedyotis ovatifolia* Cav., Icon. Pl. Hisp. 6: 52, pl. 573, f. 1. 1801; P.C. Pant, Fl. Corbett Natl. Park: 82. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007. *Oldenlandia sedgwickii* Blatt., J. Proc. Asiat. Soc. Bengal (n.s.) 26: 344. 1930. *Gonetheca ovalifolia* (Cav.) Santapau & Wagh, Bull. Bot. Surv. India 5: 107. 1964 (1963). *Thecagonum ovatifolium* (Cav.) Babu, Bull. Bot. Surv. India 11: 214. 1971; R.D. Gaur, Fl. Distr. Garhwal: 541. 1999.

Herb, annual, to 10 cm high; stems seldom branched, pubescent, sometime saprophytic on fallen wood stock. Leaves subsessile, whorls, $0.7-7.5 \times 0.4-3.5$ cm, ovate-oblong, obtuse at apex, pubescent on nerves beneath. Flowers white, in many-flowered, corymbose-panicles, calyx tube 4, persistent, subulate; corolla lobes 4, campanulate. Capsules hemispheric, crowned with calyx lobes. Seeds c 0.5 mm across, globose, brown, pitted.

Flowering & Fruiting: August–November.

Rare as forest undergrowth in moist deciduous forests.

Distribution: India (almost throughout the country), Indo-Malaya, Java, Pakistan.

Specimens examined: Vatanwasa-Rathuadhab, R. Manikandan 122326 (BSD).

10. *Ophiorrhiza* L.

Ophiorrhiza fasciculata D. Don, Prodr. Fl. Nepal.: 136. 1825; Hook.f., Fl. Brit. India 3: 83. 1880; Deb & Mondal, Bull. Bot. Surv. India 39(1–4): 44–47. 1997; R.D. Gaur, Fl. Distr. Garhwal: 539. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007.

Herb or subshrub, erect, to 1.2 m high; stems pilosulous or puberulent to glabrescent. Leaves petioled, elliptic to lanceolate-elliptic, 8–15 × 3–6 cm, glabrous or sparsely strigillose, puberulent on veins beneath, base cuneate to attenuate, apex acute to caudate-acuminate, stipules narrowly triangular. Flowers white, flushed with pink, drying yellow, many-flowered, in congested-cymose to subfasciculate; bracts ligulate-lanceolate, persistent; calyx densely puberulent to hirtellous; hypanthium compressed cylindrical; corolla tubular-funnel form, outside puberulent. Capsules compressed rhombic, $\pm$ 4.5 × 10.5 mm, puberulent or hirtellous.

Flowering & Fruiting: July–October.

Scattered in moist shady places and as forest undergrowth in moist deciduous forests.

Distribution: India (Himalaya), Bhutan, China, Myanmar, Nepal.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 122475 (BSD).

11. *Pavetta* L.

Pavetta indica L. var. ***tomentosa*** (Roxb. ex Sm.) Hook.f., Fl. Brit. India 3: 150. 1880; Rout & Deb, Bull. Bot. Surv. India 41: 128, f. 30. 2000. *P. tomentosa* Roxb. ex Sm. in Rees, Cyclop. 26: 52. 1813; P.C. Pant, Fl. Corbett Natl. Park: 83. 1986; R.D. Gaur, Fl. Distr. Garhwal: 540. 1999. *P. brunonis* Wight, Icon. Pl. Ind. Orient. t. 1065. 1846. *P. indica* subsp. *tomentosa* (Roxb. ex Sm.) Bennet, Fl. Howrah Distr. 356. 1979; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007.

Small shrub, to 2 m high; young branches softly, densely tomentose. Leaves 4.5–13.5 × 2–6.5 cm, elliptic-lanceolate, narrowed at base shortly acuminate at apex. Flowers white, fragrant, in terminal, dichotomously branched, corymbose cymes; calyx tomentose; corolla lobes 4, oblong; stamens 4, inserted. Berries $\pm$ 5 mm across, globose, black.

Flowering & Fruiting: March–August.

Occasional as undergrowth in deciduous forests.

Distribution: India (tropical regions of the country), Taiwan.

Notes: Included on the authority of Samir Sinha (2001).

12. *Spermacoce* L.

- 1a. Leaves elliptic-ovate; capsules subglobose 1. *S. articularis*
 1b. Leaves linear-lanceolate; capsules oblong-ellipsoid 2. *S. pusilla*

1. ***Spermacoce articularis*** L.f., Suppl. Pl.: 119. 1782 (1781); Sivar. & al., Proc. Indian Acad. Sci. (Pl. Sci.) 97: 350, f. 5–10. 1987. *Borreria articularis* (L.f.) F.N. Williams, Bull. Bot. Herb. Boiss. 2, 5. 956. 1905; P.C. Pant, Fl. Corbett Natl. Park: 81. 1986; R.D. Gaur, Fl. Distr. Garhwal: 530. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 93. 2007. *Spermacoce hispida* auct. mult. non L., 1753; Hook.f., Fl. Brit. India 3: 200. 1881; Deb & R. Dutta, J. Econ. Taxon. Bot. 5: 1046. 1984.

Herb, annual, to 35 cm high. Leaves sessile, 1.5–4.5 × 0.5–1.8 cm, elliptic-ovate, attenuate at base, acute and mucronate at apex. Flowers white or pale pink, in axillary whorls; calyx hispid, tube narrowly

campanulate, lobes 4, obovate, apiculate; stamens 4, inserted. Capsules ϵ 4 mm across, subglobose, hairy in the upper half. Seeds 2, ellipsoid.

Flowering & Fruiting: August–October.

Common in marshy places.

Distribution: India (almost throughout the country), Africa, Australia, China, Indonesia, Japan (Ryukyu Islands), Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124847 (BSD); Samir Sinha (2001).

2. **Spermacoce pusilla** Wall. in Roxb., Fl. Ind. (Eds. Carey & Wall.) 1: 379. 1820; Deb & R. Dutta, J. Econ. Taxon. Bot. 5: 1057. 1984; Sivar. & al., Proc. Indian Acad. Sci. (Pl. Sci.) 97: 356. 1987. *S. stricta* L.f., Suppl. Pl. 120. 1782 (1781); Hook.f., Fl. Brit. India 3: 200. 1881. *Borreria pusilla* (Wall.) DC., Prodr. 4: 543. 1830; P.C. Pant, Fl. Corbett Natl. Park: 81. 1986; R.D. Gaur, Fl. Distr. Garhwal: 530. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 94. 2007. *B. stricta* (L.f.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4(4): 143. 1891.

Herb, annual, to 35 cm high; stems 4-angled, scabrid. Leaves whorled, $2.5\text{--}5.6 \times 0.5\text{--}1.2$ cm, linear-lanceolate, attenuate at base, acute at apex, scabrid above, pubescent beneath. Flowers white, in axillary and terminal, dense heads; calyx lobes 4, oblong, equalling to tube; stamens 4, inserted. Capsules ϵ 3 mm long, oblong-ellipsoid, with a longitudinal ventral groove.

Flowering & Fruiting: July–January.

Occasional in waste places.

Distribution: India (almost throughout the country), Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; introduced in tropical Africa.

Specimens examined: Rathuadhab, R. *Manikandan* 124835, 122350 (BSD); Samir Sinha (2001).

13. **Spermadictyon** Roxb.

Spermadictyon suaveolens Roxb., Pl. Coromandel 3: 32, t. 236. 1819; P.C. Pant, Fl. Corbett Natl. Park: 83. 1986; R.D. Gaur, Fl. Distr. Garhwal: 541. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007. *Hamiltonia dulina* Buch-Ham. ex D. Don, Prodr. Fl. Nep.: 137. 1825. *H. mysorensis* Wight & Am., Prodr. 423. 1834. *H. scabra* D. Don, Prodr. Fl. Nep.: 137. 1825. *H. suaveolens sensu* D. Don, Prodr. Fl. Nep.: 137. 1825; *sensu* Hook.f., Fl. Brit. India 3: 197. 1880, *non* Roxb. 1824. *Spermadictyon azweum* Wall. in Roxb., Fl. Ind. ed. Carey. 2: 225. 1824. *S. mysorensis* Steud., Nom. ed. II. 2: 619. 1841. *Padar, Padal*

Shrub, perennial, erect, to 3 m high; stems much branched, opposite decussate, slightly pubescent, herbaceous. Leaves petioled, opposite, $7\text{--}20 \times 4\text{--}10$ cm, elliptic-oblong or ovate, acute to acuminate, attenuate, glabrous or pubescent; stipules ensiform or abruptly acuminate. Flowers bluish-purple or white, fragrant, in panicles of head-like clusters; bracts leafy; bracteoles many, subulate, vinous; calyx teeth 5, linear-subulate, hispid, persistent; tube narrow; corolla tube slender, pubescent, lobes 5, spreading, oblong or ovate; stamens included, filaments very short; style filiform; stigma 5-cleft. Capsule ϵ 4 mm long, ovoid, 5-valved, pubescent, black, compressed. Seeds 5 or less, surrounded by loose reticulate aril.

Flowering & Fruiting: September–December.

Occasional in shady places and along roadsides near dry deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, China, Nepal, Pakistan.

Specimens examined: Vatanvasa, T.S. Rana & Party 220747 (LWG); Samir Sinha (2001).

14. *Uncaria* Schreb.

Uncaria scandens (Smith) Hutch. in Sargent, Pl. Wilson. 3: 406. 1916; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007. *Nauclea scandens* Smith in Rees, Cycl. 24: *Nauclea* no. 9. 1813. *Cephalanthus cavaleriei* H. Léveillé, Repert. Spec. Nov. Regni Veg. 10 (260–262): 434. 1912. *Uncaria wangi* F.C. How., Sunyatsenia 6(3–4): 261–262, f. 42. 1946. *U. pilosa* Roxb., Fl. Ind. (ed. 1832), 1: 520–521. 1832; Hook.f., Fl. Brit. India 3: 32. 1880. [Plate-11g]

Large lianas, to 10 m long; young stems slender, weakly to markedly quadrangular, densely hirtellous or pilosulous. Leaves petioled, ovate-oblong or elliptic-oblong, 10–15 × 3–5.5 cm, densely puberulent to strigillose on veins, base truncate, subcordate or cordulate, apex acute-acuminate; stipules deciduous, deeply 2-lobed, strigillose. Flowers pale yellow sometimes flushed with pink, salverform, in axillary and often terminal 5–7 heads; bracts 4–9 mm long; bracteoles linear-spatulate, sparsely pubescent; calyx with hypanthium portion obconic, densely strigose or pilose; corolla salverform, outside sparsely to densely hirtellous. Fruiting head c. 2.5 cm across, obovoid to oblanceoloid; seeds orange-yellow.

Flowering & Fruiting: February–November.

Sparse in deciduous forests.

Distribution: India (Himalaya), China.

Specimens examined: Rathudhab-Vatanvasa, R. Manikandan 122541, 122440, 122487, 124805 (BSD); Rathudhap, H.C. Pande 220843 (LWG).

15. *Wendlandia* Bartl. ex DC.

Wendlandia heynei (Schult.) Santapau & Merchant, Bull. Bot. Surv. India 3: 110. 1962; P.C. Pant, Fl. Corbett Natl. Park: 84. 1986; R.D. Gaur, Fl. Distr. Garhwal: 542. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 96. 2007. *Rondeletia heynei* Schult. in Roem. & Schult., Syst. Veg. ed. 15 bis. 5: 234. 1819. *Wendlandia exserta* (Roxb.) DC., Prodr. 4: 411. 1830, *nom. superfl.*; Hook.f., Fl. Brit. India 3: 37. 1880. *Rondeletia exserta* Roxb., Fl. Ind. (Eds. Carey & Wall.) 2: 135. 1824. *Tirchoniya*

Small tree, to 5 m high; bark dark brown. Leaves 6.5–18 × 2.5–5.8 cm, elliptic-lanceolate, acute and oblique at base, acute to acuminate at apex, coriaceous, greyish pubescent beneath, sparsely pubescent above. Flowers white, fragrant, in pyramidal, tomentose panicles; calyx lobes 5, acute; corolla lobes 5, oblong; stamens 5, inserted. Capsules c. 5 mm across, globose, pubescent.

Flowering & Fruiting: March–September.

Rare along stream line in moist deciduous forests.

Distribution: India (Himalaya, Central India & Deccan), Nepal.

Specimens examined: Sonanadi WLS, R. Manikandan 125734 (BSD); Vatanvasa, H.C. Pande 220783 (WG).

Notes: ‘*nom. superfl.* DC.’ referred to *Rondeletia heynei* (Schult. 1819) as a synonym; therefore, *W. exserta* is an incorrect *comb. nov.*, but legitimate.

Cultivated species:

Ixora coccinia L., Sp. Pl.: 110. 1753; Hook.f., Fl. Brit. India 3: 145. 1880; T. Husain & S.R. Paul, J. Econ. Taxon. Bot. Addit. Ser. 6: 83, f. 7. 1989; R.D. Gaur, Fl. Distr. Garhwal: 534. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 95. 2007.

Shrubs, to 2 m high. Leaves oblong-elliptic, obtuse at apex. Flowers pinkish-red, in dense, corymbose cymes.

Flowering & Fruiting: Almost throughout the year.

Cultivated in gardens of adjoining villages of the sanctuary.

52. ASTERACEAE (= COMPOSITAE)

- 1a. Herbs6
- 1b. Undershrubs, shrubs or small trees 2
- 2a. Undershrubs 3
- 2b. Shrubs or small tree 5
- 3a. Female florets apetalous..... 34. **Xanthium**
- 3b. Female florets petalous.....4
- 4a. Stipule like basal leaves present4. **Artemisia**
- 4b. Stipule like basal leaves absent 33. **Vernonia**
- 5a. Leaves elliptic, lanceolate or narrowly oblong 15. **Duhaldea**
- 5b. Leaves ovate-lanceolate or oblanceolate or elliptic-lanceolate20. **Gochnatia**
- 6a. Heads homogamous 7
- 6b. Heads heterogamous 18
- 7a. Involucral bracts foliaceous 17. **Elephantopus**
- 7b. Involucral bracts not foliaceous 8
- 8a. Leaves petiolated 9
- 8b. Leaves sessile 12
- 9a. Leaves simple or 2–3 lobed 10
- 9b. Leaves lyrate pinnatifid18. **Emilia**
- 10a. Florets white or pale green 11
- 10b. Florets reddish or purple 8. **Breca**
- 11a. Stems erect2. **Ageratum**
- 11b. Stems creeping 29. **Soliva**
- 12a. Florets white or yellow 13
- 12b. Florets purple–pink 16
- 13a. Florets white1. **Adenostemma**
- 13b. Florets yellow 14

14a. Leaves radical or cauline	15
14b. Leaves not as above	19. Gamochaeta
15a. Involucral bracts large, cylindric, ovate or oblong-lanceolate	35. Youngia
15b. Involucral bracts lanceolate	30. Sonchus
16a. Leaves membranous and glandular-pubescent beneath	13. Cyanthillium
16b. Leaves otherwise	17
17a. Achenes beaked	21. Lactuca
17b. Achenes not beaked	26. Saussurea
18a. Leaves opposite	19
18b. Leaves alternate	21
19a. Pappus-bristles plumose.....	32. Tridax
19b. Pappus-bristles non-plumose.....	20
20a. Outer involucral bracts glandular.....	28. Siegesbeckia
20b. Outer involucral bracts eglandular.....	5. Bidens
21a. Pappus present	22
21b. Pappus absent	30
22a. Stems pubescent	24
22b. Stems glabrouscent	23
23a. Florets yellow	27. Senecio
23b. Florets white	3. Anaphalis
24a. Stems winged	22. Laggera
24b. Stems wingless	25
25a. Stems clothed with white cottony wooly like hairs	25. Pseudognaphalium
25b. Stems not as above	26
26a. Flowers white; pappus with reflexed awns	23. Parthenium
26b. Flowers yellow or purple; pappus without awn	27
27a. Pappus usually uniseriate	28
27b. Pappus usually biseriate	29
28a. Flowers yellow	24. Pentanema
28b. Flowers pink or purple	7. Blumea
29a. Leaves ovate-lanceolate or rhomboid-ovate	6. Blainvillea
29b. Leaves linear-lanceolate or elliptic-oblong	11. Conyza
30a. Branchlets winged	31. Sphaeranthus
30b. Branchlets not winged	31
31a. Leaves regular or simple	32

- 31b. Leaves pinnatifid or pinnatisect 33
- 32a. Achenes oblong 16. **Eclipta**
- 32b. Achenes linear-lanceolate 9. **Centipeda**
- 33a. Stems procumbent or decumbent; flowers yellow 34
- 33b. Stems suberect; flowers pinkish-purple 14. **Cyathocline**
- 34a. Corolla broadly campanulate; achenes ovate 12. **Cotula**
- 34b. Corolla tubular; achenes cuneate-oblong 10. **Chrysanthellum**

1. **Adenostemma** J.R. Forst. & G. Forst.

Adenostemma lavenia (L.) Kuntze, Revis. Gen. Pl. 1: 304. 1891; Panigrahi, Kew Bull. 30: 648. 1975; P.C. Pant, Fl. Corbett Natl. Park: 87. 1986; Uniyal in Hajra & al., Fl. India 12: 346. 1995; R.D. Gaur, Fl. Distr. Garhwal: 554. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 97. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 185. 2009. *Verbesina lavenia* L., Sp. Pl. 902. 1753. *Adenostemma viscosum* J.R. Forst. & G. Forst., Char. Gen. Pl. 90, t. 45. 1776; Hook.f., Fl. Brit. India 3: 242. 1881. *A. latifolium* D. Don, Prodr. Fl. Nepal.: 181. 1825.

Herb, to 1 m high, erect, branched; young branches glandular-pubescent, stems tinged with purple colour. Leaves sessile, variable, 4.5–14.2 × 2–5.8 cm, ovate, cuneate at base, serrate-dentate along margins, acute at apex, trinerved, scabrid above, appressed hairy beneath. Inflorescence terminal, corymbose heads. Florets white, few to many; involucre bracts biserial, oblong-elliptic; corolla glandular-hairy. Achenes c. 4 mm long, obovoid, 5-angled, compressed, tuberculate or muricate. Pappus with 2–3 glands tipped bristles.

Flowering & Fruiting: October–February.

Rare along the streams in moist deciduous forests.

Distribution: India (almost throughout the country), Australia, China, Japan, Korea, Nepal, Philippines.

Notes: Included on the authority of Samir Sinha (2001).

2. **Ageratum** L.

- 1a. Leaves cuneate at base 1. *A. conyzoides*
- 1b. Leaves cordate or truncate at base 2. *A. boustonianum*

1. **Ageratum conyzoides** L., Sp. Pl.: 839. 1753; Hook.f., Fl. Brit. India 3: 243. 1881; P.C. Pant, Fl. Corbett Natl. Park: 87. 1986; Uniyal in Hajra & al., Fl. India 12: 348. 1995; R.D. Gaur, Fl. Distr. Garhwal: 554. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 98. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 186. 2009. [Plate-11h]

Herb, annual, to 75 cm high; stems terete, aromatic. Leaves 2.5–7.5 × 1.5–5 cm, ovate, cuneate at base, crenate along margins, acute to subacute at apex, trinerved, hairy on both sides. Inflorescence of terminal, dense, corymbose heads. Florets white or pale blue; involucre bracts campanulate, lanceolate; corolla tubular, lobes 5, hairy. Achenes c. 3 mm long, sharply 5-angled, black, sparsely spiculate on angles. Pappus scales 5, aristate.

Flowering & Fruiting: July–February.

Common in moist places and also found as forest undergrowth.

Distribution: India (throughout the country), throughout the world.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124996 (BSD).

Notes: Native of America, naturalized throughout the world.

2. ***Ageratum houstonianum*** Mill., Gard. Dict., ed. 8. *Ageratum* no. 2. 1768; P.C. Pant, Fl. Corbett Natl. Park: 87. 1986; Uniyal in Hajra & al., Fl. India 12: 349. 1995; R.D. Gaur, Fl. Distr. Garhwal: 555. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 98. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 187. 2009. *Carelia houstoniana* (Mill.) Kuntze, Revis. Gen. Pl. 1: 325. 1891. *Ageratum conyzoides* var. *mexicanum* (Sims) DC., Prodr. 5: 108. 1836. *A. mexicanum* Sims., Bot. Mag. 52: pl. 2524. 1824. *A. pinetorum* (L.O. Williams) R.M. King & H. Rob., Phytologia 24(2): 115. 1972. *A. wendlandii* Vilm., Fl. Pleine Terre (ed. 4) Suppl.: 2. 1894. *Alomia pinetorum* L.O. Williams, Fieldiana, Bot. 31(2): 25, f. 4. 1964.

Herb, annual, to 80 cm high; stems erect, simple or branched, purple-red, green, or straw-colored, white tomentose or thinly lanate. Leaves petioled, broadly ovate or triangular-ovate, sparsely or densely white pubescent, base cordate or truncate, margin crenate-serrate, apex rounded or acute. Inflorescence corymbose; capitula 5–15 or more; involucre campanulate, narrowly lanceolate, abaxially glandular pubescent, margin entire, apex long acuminate; corollas tubular, limb purplish, lobes pubescent. Achenes black, 5-angled, pappus of 5 short free scales; scales oblong-lanceolate, apex aristate-acuminate, sometimes truncate.

Flowering & Fruiting: Almost throughout the year.

Common on grasslands, roadsides and hillslopes.

Distribution: India (Himalaya), Africa, tropical America, China, Myanmar, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122408 (BSD); Vatanvasa, T.S. Rana & B. Datta 220159 (LWG).

Uses: It is used medicinally as an antiphlogistic, to relieve swelling and pain in the throat.

3. ***Anaphalis*** DC.

Anaphalis busua (Buch.-Ham. ex D. Don) DC., Prodr. 6: 275. 1838; P.C. Pant, Fl. Corbett Natl. Park: 87. 1986 & in Hajra & al., Fl. India 13: 57, f. 17. 1995; R.D. Gaur, Fl. Distr. Garhwal: 556. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 98. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 189. 2009. *Gnaphalium busua* Buch.-Ham ex D. Don, Prodr. Fl. Nepal.: 173. 1825. *Anaphalis araneosa* DC., Prodr.: 6. 275. 1838; Hook.f., Fl. Brit. India 3: 283. 1881.

Herb, erect, annual or biennial, to 15 cm high; stems somewhat winged, ascending or expanding branches, glabrous or brownish glandular hairy beneath. Leaves basal sessile, often caducous, 3–10 × 0.4–1 cm, oblanceolate-linear, spathulate, apiculate at apex, decurrent or cuneate-attenuate at base, recurved along the margins; cauline leaves smaller, linear or subulate, squarrose hairy, arachnoid tomentose on veins. Florets white, in heads, on terminal umbellate or corymbose clusters; involucre bracts broadly campanulate; corolla lobes as long as pappus; male florets pappus, serrulate. Achenes $\approx$ 0.8 mm, elliptic, glandular.

Flowering & Fruiting: Almost throughout the year

Common on open hill slopes (1500–3000 m).

Distribution: India (Himalaya, N. India), Bhutan, China, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

4. *Artemisia* L.

Artemisia nilagirica (C.B. Clarke) Pamp., Nuovo. Giorn. Bot. Ital. *n.s.* 33: 452. 1926; Santapau, Bull. Bot. Surv. India 3: 12. 1962; P.C. Pant, Fl. Corbett Natl. Park: 88. 1986; B.D. Naithani in Hajra & al., Fl. India 12: 36. 1995; Karthik. & al., Flow. Pl. India-Dicot. 1: 196. 2009. *A. vulgaris* L. var. *nilagirica* C.B. Clarke, Comp. Ind. 162. 1876. *A. vulgaris auct. non* L., 1753; Hook.f., Fl. Brit. India 3: 325. 1881. *A. nilagirica* var. *septentrionalis* Pamp., Nuovo Giorn. Bot. Ital., *n.s.* 33(3): 453–454. 1926; R.D. Gaur, Fl. Distr. Garhwal: 558. 1999.

Undershrub, erect, to 3 m high, aromatic, pubescent. Leaves $3.2\text{--}5 \times 0.6\text{--}1.2$ cm, oblanceolate, 3–5-lobed, cuneate at base, with stipular appendages, acute at apex, densely white-tomentose beneath. Inflorescence heterogamous, in axillary and terminal, racemose-paniculate heads. Florets pale white; involucre bracts 2–3-seriate, ovate-oblong, scarious; outer female florets, corolla shortly bidentate at apex; inner bisexual florets, corolla 5-lobed. Achenes ≈ 1.5 mm long, ellipsoid. Pappus absent.

Flowering & Fruiting: September–January.

Rare in wild and often cultivated.

Distribution: India (Himalaya, N & S. India), China, Myanmar.

Specimens examined: Halduparao Range, R. *Manikandan* 124852, 122312 (BSD).

5. *Bidens* L.

1a. Stems quadrangular; leaves cuneate at base 1. *B. bipinnata*

1b. Stems terete; leaves attenuate at base 2. *B. biternata*

1. ***Bidens bipinnata*** L., Sp. Pl.: 832. 1753; H.J. Chowdhery in Hajra & al., Fl. India 12: 367. 1995; R.D. Gaur, Fl. Distr. Garhwal: 560. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 202. 2009. *B. pilosa* var. *bipinnata* (L.) Hook.f., Fl. Brit. India 3: 309. 1881.

Herb, erect, to 85 cm high; stems quadrangular, glabrous. Leaves opposite, bipinnate; leaflets $1.5\text{--}7 \times 0.9\text{--}2.8$ cm, ovate-lanceolate, cuneate at base, serrate along margins, subacuminate at apex. Inflorescence in terminal or leaf-opposed, paniculate heterogamous heads. Florets yellow; involucre bracts biseriate, outer linear-spathulate, inner ovate-lanceolate; corolla bilobed. Achenes ≈ 2 mm long, angled, sparsely hispid. Pappus retrose bristly.

Flowering & Fruiting: September–April.

Occasional in moist places near deciduous forests.

Distribution: India (almost throughout the country), Tropical regions of the world.

Specimens examined: Way to Halduparao, R. *Manikandan* 122303 (BSD); Samir Sinha (2001).

2. ***Bidens biternata*** (Lour.) Merr. & Sherff., Bot. Gaz. 88: 293. 1929; P.C. Pant, Fl. Corbett Natl. Park: 88. 1986; H.J. Chowdhery in Hajra & al., Fl. India 12: 367. 1995; R.D. Gaur, Fl. Distr. Garhwal: 560. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 202. 2009. *Coreopsis biternata* Lour., Fl. Cochinch.: 508. 1790. *Bidens pilosa auct. non* L., 1753; Hook.f., Fl. Brit. India 3: 309. 1881. [Plate-12a]

Herb, annual, erect, to 75 cm high; stems terete, grooved, hairy. Leaves ternate or imparipinnate to bipinnate; leaflets $1.2\text{--}6.5 \times 0.9\text{--}2.1$ cm, ovate or elliptic-lanceolate, attenuate at base, dentate along margins,

acute at apex. Inflorescence in terminal or leaf opposed, corymbose, paniculate heads. Florets yellow; involucre bracts biserial, outer lanceolate, inner ovate-lanceolate, scarious; ray florets to 4 mm long, dentate; disc florets to 3 mm long. Achenes $\approx$ 1.5 cm long, compressed, black. Pappus bristles, retrosely hispid.

Flowering & Fruiting: Throughout the year.

Common weed in deciduous forests.

Distribution: India (almost throughout the country), tropical regions of the world.

Specimens examined: Way to Halduparao, R. *Manikandan* 122411 (BSD).

6. *Blainvillea* Cass.

Blainvillea acmella (L.) Philipson, *Blumea* 6: 350, f. 1. 1950; P.C. Pant, *Fl. Corbett Natl. Park*: 88. 1986; R.D. Gaur, *Fl. Distr. Garhwal*: 561. 1999; H.J. Chowdhery in Hajra & al., *Fl. India* 12: 377, f. 101. 1995; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.*: 100. 2007; Karthik. & al., *Flow. Pl. India-Dicot.* 1: 203. 2009. *Verbesina acmella* L., *Sp. Pl.*: 901. 1753. *Blainvillea latifolia* (L.f.) DC. ex Wight, *Contr. Bot. India*: 71. 1834; Hook.f., *Fl. Brit. India* 3: 305. 1881. *B. rhomboidea* Cass., *Cict. Sci. Nat.* 29: 493. 1823.

Herb, annual, stout, pubescent, to 1.2 m high; stems simple or scarcely branched, covered with white-crisped hairs. Leaves petioled, 5.5–14.5 $\times$ 2.8–9 cm, ovate-lanceolate or rhomboid-ovate, rounded to cuneate at base, acuminate at apex, appressed hairy, dentate-serrate along the margins. Inflorescence of axillary solitary, terminal or at the fork of the branches, radiate, peduncled heads; involucre bracts campanulate, few, outer leaf-like, inner scarious scales. Florets: marginal few, with yellow or white, bidentate corolla; central florets with white or yellow, tubular, campanulate, 5-lobed corolla. Achenes $\approx$ 5 mm long, obovoid-cuneate, triquetrous, transversely rugose, dark brown to black. Pappus $\approx$ 1 cm long, 2–5-unequal, plumose.

Flowering & Fruiting: April–November.

Common along roadsides in almost throughout the state.

Distribution: India (Andhra Pradesh, Bihar, Gujarat, Jammu & Kashmir, Karnataka, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh), Africa, America, China, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

7. *Blumea* DC., *nom. cons.*

- | | |
|---|------------------------|
| 1a. Prostrate herb | 4. <i>B. oxydonta</i> |
| 1b. Erect herb | 2 |
| 2a. Florets purple | 1. <i>B. axillaris</i> |
| 2b. Florets yellow | 3 |
| 3a. Achenes linear | 3. <i>B. lacera</i> |
| 3b. Achenes oblong | 4 |
| 4a. Leaves oblong-lanceolate to broadly oblanceolate; involucre bracts linear | 2. <i>B. fistulosa</i> |
| 4b. Leaves obovate ; involucre bracts linear-lanceolate | 5. <i>B. sinuata</i> |

1. ***Blumea axillaris*** (Lam.) DC., *Prodr.* 5: 434. 1836; Karthik. & al., *Flow. Pl. India-Dicot.* 1: 204. 2009. *Conyza axillaris* Lam., *Encycl.* 2: 84. 1786. *Blumea mollis* (D. Don) Merr., *Philip. J. Sci. (Bot.)* 5: 395. 1910; Randeria, *Blumea* 10: 261. 1960; P.C. Pant, *Fl. Corbett Natl. Park*: 89. 1986; R.R. Rao & al., *Fl. Ind. Enum. Aster.*: 18. 1988; Sarv. Kumar in Hajra & al., *Fl. India* 13: 135, f. 41. 1995; R.D. Gaur, *Fl. Distr. Garhwal*: 563.

1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007. *Erigeron mollis* D. Don, Prodr. 172. 1825. *Blumea nigbtiana* DC. in Wight, Contr. Bot. India: 14. 1834; Hook.f., Fl. Brit. India 3: 261. 1881. *B. neilgherrensis* Hook.f., *L.c. B. solidaginoides* (Poir.) DC., Prodr. 5: 443. 1836.

Herb, erect, aromatic; stems and branches villous. Leaves $2.5-7 \times 1.2-3.2$ cm, ovate-oblong, attenuate at base, dentate-serrate along margins, acute at apex, densely hairy beneath. Inflorescence in spiciform paniculate heads. Florets purple; corolla of female florets filiform; bisexual florets tubular, slender, 5-lobed, glandular. Achenes 5-angled, oblong, pubescent. Pappus uniseriate.

Flowering & Fruiting: December–May.

Rare along streams line and open forests area.

Distribution: India (almost throughout the country), Afghanistan, Africa, Australia, Bhutan, Cambodia, China, Indonesia, Myanmar, Nepal, Pacific islands (New Caledonia), Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124916 (BSD); Samir Sinha (2001).

2. ***Blumea fistulosa*** (Roxb.) Kurz, J. Asiat. Soc. Bengal 46(2): 187. 1877; Randeria, *Blumea* 10: 256. 1960; P.C. Pant, Fl. Corbett Natl. Park: 89. 1986; Sarv. Kumar in Hajra & al., Fl. India 13: 124. 1995; R.D. Gaur, Fl. Distr. Garhwal: 562. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 204. 2009. *Conyza fistulosa* Roxb., Fl. Ind. 3: 429. 1832. *Blumea glomerata* DC. in Wight, Contrib. Bot. India: 15. 1834; Hook.f., Fl. Brit. India 3: 262. 1881.

Herb, erect, to 1.5 m high; stems puberulous to densely velutinous. Leaves sinuately incised, $3-15 \times 0.5-6.2$ cm, oblong-lanceolate to broadly oblanceolate, acute to apiculate at apex, tapering at base, serrate or lyrate pinnatifid, puberulous on both surfaces. Inflorescence of interrupted, spicate paniculate heads; involucre bracts 1–5 mm long, linear, bright purple, slightly longer than florets. Florets yellow; corolla of bisexual florets tubular, 5-lobed, papillate. Achenes oblong, quadrangular, brown. Pappus white, hairy.

Flowering & Fruiting: December–May.

Grows in open grasslands and on forest margins.

Distribution: India (Assam, Bihar, Goa, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal), Bhutan, China, Myanmar, Nepal, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

3. ***Blumea lacera*** (Burm.f.) DC. in Wight, Contr. Bot. India: 14. 1834; Hook.f., Fl. Brit. India 3: 263. 1881; Randeria, *Blumea* 10: 264. 1960; Sarv. Kumar in Hajra & al., Fl. India 13: 128. 1995; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 100. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 205. 2009. *Conyza lacera* Burm.f., Fl. Indica 180, t. 59, f. 1. 1768. *Blumea subcapitata* DC., Prodr. 5: 439. 1936; Hook.f., *L.c.* 261. *B. lacera* var. *cinerascens* Hook.f., *L.c.*

Herb, erect, to 70 cm high, aromatic; branches viscid, glandular-pubescent. Leaves $2.5-7.2 \times 1.2-3.5$ cm, obovate or oblanceolate, incised or lyrate lobed, attenuate at base, irregularly crenate-dentate along margins, subacute at apex, silky pubescent on both sides. Inflorescence in terminal, corymbose paniculate, heterogamous heads. Florets yellow; involucre bracts 4-seriate, outer lanceolate, glandular, inner oblong,

acuminate; outer female florets, corolla tubular to 3 mm long. Achenes linear, ribbed, subangulate, terete. Pappus white.

Flowering & Fruiting: October–May.

Infrequent in shady places near deciduous forests.

Distribution: India (Himalaya, N & S. India), Africa, N Australia, Bhutan, China, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pacific islands, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. Pande 220794 (LWG), Sonanadi WLS, R. *Manikandan* 124827, 125736 (BSD).

4. **Blumea oxyodonta** DC. in Wight, Contr. Bot. India: 15. 1834; Hook.f., Fl. Brit. India 3: 266. 1881; Randeria, *Blumea* 10: 280. 1960; P.C. Pant, Fl. Corbett Natl. Park: 90. 1986; Sarv. Kumar in Hajra & al., Fl. India 13: 139, f. 43. 1995; R.D. Gaur, Fl. Distr. Garhwal: 562. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 206. 2009.

Herb, prostrate or decumbent; branches radiating and ascending from a stout root stock. Leaves crowded at base, 1.5–6.5 × 0.5–3.2 cm, obovate-oblong or spatulate, white hairy on both sides, sharply dentate along margins, spinulose-acute or apiculate at apex. Inflorescence in slender pedunculate, heterogamous heads. Florets yellow; involucre bracts 4–5 seriate, hairy; outer female florets; inner bisexual florets; corolla tubular, lobes 4–5. Achenes oblong, pubescent.

Flowering & Fruiting: November–June.

Common on rocky areas and along roadsides in deciduous forests.

Distribution: India (almost throughout the country), Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Notes: It can easily be recognized by its prostrate or decumbent habit. Included on the authority of Samir Sinha (2001).

5. **Blumea sinuata** (Lour.) Merr., Trans. Amer. Philos. Soc. *n.s.* 24: 388. 1935; Karthik. & al., Flow. Pl. India-Dicot. 1: 207. 2009. *Gnaphalium sinuatum* Lour., Fl. cochinch. 2: 497. 1790. *Blumea laciniata* (Roxb.) DC., Prodr. 5: 436. 1836; Hook.f., Fl. Brit. India 3: 264. 1881; Randeria, *Blumea* 10: 258. 1960; P.C. Pant, Fl. Corbett Natl. Park: 89. 1986; Sarv. Kumar in Hajra & al., Fl. India 13: 128, f. 39. 1995; R.D. Gaur, Fl. Distr. Garhwal: 562. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 100. 2007. *Conyza laciniata* Roxb., Fl. ind. ed. 1832. 3: 428. 1832.

Herb, erect, aromatic, to 2 m high; stems with many branches arising from a woody base, short hairy with stalked glands. Leaves lyrate-lobed, 4.5–32 × 1–18 cm, obovate, apiculate at apex, tapering at base, coarsely dentate along the margins, pilose. Inflorescence lax, in terminal, paniculate heads; involucre bracts linear-lanceolate, reflexed. Florets yellow; corolla of bisexual florets tubular, 5-lobed, pubescent; corolla of female florets filiform, glabrous. Achenes *c.* 1 mm long, ribbed, brown, sparsely pubescent. Pappus white.

Flowering & Fruiting: February–April.

Rare in forest clearing, waste places and along roadsides.

Distribution: India (almost throughout the country), Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Pacific islands, Philippines, Sri Lanka, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125726 (BSD); Samir Sinha (2001).

8. *Breca* Less.

Breca arvensis (L.) Less., Syn. Gen. Compos.: 10. 1832; Sarv. Kumar in Hajra & al., Fl. India 12: 155, f. 46. 1995; R.D. Gaur, Fl. Distr. Garhwal: 564. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 101. 2007. *Serratula arvensis* L., Sp. Pl. 2: 820. 1753. *Cirsium arvense* (L.) Scop., Fl. Carniol., ed. 2, 2: 126. 1772; Karthik. & al., Flow. Pl. India-Dicot. 1: 214. 2009. *Cephalonoplos arvense* (L.) Fourr., Ann. Soc. Linn. Lyon, sér. 2 17: 95. 1869. *Cnicus arvensis* (L.) Roth, Catalecta B. 1: 115. 1797; Hook.f., Fl. Brit. India 3: 362. 1881. *C. candicans* Wall., Cat. No.: 2893. 1831.

Herb, perennial, dioecious, with creeping roots, bearing adventitious shoots, to 1.5 m high; stems erect, branched above, unwinged. Leaves surface smooth. Florets reddish-purple or rarely white, in often numerous capitula, in terminal, corymbose; involucre narrowly ovoid; phyllaries imbricate, in 5–7 rows, lacking wings and scarious appendage; outer and middle phyllaries triangular to ovate, apex acute; inner phyllaries elliptic-lanceolate to broadly linear, apex acute to acuminate and scarious; corolla of female florets tubular; male florets tubular. Achene *c.* 4.5 mm long, yellowish. Pappus bristles dirty white.

Flowering & Fruiting: February–May.

Grow in moist places, ditches, grasslands and along roadsides.

Distribution: India (Bihar, Himachal Pradesh, Jammu & Kashmir, Punjab, Uttarakhand, Uttar Pradesh, West Bengal), Afghanistan, SW Asia, China, Europe, Japan, Kazakhstan, Korea, Mongolia, Nepal, Russia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122547 (BSD); Vatanvasa, H.C. Pande 220731 (LWG); Samir Sinha (2001).

Uses: The plant is used to coagulate milk.

Notes: *Breca* has been segregated from *Cirsium* on account of its unisexual florets and partial dioecy and it is a very variable species.

9. *Centipeda* Lour.

Centipeda minima (L.) A. Braun & Asch., Index Sem. Berol. (Berlin) 1867: App. 6. 1868; P.C. Pant, Fl. Corbett Natl. Park: 90. 1986; B.D. Naithani in Hajra & al., Fl. India 12: 48. 1995; C.D.K. Cook, Aquat. Wetl. Pl. India 68, f. 53 e–g. 1996; R.D. Gaur, Fl. Distr. Garhwal: 565. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 101. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 210. 2009. *Artemisia minima* L., Sp. Pl. 849. 1753. *Centipeda orbicularis* Lour., Fl. Cochinch. 2: 493. 1790; Hook.f., Fl. Brit. India 3: 317. 1881. *Dichrocephala schmidtii* Wight, Icon. Pl. Ind. Orient.: t. 1610. 1850.

Herb, annual, prostrate; stems spreading, pubescent. Leaves subsessile, to 8 × 3 mm, obovate or spatulate, cuneate at base, toothed along margins, acute at apex, puberulous beneath. Inflorescence in solitary, sessile, disciform, heterogamous heads. Florets yellow; involucre bracts biseriate, ovate; outer female florets many, corolla minute, obscurely lobed; inner bisexual florets few, corolla longer than female florets. Achenes *c.* 1 mm long, linear-lanceolate, 3–4-angled, hairy on angles.

Flowering & Fruiting: April–July.

Occasional along river beds near deciduous forests.

Distribution: India (almost throughout the country), Australia, China, Indonesia, Japan, Pacific islands, Papua New Guinea, Philippines, Russia, Thailand.

Specimens examined: Vatanvasa, H.C. Pande 220751 (LWG); Samir Sinha (2001).

10. *Chrysanthellum* Rich.

***Chrysanthellum americanum* (L.)** Vatke, Abh. Nat. ver. Brem. 9: 122. 1887; B.D. Naithani in Hajra & al., Fl. India 12: 75. 1995; R.D. Gaur, Fl. Distr. Garhwal: 566. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 101. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 212. 2009. *Anthemis americana* L., Sp. Pl. 2: 895. 1753. *Chrysanthellum indicum* DC., Prodr. 5: 631. 1836; Hook.f., Fl. Brit. India 3: 310. 1881; P.C. Pant, Fl. Corbett Natl. Park: 90. 1986.

Herb, procumbent, annual; stems rigid, grooved, glabrous to scabrous, 4-angular. Leaves petioled, deltoid, pinnatifid, succulent; segments oblong or cuneiform, obtusely lobed, membranous at margins; petioles dialated at sheathing base. Florets yellowish-white, in heads, enlarging in fruit; involuclral bracts equalling achenes, oblong to elliptic, obtuse, strongly nerved with broad membranous margins; ray florets few, female; corolla dark veined; style bifid; disc florets many, bisexual; corolla tubular. Achenes cuneate-oblong, *c.* 3×1 mm, grooved, smooth, with thick margins.

Flowering & Fruiting: July–December.

Distribution: India (Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Uttarakhand, Uttar Pradesh, West Bengal), Tropical Africa, Madagascar.

Notes: Included on the authority of Samir Sinha (2001).

11. *Conyza* Less., *nom. cons.*

- 1a. Stems glandular-hairy; leaves elliptic-oblong 2. *C. leucantha*
 1b. Stems pubescent; leaves not as above 2
 2a. Inflorescence in branched panicles 1. *C. canadensis*
 2b. Inflorescence in terminal corymbose 3. *C. stricta*

1. ***Conyza canadensis* (L.) Cronq.**, Bull. Torrey Bot. Club 79: 632. 1943; Hajra in Hajra & al., Fl. India 12: 105, f. 30. 1995; R.D. Gaur, Fl. Distr. Garhwal: 568. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 217. 2009. *Erigeron canadensis* L., Sp. Pl.: 863. 1753; Hook.f., Fl. Brit. India 3: 254. 1881.

Herb, annual, to 90 cm high; stems slender, much branched above, pubescent, hirsute or nearly glabrous. Leaves linear or linear-lanceolate, entire or toothed. Inflorescence of heads 0.5–0.6 cm across, peduncled, in elongated branched panicles; involuclral bracts narrow, glabrate, acuminate. Ligules pale rosy or purplish, pale. Achenes *c.* 1 mm long, flat, nearly glabrous. Pappus hairs dirty white, 3 mm long.

Flowering & Fruiting: June–August.

Distribution: India (Andhra Pradesh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Orissa, Tamil Nadu, Uttarakhand, Uttar Pradesh), China, Nepal, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125671 (BSD); Samir Sinha (2001).

Notes: It is a cosmopolitan weed of N. American origin.

2. ***Conyza leucantha* (D. Don)** Ludlow & P.H. Raven, Kew Bull. 17: 71. 1963; P.C. Pant, Fl. Corbett Natl. Park: 91. 1986; Hajra in Hajra & al., Fl. India 12: 105. 1995; R.D. Gaur, Fl. Distr. Garhwal: 569. 1999;

Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 217. 2009. *Erigeron leucanthus* D. Don, Prodr. Fl. Nepal.: 171. 1825. *Conyza viscidula* Wall. ex DC., Prodr. 5: 383. 1836; Hook.f., Fl. Brit. India 3: 258. 1881.

Herb, to 45 cm high; stems erect, ribbed, branched, glandular-hairy. Leaves $3.8-7.7 \times 1.2-2.8$ cm, elliptic-oblong, narrowed at base, acute at apex, glandular-pubescent. Inflorescence in corymbose, paniculate heads. Florets pink; involucre bracts purple tinged along margins, glandular-pubescent at tip; outer florets female; inner floret bisexual. Achenes compressed. Pappus turning reddish.

Flowering & Fruiting: March–May.

Occasional in moist deciduous forests.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, Myanmar, China, Indo-China, Malayasia, New Caladonia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124825, 122586 (BSD).

3. ***Conyza stricta*** Willd., Sp. Pl. 3: 1922. 1803; Hook.f., Fl. Brit. India 3: 258. 1881; P.C. Pant, Fl. Corbett Natl. Park: 91. 1986; Hajra in Hajra & al., Fl. India 12: 108. 1995; R.D. Gaur, Fl. Distr. Garhwal: 534. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 217. 2009.

Herb, annual, to 70 cm high; stems erect, branched, sparsely pubescent. Leaves sessile, $1.8-4 \times 0.4-0.8$ cm, narrowly linear-spathulate to oblanceolate, narrowed at base, entire or coarsely serrate or rarely pinnatifid, acute at apex, crispate-pubescent. Inflorescence in terminal corymbose, dense heads. Florets yellow; involucre bracts multiseriate, linear-lanceolate to oblong-lanceolate, acute, scarious margined; corolla of outer florets female; inner florets bisexual. Achenes ovoid-oblong, brownish. Pappus plumose, longer than achenes.

Flowering & Fruiting: September–December.

Occasional in open grass fields near moist deciduous forests.

Distribution: India (Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh, Uttarakhand), Africa, Asia, Myanmar.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125733 (BSD); Samir Sinha (2001).

12. *Cotula* L.

Cotula anthemoides L., Sp. Pl.: 891. 1753; Hook.f., Fl. Brit. India 3: 316. 1881; P.C. Pant, Fl. Corbett Natl. Park: 91. 1986; Hajra in Hajra & al., Fl. India 12: 52. 1995; R.D. Gaur, Fl. Distr. Garhwal: 569. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 102. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 218. 2009.

Babuna

Herb, annual, pale green, weak, procumbent or decumbent, glabrous; stems many from the rootstock, 5–20 cm long. Leaves petioled, bipinnatisect or pinnatifid; segments narrowly oblong, slightly curved; ultimate segments obtuse, shortly mucronate. Inflorescence of heads yellow, solitary on long, naked filiform peduncles; involucre bracts narrowly oblong, obtuse, prominently nerved inside, slightly scarious at the tips. Receptacle naked, tubercled; outer florets female, fertile; corolla minute; disc florets hermaphrodite, fertile, tubular; corolla, broadly campanulate. Achenes ovate, with thick narrow wings, that of ray florets broad, flat.

Flowering & Fruiting: December–April.

Grows under moist shady places near deciduous forests.

Distribution: India (Bihar, Himachal Pradesh, Madhya Pradesh, Punjab, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh), Africa, China, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

13. *Cyanthillium* Blume

Cyanthillium cinereum (L.) H. Rob., Proc. Biol. Soc. Wash. 10: 252. 1990; Karthik. & al., Flow. Pl. India-Dicot. 1: 223. 2009. *Conyza cinerea* L., Sp. Pl.: 862. 1753. *Vernonia cinerea* (L.) Less., Linnaea 4: 291. 1829; Hook.f., Fl. Brit. India 3: 233. 1881; P.C. Pant, Fl. Corbett Natl. Park: 96. 1986; Uniyal in Hajra & al., Fl. India 13: 367. 1995; R.D. Gaur, Fl. Distr. Garhwal: 594. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007.

Herb, erect or decumbent, to 70 cm high. Leaves $1-5.5 \times 0.8-2.5$ cm, broadly elliptic or lanceolate, cuneate at base, crenate along margins, acute at apex, pubescent on both surfaces. Inflorescence in terminal or axillary, corymbose-paniculate, homogamous heads. Florets pinkish; involucre bracts many seriate, ovate-lanceolate, hairy; corolla lobes ovate-acute. Achenes ≈ 3 mm long, 3–4-angled, silky pubescent. Pappus small, biseriate, inner longer than achenes.

Flowering & Fruiting: September–February.

Common in deciduous forests.

Distribution: India (almost throughout the country), Africa, America, Asia, Mexico, Pacific Islands, West Indies.

Specimens examined: Sonanadi WLS, R. *Manikandan*, 122579, 124826, 125766 (BSD); Vatanvasa, H.C. Pande 220761 (LWG).

14. *Cyathocline* Cass.

Cyathocline purpurea (Buch.-Ham. ex D. Don) Kuntze, Revis. Gen. Pl. 1: 333. 1891; P.C. Pant, Fl. Corbett Natl. Park: 91. 1986; Hajra in Hajra & al., Fl. India 12: 111, f. 32. 1995; C.D.K. Cook, Aquat. Wetl. Pl. India 68, f. 54 a–c. 1996; R.D. Gaur, Fl. Distr. Garhwal: 570. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007. *Tanacetum purpureum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 181. 1825. *Cyathocline lyrata* Cass., Ann. Sc. Nat. Ser. 1, 17: 420. 1829; Hook.f., Fl. Brit. India 3: 246. 1881.

Herb, suberect, viscid and glandular, silky hairy. Leaves radical and cauline, sessile, to 7.5–10.5 cm long, pinnatisect, segments toothed. Inflorescence in terminal, corymbose, paniculate heads. Florets purple or pinkish-purple; involucre bracts linear, acute, hairy along margins; outer female florets many, corolla filiform; inner bisexual florets, corolla tubular, lobes 5. Achenes oblong-ovoid, glabrous. Pappus absent.

Flowering & Fruiting: December–March.

Common in rice fields but rare along the streams near moist deciduous forests.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122556 (BSD); Samir Sinha (2001).

15. *Duhaldea* DC.

- 1a. Leaves rounded at base 1. *D. cappa*
 1b. Leaves cuneate at base 2. *D. cuspidata*

1. **Duhaldea cappa** (Buch.-Ham. ex D. Don) Pruski & Anderb., *Compositae Newslett.* 40: 44. 2003; Karthik. & al., *Flow. Pl. India-Dicot.* 1: 226. 2009. *Conyza cappa* Buch.-Ham. ex D. Don, *Prodr. Fl. Nepal.* 176–177. 1825; Hook.f., *Fl. Brit. India* 3: 295. 1881. *Inula cappa* (Buch.-Ham. ex D. Don) DC., *Prodr.* 5: 469. 1836; P.C. Pant, *Fl. Corbett Natl. Park*: 93. 1986; Sarv. Kumar in Hajra & al., *Fl. India* 13: 13, f. 4. 1995; R.D. Gaur, *Fl. Distr. Garhwal*: 579. 1999; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.* 105. 2007.

Shrub, to 2 m high; stems lanate-tomentose, branched. Leaves petioled, leaf blade elliptic, lanceolate, or narrowly oblong, 8–25 × 2.5–5.5 cm, thick, rather papery, whitish lanate abaxially, obscuring minor veins, green and sparsely coarsely pubescent adaxially, base rounded, margin remotely serrulate, apex acute or shortly acuminate. Capitula radiate or disciform, yellow, in dense corymbs; involucre 6-seriate; phyllaries lanceolate, tomentose, inner ones; ray florets few; corollas tubular and erect or curved outward or with short lamina; disk floret corollas yellow. Achenes cylindric, white tomentose. Pappus whitish, sometimes brownish tipped, 4–5 cm long.

Flowering & Fruiting: June–December.

Grows on dry hills, waste fields, thickets and grasslands.

Distribution: India (Himalayas), Bhutan, China, Malaysia, Nepal, Pakistan, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

2. **Duhaldea cuspidata** (DC.) Anderb., *Pl. Syst. Evol.* 176: 104. 1991; Karthik. & al., *Flow. Pl. India-Dicot.* 1: 226. 2009. *Amphiraphis cuspidata* DC., *Prodr.* 5: 343. 1836. *Inula cuspidata* (DC.) C.B. Clarke, *Comp. ind.* 125. 1876; Hook.f., *Fl. Brit. India* 3: 296. 1881; P.C. Pant, *Fl. Corbett Natl. Park*: 93. 1986; Sarv. Kumar in Hajra & al., *Fl. India* 13: 15, f. 5. 1995; R.D. Gaur, *Fl. Distr. Garhwal*: 579. 1999; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.*: 105. 2007.

Shrub, erect, to 1 m high; stems much branched, branchlets pubescent. Leaves petioled, 2.5–12 × 1.5–4 cm, elliptic-lanceolate, acute-acuminate at apex, narrowed or cuneate at base, serrulate along the margins, rough, glabrous on upper surface, thinly pubescent on lower surface. Florets yellow, in terminal, corymbiform, many, globose heads; involucre bracts linear-oblong, with prominent midrib. Achenes c. 2 mm long, terete, dirty white, silky hairy. Pappus hairs fimbriate or feathery at tip.

Flowering & Fruiting: June–December.

Grows in hills, waste fields, thickets, grasslands.

Distribution: India (Himalayas), Bhutan, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

16. **Eclipta** L., *nom. cons.*

Eclipta prostrata (L.) L., *Mant. Pl.* 2: 286. 1771; P.C. Pant, *Fl. Corbett Natl. Park*: 91. 1986; H.J. Chowdhery in Hajra & al.; *Fl. India* 12: 381. 1995; C.D.K. Cook, *Aquat. Wetl. Pl. India* 69, f. 54 d–f. 1996; R.D. Gaur, *Fl. Distr. Garhwal*: 572. 1999; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.*: 103. 2007; Karthik. & al., *Flow. Pl. India-Dicot.* 1: 227. 2009. *Verbesina prostrata* L., *Sp. Pl.*: 902. 1753. *Verbesina alba* L., *Sp. Pl.* 2: 902.

1753. *Eclipta erecta* L., Mant. Pl. 2: 286. 1771 *nom. superfl.* for *Verbesina alba* L. *E. alba* (L.) Hassk., Fl. Jav. Rar. 528. 1848; Hook.f., Fl. Brit. India 3: 304. 1881.

Herb, annual, erect or prostrate, to 30 cm long. Leaves sessile, 1.5–5.6 × 0.5–1.6 cm, linear, oblong, acute at apex, attenuate at base, appressed strigose on both sides. Inflorescence in axillary, solitary or paired, on unequal, pedunculate heterogamous heads. Florets white; involucre bracts cupular, biseriate, oblong to ovate, hairy; outer florets many, tube small; inner florets few, c 2 mm long. Achenes c 3 mm long, oblong-obovate, 3–4-angled, truncate above, brown to black. Pappus absent.

Flowering & Fruiting: Throughout the year.

Common in wet places and fallow fields.

Distribution: India (almost throughout the country), Africa, America, Asia, Australia, Europe, Pacific Islands.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122578 (BSD); Samir Sinha (2001).

Uses: The whole plant is used in hair-falling complaints and crude extracts of leaves applied to cure wounds and cuts.

Notes: Linnaeus (1753) described *Verbesina prostrata* L. (p. 902), *V. alba* (p. 902) and *V. pseudo-acmella* L. (p. 901). It has been found that all the 3 names denote only a single species of which there are many forms, although the forms do not merit even a varietal status. Again in 1771, Linnaeus reduced the above three species to two and described *E. prostrata* L. and *E. erecta* L. The former name based on *Verbesina prostrata* L. (1753) whereas the later dated only from 1771. Thus *E. prostrata* is accepted here.

17. *Elephantopus* L.

Elephantopus scaber L., Sp. Pl.: 814. 1753; Hook.f., Fl. Brit. India 2: 242. 1881; P.C. Pant, Fl. Corbett Natl. Park: 91. 1986; P.C. Pant, Fl. Corbett Natl. Park: 91. 1986; Uniyal in Hajra & al., Fl. India 13: 334, f. 102. 1997; R.D. Gaur, Fl. Distr. Garhwal: 572. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 224. 2009.

Herb, stiff erect, to 25 cm high; rootstock creeping, rhizomatous; stems dichotomously branched, appressed white-hairy. Leaves radical, few cauline, 5.5–13.5 × 2.5–4.5 cm, obovate-oblong, attenuate at base, serrate to dentate along the margins, subacute at apex, bulbous white hairy. Inflorescence in terminal, dichotomously branched, clustered homogamous heads, surrounded by 3 foliaceous, cordate bracts upto 1.2 cm long. Florets bluish; involucre bracts 2-seriate, oblanceolate; corolla tubular, lobes lanceolate. Achenes c 3 mm long, oblong, ribbed, tapering at base, hairy in between ribs. Pappus with 4–6-bristles.

Flowering & Fruiting: August–January.

Common along roadsides and shady places in moist deciduous forests as undergrowth.

Distribution: India (almost throughout the country), widely distributed in tropical areas of Africa, America and Asia

Specimens examined: Sonanadi WLS, R. *Manikandan* 122370 (BSD); Samir Sinha (2001).

18. *Emilia* (Cass.) Cass.

Emilia sonchifolia (L.) DC. in Wight, Contr. Bot. India 24. 1834; Hook.f., Fl. Brit. India 3: 336. 1881; P.C. Pant, Fl. Corbett Natl. Park: 92. 1986; R. Mathur in Hajra & al., Fl. India 13: 214, f. 67. 1995; R.D. Gaur, Fl. Distr. Garhwal: 573. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 228. 2009. *Cacalia onchifolia* L., Sp. Pl.: 835. 1753.

Herb, erect or diffuse, to 40 cm high. Leaves variable, lower petioled, lyrate-pinnatifid, with triangular-ovate, terminal lobed; upper leaves 2–3.2 × 0.5–0.8 cm, lanceolate, acute at apex, semi-amplexicaul at base. Inflorescence in terminal, lax, corymbose-paniculate, homogamous heads. Florets pale purple; involucre bracts campanulate, equalling florets; corolla c. 1 mm long. Achenes c. 3 mm long, 5-ribbed, ribs grooved, minutely hairy. Pappus copious, white.

Flowering & Fruiting: July–December.

Occasional along roadsides and waste places in deciduous forests.

Distribution: India (almost throughout the country), Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122555, 122395, 122319 (BSD); Samir Sinha (2001).

19. **Gamochaeta** Wedd.

Gamochaeta pensylvanica (Willd.) Cabrera, Bol. Soc. Argent. Bot. 9: 375. 1961; Karthik. & al., Flow. Pl. India-Dicot. 1: 233. 2009. *Gnaphalium pensylvanicum* Willd., Enum. Pl. Hort. Berol.: 867. 1809; Drury, New Zealand J. Bot. 9: 167, fig. 4. 1971; P.C. Pant in Hajra & al., Fl. India 13: 89, f. 29. 1995; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007. *G. purpureum* auct. non L. 1753; Hook.f., Fl. Brit. India 3: 289. 1881; Hsu, Lu, Yang & Huang, Wild Herb. Pl. Taiwan: 67. 1987.

Herb, annual, to 50 cm high; stems erect, simple or more often branching from base, grayish tomentose. Leaves sessile, oblanceolate to spatulate, 2.5–8 × 0.4–1.8 cm, margins entire or slightly wavy, apex rounded to obtuse, upper surface loosely cob-webby, lower surface gray-green, woolly. Inflorescence of heads numerous, in axillary clusters, forming spicate panicles; outer involucre bracts ovate-lanceolate or lanceolate, apex long acute; inner ones linear-oblong, rounded to short acute. Achenes brown, elliptic, c. 0.5 mm long, minutely glandular. Pappus white, connate at base into a ring.

Flowering & Fruiting: June–March.

Common along the roadsides and waste fields.

Distribution: India: (Himalaya, C. & S. India), America, Asia and elsewhere.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124828 (BSD).

Notes: It is a native of the Americas, widely adventive elsewhere.

20. **Gochnatia** Kunth

Gochnatia spectabilis (D. Don) Less., Linnaea 5: 261. 1830; P.C. Pant, Fl. Corbett Natl. Park: 92. 1986. *Leucomeris spectabilis* D. Don, Prodr. Fl. Nepal.: 179. 1825; Hook.f., Fl. Brit. India 3: 386. 1881; Sarv. Kumar in Hajra & al., Fl. India 13: 182, f. 58. 1995; R.D. Gaur, Fl. Distr. Garhwal: 582. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 106. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 235. 2009.

Phusara, *Phusiari* [Plate-12b]

Shrub to small tree, 2–3 m high; young branches with persistent leaf scars. Leaves ovate-lanceolate or oblanceolate or elliptic-lanceolate, narrowed or rounded at apex, gradually narrowed at base to short petiole, 5–25 × 2–4.5 cm, green and coriaceous above, densely dirty white, velvety tomentose beneath; midrib raised below. Heads corymbose, dense; involucre bracts in 4–5-rows, imbricate; outer ones ovate-oblong, gradually smaller, much smaller than the florets, acute, dry. Florets all bisexual, fertile; corolla pale yellow, tubular, 5-lobed; lobes revolute; anther bases caudate, ciliate; style filiform, obtuse, 2-fid. Achenes subterete, 3-ribbed on each face, densely silvery pilose. Pappus dirty white, longer than the achenes, scabrid.

Flowering & Fruiting: April–June.

Distribution: India (W. Himalayas, Uttarakhand, Uttar Pradesh), Nepal.

Specimens examined: Khanda-Rathuadhab, R. *Manikandan* 122531 (BSD).

Notes: Flowers are aromatic and attract large number of insects during peak flowering.

21. *Lactuca* L.

Lactuca dissecta D. Don, Prodr. Fl. Nepal.: 164. 1825; Hook.f., Fl. Brit. India 3: 405. 1881; P.C. Pant, Fl. Corbett Natl. Park: 92. 1986; Mamgain & R.R. Rao in Hajra & al., Fl. India 12: 297, f. 75. 1995; R.D. Gaur, Fl. Distr. Garhwal: 580. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 233. 2009. *L. auriculata* DC., Prodr. 7: 140. 1838.

Herb, annual, erect, c. 40 cm high; stems simple or divaricately branched from base, slender, glabrous. Leaves sessile, obovate, spatulate, or elliptic, 3–7 × 1–3.5 cm, pinnatifid to subpinnatifid, margin entire or sparsely dentate, lateral lobes 3–6-pairs, rhombic, flabelliform, or orbicular, apex rounded to acute; terminal lobe rhombic, apex acute. Florets blue to bluish-purple in synflorescence corymbiform, with some to numerous capitula. Capitula with c. 15 florets; involucre narrowly cylindric; phyllaries abaxially purplish-red, glabrous, apex acute; outer phyllaries ovate to linear-lanceolate, approaching inner phyllaries to 3/4 their length. Achene body pale brown to blackish, obovoid, compressed, with 3 ribs on either side; beak white, filiform, Pappus 3–4 mm long.

Flowering & Fruiting: April–June.

Occasional on open grasslands and roadsides.

Distribution: India (C & N India, Himalayas), Afghanistan, SW Asia, Bhutan, China, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan.

Specimens examined: Sona river bank, H.C. Pande 220832 (LWG); Samir Sinha (2001).

22. *Laggera* Sch. Bip. ex Benth.

Laggera crispata (Vahl) Hepper & Wood, Kew Bull. 38: 83. 1983; Sarv. Kumar in Hajra & al., Fl. India 13: 151, f. 47. 1995; R.D. Gaur, Fl. Distr. Garhwal: 581. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 245. 2009. *Conyza crispata* Vahl, Symb. Bot. 1: 71. 1790. *Laggera pterodonta* (DC.) Sch.-Bip. ex Oliver, Trans. Linn. Soc. London 29: 94. 1873; Hook.f., Fl. Brit. India 3: 271. 1881. *Blumea pterodonta* DC. in Wight, Contr. Bot. India 15. 1834.

Herb, to 1.5 m high; stems erect, winged, slender, viscid. Leaves 8.5–10 × 2–4 cm, elliptic, cuneate to decurrent at base, acute at apex. Inflorescence in short paniculate, heterogamous, few, disciform heads. Florets purple; involucre bracts many seriate; outer female florets many, inner few bisexual florets. Achenes ribbed. Pappus uniseriate.

Flowering & Fruiting: December–March.

Occasional as undergrowth in teak plantation near deciduous forests.

Distribution: India (C & N India, Himalayas), tropical Africa, Bhutan, China, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

23. *Parthenium* L.

Parthenium hysterophorus L., Sp. Pl.: 988. 1753; R.S. Rao, J. Bombay Nat. Hist. Soc. 54: 218, t. 1. 1956; Sarv. Kumar in Hajra & al., Fl. India 12: 403, f. 113. 1995; R.D. Gaur, Fl. Distr. Garhwal: 583. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 106. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 255. 2009.

Herb, erect, to 1.5 m high; stems and branches hairy, angular. Leaves alternate, sessile, bipinnatifid, 4.5–16.5 × 3–7.5 cm, irregularly much dissected, rounded at apex; white-pubescent on both sides. Inflorescence in terminal and axillary, paniculate, heterogamous heads. Florets white; involucre bracts biseriate, ovate, densely hairy; outer florets 5, ligule obovate, supported by 2 hyaline wings at base; inner florets bisexual; corolla lobes 5. Achenes small, compressed, triquetrous, puberulous along sides. Pappus with reflexed awns.

Flowering & Fruiting: June–January.

Common weed in disturbed areas and along roadsides near deciduous forests.

Distribution: India (throughout the country), Pantropical.

Specimens examined: Vatanvasa, H.C. Pande 220766 (LWG).

Notes: It is native of tropical America and introduced elsewhere. Though it was suspected by R.S. Rao, *l.c.* as a new entrant to the Flora of India, Bennet & al. (Indian J. Forest. 1: 128–131. 1978) and Maiti (Indian J. Forest. 6: 328. 1983) have established that this plant has been introduced in Indian Botanic Garden, Howrah around 1810. However its presence remained obscure and since R.S. Rao's report, botanists have taken cognizance of this plant in various parts of India and have initiated studies on its obnoxious effects on man and alleopathic effect on other crops (Manikandan & Abdul Hakkim, 1999).

24. *Pentanema* Cass.

- 1a. Leaves linear-lanceolate, cordate to auriculate at base1. *P. indicum*
 1b. Leaves oblong to oblong-lanceolate, semiamplexicaul at base2. *P. vestitum*

1. ***Pentanema indicum*** (L.) Ling, Acta Phyt. Sin. 10: 179. 1965; P.C. Pant, Fl. Corbett Natl. Park: 94. 1986; Sarv. Kumar in Hajra & al., Fl. India 13: 28, f. 9. 1995; R.D. Gaur, Fl. Distr. Garhwal: 584. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 107. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 255. 2009. *Inula indica* L., Sp. Pl. 2: 1236. 1763. *Vicoa indica* (L.) DC. in Wight, Contr. Bot. India: 10. 1834. *V. auriculata* Cass., Ann. Sci. Nat. Bot. 1, 17: 418. 1829; Hook.f., Fl. Brit. India 3: 297. 1881.

Herb, perennial, erect, suffrutescent, to 90 cm high; stems reddish, sparsely puberulous. Leaves sessile, 3.5–6.2 × 0.7–1.2 cm, linear-lanceolate, cordate to auriculate at base, acute at apex, sparsely pubescent. Inflorescence in solitary, axillary and terminal, heterogamous heads. Florets yellow; involucre bracts many seriate, linear-lanceolate; outer florets few, 2–3 dentate; inner florets bisexual; corolla lobes 5, ovate, acute. Achenes c. 2 mm long, brown, sparsely hairy. Pappus uniseriate.

Flowering & Fruiting: November–February.

Occasional along roadsides in deciduous forests.

Distribution: India (C & N India, Himalayas), tropical Africa, China, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124850 (BSD); Sandikhal-Vatanvasa, *TBH* 220132 (LWG); Samir Sinha (2001).

2. **Pentanema vestitum** (Wall. ex DC.) Ling, Acta Phyt. Sin. 10: 180. 1965; P.C. Pant, Fl. Corbett Natl. Park: 94. 1986; Sarv. Kumar in Hajra & al., Fl. India 13: 30, f. 10. 1995; R.D. Gaur, Fl. Distr. Garhwal: 584. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 107. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 256. 2009. *Inula vestita* Wall. ex DC., Prodr. 5: 470. 1836. *Vivco vestita* (Wall. ex DC.) Benth. ex Hook.f., Fl. Brit. India 3: 297. 1881.

Herb, annual, erect, stout, to 45 cm high; stems branched, branches glandular, softly pubescent villous. Leaves sessile, 3.2–6 × 1–2 cm, oblong to oblong-lanceolate, semiamplexicaul base, serrate along margins, obtuse to subacute at apex, appressed villous. Florets yellow, heterogamous heads, in long villous peduncle; involucre bracts 4-seriate, linear-subulate, long acuminate with recurved tips, soft white hairy on both surfaces; corolla of ray florets linear, 2 or 3-toothed; corolla of disc florets shorter than ray florets. Achenes thinly hairy. Pappus white, hairs few.

Flowering & Fruiting: March–June.

Grows on hillslopes, open grassy fields.

Distribution: India: (Bihar, Jammu & Kashmir, Maharashtra, Sikkim, Uttarakhand, Uttar Pradesh), Afghanistan, China, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

25. **Pseudognaphalium Kirp.**

Pseudognaphalium luteoalbum (L.) Hilliard & B.L. Burtt, Bot. J. Linn. Soc. London 82: 206. 1981; Karthik. & al., Flow. Pl. India-Dicot. 1: 260. 2009. *Gnaphalium luteoalbum* L., Sp. Pl.: 851. 1753; Hook.f., Fl. Brit. India 3: 288. 1881; P.C. Pant, Fl. Corbett Natl. Park: 92. 1986 & in Hajra & al., Fl. India 13: 87. 1995; R.D. Gaur, Fl. Distr. Garhwal: 577. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 104. 2007.

Herb, to 45 cm high, erect or diffuse, densely clothed with white cottony wool. Leaves 1.5–3 × 0.2–0.5 cm, linear-oblong or oblanceolate, attenuate or semi-amplexicaul at base, entire along margins, obtuse at apex, cottony-pubescent on both surfaces. Inflorescence in dense, terminal, corymbose panicle (on leafless), heterogamous heads. Florets yellow; involucre bracts many seriate, pale to dark brown or reddish-brown; outer female florets numerous, inner bisexual florets few. Achenes *c.* 1 mm long, ellipsoid-oblong, pale brown, glabrous. Pappus bristles 10, caducous.

Flowering & Fruiting: January–March.

Occasional along ponds and river beds near deciduous forests.

Distribution: India (C & N. India, Himalayas), Afghanistan, Africa, SW Asia, Australia, Europe, China, Laos, North America, Pakistan, Thailand, Vietnam.

Specimens examined: Vatanvasa forest, *H.C. Pande* 220804 (LWG).

26. **Saussurea** DC.

Saussurea heteromalla (D. Don) Hand.-Mazz., Symb. Sin. 7: 1152. 1936; P.C. Pant, Fl. Corbett Natl. Park: 94. 1986; Hajra & al., Fl. India 12: 202, f. 53. 1995; R.D. Gaur, Fl. Distr. Garhwal: 586. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 108. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 266. 2009. *Cnicus heteromalla* D. Don, Prodr. Fl. Nepal. 166. 1825. *Saussurea candicans* (DC.) Sch.-Bip., Linnaea 19: 330. 1846; Hook.f., Fl. Brit. India 3: 373. 1881.

Herb, erect, annual; stems simple below, cormbosely branched above, often many from base. Leaves basal petioled, rosette, obovate, acute or obtuse at apex, lyrate-pinnatifid, white-tomentose beneath; cauline leaves lanceolate-oblong, entire or dentate along the margins, acute-acuminate at apex. Florets purple, in corymbiform paniculate heads; involucre bracts lanceolate. Achenes 4–5-angled, muricate. Pappus white hairy.

Flowering & Fruiting: September–March.

Rare in dry, stony hill slopes.

Distribution: India India (Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh), Afghanistan, Bhutan, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

27. **Senecio** L.

- 1a. Scapigerous herbs; basal leaves sessile 2. *S. nudicaulis*
 1b. Non-scapigerous herbs; basal leaves petiolated 1. *S. analogus*

1. **Senecio analogus** DC., Prodr. 6: 366. 1838. *S. laetus* Edgew., Trans. Linn. Soc. London 20: 74. 1846; R. Mathur in Hajra & al., Fl. India 13: 263. 1995; R.D. Gaur, Fl. Distr. Garhwal: 587. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 108. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 272. 2009. *S. chrysanthemoides* DC., Prodr. 6: 365. 1838; Hook.f., Fl. Brit. India 3: 339. 1881.

Herb, erect, perennial, to 50 cm high; stems simple or branched above, with rhizomatous roots. Leaves both radical and cauline, basal leaves petioled, 7–14 × 2.8–6.5 cm, ovate-lanceolate, narrowly cuneate at base, lyrate-pinnatifid along the margins, acute-acuminate at apex, pubescent; cauline leaves sessile, small, ovate-lanceolate, auricled or amplexicaul at base, acute-acuminate at apex. Florets yellow, in heads, terminal, simple or compound corymbs. Ray florets oblong, 4-veined, 3-dentate at tips. Disc florets many. Achenes c 2.5 mm long, cylindrical, pale brown. Pappus hairy.

Flowering & Fruiting: July–October.

Grows in open places and along the roadsides.

Distribution: India (N.E and N.W. India), Bhutan, China, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

2. **Senecio nudicaulis** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 178. 1825; Hook.f., Fl. Brit. India 3: 340. 1881; P.C. Pant, Fl. Corbett Natl. Park: 94. 1986; R. Mathur in Hajra & al., Fl. India 13: 273, f. 85. 1995; R.D. Gaur, Fl. Distr. Garhwal: 587. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 108. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 273. 2009.

Herb, scapigerous, perennial, rhizomatous, to 70 cm high; stems solitary or few, simple or branched. Leaves basal sessile, obovate-oblong to obovate-spathulate; cauline leaves sessile, 3–5, 2–4 × 0.5–1.5 cm, oblong or oblanceolate-oblong, auriculate, subamplexicaul at base, crenate-dentate to lobulate along the margins, obtuse at apex. Florets yellow, in heads, on terminal corymbs; involucre bracts broadly campanulate, calyculate, herbaceous, sparsely arachnoid or subglabrous, trinerved; ray florets 13, corolla tube yellow, oblong, 4-veined, apically 3-denticulate; disc florets many, funnel-form limb, ovate-triangular. Achenes $\approx$ 2 mm long, cylindric, pubescent. Pappus whitish.

Flowering & Fruiting: June–October.

Fairly common in exposed places.

Distribution: India (C & N India, Himalayas), Bhutan, China, Myanmar, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

28. *Sigesbeckia* L.

Sigesbeckia orientalis L., Sp. Pl.: 900. 1753; Hook.f., Fl. Brit. India 3: 304. 1881; P.C. Pant, Fl. Corbett Natl. Park: 95. 1986; H.J. Chowdhery in Hajra & al., Fl. India 12: 407, f. 115. 1995; R.D. Gaur, Fl. Distr. Garhwal: 588. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 275. 2009.

Herb, woody, to 1 m high; stems viscid, red. Leaves 2.5–8.5 × 1–5.6 cm, ovate, cuneate at base, irregularly crenate along margins, acute at apex, pubescent, palmately trinerved. Inflorescence in axillary and terminal, few to many, paniculate heterogamous heads. Florets yellow; involucre bracts biseriate, campanulate-hemispherical; outer cylindrical, clavate, glandular; inner boat-shaped, enclosing ray florets, glandular; corolla 5-lobed, ligulate. Achenes $\approx$ 3 mm long, obovoid, narrowed below, glandular. Pappus absent.

Flowering & Fruiting: October–December.

Occasional in open situations near deciduous forests.

Distribution: India (C & N India, Himalayas), Africa, tropical America, Australia, Bhutan, China, Japan, Laos, Malesia, Nepal, Oceania, Russia, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122313 (BSD).

Notes: It can easily be known by its glandular, sticky involucre bracts.

29. *Soliva* Ruiz & Pavon

Soliva anthemifolia (Juss.) Sweet, Hort. Brit.: 243. 1826; U.C. Bhattach., Bull. Bot. Surv. India 5: 375. 1963; P.C. Pant, Fl. Corbett Natl. Park: 95. 1986; B.D. Naithani in Hajra & al., Fl. India 12: 57. 1995; R.D. Gaur, Fl. Distr. Garhwal: 589. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 276. 2009. *Gymnostyles anthemifolia* Juss., Ann. Mus. Natl. Hist. Nat. 4: 262, pl. 61, f. 1. 1804.

Herb, creeping or spreading, annual-biennial, to 30 cm high; stems mostly villous, glabrescent, at times stoloniferous, mat-forming. Leaves petioled, mostly basal, 2–3-pinnati-palmately lobed, blades 3–12 × 0.7–4.5 cm, obovate to spatulate. Florets pale green, in heads mostly clustered in leaf axils, rarely scattered along stems; involucre bracts to 8 mm long, lanceolate; corolla lobes to 2 mm long. Achenes $\approx$ 2 mm long,

oblanceolate to cuneate-oblong, wings transversely rugulose or ribbed, villous to pilose, sometimes glabrescent. Pappus absent or persistent stylar sheaths indurate, spine-like, usually inflexed.

Flowering & Fruiting: March–August.

Occasion in disturbed sites and along river banks and moist places.

Distribution: India: (Sub Himalayan tracts: Delhi, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttarakhand, Uttar Pradesh), Asia, Australia, South America.

Notes: Included on the authority of Samir Sinha (2001).

30. *Sonchus* L.

Sonchus wightianus DC., Prodr. 7: 1838; P.C. Pant, Fl. Corbett Natl. Park: 95. 1986; Mamgain & R.R. Rao in Hajra & al., Fl. India 12: 321, f. 84. 1995; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 276. 2009. *S. arvensis sensu* Hook.f., Fl. Brit. India 3: 414. 1881, *p.p. non* L. 1753. *S. brachyotus* DC., Prodr. 7: 186. 1838; Mamgain & R.R. Rao in Hajra & al., *l.c.* 320; R.D. Gaur, Fl. Distr. Garhwal: 590. 1999.

Herb, perennial, erect, to 1.2 m high; stems terete, branched, grooved, glabrous. Leaves 5.6–22 × 1.2–4.5 cm, oblong lanceolate, cordate to amplexicaul at base, subacuminate at apex, glaucous beneath, toothed along margins. Inflorescence in terminal, few to many, paniculate, homogamous heads. Florets yellow; involucre bracts lanceolate, glandular-hairy. Achenes ϵ 4 mm long, ellipsoid, ribbed. Pappus silky.

Flowering & Fruiting: September–March.

Occasional in wet places and along road sides.

Distribution: India (C & N India, Himalayas), Afghanistan, Bhutan, China, Indonesia, Laos, Malaysia Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: On way to Rathuadhup from Vatanvasa forest, H.C. Pande 220711, 220761 (LWG); Samir Sinha (2001).

Notes: It can easily be recognized by its stalked glands on peduncle.

31. *Sphaeranthus* L.

Sphaeranthus senegalensis DC., Prodr. 5: 370. 1836; P.C. Pant, Fl. Corbett Natl. Park: 95. 1986; Sarv. Kumar in Hajra & al., Fl. India 13: 162. 1995; C.D.K. Cook, Aquat. Wetl. Pl. India: 73, f. 58 c–d. 1996; R.D. Gaur, Fl. Distr. Garhwal: 590. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 109. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 277. 2009. *S. indicus auct non* L. 1753; Hook.f., Fl. Brit. India 3: 275. 1881, *p.p.*

Herb, annual, prostrate or decumbent, to 70 cm high; stems with several ascending branches, winged, densely hirsute or tomentose. Leaves 2.5–10 × 1–3.5 cm, linear-oblong or oblanceolate, obtuse to acute at apex, semi-amplexicaul at base, dentate along the margins, densely glandular villous. Inflorescence of terminal, globose or ellipsoid, ϵ 1 cm across, on 1–6 cm long peduncled heads; involucre bracts oblanceolate, spatulate, green, often with purple tinged tips, scarious below, ciliate. Florets reddish violet; marginal florets female 7–10; corolla filiform; central florets bisexual 2–4; corolla purple or violet, swollen in the lower half. Achenes glabrous, glandular.

Flowering & Fruiting: January–April.

Grows in the forests.

Distribution: India (almost throughout the country), Africa, Australia, Bangladesh, China, Malayasia, Myanmar, Singapore, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122505 (BSD); Samir Sinha (2001).

Notes: It is very similar to *Sphaeranthus indicus*.

32. **Tridax** L.

Tridax procumbens L., Sp. Pl.: 900. 1753; Hook.f., Fl. Brit. India 3: 311. 1881; P.C. Pant, Fl. Corbett Natl. Park: 95. 1986; H.J. Chowdhery in Hajra & al., Fl. India 12: 418, f. 119. 1995; R.D. Gaur, Fl. Distr. Garhwal: 594. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 110. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 290. 2009.

Herb, annual, to 40 cm high; branches arising from base, procumbent, pubescent. Leaves opposite, 2–5.8 × 1.2–3.5 cm, ovate to lanceolate, cuneate at base, serrate to coarsely incised dentate or sometimes 3-lobed along margins, acute at apex, hairy. Inflorescence of solitary, terminal, long-peduncled heads. Florets yellow to creamy-white; involucre bracts to 7 mm long, ovate, biseriate, outer membranous, inner scarious; outer florets few, ligules bilabiate; inner florets tubular-campanulate, 5-lobed. Pappus bristly, unequal. Achenes *c.* 2.5 mm long, obconical, turbinate, blackish.

Flowering & Fruiting: Throughout the year.

Occasional weed along the roadsides and disturbed situations in deciduous forests.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122564, 122381 (BSD); Vatanvasa, H.C. Pande 220713 (LWG); Samir Sinha (2001).

Uses: The crude extracts of young shoots and leaves are applied to cure wounds and cuts.

Notes: Native of Central America, naturalized weed elsewhere.

33. **Vernonia** Schreb., *nom. cons.*

Vernonia squarrosa (D. Don) Less., Linnaea 6(4): 627. 1831; P.C. Pant, Fl. Corbett Natl. Park: 96. 1986; Uniyal in Hajra & al., Fl. India 13: 387. 1995; R.D. Gaur, Fl. Distr. Garhwal: 595. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 111. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 295. 2009. *Acilepis squarrosa* D. Don, Prodr. Fl. Nepal.: 169. 1825. *Vernonia teres* Wall. ex DC., Prodr. 5: 15. 1836; Hook.f., Fl. Brit. India 3: 234. 1881.

Undershrub, to 1.5 m high. Leaves 3.5–8.5 × 1.2–2.5 cm, elliptic, serrate along margins, acute at apex, scabrid above, pubescent beneath. Inflorescence in axillary and terminal much-branched, corymbose heads. Florets purple; involucre bracts 4–5-seriate, elliptic, mucronate; corolla *c.* 3 mm long. Achenes *c.* 4 mm long, stout, obovoid, tapering towards base, densely silky-pubescent. Pappus slender, caducous, longer than achenes.

Flowering & Fruiting: November–January.

Occasional in deciduous forests.

Distribution: India (Sub Himalayan tracts, N.E. and Central India), China, Indo-China, Myanmar.

Notes: Included on the authority of Samir Sinha (2001).

34. **Xanthium** L.

Xanthium strumarium L., Sp. Pl.: 987. 1753; Hook.f., Fl. Brit. India 3: 303. 1881; Karthik. & al., Flow. Pl. India-Dicot. 1: 297. 2009. *X. indicum* Koenig in Roxb., Fl. Ind. [Ed. Carey] 3: 601. 1832; H.J. Chowdhery in Hajra & al., Fl. India 12: 427, f. 123. 1995; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 111. 2007. [Plate-12c]

Undershrub, to 95 cm high; branches rough with short hairs. Leaves petioled, 4.5–9.2 × 1.8–6.5 cm, broadly ovate, triangular or 3–5-lobed, acute at apex, irregularly serrate along margins, appressed hairy. Florets yellow, many, in unisexual heads; male heads in upper axil; involucre bracts biseriate, lanceolate; corolla lobes 5; stamens exserted; female heads in lower axil: involucre bracts biseriate, outer bracts free, inner connate. Fruits covered with uncinat spines, tipped with two large spines. Achenes 1×0.4 cm, oblong or ellipsoid, black.

Flowering & Fruiting: December–April.

Common as a weed in waste places.

Distribution: India (throughout the country), Pantropical of Old and New Worlds.

Notes: It can easily be recognised by its fruits, covered with hooked prickles.

35. **Youngia** Cass.

Youngia japonica (L.) DC., Prodr. 7: 194. 1838; P.C. Pant, Fl. Corbett Natl. Park: 96. 1986; Mamgain & R.R. Rao in Hajra & al., Fl. India 12: 329. 1995; R.D. Gaur, Fl. Distr. Garhwal: 596. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 111. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 298. 2009. *Prenanthes japonica* L., Mant. Pl.: 107. 1767. *Youngia japonica* subsp. *genuina* (Hochr.) Babcock. & Stebbins, Carn. Inst. Wash. Publ. 484: 95. 1937. *Crepis japonica* (L.) Benth., Fl. Hongk.: 194. 1861; Hook.f., Fl. Brit. India 3: 395. 1881.

Herb, erect, annual, to 75 cm high; stems minutely grooved, distinctly hollow, with solitary or many flowering branches from rootstock. Leaves sessile, chiefly radical, many from base of the stem, rosulate, oblanceolate, obovate, sinuate-toothed or runcinate-pinnatifid; cauline leaves few, smaller, linear or somewhat lanceolate. Florets yellow or orange yellow, in many flowered heads, in cymose corymbs; involucre bracts large, cylindric, ovate or oblong-lanceolate, glabrous; stigma bluish, exserted, bifid. Achenes dark reddish-brown, compressed or angular, 2–3 mm long, contracted at both ends. Pappus white, soft.

Flowering & Fruiting: October–April.

Occasional on shady hill slopes or moist sandy soils near deciduous forests.

Distribution: India (Hawai, Himachal Pradesh, W. Himalayas, Jammu & Kashmir, Japan, Korea, Punjab, Uttar Pradesh), Afghanistan, Pakistan, Bhutan, China, Malesia, Philippines.

Specimens examined: Rathuadhab-Vatantawasu, R. *Manikandan* 124858 (BSD).

Cultivated species:

1. **Chrysanthemum indicum** L., Sp. Pl.: 889. 1753; B.D. Naithani in Hajra & al., Fl. India 12: 75. 1995; R.D. Gaur, Fl. Distr. Garhwal: 596. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 101. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 213. 2009.

Herb, perennial; stems erect. Leaves pinnatifid. Inflorescence in heads. Florets yellow.

Flowering & Fruiting: September–January.

Native of China and Japan. Cultivated for its flowers.

2. ***Dahlia imperialis*** Roetzl ex Ort., Gart. Fl. 243. 1863; R.D. Gaur, Fl. Distr. Garhwal: 596. 1999; Hajra in Hajra & al., Fl. India 12: 430. 1995; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 103. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 224. 2009. *D. rosea* Cav., Icon. 3: 37. 1794.

Undershrub, erect, to 2 m high; roots tuberous. Leaves bipinnate, ovate, crenate-dentate along margins, greyish-beneath. Inflorescence in solitary heads. Florets variously coloured. Achenes oblong or obovoid, compressed, black. Pappus absent.

Flowering & Fruiting: September–December.

Native of Mexico. Planted in gardens.

3. ***Helianthus tuberosus*** L., Sp. Pl.: 905. 1753; Hajra in Hajra & al., Fl. India 12: 431. 1995; R.D. Gaur, Fl. Distr. Garhwal: 597. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 105. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 237. 2009.

Herb, annual, erect, to 2.5 m high; stems hispid. Leaves broadly ovate, narrowed at base. Inflorescence in solitary heads. Florets yellow. Achenes obovoid, black. Pappus of 2 scale like awns, deciduous.

Flowering & Fruiting: September–December.

Native of Western USA. Cultivated for oil seeds.

53. CAMPANULACEAE

- 1a. Calyx lobes triangular to lanceolate; corolla regular 1. ***Campanula***
 1b. Calyx lobes subulate or linear-triangular; corolla bilipped..... 2. ***Lobelia***

1. *Campanula* L.

Campanula colorata Wall. in Roxb., Fl. Ind. 2: 101. 1824; C.B. Clarke in Hook.f., Fl. Brit. India 3: 440. 1881. *C. pallida* Wall., Asiat. Res. 13: 375. 1820; R.D. Gaur, Fl. Distr. Garhwal: 525. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 111. 2007; S.S. Dash & U.L. Tiwari in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 2. 2020. *Scilla*

Herb, annual, erect or suberect, to 45 cm high; stems branched, roughly hairy. Leaves sessile to petioled, 1–3.5 × 0.5–2 cm, lanceolate-ovate, crenate to dentate along the margins, acute-acuminate at apex, hairy. Flowers pale-purple or lilac; calyx lobes triangular to lanceolate; corolla 1 cm long, lobes short, campanulate, hairy outside, with included style. Capsules globose to ovate, hirsute, dehiscing at base.

Flowering & Fruiting: May–September.

Common along the bridal path in deciduous forests.

Notes: Included on the authority of Samir Sinha (2001).

2. *Lobelia* L.

- 1a. Petioles winged; capsules oblong or obovoid-oblong1. *L. beyneana*
 1b. Petioles wingless; capsules subglobose or broadly ovoid2. *L. nicotianifolia*

1. **Lobelia heyneana** Schult., Syst. Veg. 5: 50. 1819; P.C. Pant, Fl. Corbett Natl. Park: 97. 1986; R.D. Gaur, Fl. Distr. Garhwal: 527. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 112. 2007; U.L. Tiwari in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 7. 2020. *L. trialata* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 157–158. 1825; C.B. Clarke in Hook.f., Fl. Brit. India 3: 425. 1881. *L. trialata* var. *asiatica* Chiov., Res. Sci. Somal. Ital. 1: 109. 1916.

Herb, annual, to 55 cm high; stems erect, 3-angular, winged, glabrous, branched. Leaves winged petioled, alternate; blade broadly deltoid-ovate, 0.8–2.5 × 0.4–2.5 cm, base truncate or shallowly cordate, often decurrent, apex rounded or acute. Flowers pale purple, solitary, axillary, often forming a raceme; bracts narrowly elliptic, shorter than pedicels; bracteoles subulate, often caducous. Hypanthium campanulate, glabrous; calyx lobes subulate, entire, longer than hypanthium and shorter than tube; corolla inside sparsely puberulent, limb bilipped, upper lobes erect, linear, lower lobes spreading, elliptic to suborbicular; stamens connate into tube above middle of filaments. Capsules $\approx 5 \times 4$ mm, oblong or obovoid-oblong; seeds pale red-brown, ellipsoid, slightly compressed, smooth.

Flowering & Fruiting: January–December.

Occasional in moist places and forest edges.

Distribution: India (almost throughout the country), Africa, Bhutan, China, Indonesia, Laos, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

2. **Lobelia nicotianifolia** Roth in Roem. & Schult., Syst. Veg. 5: 47. 1819; U.L. Tiwari in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 7. 2020. *Lobelia pyramidalis* Wall., Asiat. Res. 13: 376. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 3: 426. 1881; P.C. Pant, Fl. Corbett Natl. Park: 97. 1986; R.D. Gaur, Fl. Distr. Garhwal: 527. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 112. 2007. *L. pyramidalis* var. *wallichiana* (C. Presl) Steud., Nomencl. Bot. ed. 2, 2: 62. 1841. *L. wallichiana* (C. Presl) Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 29. 1858. *Rapuntium wallichianum* (Wall.) C. Presl., Prodr. Monogr. Lobel.: 23, 24. 1836.

Herb, erect, to 90 cm high; stems glabrous. Leaves sessile or shortly petiolate, alternate, subleathery. Leaves lower spatulate; upper ones narrowly elliptic or narrowly oblong, 10–30 × 1–4 cm, base attenuate, margin serrulate, apex acuminate, glabrous. Flowers white, rose, or bluish, in terminal racemes, forming paniculate; bracts linear, often shorter than flowers, entire. Hypanthium campanulate or broadly ellipsoid glabrous; calyx lobes subulate or linear-triangular, margin entire; corolla outside glabrous, inside tube densely villous, nearly bilipped; stamens connate into tube above base. Capsules subglobose or broadly ovoid, ≈ 6.5 mm across, glabrous, often pendulous; seeds elliptic, obviously compressed.

Flowering & Fruiting: January–May.

Rare on grassy slopes, roadsides near scrub jungle.

Distribution: India (Himalayas, throughout N. India), Bhutan, China, Myanmar, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124901 (BSD).

54. PLUMBAGINACEAE**Plumbago L.**

Plumbago zeylanica L., Sp. Pl.: 151. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 3: 480. 1882; P.C. Pant, Fl. Corbett Natl. Park: 98. 1986; R.D. Gaur, Fl. Distr. Garhwal: 141. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 113. 2007; Mastakar & S.S. Dash in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 29. 2020. [Plate-12d]

Undershrub, perennial, erect, to 1 m high. Leaves $3.2-6.5 \times 1.5-3$ cm, elliptic-ovate, narrowed at base, crenate to serrate along margins, shortly acuminate at apex. Flowers white, in axillary racemes; calyx cupular, lobes 5, deeply divided; corolla rotate, lobes 5, ovate; stamens 5. Capsules $\approx$ 5 mm long, oblong, enclosed with persistent calyx.

Flowering & Fruiting: March–December.

Occasional along the road side near deciduous forests.

Distribution: India (almost throughout the country), Hawaii, Old World tropics.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122503 (BSD); Samir Sinha (2001).

Uses: The whole plant is used in native medicine especially for jaundice and piles.

55. PRIMULACEAE**Anagallis L.**

Anagallis pumila Sw., Prodr.: 40. 1788; P. Taylor, Kew Bull. 1955: 342. 1955; P.C. Pant, Fl. Corbett Natl. Park: 98. 1986; R.D. Gaur, Fl. Distr. Garhwal: 208. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 113. 2007; U.L. Tiwari & S.S. Dash in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 31. 2020. *Centunculus tenellus* Duby in DC., Prodr. 8: 72. 1844; Wight, Icon. Pl. Ind. Orient. t. 2000. 1853; Hook.f., Fl. Brit. India 3: 506. 1880. *Mycropyxis tenella* (Duby) Wight, Icon. Pl. Ind. Orient.: t. 1585. 1850.

Herb, erect, to 10 cm high. Leaves opposite below, alternate above, $0.8-4.5 \times 0.4-1.5$ cm, ovate, attenuate at base, acute to mucronate at apex, 1-nerved. Flowers white, axillary solitary; calyx lobes ovate-lanceolate; corolla shorter than calyx; stamens exserted, filaments glabrous. Capsules subglobose.

Flowering & Fruiting: September–November.

Rare in open, wet places.

Distribution: India (almost throughout the country), Central and South America, Mexico, West Indies.

Notes: Included on the authority of Samir Sinha (2001).

56. MYRSINACEAE

1b. Leaves elliptic-ovate; corolla companulate 3. **Maesa**

1a. Leaves elliptic-oblongate; corolla ovate or elliptic 2

2a. Erect shrubs; flowers pink; corolla lobes ovate 1. **Ardisia**

2b. Scandent shrubs; flowers white; corolla lobes elliptic 2. **Embelia**

1. **Ardisia** Sw., *nom. cons.*

Ardisia solanacea Roxb., Pl. Coromandel 1: 27, t. 27. 1795; P.C. Pant, Fl. Corbett Natl. Park: 98. 1986; R.D. Gaur, Fl. Distr. Garhwal: 205. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 115. 2007; R. Roy & A. Pramanik in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 49. 2020. *A. humilis* auct. non Vahl 1794; C.B. Clarke in Hook.f., Fl. Brit. India 3: 529. 1882. [Plate-12e]

Shrub, to 3 m high; branches stout. Leaves alternate, 7.5–22 × 4–7.5 cm, elliptic-oblongate, attenuate at base, acute to acuminate at apex, subcoriaceous, gland dotted. Flowers pink, in axillary corymbose cymes; calyx lobes 5, suborbicular; corolla lobes 5, ovate, punctuate; stamens 5, exserted. Berries c. 7 mm across, globose, black when ripe.

Flowering & Fruiting: February–November.

Common in moist deciduous forests.

Distribution: India (almost throughout the country), China, Hawaii, Nepal, Singapore, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125706, 122596 (BSD).

Uses: Leaves rarely eaten as salad; juice of fruits yields yellow dye.

2. **Embelia** Burm.f., *nom. cons.*

Embelia tsjeriam-cottam (Roem. & Schult.) A. DC., Trans. Linn. Soc. London 17(1): 131. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 3: 513. 1882; P.C. Pant, Fl. Corbett Natl. Park: 99. 1986; R.D. Gaur, Fl. Distr. Garhwal: 205. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 115. 2007; R. Roy & A. Pramanik in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 52. 2020. *Ardisia tsjeriam-cottam* Roem. & Schult., Syst. Veg. 5: 518. 1819. *Embelia robusta* Roxb., Fl. Ind., ed. 1820, 2: 287. 1824; C.B. Clarke in Hook.f., *l.c.* 515. *Baibirang, Baya Birang*

Scandent shrub; stems with long tubercles at base. Leaves 5–8.5 × 2–3 cm, elliptic-oblongate, rounded at base, acute at apex, thinly coriaceous, with glandular pits beneath. Flowers white, in axillary and terminal panicles; calyx lobes 5, broadly triangular, hairy; corolla lobes 5, elliptic, subobtusate, densely hairy. Drupes c. 5 mm across, globose.

Flowering & Fruiting: March–July.

Common in moist deciduous forests.

Distribution: India (almost throughout the country), Myanmar.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122472 (BSD); Vatanvasa, H.C. Pande 220779 (LWG); Samir Sinha (2001).

Uses: Seed used as an anthelmintic, sometimes adulterated with black-pepper. The young leaves are cooked and eaten as a green vegetable and also the bark has been chewed like betel nut by tribals.

3. **Maesa** Forssk.

Maesa indica (Roxb.) A. DC., Trans. Linn. Soc. London 17: 134. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 3: 509. 1882; P.C. Pant, Fl. Corbett Natl. Park: 99. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 115. 2007; R. Roy & A. Pramanik in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 53. 2020. *Baeobotrys indicus* Roxb., Fl. Ind. (Eds. Carey & Wall.) 2: 230. 1824. *B. dubia* Wall. in Roxb., *l.c.* 235. *Maesa dubia* (Wall.) A. DC., *l.c.*; C.B. Clarke in Hook.f., *l.c.* 510. *M. perrottetiana* A. DC. in DC., Prodr. 8: 80.

1844. *M. indica* var. *perrottetiana* (A. DC.) C.B. Clarke in Hook.f., *l.c.* 509. *M. montana* A. DC. in DC., Prodr. 8: 79. 1844; R.D. Gaur, Fl. Distr. Garhwal: 206. 1999.

Shrub or small tree, to 4 m high; bark thin, lenticellate. Leaves 4–15 × 2.5–8 cm, elliptic-ovate, rounded to subacute at base, serrate-dentate along margins, acute to shortly acuminate at apex. Flowers white, in axillary branched racemes; calyx tubes adnate to ovary, lobes 5, ovate; corolla campanulate; stamens 5, inserted on corolla tubes. Drupes *c.* 6 mm across, globose.

Flowering & Fruiting: November–April.

Rare in dense moist deciduous forests.

Distribution: India (C & S India, Himalayas), China, Malaysia, Pakistan, Sri Lanka, Vietnam.

Specimens examined: Vatawasa-Halduparao, R. *Manikandan* 122535, 122520, 122496, 122357 (BSD); Samir Sinha (2001).

Uses: Leaves used to intoxicate fishes and fruits edible.

57. SAPOTACEAE

Madhuca Ham. ex J.F. Gmel.

Madhuca longifolia (J. König) J.F. Macbr., Contr. Gray Herb. Harv. Uni. NS. 53: 17. 1918; Royen, Blumea 10: 53. 1960; P.C. Pant, Fl. Corbett Natl. Park: 99. 1986; R.D. Gaur, Fl. Distr. Garhwal: 201. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 115. 2007; Rakesh & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 56. 2020. *Bassia longifolia* Koenig in L., Mant. Alt. App.: 563. 1771; C.B. Clarke in Hook.f., Fl. Brit. India 3: 544. 1882. *Madhuca indica* J.F. Gmel., Syst. Nat.: 799. 1791. *Mabua*, *Mohma* [Plate-12f]

Tree, to 10 m high; young branches rusty-tomentose. Leaves petioled, 5.5–12 × 3–8.2 cm, broadly elliptic, rounded at base, acute at apex. Flowers cream-coloured, in dense fascicles, near tips of branches; calyx lobes 4, biseriate, obovate; corolla campanulate, obovate, lobes 8, biseriate, ovate; stamens 16–20. Berries *c.* 5 cm long, ovoid, fleshy, brown tomentose.

Flowering & Fruiting: July–August.

Rare in moist deciduous forests.

Distribution: India (Sub Himalayan tracts, C & South India), Myanmar, China, Pakistan, Sri Lanka.

Specimens observed: On way to Adnala, Halduparao, could not collected because vegetative condition.

Uses: Tribals eat the large fleshy cream-coloured corollas which contain a lot of sugar and extract obtained by distillation of spirit and is popular drink of tribals. Seeds yield an oil used for manufacturing candles and soap.

58. EBENACEAE

Diospyros L.

Diospyros melanoxylon var. **tupru** (Buch.-Ham.) V. Singh, Monogr. Ind. Diospyros: 159. 2005; V. Singh in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 66. 2020. *Diospyros exsculpta* Buch.-Ham., Trans. Linn. Soc. London 15: 110. 1826; P.C. Pant, Fl. Corbett Natl. Park: 99. 1986; R.D. Gaur, Fl. Distr. Garhwal: 202. 1999; V. Singh, Monogr. Ind. Diospyros 149, f. 36. 2005; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 116. 2007. *D. tomentosa* Roxb., Fl. Ind. (ed 1832), 2: 532. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 3: 564. 1882.

Tendu [Plate-12g]

Tree, to 12 m high; branchlets fulvous-tomentose. Leaves alternate or subopposite 4.9–12.5 × 2.5–5.6 cm, elliptic-oblong, acute at base, obtuse to subacute at apex, glabrescent. Male flowers 3–12, in tomentose paniced cymes. Female flowers subsessile, solitary. Berries $\approx$ 3 cm wide, globose or ovoid, fruiting calyx flat with thick undulate lobes. Seeds 2–8.

Flowering & Fruiting: February–April.

Common in deciduous forests.

Distribution: India (Andhra Pradesh, Himalaya, Karnataka, Maharashtra, Madhya Pradesh, Tamil Nadu), Asia, Sri Lanka.

Specimens examined: Adnala-Sonanadi, *R Manikandan* 125757, 122393, 122493, 122585 (BSD).

59. OLEACEAE

1a. Shrubs; leaves soft tomentose; fruits ellipsoid 1. **Jasminum**

1b. Trees; leaves coriaceous; fruits ovoid or obcordate..... 2

2a. Branches quadrangular; flowers whitish-orange2. **Nyctanthes**

2b. Branches terete; flowers cream-coloured 3. **Olea**

1. **Jasminum** L.

Jasminum arborescens Roxb., Fl. Ind. (ed. Carey ex Wall.) 1: 94. 1820; C.B. Clarke in Hook.f., Hook.f., Fl. Brit. India 3: 594. 1882; P.C. Pant, Fl. Corbett Natl. Park: 100. 1986; R.D. Gaur, Fl. Distr. Garhwal: 482. 1999; P.S. Green, Kew Bull. 58: 290. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 116. 2007; S.K. Srivast. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 77. 2020. *J. roxburghianum* Wall. ex C.B. Clarke in Hook.f., Fl. Brit. India 3: 595. 1882; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007. *Chameli, Kutmanibel*

Shrub large, suberect, not twining or climbing; branchlets hairy. Leaves opposite, simple, variable in size, to 7.5–18 × 4–10 cm, ovate, acute or acuminate, soft-tomentose when young, later glabrate, leaf-base broadly rounded, sometimes cordate, nerves distinct beneath, lower divaricate; petiole 1–2.5 cm. Flowers white, fragrant, in lax trichotomous cymes; bracts linear, up to 5 mm long; calyx teeth 5–6, sometimes more, linear, 1–2 mm long; corolla lobes usually 9, lanceolate, acute. Berry mostly simple, $\approx$ 1.5 cm long, ellipsoid, slightly bent, black when ripe.

Flowering & Fruiting: April–May.

Occasional in moist deciduous forests

Distribution: India (Deccan Peninsula, tropical NW. Himalaya). Pakistan.

Specimens examined: Vatanvasa, *H.C.Pande* 220834, On way to Mundiapani, *R. Manikandan* 125677 (BSD); Samir Sinha (2001).

2. **Nyctanthes** L.

Nyctanthes arbor-tristis L., Sp. Pl.: 6. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 3: 603. 1882; P.C. Pant, Fl. Corbett Natl. Park: 100. 1986; R.D. Gaur, Fl. Distr. Garhwal: 484. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007; S.K. Srivast. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 83. 2020. *Harsbringar*

Small tree, to 10 m high; branches quadrangular, bark grey or greyish-green. Leaves petioled, 4.5–10 × 2–5 cm, ovate, cuneate to rounded at base, coriaceous, covered with stiff white hairs. Flowers whitish-orange, fragrant, in 3–7-flowered pedunculate heads or cymes; corolla tube to 1 cm long; lobes 5–7 mm long, patent. Capsules $\approx$ 1.5 cm across, obcordate, flat.

Flowering & Fruiting: Almost throughout the year.

Occasional in moist deciduous forests.

Distribution: India (Sub-Himalayan tract, Central India, N.E. India), China?, Pakistan.

Specimens examined: Rathuadhab, R. *Manikandan* 122427 (BSD); Samir Sinha (2001).

3. *Olea* L.

Olea paniculata R. Br., Prodr. Fl. Nov. Holland.: 528. 1810; S.K. Srivast. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 84. 2020. *O. glandulifera* Wall. ex G. Don, Gen. Syst. 4: 49. 1837; C.B. Clarke in Hook.f., Fl. Brit. India 3: 612. 1882; P.C. Pant, Fl. Corbett Natl. Park: 100. 1986; P.S. Green, Kew Bull. 58: 259. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007. *Barkao*

Tree, deciduous, to 20 m high; branches lenticellate, glabrous or nearly so, bark rough. Leaves petioled, 4–10 × 1.5–5 cm, oblong-lanceolate, cuneate at base, slightly undulate along margins, acuminate at apex, glabrous, dark green, shining above, paler beneath, coriaceous, with domatia at the axils of nerves. Flowers cream-coloured, in terminal or lateral compound trichotomous cymes; calyx 4-toothed, persistent; corolla deeply divided, lobes valvate, elliptic. Drupes $\approx$ 1.5 × 0.7 cm, ovoid, somewhat oblique, apex acute.

Flowering & Fruiting: April–November.

Rare in moist ravines.

Distribution: India (N.W. Himalaya, mountains of South India), Australia, Indus eastwards to Nepal, Malesia, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125535, 122314 (BSD).

Cultivated species:

Jasminum multiflorum (Burm.f.) Andrews, Bot. Repos. 8: t. 496. 1807; R.D. Gaur, Fl. Distr. Garhwal: 483. 1999; P.S. Green, Kew Bull. 58: 288. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007; S.K. Srivast. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 80. 2020. *Nyctanthes multiflorum* Burm.f., Fl. Indica 5, t. 3, f. 1. 1768.

Scandent shrub; young branches velvety-pubescent. Leaves ovate, acute, mucronate at apex. Flowers white, bracteate, in cuspidate cymes. Berries $\approx$ 5 mm across.

Flowering & Fruiting: December–June.

Cultivated in gardens for its fragrant flowers.

60. APOCYNACEAE *s.l.*

From the cladistic perspective as well as morphological characters supplemented occasionally by molecular studies (results), Endress & Bruyns (2000) merged the families Asclepiadaceae (including subfamilies Periplocoideae and Secamonoideae) and Apocynaceae (including subfamily Rauvolfioideae). The merged family Apocynaceae is classified into five subfamilies viz., Apocynoideae, Rauvolfioideae,

Periplocoideae, Secamonoideae and Asclepiadoideae. As these taxonomic categories are based on sound morpho-genetic evaluation and the unified family, although considerably very large (with 424 genera), 'best reflects phylogeny' the contemplated new classification is adopted in the systematic treatment in this research study.

Subfamily-I. **APOCYNODEAE**

- 1a. Stems climbing2
 1b. Stems erect3
- 2a. Leaves oblong-oblongate or elliptic-oblong; flowers yellow 1. **Gongronema**
 2b. Leaves ovate to elliptic; flowers white3. **Ichnocarpus**
- 3a. Usually shrubs; leaves ovate to elliptic 2. **Holarrhena**
 3b. Usually trees; leaves elliptic-oblong 4. **Wrightia**

1. **Gongronema** (Endl.) Decaisn.

Gongronema napalense (Wall.) Decaisn. in A. DC. in DC., Prodr. 8: 624. 1844; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 118. 2020. *Gymnema napalense* Wall., Tent. Fl. Nepal.: 50, t. 38. 1826.

Liana; stems glabrous, with regularly and longitudinally striated bark when older. Leaves petioled, leaf blade oblong-oblongate or elliptic-oblong, 5.5–14 × 2–8 cm, papery, glabrous, base rounded, truncate or subcordate, apex short acuminate, veins 5–7. Flowers yellow, in umbel-like to short raceme-like; bracteoles subtending pedicels few, minute, linear; Sepals 1.5–2 mm, ovate, sometimes pubescent; corolla tube as long as sepals, lobes ovate-triangular, externally glabrous or margin sparsely pubescent, lobes semi-circular. Follicles oblong-lanceolate in outline, glabrous. Seeds ovate.

Flowering & Fruiting: June–September.

Rare along the bushes near moist deciduous forests.

Distribution: India (Himalayas), China, Laos, Nepal.

Uses: Decoction of all parts is used for the treatment of leucorrhea, blennorrhoea, and traumatic injury.

Fine strong fibers, obtained from the inner bark, are used in making ropes, sacks, and paper.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125547 (BSD).

2. **Holarrhena** R. Br.

Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don, Gen. Hist. 4: 78. 1837; Panigrahi, Taxon 36: 466 1987; P.C. Pant, Fl. Corbett Natl. Park: 101. 1986; R.D. Gaur, Fl. Distr. Garhwal: 412. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 133. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 93. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 122, f. 30. 2021. *Echites pubescens* Buch.-Ham., Trans. Linn. Soc. London 13: 521. 1822. *Holarrhena antidyserterica* Wall. ex A. DC. in DC., Prodr. (Ed. A. DC.) 8: 413. 1844; Hook.f., Fl. Brit. India 3: 644. 1882.

Shrubs or small trees, to 3.5 m high. Leaves 8.5–18.5 × 4–8 cm, ovate to elliptic, obtusely acuminate at apex, obtuse to rounded at base. Flowers white, fragrant, in terminal corymbose cymes; calyx lobes 5, oblong-

lanceolate; corolla tube pubescent, slightly smaller than lobes; stamens 5. Follicles $\approx 25 \times 0.7$ cm, cylindric, mottled with white spots. Seeds ≈ 7 mm long, linear-oblong, with deciduous hairs.

Flowering & Fruiting: February–June.

Common in deciduous forests.

Distribution: India (C. S & N India, Himalayas), Africa, Bangladesh, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Halduparao, R *Manikandan* 124911, 122375, 122322 (BSD); Vatanvasa, H.C. Pande 218705 (LWG).

3. *Ichnocarpus* R. Br.

Ichnocarpus frutescens (L.) R. Br. in Ait. f., Hortus. Kew (ed. 2) 2: 69. 1811; Hook.f., Fl. Brit. India 3: 669. 1882; P.C. Pant, Fl. Corbett Natl. Park: 101. 1986; Karthik. & al., Flow. Pl. India-Dicot. 1: 134. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 94. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 135, f. 32. 2021. *Apocynum frutescens* L., Sp. Pl.: 213. 1753. *Quirivelia frutescens* (L.) M.R. Almeida & S.M. Almeida, J. Bombay Nat. Hist. Soc. 90: 427. 1993; R.D. Gaur, Fl. Distr. Garhwal: 414. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007.

Climbing shrub; slender branches. Leaves lanceolate to ovate, $2.5-6 \times 1-3$ cm, rounded to subacute at base, acute to acuminate at apex. Flowers white, in axillary and terminal rusty pubescent, paniculately branched cymes; calyx lobes 5; corolla tube pubescent, equal or slightly longer than tube; stamens 5. Follicles ≈ 10 cm long, cylindric, divaricate. Seeds ≈ 1.5 cm long, linear, coma white, scanty.

Flowering & Fruiting: July–January.

Occasional along the bushes in scrubs and dry deciduous forests.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125687, 122317 (BSD); Samir Sinha (2001).

4. *Wrightia* R. Br.

Wrightia arborea (Dennst.) Mabb., Taxon 26: 533. 1977; P.C. Pant, Fl. Corbett Natl. Park: 102. 1986; R.D. Gaur, Fl. Distr. Garhwal: 417. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 141. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 103. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 279, f. 65. 2021. *Periploca arborea* Dennst., Schlüssel Hortus Malab.: 13, 23, 25. 1818. *Nerium tomentosum* Roxb., Fl. Ind. (Ed. Carey) 2: 6. 1832. *Wrightia tomentosa* (Roxb.) Roem. & Schult., Syst. Veg. ed. 15 bis. 4: 414. 1819; Hook.f., Fl. Brit. India 3: 653. 1882.

Dudhi [Plate-12h]

Small tree, to 8 m high. Leaves $5.6-9.5 \times 2.5-4.5$ cm, elliptic-oblong, acute at base, tomentose, abruptly acuminate at apex. Flowers white, in terminal, corymbose cymes; calyx lobes 5, scales within; corolla lobes 5, salver-shaped; corona-scales oblong. Follicles ≈ 25 cm long, cylindric, white-tuberculate, grooved.

Flowering & Fruiting: March–September.

Infrequent along forest edges near moist deciduous forests.

Distribution: India (almost throughout the country), China, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125762, 122353 (BSD).

Subfamily-II. ASCLEPIADOIDEAE

- 1a. Plants epiphytic 6. **Hoya**
 1b. Plants terrestrial 2
- 2a. Stems erect 5. **Calotropis**
 2b. Stems climbing 3
- 3a. Leaves ovate-elliptic, flowers greenish-yellow 7. **Leptadenia**
 3b. Leaves elliptic or oblong-lanceolate, flowers white 8. **Vallisneria**

5. **Calotropis** R. Br.

- 1a. Flowers purplish-white; follicles boat-shaped, with hooked tips 1. *C. gigantea*
 1b. Flower white outside, pinkish inside; follicles subglobose to obliquely ovoid, inflated 2. *C. procera*

1. **Calotropis gigantea** (L.) R. Br. in Ait.f., Hortus. Kew (ed. 2) 2: 78. 1811; Hook.f., Fl. Brit. India 4: 17. 1883; P.C. Pant, Fl. Corbett Natl. Park: 102. 1986; A.P. Jagtap & N.P. Singh, Fasc. Fl. India 24: 9. 1999; R.D. Gaur, Fl. Distr. Garhwal: 419. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 158. 2009; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 108. 2020; Jayanthi in Jayanthi & A.A. Mao (eds.), Fasc. Fl. India 17: 44, P. 9 & 10. 2022. *Asclepias gigantea* L., Sp. Pl.: 214. 1753. *Aak* [Plate-13a]

Shrubs, erect, to 2 m high; stems woody, terete, branched. Leaves subsessile, 6.5–16 x 3.5–9 cm, elliptic-ovate or oblong, acute at apex, cordate at base, clasping, fugaciously pubescent on both sides. Flowers purplish-white, in subterminal or lateral umbellate panicles; calyx lobes 5, ovate, glandular; corolla lobes ovate, thick; corona uniseriate, lobes 5, laterally compressed, adnate to staminal column. Follicles c. 8.5 cm long, in pairs, boat-shaped, with hooked tips, cottony pubescent. Seeds broadly ovoid, coma silky.

Flowering & Fruiting: January–April.

Common weed in disturbed areas.

Distribution: India (almost throughout the country), tropical Africa, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Halduparao Range, R. *Manikandan* 124932 (BSD).

2. **Calotropis procera** (Aiton) W.T. Aiton, Hortus Kew. ed. 2: 2: 78. 1811; Hook.f., Brit. India 4: 18. 1883; P.C. Pant, Fl. Corbett Natl. Park: 102. 1986; A.P. Jagtap & N.P. Singh, Fasc. Fl. India 24: 11. 1999; R.D. Gaur, Fl. Distr. Garhwal: 419. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 158. 2009; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 108. 2020; Jayanthi in Jayanthi & A.A. Mao (eds.), Fasc. Fl. India 17: 45, P. 11 & 12. 2022. *Asclepias procera* Aiton, Hort. Kew. 1: 305. 1789. *Calotropis wallichii* Wight, Contr. Bot. India 53. 1834. *C. procera* subsp. *hamiltonii* (Wight) Ali, Notes Roy. Bot. Gard. Edinburgh 38(2): 289. 1980. *C. hamiltonii* Wight, l.c. *Madar*

Shrubs or small trees, to 3 m high. Leaves sessile or subsessile, grayish-green or hoary white, ovate to obovate, 10–30 x 5–15 cm, base cordate, apex abruptly pointed. Flower white outside, pinkish inside, buds subglobose, in 3–10-flowered, umbel-like cymes; calyx lobes elliptic or ovate; corolla lobes with purple-brown apices, broadly ovate or ovate-triangular, spreading; corona as long as gynostegium. Follicles subglobose to obliquely ovoid, inflated, *c.* 10 x 7 cm, pericarp thick, spongy; seeds many with coma.

Flowering & Fruiting: May–December.

Cultivated for medicine.

Distribution: India (Deccan Peninsula, tropical NW. Himalaya), Afghanistan, Africa, Central, South America, SW Asia, Australia, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Uses: The bark and leaves are used for the treatment of leprosy and asthma, respectively.

Notes: Included on the authority of Samir Sinha (2001).

6. *Hoya* R. Br.

Hoya lanceolata Wall. ex D. Don, Prodr. Fl. Nepal: 130. 1825; Hook.f., Fl. Brit. India 4: 54. 1883; R.D. Gaur, Fl. Distr. Garhwal: 422. 1999; A.P. Jagtap & N.P. Singh, Fasc. Fl. India 24: 104. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 173. 2009; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 122. 2020; Jayanthi in Jayanthi & A.A. Mao (eds.), Fasc. Fl. India 17: 166, P. 76. 2022. [Plate-13b]

Epiphytic shrubs, hanging from cracks in tree trunks, rooting at nodes; nodes swollen with long internodes. Leaves petioled, 2–5.5 x 1–2.5 cm, lanceolate to ovate-lanceolate, subacute to acute at apex, cuneate at base, entire along margins, fleshy, coriaceous, glabrous on both sides. Flowers white, with pink centre, in terminal, 6–10-flowered, umbellate cymes; bracts minute, caducous; calyx lobes 5, oblong-lanceolate, pubescent; corolla lobes 5, triangular, pubescent; corona 5-stellate, short, blunt spreading; corona staminal, uniseriate, lobes 5, adnate below to staminal-column. Follicles *c.* 15 cm long, slender. Seeds minute, comose.

Flowering & Fruiting: December–April.

Rare in moist deciduous forests.

Distribution: India (tropical NW. Himalaya, Peninsula India), Asia.

Specimens observed: Seen in vegetative condition between Rahuadhab-Vatanwasa.

7. *Leptadenia* R. Br.

Leptadenia reticulata (Retz.) Wight & Arn., Contr. Bot. India: 47. 1834; P.C. Pant, Fl. Corbett Natl. Park: 103. 1986; R.D. Gaur, Fl. Distr. Garhwal: 422. 1999; A.P. Jagtap & N.P. Singh, Fasc. Fl. India 24: 261. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 175. 2009; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 123. 2020; Jayanthi in Jayanthi & A.A. Mao (eds.), Fasc. Fl. India 17: 179, P. 82. 2022. *Cynanchum reticulatum* Retz., Observ. Bot. 2: 15. 1781. *Jumka, Meethi dori* [Plate-13c]

Twining shrub, perennial, tuberous, with numerous branches; stems cork-like, deeply cracked bark, glabrous when young. Leaves petioled, 4–12.5 x 2–5.5 cm, ovate-elliptic, acute-acuminate at apex, rounded at base, entire along margins, glabrous above, finely velvety below, leathery. Flowers greenish-yellow, in lateral or subaxillary cymes. Fruits follicle outer seed-pods woody.

Flowering & Fruiting: April–October.

Distribution: India (Deccan Peninsula, Himalayas, sub-Himalayan tracts of Punjab and Uttarakhand), Madagascar, Mauritius, Myanmar, Sri Lanka.

Specimens examined: Vatanvasa, *T.S. Rana & Party* 220169 (LWG); Samir Sinha (2001).

Uses: The whole plant is used to cures eye diseases, hematemeses, emaciation, cough, dyspnoea, fever and burning sensation.

8. *Vallaris* Burm. f.

Vallaris solanacea (Roth) Kuntze, Rev. Gen. Pl. 2: 417. 1819; P.C. Pant, Fl. Corbett Natl. Park: 101. 1986; R.D. Gaur, Fl. Distr. Garhwal: 416. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 141. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 102. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30, f. 62. 265. 2021. *Peltanthera solanacea* Roth, Nov. Plant. Praes. Ind. Or. Sp.: 132. 1821. *Vallaris heynei* Sprengel, Syst. Veg. 1: 635. 1825; Benth. & Hook.f., Gen. Pl. 2: 650. 1876.

Climbing shrubs, to 6 m high; stem branched, smooth, yellowish-white, grey lenticelates, with milky latex. Leaves petioled, 5–12 x c. 2.5 cm, elliptic or oblong-lanceolate, acute or acuminate, cuneate at base, glabrous. Flower white, fragrant, axillary, lax cymes; bracts linear-lanceolate, acute, pubescent; calyx pubescent tube short, lobes acuminate or acute; corolla-tube narrow, cylindrical, hairy within, pubescent outside, lobes orbicular or obovate, obtuse; stamens included, inserted at the mouth of the tube. Fruits c. 15 x 5 cm, somewhat beaked.

Flowering & Fruiting: December–April.

Forests, thickets, streambanks; 0–2700 m.

Distribution: India (almost throughout the country), Cambodia, China, Indonesia, Laos, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124936, 125555, 122308, 125529, 124868 (BSD); Vatanvasa, H.C. *Pande* 220771 (LWG).

Uses: The bark is chewed for fixing teeth. The latex is of medicinal importance and is applied in sores and wounds.

Subfamily-III. PERIPLOCOIDEAE

- 1a. Undershrubs, stems sparsely pubescent, leaves linear-lanceolate 10. **Hemidesmus**
 1b. Shrubs, stems glabrous, leaves elliptic-oblong 9. **Cryptolepis**

9. *Cryptolepis* R. Br.

Cryptolepis dubia (Burm.f.) M.R. Almeida, Fl. Maharashtra 3A: 221. 2001; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 114. 2020; Jayanthi in Jayanthi & A.A. Mao (eds.), Fl. India 17: 103, P. 48 & 49. 2022. *Periploca dubia* Burm.f., Fl. Indiana 70. 1768. *Cryptolepis buchananii* Schult. in Roem. & Schult., Syst. Veg. ed. 15 bis. 4: 409. 1819; Hook.f., Fl. Brit. India 4: 5. 1883; P.C. Pant, Fl. Corbett Natl. Park: 103. 1986; A.P. Jagtap & N.P. Singh, Fasc. Fl. India 24: 290. 1999; R.D. Gaur, Fl. Distr. Garhwal: 420. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 164. 2009.

Climbing shrubs; branches glabrous, terete. Leaves 5.5–12.5 x 3.5–5.6 cm, elliptic-oblong, acute to shortly acuminate and mucronate, acute at base, shining above, pale beneath. Flowers greenish-yellow, in axillary, paniculate cymes; calyx lobes ovate-lanceolate, ciliate; corolla tube equal to calyx; stamens 5; corona uniseriate, lobes 5, fleshy, oblong-spathulate, inserted near mouth of corolla tube. Follicles $\approx$ 8 cm long, paired, lanceolate, ridged. Seeds many.

Flowering & Fruiting: March–September.

Occasional along the road sides in deciduous forests.

Distribution: India (C, S & N India, Himalayas), China, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. Manikandan 124997 (BSD); Vatanvasa forest, H.C. Pande 220708 (LWG).

10. **Hemidesmus** R. Br.

Hemidesmus indicus (L.) R. Br. in Ait.f., Hortus. kew (ed. 2) 2: 75. 1811; Hook.f., Fl. Brit. India 4: 5. 1883; A.P. Jagtap & N.P. Singh, Fasc. fl. India 24: 301. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 172. 2009; Jayanthi & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 120. 2020; Jayanthi in Jayanthi & A.A. Mao (eds.), Fl. India 17: 149, f. 72 & 73. 2022. *Periploca indica* L., Sp. Pl.: 211. 1753.

Twining undershrubs; stems terete, sparsely pubescent, with aromatic, woody rootstock. Leaves 3.5–9 x 0.7–2.5 cm, linear-lanceolate, acute to acuminate at apex, rounded or truncate at base. Flowers yellowish-brown, in axillary, subsessile cymes; calyx lobes ovate, puberulous; corolla tube almost equal to calyx; stamens 5; corona uniseriate, lobes 5 fleshy, truncate, inserted near corolla tube. Follicles $\approx$ 15 x 0.6 cm, in pairs, tapering at apex. Seeds many.

Flowering & Fruiting: August–February.

Common in dry deciduous forests.

Distribution: India (Almost throughout the country), Malaysia, Pakistan, Sri Lanka.

Specimens observed: Observed almost throughout the sanctuary and specimens could not collected due to vegetative condition.

Subfamily-IV. **RAUVOLFIOIDEAE**

11. **Carissa** L., *nom. cons.*

1a. Leaves broadly ovate, obtuse and mucronate at apex1. *C. congesta*

1b. Leaves elliptic, ovate or rounded, acute-mucronate, apiculate, rarely obtuse at apex2. *C. paucinervia*

1. **Carissa congesta** Wight, Icon. Pl. Ind. Orient.: t. 1289. 1848; P.C. Pant, Fl. Corbett Natl. Park: 101. 1986; R.D. Gaur, Fl. Distr. Garhwal: 411. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 130. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 91. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 74, f. 17. 2021.

Karunda

Shrubs, often scandent, with stout, horizontal spines, sometimes slightly recurved. Leaves 3.5–7.2 x 1.8–4 cm, broadly ovate, obtuse and mucronate at apex, cuneate to subacute at base, coriaceous. Flowers

white, in terminal corymbose cymes; calyx lobes 5, lanceolate, acuminate; corolla lobes 5, acute; stamens 5. Berries c 2.5 cm long, ellipsoid or spherical, 4–6-seeded, dark purplish when ripe.

Flowering & Fruiting: March–July.

Occasional in deciduous forests.

Distribution: India (almost throughout the country), S.E. Asia, China, Malacca, Myanmar, Pakistan, Sri Lanka.

Specimens examined: Vatanvasa, H.C. Pande 217111 (LWG).

2. **Carissa paucinervia** A. DC. in DC., Prodr. 8: 333. 1844; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 91. 2020. *Carissa opaca* Stapf ex Haines in Indian For. 47: 378. 1921; R.D. Gaur, Fl. Distr. Garhwal: 411. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 131. 2009. *C. spinarum sensu* Hook.f., Fl. Brit. India 3: 631. 1882; *sensu* DC., Prodr. 8: 322. 1846, *non* L. 1753. Jungli Karunda

Shrub, erect, evergreen, to 3 m high; stems branched, glabrous or puberulous, armed with spines, arising between petiole, straight or bifurcate, sharp, hard, to 3.5 cm long, with milky juice. Leaves petioled, opposite, elliptic, ovate or rounded, 2.5–5 x 1–2 cm, acute-mucronate, apiculate, rarely obtuse, coriaceous, shining green above, paler, puberulous on nerves beneath. Flowers white or light rose, sweet scented; bracts small, subulate; calyx lobes lanceolate, acuminate, puberulous or ciliate; corolla tube slender, to 1.2 cm long, lanceolate; stamens inserted at the top of corolla tube; stigma slightly bifid. Berry to 7 mm long, ellipsoid or subglobose, dark purple when ripe, with milky juice, edible.

Flowering & Fruiting: April–June.

Grows in dry deciduous forests.

Distribution: India (Drier parts of the country), Myanmar, Pakistan, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

Cultivated species:

1. **Allamanda cathartica** L., Mant. Pl. 2: 214. 1771; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 128. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 87. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 19, f. 3. 2021.

Scandent shrubs. Leaves in whorls, obovate-lanceolate, tapering at base, wavy along margins. Flowers golden-yellow.

Flowering & Fruiting: Almost throughout the year.

Native of Tropical America. Grown in gardens.

2. **Thevetia peruviana** (Pers.) Merr., Philipp. J. Sci. 9: 130. 1914; Karthik. & al., Flow. Pl. India-Dicot. 1: 139. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 100. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 239, f. 56. 2021. *Cascabella thevetia* (L.) Lippold, Feddes Repert. 91: 52. 1980; R.D. Gaur, Fl. Distr. Garhwal: 412. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 117. 2007. *Cerbera thevetia* L., Sp. Pl.: 203. 1753. *T. neriifolia* Juss. ex A. DC. in DC., Prodr. 8: 343. 1844.

Shrubs, to 4.5 m high, evergreen. Leaves linear-lanceolate, narrowed at both ends. Flowers bright yellow, in cymes. Drupes $\approx$ 5 cm across, with obscure angles.

Flowering & Fruiting: June–October.

Native of S. America and West Indies. Planted in gardens also as hedge plant.

3. **Catharanthus roseus** (L.) G. Don, Gen. Hist. 4: 95. 1837; R.D. Gaur, Fl. Distr. Garhwal: 412. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 132. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 92. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 92, f. 23. 2021. *Vinca rosea* L., Syst. Nat. ed. 10. 2: 944. 1759; C.B. Clarke in Hook.f., Fl. Brit. India 3: 640. 1882.

Herb, perennial, to 85 cm high. Leaves elliptic-oblong, acute at base. Flowers white or rosy, solitary or in pairs. Follicles $\approx$ 3 cm long, cylindric. Seeds black.

Flowering & Fruiting: Throughout the year.

Distribution: Native of Madagascar. Weed in gardens and open places.

4. **Nerium oleander** L., Sp. Pl.: 209. 1753; R.D. Gaur, Fl. Distr. Garhwal: 414. 1999; Karthik. & al., Flow. Pl. India-Dicot. 1: 135. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 95. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 166, f. 37. 2021. *N. indicum* Mill., Gard. Dict. ed. 8, n. 2. 1768; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 118. 2007. *N. odorum* Sol. in W. Aiton, Hortus Kew. (ed. 1) 1: 297. 1789; C.B. Clarke in Hook.f., Fl. Brit. India 3: 655. 1882.

Shrub, to 4 m high. Leaves whorled, linear-lanceolate, tapering at both ends. Flowers white, pink or red, fragrant, in cymes. Follicles $\approx$ 15 cm long, lanceolate. Seeds villous, comose.

Flowering & Fruiting: Almost throughout the year.

Native of W. Himalayas and Nepal. Grown in gardens.

Specimens examined: Vatanvasa, B. Datta & H.C. Pande 220896 (LWG).

5. **Plumeria rubra** L., Sp. Pl.: 209. 1753; R.D. Gaur, Fl. Distr. Garhwal: 414. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 119. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 136. 2009; A. Datta in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 97. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 190, f. 42. 2021. *P. acutifolia* Poir. in Lam., Encycl. Suppl. 2: 677. 1812; C.B. Clarke in Hook.f., Fl. Brit. India 3: 641. 1882. *P. rubra* L. f. *acuminata* (Aiton) Santapau & Irani ex Shah, J. Univ. Bombay 30: 35. 1961–62.

Small trees, to 5 m high. Leaves oblong-lanceolate, narrowed at base. Flowers white or red, in corymbs.

Flowering & Fruiting: March–September.

Native of Tropical America. Planted near temples.

61. LOGANIACEAE**Buddleja L.**

Buddleja asiatica Lour., Fl. Cochinch.: 72. 1790; C.B. Clarke in Hook.f., Fl. Brit. India 4: 82. 1883; P.C. Pant, Fl. Corbett Natl. Park: 103. 1986; R.D. Gaur, Fl. Distr. Garhwal: 480. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 120. 2007; Prasanna in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 135. 2020; A. Datta & M.P. Nayar in Prasanna (ed.), Fasc. Fl. India 30: 122, f. 30. 2021; Prasanna in Jayanthi & A.A. Mao (eds.), Fl. India 17: 293, P. 126, f. 12. 2022. *B. neemda* Buch.-Ham. ex Roxb., Fl. Ind. (ed. Carey & Wall.) 1: 411. 1820. *Bhati, Neemda*

Evergreen shrubs; branches stellate-tomentose. Leaves subsessile, 3–9 x 0.8–3 cm, lanceolate, acute to acuminate, entire to serrulate, glabrous above, tomentose beneath, tomentum stellate, grey. Flowers subsessile, white, fragrant, in terminal and axillary, dense, continuous spikes; bract lanceolate, acuminate, stellate-pubescent; calyx campanulate, lobes ovate, obtuse; corolla stellate-tomentose, 4-lobed, lobes orbicular, sparsely pubescent, margin undulate; stamens subsessile, included. Capsule oblong-ovate, c. 3 mm long, glabrous, 2-valved. Seeds minute, many, membranous round the edge.

Flowering & Fruiting: February–April.

Rare in open places and along the edge of open forests near deciduous forests.

Distribution: India (sub-Himalayan tract), Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Thailand, Vietnam.

Uses: It is planted in gardens as an ornamental shrub, and the wood may be used for making walking sticks.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122511 (BSD); Samir Sinha (2001).

62. GENTIANACEAE

- 1a. Flowers irregular, three stamens short, sterile; one long, fertile 2. **Hoppea**
 1b. Flowers regular, all stamens equal, fertile 1. **Canscora**

1. Canscora Lam.

- 1a. Stems 20 cm high; flowers white; corolla lobes lanceolate 1. *C. alata*
 1b. Stems 2.5 cm high; flowers pink; corolla lobes oblong 2. *C. diffusa*

1. **Canscora alata** (Roth) Wall., Numer. List no.: 4363. 1831; M. Thiv, Blumea 48: 6. 2003; Jayanthi in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 136. 2020; Jayanthi & D.M. Prachiti in Jayanthi & A.A. Mao, (eds.) Fl. India 17: 314, P. 129. 2022. *Exacum alatum* Roth in Roem. & Schult., Syst. Veg. ed. 15 bis. 3: 159. 1818. *Pladera decussata* Roxb., Fl. Ind. (Eds. Carey & Wall.) 1: 418. 1820. *Canscora decussata* (Roxb.) Schult. & Schult.f., Mant. 3: 229. 1827; C.B. Clarke in Hook.f., Fl. Brit. India 4: 104. 1883; P.C. Pant, Fl. Corbett Natl. Park: 104. 1986; R.D. Gaur, Fl. Distr. Garhwal: 404. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 120. 2007.

Herb, erect, to 20 cm high; stems 4-winged. Leaves opposite, sessile, 1.5–2.5 x 0.5–1 cm, ovate or elliptic, acute at apex, rounded or subacute at base, trinerved. Flowers white, in axillary or terminal cymes; calyx lobes lanceolate, winged, corolla lobes lanceolate; stamens 4. Capsules c. 1 cm long, 2-valved. Seeds many.

Flowering & Fruiting: June–December.

Common in moist places.

Distribution: India (almost throughout tropical regions of the country), Tropical Africa and South Asia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124846 (BSD); Samir Sinha (2001).

2. **Canscora diffusa** (Vahl.) R. Br. ex Roem. & Schult., Syst. Veg. ed. 15 bis. 3: 301. 1818; C.B. Clarke in Hook.f., Fl. Brit. India 4: 103. 1883; P.C. Pant, Fl. Corbett Natl. Park: 104. 1986; R.D. Gaur, Fl. Distr. Garhwal: 404. 1999; M. Thiv, Blumea 48: 11. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 120. 2007; Jayanthi in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 137. 2020; Jayanthi & D.M. Prachiti in Jayanthi & A.A. Mao (eds.), Fl. India 17: 316, P. 130. 2022. *Gentiana diffusa* Vahl, Symb. Bot. 3: 47. 1794. *Canscora decurrens* Dalzell in Hooker's J. Bot. Kew Gard. Misc. 2: 136. 1850; C.B. Clarke in Hook.f., *l.c.* *C. pauciflora* Dalzell in Hooker's J. Bot. Kew Gard. Misc. 2: 136. 1850; C.B. Clarke in Hook.f., *l.c.* *C. lawii* Wight, Icon. Pl. Ind. Orient.: t. 1327. 1848. [Plate-13d]

Herb, erect, to 2.5 cm high; stems much branched. Leaves 0.5–2.5 x 0.5–1 cm, ovate or elliptic, acute at apex, acute or rarely rounded at base, upper sessile, lower subsessile. Flowers pink, many, in lax, paniculate cymes; calyx tubular, lobes short, lanceolate; corolla lobes 4, unequal, oblong; stamens 4. Capsules c. 5 mm long, membranous, narrowly oblong, compressed. Seeds many.

Flowering & Fruiting: November–March.

Rare in moist shady places near deciduous forests.

Distribution: India (almost throughout the country), tropical Africa, tropical Australia, Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122344 (BSD); Samir Sinha (2001).

2. **Hoppea** Hayne ex Willd.

Hoppea dichotoma Hayne ex Willd., Ges. Naturf. Fr. Neue Schrift. 3: 435. 1801; C.B. Clarke in Hook.f., Fl. Brit. India 4: 100. 1883; P.C. Pant, Fl. Corbett Natl. Park: 104. 1986; R.D. Gaur, Fl. Distr. Garhwal: 407. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 122. 2007; Jayanthi in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 147. 2020; Jayanthi & D.M. Prachiti in Jayanthi & A.A. Mao (eds.), Fl. India 17: 413. 2022.

Herb, small, delicate, annual, dichotomously branched, to 10 cm high; stem branched from base or above, lineolate. Leaves sessile, 2.5–15 x 1.5–8 mm, oblanceolate-lanceolate or elliptic, acute, entire. Flowers solitary, terminal on 2–4 mm long pedicel, tetramerous; calyx lobes lanceolate-oblanceolate, acute-acuminate, entire, tube smaller than lobes; corolla tubular, smaller than calyx, lobes ovate, entire, acute; stamens 4, 3 sterile, 1 fertile, fertile one larger than sterile. Capsules many-seeded, seeds reticulate.

Flowering & Fruiting: June–November.

Grows along the water stream and ponds.

Distribution: India (Himalayas), Malaysia, Myanmar, Pakistan?, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

63. BORAGINACEAE

- 1a. Trees..... 2
 1b. Herbs..... 3
- 2a. Calyx accrescent in fruits 1. **Cordia**
 2b. Calyx not accrescent in fruits 3. **Ehretia**
- 3a. Flowers in solitary or in terminal cymes or in racemes 4
 3b. Flowers in unilateral scorpioid cymes 4. **Heliotropium**
- 4a. Calyx deeply divided, hispid 5. **Trichodesma**
 4b. Calyx undivided, pubescent 2. **Cynoglossum**

1. Cordia L.

- 1a. Leaf base rounded to cordate; fruits ovoid 1. *C. dichotoma*
 1b. Leaf base truncate or cuneate; fruits ellipsoid 2. *C. vestita*

1. **Cordia dichotoma** Forst.f., Fl. Ins. Austr.: 18. 1786; Kazmi, J. Arnold Abor. 51: 141. 1970; P.C. Pant, Fl. Corbett Natl. Park: 106. 1986; R.D. Gaur, Fl. Distr. Garhwal: 445. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 123. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 158. 2020. *C. obliqua* Willd., Phytogr. 1: t. 4, f. 1. 1794; C.B. Clarke in Hook.f., Fl. Brit. India 4: 137. 1883 (excl. var.). *C. myxa* auct. plur. non L., 1753; C.B. Clarke in Hook.f., *l.c.* 136. *Lissora* [Plate-13e]

Trees, to 10 m high; rough bark. Leaves variable, 5.6–10 x 3.8–7.5 cm, broadly ovate, obtuse at apex, rounded to cordate at base, scabrous above, glabrous beneath, basal nerves 3. Flowers white, polygamous; male flowers in cymose-panicles, larger than bisexual ones; calyx irregularly splitting; corolla lobes oblong. Berries *c.* 2.5 cm long, ovoid, glossy, supported by persistent calyx, pulp mucilaginous, edible.

Flowering & Fruiting: February–June.

Infrequent in deciduous forests.

Distribution: India (Peninsular India, C & N India), NE Australia, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Pacific Islands, Pakistan, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124812, 124813, 125633, 125725 (BSD); Morghatty-Phakhro, R. *Manikandan* 124898 (BSD).

2. **Cordia vestita** (DC.) Hook.f., & Thomson, J. Linn. Soc. Bot. 2: 128. 1858; C.B. Clarke in Hook.f., Fl. Brit. India 4: 136. 1885; P.C. Pant, Fl. Corbett Natl. Park: 106. 1986; R.D. Gaur, Fl. Distr. Garhwal: 445. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 123. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 159. 2020. *Gynaion vestitum* DC., Prodr. 9: 468. 1845. *Cordia incana* Royle, Illustr. Himal. Mount. 1: 306. 1839, *nom. mid.*

Tree, deciduous, polygamous, with densely tomentose branchlets. Leaves petioled, 7–15 x 4.5–12 cm, broadly ovate to obovate, obtuse or acute, base truncate or cuneate, margin undulate, scabrid on upper surface, lower dense grey-white tomentose. Flowers yellowish-white, in dense cymes; calyx 5-lobed, ribbed, tomentose on the outside; corolla tube equalling calyx, hairy within, limb to 1cm broad, lobes 5, obtuse-crenulate; filaments hairy at base. Drupe *c.* 1.5 cm long, ellipsoid.

Flowering & Fruiting: March–April.

Rare in deciduous forests.

Distribution: India (Himalayas), Pakistan.

Specimens examined: Rathnadh, R. *Manikandan* 122569, 125735, 125763 (BSD); Samir Sinha (2001).

2. *Cynoglossum* L.

- 1a. Flowers pale blue to white; nutlets ovoid..... 1. *C. lanceolatum*
 1b. Flowers white, tinged with pale blue; nutlets round..... 2. *C. zeylanicum*

1. ***Cynoglossum lanceolatum*** Forssk., Fl. Aegypt.-Arab.: 41. 1775; DC., Prodr. 10: 149. 1846; C.B. Clarke in Hook.f., Fl. Brit. India 4: 156. 1883; P.C. Pant, Fl. Corbett Natl. Park: 105. 1986; R.D. Gaur, Fl. Distr. Garhwal: 447. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 123. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 160. 2020. *C. canescens* Willd., Enum. H. Berol.: 180. 1809. *C. micranthum* Desf., Tab. Ecole Bot. ed. 1. 220. 1804. *C. racemosum* Roxb., Hort. Beng.: 13. 1814 & Fl. Indica ed. (Carey & Wall.) 2: 6. 1824.

Herb, erect much branched, biennial or perennial, to 1.2 m high; stem and branches covered with rigid white hairs. Leaves basal petiolate, lanceolate, including petioles 10–20 x 2–4 cm, hairy on upper surface, lower densely hairy; cauline leaves similar, but smaller and sessile. Flowers pale blue to almost white, in axillary and terminal cymes; calyx lobes densely hairy to externally, glabrous within, spreading; corolla with ovate-obtuse lobes; throat scales broader than long. Nutlets round, uniformly appendiculate, with erect glabrous bases not confluent; style stout.

Flowering & Fruiting: June–August.

Very common and widely distributed from sea level to 2500 m.

Distribution: India (Himalayas, N. India), Africa, S.W and W. Asia, Cambodia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, N. Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122348, 122515 (BSD); Samir Sinha (2001).

2. ***Cynoglossum zeylanicum*** (Vahl ex Hornem.) Thunb. ex Lehm., Neue Schriften Naturf. Ges. Halle 3(2): 20. 1817; P.C. Pant, Fl. Corbett Natl. Park: 105. 1986; R.D. Gaur, Fl. Distr. Garhwal: 447. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 123. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 160. 2020. *Anchusa zeylanica* Vahl ex Hornem., Enum. Pl. Hort. Hafn.: 3. 1807. *Cynoglossum furcatum* Wall. in Roxb., Fl. Ind. (Eds. Carey & Wall.) 2: 6. 1824; C.B. Clarke in Hook.f., Fl. Brit. India 4: 155. 1883. *C. denticulatum* A. DC. var. *zeylanicum* (Vahl ex Hornem.) C.B. Clarke in Hook.f., l.c. 157.

Herb, erect, to 70 cm high; stems and branches clothed with white or yellow hairs, slightly angular. Leaves 3.2–7.5 x 1.8–3 cm, elliptic-lanceolate, acute at apex; lower leaves bigger than cauline with 8–10 cm long petioles, upper sessile. Flowers white, tinged with pale blue, in axillary and terminal racemes; calyx lobes 5, ovate, hairy; corolla tube short, lobes 5, spreading. Nutlets c. 4 mm long, ovoid.

Flowering & Fruiting: August–December.

Occasional in open sandy moist places.

Distribution: India (South, C & N India, Himalayas), China, Indo-Malesia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125764 (BSD); Samir Sinha (2001).

3. *Ehretia* P. Browne

- 1a. Leaves elliptic-oblong; flowers in panicles..... 1. *E. acuminta*
 1b. Leaves ovate-elliptic or obovate; flowers in compound spikes..... 2. *E. laevis*

1. ***Ehretia acuminta*** R. Br., Prodr. Fl. Nov. Holland.: 497. 1810; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 160. 2020. *Ehretia serrata* Roxb., Fl. Ind.: ed. 2, 2: 340. 1824. *E. acuminata sensu* C.B. Clarke in Hook.f., Fl. Brit. India 4: 155. 1883, *non* R. Br. 1810. *E. acuminata* var. *serrata* (Roxb.) I.M. Johnston, J. Arn. Arb. 32: 23. 1951; P.C. Pant, Fl. Corbett Natl. Park: 106. 1986; R.D. Gaur, Fl. Distr. Garhwal: 445. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 124. 2007, *p.p.* *Puna*

Tree, deciduous, to 10 m high; young shoots glabrescent. Leaves petioled, 5–15 x 2.8–5.5 cm, elliptic-oblong, acuminate, cuneate, serrulate, glabrous, midrib prominent on undersurface, nerves pubescent. Flowers white, in terminal pubescent panicles; calyx cupular, lobes 5, obtuse, ciliate; corolla rotate, limb 5-lobed, oblong, minutely crenulate; filaments shorter than lobes, glabrous; basifixed, oblong; style bifid. Ovary subglobose to ovoid, glabrous. Drupe globose, black when ripe; with 2 seeds.

Flowering & Fruiting: March–May.

Grows in moist deciduous forests.

Distribution: India (Himalaya from Indus eastward to Sikkim), Pakistan.

Uses: The young fruit is used to make pickled.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Ehretia laevis*** Roxb., Pl. Coromandel 1: 42, t. 55. 1795 & Fl. Ind. (Eds. Carey & Wall.) 2: 341. 1824; C.B. Clarke in Hook.f., Fl. Brit. India 4: 141. 1883; Kazmi, J. Arnold Arbor. 51: 147. 1970; P.C. Pant, Fl. Corbett Natl. Park: 107. 1986; R.D. Gaur, Fl. Distr. Garhwal: 446. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 124. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 161. 2020. *Chamror, Khoda chamror*

Small trees, to 8 m high; branches sparsely glabrescent. Leaves 3.5–9.5 x 2.8–5.2 cm, ovate-elliptic or obovate, acute to acuminate at apex, truncate to attenuate at base. Flowers white, sessile or subsessile, in unilateral, compound spikes; calyx *c.* 2 mm long, hairy; corolla *c.* 4 mm long; subrotate. Drupes *c.* 4 mm across, 2-lobed, ripen orange.

Flowering & Fruiting: March–July.

Rare in deciduous forests.

Distribution: India (Himalayas, C & S. India), Australia, Bhutan, China, Kashmir, Laos, Myanmar, Pakistan, Vietnam.

Specimens examined: Vatanvasa forest, H.C. Pande 220777 (LWG); Sonanadi WLS, R. Manikandan 125735 (BSD).

4. *Heliotropium* L.

Heliotropium strigosum Willd., Sp. Pl. 1: 743. 1798; DC., Prodr. 9: 546. 1845; C.B. Clarke in Hook.f., Fl. Brit. India 4: 151. 1883; P.C. Pant, Fl. Corbett Natl. Park: 106. 1986; R.D. Gaur, Fl. Distr. Garhwal: 448. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 124. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 165. 2020.

Herb, perennial, prostrate to procumbent or erect, to 30 cm high; stems usually much branched from the base, appressed hairy. Leaves sessile or subsessile, 1–3 x 0.2–0.5 cm, linear-lanceolate, acute, appressed, strigosely hairy on both surfaces, usually grayish-white with short hairs. Flowers white, simple or paired, in unilateral scorpioid cymes; bracts lanceolate; calyx 5-partite, lobes lanceolate, hairy to the outside; corolla tubular or funnelform, throat constricted, glandular, sparsely pubescent, lobes suborbicular, with folds above middle, densely hispid outside; anthers adnate when young, attached from base of corolla tube; stigma conical, stigmatic ring prominent; style slightly shorter, glabrous. Fruit globose, depressed, distinctly 4-lobed, dense pilose. Nutlets 4, dark brown.

Flowering & Fruiting: March–November.

Common in moist places.

Distribution: India (almost throughout tropical regions of the country), Afghanistan, Africa, Australia, Bhutan, Cambodia, India, Kashmir, Laos, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

5. *Trichodesma* R. Br.

Trichodesma indicum (L.) Lehm., Pl. Asperif. Nucif.: 193. 1818; C.B. Clarke in Hook.f., Fl. Brit. India 4: 153. 1883; S.P. Banerjee & Pramanik, Bull. Bot. Surv. India 17: 110. 1978 (1975); P.C. Pant, Fl. Corbett Natl. Park: 106. 1986; R.D. Gaur, Fl. Distr. Garhwal: 448. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 125. 2007; S.L. Meena & al. in A.A. Mao & S.S. Dash, Fl. Pl. India, Annot. Checkl. Dicot. 2: 174. 2020. *Borago indica* L., Sp. Pl.: 137. 1753. *Trichodesma amplexicaule* Roth, Nov. Pl. Sp.: 104. 1821; C.B. Clarke in Hook.f., *l.c.*, *p.p.* *T. indicum* var. *amplexicaule* (Roth) T. Cooke, Fl. Bombay 2: 215. 1904 [2: 282. 1967 (Repr.)]; S.P. Banerjee & Pramanik, *l.c.* 113.

Herb, erect, annual, to 60 cm high; stems and branches sparsely or densely hairy. Leaves 2.8–8.5 x 0.5–3.6 cm, ovate-oblong, lanceolate, hairy on both sides, obtuse to subacute at apex, auriculate at base. Flowers pale blue, solitary or few-flowered in terminal cymes; calyx deeply divided, hispid hairy; corolla infundibuliform, lobes ovate to rounded. Nutlets $\approx$ 5 mm long, ovoid, smooth on outer face, rugosely pitted on inner face.

Flowering & Fruiting: October–February.

Occasional in open dry situations.

Distribution: India (almost throughout the country), Afghanistan, China, Mauritius, Pakistan, Philippines.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125712, 122391 (BSD); Morghatty-Kalagarh Dam, R. *Manikandan* 124832, 124940 (BSD).

64. CONVULVULACEAE

- | | |
|---|---------------------|
| 1a. Plants parasitic, leafless | 1. Cuscuta |
| 1b. Plants non-parasitic, with leaves | 2 |
| 2a. Sepals enlarged and wing-like in fruits | 5. Porana |
| 2b. Sepals not as above | 3 |
| 3a. Styles 2, stigma clavate | 2. Evolvulus |
| 3b. Style 1, stigmas 2 or 3 globular | 4 |

- 4a. Flowers usually less than 3 cm long, yellow colour 4. **Merremia**
 4b. Flowers usually more than 3 cm long, other than yellow colour 3. **Ipomoea**

1. **Cuscuta** L.

Cuscuta reflexa Roxb., Pl. Coromandel 2: 3, t. 104. 1798; C.B. Clarke in Hook.f., Fl. Brit. India 4: 225. 1883; Yunk., Mem. Torr. Bot. Club 18: 259, f. 130 & 130, A–F. 1932; Bhattacharya & S.K. Mukerjee in Indian J. Forest. 1: 162. 1978; P.C. Pant, Fl. Corbett Natl. Park: 107. 1986; R.D. Gaur, Fl. Distr. Garhwal: 444. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 126. 2007.

Twiners; stems greenish-yellow, coarsely terete. Leaves reduced to minute scales. Flowers small, white, subsessile, in subglobose clusters or short racemes; bracts $\approx$ 1 mm long, triangular; calyx united, lobes 5, cupulate, fleshy, subequal, verrucose without; corolla to 8 mm long, campanulate-tubular, lobes ovate-triangular, obtuse, margins wavy; stamens 5, inserted on throat of corolla. Capsules $\approx$ 4 mm across, globose-conical, apiculate, circumscissile. Seeds 1–2, suborbicular, minutely foveolate.

Flowering & Fruiting: February–May.

Occasional in deciduous forests and found parasitic on host plant.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125758 (BSD).

2. **Evolvulus** L.

- 1a. Leaves elliptic-oblong or lanceolate; flowers blue or bluish-white 1. *E. alsinoides*
 1b. Leaves broadly ovate-orbicular; flowers cream-coloured 2. *E. nummularius*

1. **Evolvulus alsinoides** (L.) L., Sp. Pl. ed. 2, 2: 392. 1762; C.B. Clarke in Hook.f., Fl. Brit. India 4: 220. 1883; P.C. Pant, Fl. Corbett Natl. Park: 108. 1986; R.D. Gaur, Fl. Distr. Garhwal: 438. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 125. 2007. *Convolvulus alsinoides* L., Sp. Pl.: 157. 1753. [Plate-13f]

Herb, suffrutescent, prostrate or suberect; branches spreading, pubescent. Leaves subsessile, 0.5–1.8 x 0.2–0.4 cm, elliptic-oblong or lanceolate, obtusely apiculate at apex, acute at base, appressed silky. Flowers blue or bluish-white, axillary solitary or in 3-flowered cymes; calyx lobes 5, lanceolate, acute to acuminate, pubescent; corolla to 8 mm long, rotate; stamens 5. Capsules $\approx$ 4 mm long, ovoid, 4-valved. Seeds 4, black.

Flowering & Fruiting: Throughout the year.

Occasional in grasslands and open waste places.

Distribution: India (almost throughout the country), Africa, America, Ceylon, China, Iran, Malaysia, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124815-a, 124845 (BSD).

2. **Evolvulus nummularius** (L.) L., Sp. Pl. (ed. 2) 1: 391. 1762; C.B. Clarke in Hook.f., Fl. Brit. India 4: 734. 1885; Stearn, Taxon 21: 649. 1972; P.C. Pant, Fl. Corbett Natl. Park: 108. 1986; R.D. Gaur, Fl. Distr. Garhwal: 438. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 125. 2007. *Convolvulus nummularius* L., Sp. Pl.: (ed. 1) 157. 1753. *Volvuopsis nummularium* (L.) Roberty, Candollea 14: 28. 1952.

Herb, perennial; stems prostrate, herbaceous, radially spreading, pilose with short trichomes. Leaves to 1.5 x 1 cm, broadly ovate-orbicular, rounded to emarginate at apex, rounded-subcordate at base, glabrous or sparsely pubescent beneath. Flowers cream-coloured, axillary solitary; calyx elliptic-ovate, pubescent; corolla

to 7 mm across, campanulate; stamens 5. Capsules *c.* 4 mm across, globose. Seeds brownish-black, subglobose, slightly muricate.

Flowering & Fruiting: July–December.

Occasional near moist places and along roadsides.

Distribution: India (C & N India, Himalayas), Africa, America, China, Malaysia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124907 (BSD).

Notes: It is a native of South America, now naturalized in the tropics like Africa, Madagascar, India, etc. The genus *Voluhlopsis* Roberty was created by Roberty (*l.c.*) carved out from *Evolvulus* L. in 1952. However, Ooststroom in Steenis, Fl. Males., Ser. 1, Spermat. 4: 58. 1958 and D.F. Austin in Dassan. & Fosberg, Revis. Handb. Fl. Ceylon 1: 311. 1980 retained the species in *Evolvulus* L.

3. *Ipomoea* L.

- 1a. Shrubs 1. *I. carnea* subsp. *fistulosa*
 1b. Twiners 2
- 2a. Stems glabrouscent 3
 2b. Stems pubescent 4
- 3a. Leaves 3-lobed; capsules subglobose 2. *I. hederifolia*
 3b. Leaves deeply pinnately dissected to 8–20 pairs of segments; capsules ovoid 6. *I. quamoclit*
- 4a. Leaves simple or lobed; capsules globose or subglobose 5
 4b. Leaves palmately divided nearly to base; capsules ovoid 4. *I. pes-tigridis*
- 5a. Leaves palmately 3-lobed; flowers blue 3. *I. nil*
 5b. Leaves simple; flowers dark purple or pink, with throat white 5. *I. purpurea*

1. ***Ipomoea carnea* subsp. *fistulosa*** (Mart. ex Choisy) D.F. Austin, Taxon. 26: 237. 1977; R.D. Gaur, Fl. Distr. Garhwal: 440. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 125. 2007. *I. fistulosa* Mart. ex Choisy in DC., Prodr. 9: 349. 1845. *Batatas crassicaulis* Benth., Voy. Sulphur. 5: 134. 1845. *Ipomoea carnea sensu* P.C. Pant, Fl. Corbett Natl. Park: 108. 1986, *non*. Jacq., 1760. *I. crassicaulis* (Benth) Robins., Proc. Amer. Acad. Arts. 51: 530. 1916.

Behaya

Shrubs, perennial, erect, to 2.5 m high; stems woody at the base, hollow, glabrous or minutely puberulent. Leaves petioled, ovate to lanceolate, 10–25 x 5–12 cm, truncate to shallowly cordate basally, long acuminate apically, puberulent on both surfaces. Flowers deep pink to rose-purple to almost white, in cymose-paniculate clusters; calyx lobes suborbicular, subcoriaceous, glabrous or puberulent; corolla tubular, funnel-shaped, to 8 cm long. Fruit capsular, ovoid to subglobose, *c.* 2 cm long; seeds covered with long comose brown trichomes.

Flowering & Fruiting: July–November.

Grows near ponds, marshy places and as hedge plant near human habitation.

Distribution: India (almost throughout the country), America, subtropical or tropical countries of the world.

Uses: It is commonly used as a hedge plant.

Notes: In Asia, belong to this subspecies, perhaps reflecting Portuguese transport from the Brazilian region. Differs from the type variety in its habit, the shape of the leaves and being mostly glabrous or puberulent. Included on the authority of Samir Sinha (2001).

2. ***Ipomoea hederifolia*** L., Syst. Nat. ed. 10. 2: 925. 1759; P.C. Pant, Fl. Corbett Natl. Park: 108. 1986; R.D. Gaur, Fl. Distr. Garhwal: 440. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 125. 2007. *Quamoclit coccinea* Moench., Methodus: 453. 1795. *Ipomoea coccinea sensu* C.B. Clarke in Hook.f., Fl. Brit. India 4: 199. 1883 *non* L., 1753.

Twiningers, slender; stems terete or slightly angular, often contorted, glabrescent. Leaves 2.5–5.6 x 1.5–7.8 cm, ovate-suborbicular, 3-lobed or angled, acute to acuminate at apex, cordate at base, membranous. Flowers red, in few to many-flowered cymes; calyx lobes 5, oblong, distinctly awned, obtuse-truncate at apex; corolla to 4.5 cm long, salver-shaped; stamens 5, exserted. Capsules *c.* 8 mm long, subglobose. Seeds pyriform dark brown or black.

Flowering & Fruiting: August–November.

Occasional among bushes and along roadsides in moist deciduous forests.

Distribution: India (almost throughout the country), Old World tropics.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122565, 122307 (BSD).

Notes: Native of Tropical America, introduced and become naturalised in tropics. Included on the authority of Samir Sinha (2001).

3. ***Ipomoea nil*** (L.) Roth, Catal. Bot. 1: 36. 1797; Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4: 465. 1953; P.C. Pant, Fl. Corbett Natl. Park: 109. 1986; R.D. Gaur, Fl. Distr. Garhwal: 441. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 125. 2007. *Convolvulus nil* L., Sp. Pl. ed. 2: 219. 1762. *Ipomoea hederacea sensu* C.B. Clarke in Hook.f., Fl. Brit. India 4: 199. 1883, *non* (L.) Jacq. 1787.

Twiningers, annual; stems bristly-pilose. Leaves 4.5–8.5 x 4–8.2 cm, ovate or suborbicular, palmately 3-lobed, midlobe acuminate at apex, lateral lobes acute at apex, cordate at base, pubescent on both sides. Flowers blue, solitary or in lax, few-flowered cymes; calyx lobes 5, linear-lanceolate, hirsute; corolla to 7 cm long, funnel-shaped; stamens 5, subequal, included. Capsules *c.* 1 cm across, subglobose, 3-celled. Seeds black with grey-pubescent.

Flowering & Fruiting: August–November.

Occasional along thickets in deciduous forests.

Distribution: India (C & N India, Himalayas), China, Japan, Myanmar, Nepal, New Guinea, Pakistan, South America, Sri Lanka, Thailand; all tropical regions of the world.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122517 (BSD).

4. ***Ipomoea pes-tigridis*** L., Sp. Pl. 1: 162. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 204. 1883; P.C. Pant, Fl. Corbett Natl. Park: 109. 1986; R.D. Gaur, Fl. Distr. Garhwal: 441. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 126. 2007. *Convolvulus pes-tigridis* (L.) Spreng., Syst. Veg. 1: 592. 1825. *Ipomoea capitellata* Choisy, Mém. Soc. Phys. Genève 6: 457. 1833. *I. hepaticifolia* L., Sp. Pl. 1: 161. 1753.

Herb, annual, twining, with spreading hispid axial parts, to 3 m long. Leaves petioled, circular or transversely elliptic, 2–10 x 3–13 cm, palmately deeply divided, segments 5–9, elliptic or oblong, tapered at both ends, densely pubescent, apex mucronate. Flowers white, few flowered, in capitate; bracts hirsute; outer involucral bracts oblong to linear-oblong; inner bracts smaller; calyx lobes lanceolate, slightly unequal, hirsute; corolla funnel-form; stamens included, filaments glabrous; stigma 2-lobed. Capsules ovoid, 4-valved; seeds ellipsoid, gray tomentellous.

Flowering & Fruiting: October–April.

Grows in thickets, roadsides and along the dry ponds and lakes.

Distribution: India (almost throughout the country), Africa, Australia, Cambodia, China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Pacific Islands, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124220, 122340, 122516 (BSD).

5. ***Ipomoea purpurea*** (L.) Roth, Bot. Ash.: 27. 1787; C.B. Clarke in Hook.f., Fl. Brit. India 4: 200. 1833; R.D. Gaur, Fl. Distr. Garhwal: 441. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 126. 2007. *Convolvulus purpureus* L., Sp. Pl. 2: 219. 1762.

Twiners, extensive, herbaceous, pilose to hirsute, with spreading trichomes. Leaves petioled, 2–10 x 2.2–11 cm, broadly ovate-orbicular, acute or obtuse at apex, cordate at base, entire or trilobate along the margins, pubescent on both surfaces. Flowers dark purple or pink, with throat white, 1–5-flowered, in cymes; calyx lobes oblong-lanceolate, abruptly acute, hirsute on lower portion; corolla lobes to 5 cm long, funnel-shaped. Capsules c. 1 cm long, depressed globose; seeds pyriform, glabrous, black.

Flowering & Fruiting: July–November.

Grows in waste places and along the road sides.

Distribution: India (South, C & N India, Himalayas), America, China, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka; naturalized worldwide.

Notes: Included on the authority of Samir Sinha (2001).

6. ***Ipomoea quamoclit*** L., Sp. Pl.: 159. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 199. 1883; P.C. Pant, Fl. Corbett Natl. Park: 109. 1986; R.D. Gaur, Fl. Distr. Garhwal: 442. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 126. 2007. *Quamoclit pinnata* (Desr.) Boj., Hortus Maurit. 224. 1837.

Herb, twining, glabrous. Leaves deeply pinnately dissected, with 8–20 pairs of linear segments. Flowers scarlet, 1–few-flowered cymes. Capsules ovoid. Seeds ovoid-oblong, dark brown.

Flowering & Fruiting: September–December.

Cultivated in gardens and also along hedges, often found as an escape.

Distribution: India (almost throughout the country), most of the tropical countries.

Specimens examined: Vatanvasa, T. S. Rana & B. Datta 218701 (LWG); Vatanvasa, R. *Manikandan* 125521, 122398 (BSD); Samir Sinha (2001)

Notes: It is a native of Mexico.

4. **Merremia** Dennst. ex Endl.

Merremia hederacea (Burm. f.) Hall.f., Bot. Jahrb. Syst. 18: 118. 1894; Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 1, 4: 441.1953; Uniyal & al., Flow. Pl. Uttarakhand Checkl. 126. 2007. *Evolvulus hederaceus* Burm.f., Fl. Ind. 77, t. 30, f. 2. 1768. *Ipomoea chryseoides* Ker-Gawl., Bot. Reg. t. 270. 1818; Choisy, Mem. Soc. Phys. Geneve 6: 469.1834; C.B. Clarke in Hook.f., Fl. Brit. India 4: 206. 1883. *Merremia chryseoides* (Ker-Gawl.) Hall.f., Bot. Jahrb. 16: 552. 1893.

Climbers with twining or prostrate stems, smooth or minutely tuberculate, glabrous or sparsely pubescent. Leaves petioled, 1.5–5 x 0.7–3 cm, ovate, broadly cordate basally, obtuse apically, margins entire, crenate, shallowly lobed or deeply 3-lobed, glabrous or pubescent. Flowers yellow, solitary or cymose; calyx broadly obovate to spatulate, notched at apex, glabrous or pilose; corolla campanulate. Fruit c. 6 mm long, capsular, broadly conical to depressed-globose, somewhat 4-angled, the valves wrinkled. Seeds blackish, short-pubescent or nearly glabrous.

Flowering & Fruiting: August to December.

Occasional in thickets along forest edges.

Distribution: India (Himalayas), Tropical Africa, tropical Asia to China, Malaysia, Queensland and some Pacific islands.

Specimens examined: Vatanvasa-Haduparao, R. Manikandan 125636 (BSD).

Notes: van Ooststroom (*l.c.*), Verdcourt (Fl. Trop. East. Africa 54. 1963) treated *M. umbellata* subsp. *orientalis* (Hall.f.). Ooststr. as separate taxon considering that this subsp. is less robust than subsp. *umbellata* with longer peduncles and many-flowered cymes, calyx lobes mostly 7–10 mm long, corolla always yellow. D.F. Austin (*l.c.*) merged the subsp. *orientalis* under the species *umbellata* which has been followed here.

5. **Porana** Burm.f.

Porana paniculata Roxb., Pl. Coromandal 3: 31. 1819; Choisy in DC., Prodr. 9: 436.1845; C.B. Clarke in Hook.f., Fl. Brit. India 4: 222.1883; P.C. Pant, Fl. Corbett Natl. Park: 109. 1986; R.D. Gaur, Fl. Distr. Garhwal: 442. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 126. 2007. *Safed Bel*

Climbers, herbaceous, woody at the base, grayish pubescent. Leaves petioled, ovate, 4–9 x 2.5–7 cm, cordate basally, obtuse, acute-acuminate or cuspidate apically, pubescent on both surfaces. Flowers white, in lateral or terminal, paniculate racemes or thyrsiform clusters; calyx lobes linear, densely tomentellous; corolla white, funnel-shaped, to 6 mm long. Fruits indehiscent, ovoid-globose, c. 6 mm long, outer 3 sepals enlarged and wing-like; seeds ovoid, brown.

Flowering & Fruiting: October–March.

Growson bushes in deciduous forests.

Distribution: India (almost throughout the country), Africa, Malaysia, Myanmar, Pakistan, Sri Lanka, New World tropics.

Uses: The stems are used for weaving baskets.

Notes: Included on the authority of Samir Sinha (2001).

65. **SOLANACEAE**

- 1a. Fruit a capsule 1. **Datura**
 1b. Fruit a berry 2

- 2a. Anthers connivent in a cone, longer than filaments3. **Solanum**
 2b. Anthers not as above, shorter than filaments 2. **Physalis**

1. **Datura** L.

Datura metel L., Sp. Pl.: 179. 1753 (*non auct. pl.* Indian Fl.); R.D. Gaur, Fl. Garhwal: 429. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 183. 2007. *D. alba* Nees, Trans. Linn. Soc. London 17: 73. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 4: 243. 1883, *p.p.* *Dhatura*

Herb or undershrub, annual or perennial, to 1 m high; stems dark-pink, flerouous, nearly glabrous or short hairy, lenticellate. Leaves petioled, ovate-triangular, 10–20 x 7–12 cm, short hairy or glabrous, rounded at base, acute, margin repand-dentate. Flowers white or purple, large, solitary or axillary; calyx tubular, to 10 cm long, lobes unequal, triangular, lanceolate, acuminate; corolla funnel-shaped, to 20 cm long, pubescent outsides. Fruits deflexed, nodding, globose, covered with short conical prickles; seeds brown.

Flowering & Fruiting: July–December.

Commonly found in waste places and road sides.

Distribution: India (almost throughout the country), Africa, Tropical America, Asia, Egypt.

Notes: Included on the authority of Samir Sinha (2001).

2. **Physalis** L.

Physalis minima L., Sp. Pl.: 183. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 238. 1883; P.C. Pant, Fl. Corbett Natl. Park: 110. 1986; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 184. 2007. *P. divaricata* D. Don, Prodr. Fl. Nep.: 97. 1825; R.D. Gaur, Fl. Distr. Garhwal: 433. 1999.

Herb, annual, erect or diffuse, pubescent, to 60 cm high; stems striate, nearly glabrous. Leaves petioled, ovate, 2–10 x 1.5–4 cm, sinuately angular, acute, shallowly toothed, cuneate at base. Flowers yellow or bluish white, sometime spotted at base within, in solitary, nodding; calyx truncate at base, lobes triangular, acute, ciliate; corolla bell-shaped, to 1 cm long, angular, 5-lobed; stamens 5; filaments glabrous; style glabrous. Berries globose, *c.* 1.5 cm long, inflated, membranous, 5-angled calyx.

Flowering & Fruiting: July–November.

Common in waste lands, crop fields, along road sides, on hill slopes, and in moist sandy soils; up to 1500 m.

Distribution: India (throughout the country), Tropical Africa, Asia, Australia.

Specimens examined: Way to Hathikhund, R. *Manikandan* 122420, 122513 (BSD); Vatanvasa, H.C. Pande 220817 (LWG); Samir Sinha (2001).

3. **Solanum** L.

- 1a. Stems armed 2
 1b. Stems unarmed 4
- 2a. Herbs or undershrubs 3
 2b. Shrubs5. *S. viarum*
- 3a. Calyx usually prickly, lobes ovate-lanceolate6. *S. virginianum*
 3b. Calyx non prickly, lobes triangular 1. *S. anguvi*

- 4a. Stems densely stellate-tomentose; calyx stellate-pubescent 2. *S. erianthum*
 4b. Stems glabrous or sparsely pubescent; calyx glabrouscent 5
 5a. Erect herbs; leaves petioled 3. *S. nigrum*
 5b. Scandent or climbing shrubs; leaves subsessile or sessile 4. *S. seaforthianum*

1. ***Solanum anguivi*** Lam., Encycl. Meth. 2: 23. 1794; P.C. Pant, Fl. Corbett Natl. Park: 110. 1986; R.D. Gaur, Fl. Distr. Garhwal: 433. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 184. 2007. *S. indicum sensu* C.B. Clarke in Hook.f., Fl. Brit. India 4: 234. 1883, *non* L. 1753. *Ban-Bhatta, Katang, Kuntkari*

Herb or undershrubs, perennial, erect, stellate-tomentose, to 1 m high; stems stout, aculeate with hooked prickles. Leaves petioled, ovate-oblong, 5–15 x 4–10 cm, sinuate-pinnatifid, cuneate or truncate at base, obtuse, sparsely prickly, stellate-pubescent on both surfaces. Flowers violet, purplish-white, in extra-axillary, rarely solitary, rusty-tomentose, corymbose cymes; calyx campanulate, stellate pubescent, lobes 5, triangular, acute; corolla lobes 5, ovate-lanceolate, acute or obtuse. Fruits globose, orange-yellow, glabrous; seeds many, smooth.

Flowering & Fruiting: Almost throughout the year.

Common; found in waste lands, dry sandy places, along road sides and hill slopes; up to 1500 m.

Distribution: India (throughout), Tropical Africa, China, Malaysia, Philippines.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Solanum erianthum*** D. Don, Prodr. Fl. Nep.: 96. 1825; K.E. Roe, Brittonia 19: 358. 1967; P.C. Pant, Fl. Corbett Natl. Park: 110. 1986; R.D. Gaur, Fl. Distr. Garhwal: 434. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 184. 2007. *S. verbascifolium sensu* C.B. Clarke in Hook.f., Fl. Brit. India 4: 230. 1883, *non* L. 1753. *Ban-tambakhu, Priyamkri*

Shrubs or small trees, erect, unarmed, to 7 m high; stems densely stellate-tomentose. Leaves petioled, broadly ovate or lanceolate-elliptic, 10–20 x 5–15 cm, entire, acute or acuminate, acute or rounded at the base, softly pubescent above, densely woolly beneath. Flowers white, many, in densely terminal, crowded in stalked, compound cymes; calyx stellate-tomentose, lobes broad, ovate, acute; corolla lobes ovate-lanceolate, acute, woolly outsides; stamens subequal; filaments glabrous, narrowing upward; style glabrous. Berries yellow, globose, to 1 cm long; seeds minutely dotted, compressed.

Flowering & Fruiting: Almost throughout the year.

Common in ravine slopes, open places, sandy riverbeds and along roadsides, up to 1500 m.

Distribution: India (throughout), Tropical America, North Australia, Malaya, Sri Lanka.

Specimens examined: Rathudhab-Vatanvasa, R. *Manikandan* 122540, 122499, 122368 (BSD); Samir Sinha (2001).

3. ***Solanum nigrum*** L., Sp. Pl.: 186. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 229. 1883; P.C. Pant, Fl. Corbett Natl. Park: 110. 1986; R.D. Gaur, Fl. Distr. Garhwal: 435. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 184. 2007; Pusalkar & D.K. Singh, Fl. Gangotri Natl. Park: 480. 2012. *Makoi*

Herb, annual, erect or rambling, glabrous, to 50 cm high; stems terete, purplish-green much branched, nearly glabrous or sparsely pubescent. Leaves petioled, alternate, ovate-lanceolate, 2–8 x 1–4 cm, cuneate or tapering at the base, entire or repand, dentate or sinuate toothed, acute or acuminate. Flowers white or with dark-blue centre, in extra-axillary, nodding, in umbelliform; calyx glabrous, 5-lobed, ovate; corolla triangular, 5-lobed, longer than calyx; stamens 5, anthers yellow, winged; filaments as long as or shorter than anthers; style included, hairy at the base; stigma capitate. Berries globose, c. 1 cm across, black, orange, red or yellow; seeds discoid, yellow, minutely reticulate-foveolate.

Flowering & Fruiting: July–September.

Common in waste places, along roadsides near stream, moist shady places.

Distribution: India (almost throughout the country), Tropical America, South & West Asia, Europe.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122581 (BSD); Samir Sinha (2001).

4. ***Solanum seaforthianum*** Andrews, Bot. Repos.: 8. t. 504. 1808; Raizada & Saxena, Fl. Muss.: 487. 1978; R.D. Gaur, Fl. Distr. Garhwal: 435. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 184. 2007.

Potato Creeper [Plate-13g]

Scandent or climbing shrubs, glabrous, unarmed, to 3 m high. Leaves subsessile or sessile, simple or 3-foliolate or deeply pinnatifid, elliptic-lanceolate or ovate-obovate, 4–5 x 1.5–2 cm, apex acute-acuminate, oblique decurrent at the base, entire or undulate margin. Flowers blue, rose or violet or rarely white, fragrant, in axillary or terminal, corymbose panicles; calyx teeth small, triangular, obtuse, glabrous; corolla 5-fid to near base; lobes with tapering apex, white hairy along the margins; anthers bright yellow; styles curved at apex. Berries globose, c. 1 cm across, red or scarlet; seeds minute, pubescent.

Flowering & Fruiting: Almost throughout the year.

Commonly cultivated in gardens, parks, roadside and waste places.

Distribution: India (almost throughout the country), tropical America, naturalised elsewhere.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122580, 122399 (BSD).

5. ***Solanum viarum*** Dunal in DC., Prodr. 13: 240. 1852; P.C. Pant, Fl. Corbett Natl. Park: 111. 1986; R.D. Gaur, Fl. Distr. Garhwal: 436. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 185. 2007. *S. khasianum* Clarke var. *chatterjeeanum* Sen Gupta, Bull. Bot. Surv. India 3: 413. 1961. *Solanum viridiflorum* Ruiz & Pav., Fl. Peruv. 2: 38, t. 173, f. b. 1799. [Plate-13h]

Shrubs, armed, annual or perennial, erect or diffused, to 1.5 m high; stems aculeate, recurved or straight prickles, glandular-pubescent. Leaves petioled, thorny, broadly ovate-cordate, 5–18 x 4–15 cm, lobed, cordate at base, subacute or subobtuse, sparsely prickly on both surfaces. Flowers white, 3–5-flowered, in lateral, sparsely glandular-pubescent, corymbose cymes; calyx campanulate, lobes ovate-triangular, acute; corolla lobes ovate-lanceolate, acute, pubescent; style glabrous. Berries globose, pale-yellow, glabrous; seeds compressed.

Flowering & Fruiting: Almost throughout the year.

Common in open dry waste places, hillslopes and forest clearings.

Distribution: India (North-West Himalayas), tropical Asia, Africa.

Notes: Included on the authority of Samir Sinha (2001).

6. ***Solanum virginianum*** L., Sp. Pl.: 187. 1753; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 185. 2007. *S. surattense* Burm.f., Fl. Ind.: 57. 1768; R.D. Gaur, Fl. Garhwal: 435. 1999. *S. xanthocarpum* Schrad. & Wendl., Sert. Hana. i: 8. t. 2. 1795; C.B. Clarke in Hook.f., Fl. Brit. India 4: 236. 1883. *Kantkari, Kateli*

Herb, annual or perennial, prostrate to decumbent or ascending, diffused, to 70 cm high; stems aculeate, profusely armed with straight, yellow prickles. Leaves petioled, alternate-distichous, ovate or elliptic, 10–15 x 2.5–4 cm, acute, attenuate, deeply lobed or sub-pinnatifid, ultimately glabrous, yellow prickles. Flowers bluish-purple, in extra-axillary, few; calyx campanulate, usually prickly, lobes ovate-lanceolate, acute, densely stellate-hairy; corolla rotate, lobes lanceolate, acute, hairy outside, spreading; style glabrous. Berries pale-yellow, globose, smooth; seeds flat, glabrous.

Flowering & Fruiting: Almost throughout the year.

Common in roadsides, sandy river beds, edges of fields and on waste places.

Distribution: India (throughout the country), Afghanistan, Africa, Asia, Australia, Japan, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125721, 122400 (BSD); Sona River bank, H.C. *Pande* 220751(LWG); Samir Sinha (2001).

Cultivated species:

1. ***Capsicum annum*** L., Sp. Pl.: 188. 1753; R.D. Gaur, Fl. Distr. Garhwal: 427. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 183. 2007. *C. annum* L. var. *acuminata* Fingerh., Mon. Gen. Caps.: 13, t. 2(f. c.). 1832. *C. grossum* Willd. var. *cerasiforme* (Miller) C.B. Clarke in Hook.f., Fl. Brit. India 4: 239. 1883. *Mirchi*

Herb, annual or biennial, to 1 m high. Leaves ovate-oblong or ovate-lanceolate, acute to acuminate. Flowers white or dull-white, solitary, nodding. Berries elongate, ovoid or globose, yellow to red when ripe, pulp thin or thick usually mildly or keenly pungent; seeds yellow or cream-yellow, almost circular, long placental connections.

Flowering & Fruiting: September–April.

Commonly cultivated; growing in waste places and along roadsides.

2. ***Solanum melongena*** L., Sp. Pl.: 186. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 235. 1883; R.D. Gaur, Fl. Distr. Garhwal: 434. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 184. 2007. *S. insanum* L., Mant. Pl.: 46. 1767. *S. esculentum* Dunal, Hist. Solan.: 208. 1813. *Bintak, Baingan, Baigan*

Herb or undershrubs, erect, prickly, stellate-hairy. Leaves ovate, prickly, angulate, acute, obliquely truncate at the base. Flowers purple to violet, solitary; pedicels recurved. Fruits of various shape & sizes, white, yellow or dark purple, oval, globose, obovoid or cylindrical; seeds minute, many, pitted, brownish.

Flowering & Fruiting: Almost throughout the year.

Common extensively cultivated for its fruits which are cooked as vegetable, up to 2000 m.

Distribution: India (Shiwalik range, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, South India), South Africa, Arabia, Egypt, Ethiopia, Iran, Pakistan, Sudan, Syria.

3. **Solanum tuberosum** L., Sp. Pl.: 185. 1753; R.D. Gaur, Fl. Distr. Garhwal: 436. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 185. 2007. *Aalu*

Herb, erect or ascending, perennial, unarmed with subterranean stolons bearing tubers, 1 m high; stems winged-ribbed, glabrescent or hairy. Leaves imparipinnate, rarely bi-pinnate. Flowers white or purple, many flowered, in terminal or lateral corymbose cymes. Berries globose to ovoid, glabrous, yellow or green; seeds many, flattened, oval.

Flowering & Fruiting: January–June.

Commonly cultivated; grown in waste places, roadsides and open fields, up to 2500 m.

Distribution: India (throughout), South America, Australia, China, Pakistan; cultivated throughout the world.

66. SCROPHULARIACEAE

- 1a. Plants aquatic 3. **Limnophila**
- 1b. Plants terrestrial 2

- 2a. Plants turning black when dry 2. **Mecardonia**
- 2b. Plants not as above 3

- 3a. Calyx tube ribbed or winged 10. **Torenia**
- 3b. Calyx tube smooth 4

- 4a. Calyx lobes free, imbricate, unequal in width.....1. **Bacopa**
- 4b. Calyx lobes usually connate, not imbricate, equal in width..... 5

- 5a. Corolla usually rotate and tube inconspicuous..... 6
- 5b. Corolla not rotate or subrotate and tube conspicuous.....7

- 6a. Leaves alternate; flowers pentamerous.....11. **Verbascum**
- 6b. Leaves opposite or whorled; flowers tetramerous.....12. **Veronica**

- 7a. Corolla-throat palate 4. **Lindenbergia**
- 7b. Corolla-throat not palate 8

- 8a. Filaments appendaged 5. **Lindernia**
- 8b. Filaments not appendaged 9

- 9a. Plants glandular-pubescent; capsules asymmetrical.....7. **Misopates**
- 9b. Plants eglandular; capsules symmetrical.....10

- 10a. Corolla tube inconspicuous; stamens subequal 8. **Scoparia**
- 10b. Corolla tube c. 2 cm long; stamens didynamous 11

- 11a. Flowers in racemes; capsules globose6. **Mazus**
- 11b. Flowers in spikes; capsules obovoid-oblong9. **Striga**

1. **Bacopa** Aublet

Bacopa monnieri (L.) Pennell, Proc. Acad. Nat. Sci. Philadelphia. 98: 94. 1946; P.C. Pant, Fl. Corbett Natl. Park: 112. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 340, f. 346 d–e. 1996; R.D. Gaur, Fl. Distr. Garhwal: 487. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 185. 2007. *Lysimachia monnieri* L., Cent. Pl. II 9. 1756. *Bacopa monniera* (L.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 77. 1891. *Gratiola monnieri* (L.) L., Syst. Nat. (ed. 10) 2: 851. 1759. *Herpestis monniera* Kunth, Nov. Gen. Sp. (HBK). 2(fol.): 366. 1888; Hook.f., Fl. Brit. India 4: 272. 1884.

Neer Brahmi, Pan Brahmi

Herb, annual, succulent; stems creeping, rooting at nodes, succulent, glabrous. Leaves sessile, oblong-ob lanceolate, 8–20 x 3–6 mm, margin entire or rarely dentate, apex rounded. Flower blue, purple, or white, in axillary solitary or 2–3 clusters; bracteole 2, linear, below calyx; calyx lobes 5, lower and upper sepals ovate-lanceolate; lateral 2 sepals lanceolate to linear; corolla obscurely bilipped; stamen didynamous; stigma capitate. Capsule narrowly ovoid, enveloped in persistent calyx, apex acute; seed yellow-brown, ellipsoid, truncate at one end, longitudinally striate.

Flowering & Fruiting: May–October.

Grows in wet places, sandy beaches, up to 1100 m.

Distribution: India (almost throughout the country), China, widespread in tropics and subtropics.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124904 (BSD).

Uses: Crude paste of whole plant applied for rheumatic pains, along with milk said to improve intellect and memory, also used in epilepsy.

Notes: The nomenclature of the species has been discussed by Philcox, Kew Bull. 33: 679–680. 1979. Included on the authority of Samir Sinha (2001).

2. **Mecardonia** Ruiz & Pav.

Mecardonia procumbens (Mill.) Small, Fl. s.e. U.S. 1065, 1338. 1903. *Erinus procumbens* Mill., Gard. Dict. ed. 8, n. 6. 1768. *Bacopa procumbens* (Mill.) Greenm., Publ. Field Columb. Mus., Bot. Ser. 2(6): 261. 1907.

Herb, annual, prostrate, to 20 cm high; stems 4-angled, rooting at nodes. Leaves opposite, to 1.5 x 0.7 cm, elliptic-ovate, acute at apex, attenuate at base, crenate-serrate along margins. Flowers yellow, axillary solitary; bracts foliaceous; calyx lobes linear, inner narrow, segments unequal; corolla obscurely bilipped, lobes obtuse; stamens 4, didynamous. Capsules c. 6 mm long, cylindrical. Seeds reticulate.

Flowering & Fruiting: August–December.

Common in moist sandy places.

Distribution: India (Sub Himalayan regions, Eastern Ghats, Western Ghats), tropical America, elsewhere.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122551, 124842, 125714 (BSD).

Notes : The whole plant turns black on drying.

3. **Limnophila** R. Br.

Limnophila indica (L.) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles. 3: 420. 1914; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 26. 1943; Philcox, Kew Bull. 24: 115. 1970; P.C. Pant, Fl. Corbett Natl. Park: 112. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 346, f. 351a–c. 1996; R.D. Gaur, Fl. Distr. Garhwal: 490. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 186. 2007. *Hottonia indica* L., Sp. Pl. ed. 2, 208. 1762.

Limnophila gratioloides R. Br., Prodr.: 442. 1810, *nom. illeg. superfl.*; Hook.f., Fl. Brit. India 4: 271. 1885. *Ambulia gratioloides* (R. Br.) Baill., Nat. Pflanzenfam. 4(3B): 73. 1891.

Herb, aquatic, perennial, amphibious, to 25 cm high; stems submerged, much branched, glabrous; aerial stems to 15 cm, simple or branched, glabrous, with stalked or sessile glands to nearly smooth. Leaves whorled or opposite, 1.5–2.5 cm long, pinnatisect; segments flattened to capillary; aerial one pinnately lobed, crenate along the margins. Flower white, pale purple or red, in axillary solitary; bracteoles 2, acute at apex, entire or sparsely serrate at margins; calyx lobes ovate to lanceolate, short acuminate at apex, sessile glands; corolla bilipped. Capsule $\pm$ 3 mm, ellipsoid to subglobose, compressed, dark brown.

Flowering & Fruiting: March–November.

Rare in swamps, rice fields and wet places (up to 1800 m).

Distribution: India (almost throughout the country), Africa, SW Asia, Australia, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Nepal, Oceania, Pakistan, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

Uses: Infusion of leaves useful in dyspepsia and dysentery.

4. *Lindenbergia* Lehm.

Lindenbergia polyantha Royle ex Benth., Scroph. Ind. 22. 1835; Hook.f., Fl. Brit. India 4: 262. 1884. *L. indica* (L.) Vatke, Osterr. Bot. 25: 10. 1875; Prijanto, Reinwardtia 7: 550. 1969; P.C. Pant, Fl. Corbett Natl. Park: 112. 1986; R.D. Gaur, Fl. Distr. Garhwal: 491. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 186. 2007. *Dodartia indica* L., Sp. Pl.: 633. 1753. *Lindenbergia urticifolia* Lehm. in Link. & Otto, Icon. Pl. Rar. Berol. 95, t. 48. 1831; Hook.f., *L.c.*

Herb, annual, erect, tufted, to 30 cm high; stems glandular-villous. Leaves subsessile, opposite, 2–5 x 1–2.5 cm, ovate-elliptic or oblong, subacute at apex, crenate-serrate along the margins, glandular-villous. Flower yellow, in axillary solitary or in terminal leafy racemes; calyx campanulate, lobes 5; corolla tube cylindric, bilipped, furnished with red; stamen 4, didynamous, included. Capsule $\pm$ 4 x 2 mm, ovoid, densely pilose; seed many, dark brown, oblong, minute.

Flowering & Fruiting: March–September.

Occasional on walls, on rocks and shady places.

Distribution: India (Himalaya, S. India), Asia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124958, 125612, 122325, 125714 (BSD); Samir Sinha (2001).

Uses: Leaves used in bronchitis, poultice applied on cuts and wounds.

5. *Lindernia* All.

- | | |
|--|------------------------|
| 1a. Sepals united upto middle, not exceeded by capsules..... | 4. <i>L. crustacea</i> |
| 1b. Sepals free, much exceeded by capsules..... | 2 |
| 2a. Stem with coarse spreading long hairs..... | 6. <i>L. viscosa</i> |
| 2b. Stem glabrous or with sparsely spreading hairs..... | 3 |
| 3a. Stamens 4 | 4 |
| 3b. Stamens 2 | 5 |

- 4a. Leaf base amplexicaul3. *L. ciliata*
 4b. Leaf base cuneate or decurrent2. *L. antipoda*
- 5a. Leaves subsessile or petioled1. *L. anagallis*
 5b. Leaves sessile5. *L. nummulariifolia*

1. ***Lindernia anagallis*** (Burm.f.) Pennell, J. Arnold Arbor.: 24. 252. 1943 & Acad. Nat. Sci. Philadelphia Monogr. 5: 31. 1943; Philcox, Kew Bull. 17: 484. 1964; P.C. Pant, Fl. Corbett Natl. Park: 113. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 351, f. 354 a–c. 1996; R.D. Gaur, Fl. Distr. Garhwal: 492. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 186. 2007. *Ruellia anagallis* Burm.f., Fl. Indica 135. 1768. *Vandellia anagallis* (Burm. f.) T. Yamaz, J. Jap. Bot. 30(6): 176. 1955. *V. pedunculata* Benth., Scroph. Ind.: 37. 1835; Hook.f., Fl. Brit. India 4: 282. 1884. *V. angustifolia* Benth., Lc. 38. *Gratiola cordifolia* Colsm., Prodr. Descr. Grat. 15. 1793. *Vandellia cordifolia* (Colsm.) G. Don, Gen. Hist. 4: 549. 1838. *Lindernia cordifolia* (Colsm.) Merr., Enum. Philipp. Fl. Pl. 3: 437. 1923.

Herb, annual, decumbent or creeping, to 18 cm high; stems glabrous or hairy, rooting at nodes. Leaves subsessile or petioled, opposite, to 2 x 1cm, ovate, acute at apex, subcuneate at base, obscurely serrate or entire along the margins. Flower white-purple or pale pink, axillary solitary and terminal racemes; calyx c. 5 mm long, lanceolate; corolla bilipped, to 1cm long; Stamens 4, didynamous. Capsule c. 9 mm across, cylindrical, beaked with persistent style.

Flowering & Fruiting: May–December.

Occasional in moist situations and open grassy fields.

Distribution: India (Almost throughout the country), Australia, Bhutan, Cambodia, China, Japan, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. Manikandan 122356 (BSD); Samir Sinha (2001).

2. ***Lindernia antipoda*** (L.) Alston, Trimen, Handb. Fl. Ceylon 6 (Suppl.): 214. 1931; Philcox, Kew Bull. 22: 57. 1968; P.C. Pant, Fl. Corbett Natl. Park: 113. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 352, f. 354 d–e. 1996; R.D. Gaur, Fl. Distr. Garhwal: 492. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 186. 2007. *Ruellia antipoda* L., Sp. Pl.: 635. 1753. *Bonnaya antipoda* (L.) Druce, Rep. Bot. Exch. Club 3: 415. 1914. *Gratiola veronicifolia* Retz., Observ. Bot. 4: 8. 1786. *Lindernia veronicifolia* (Retz.) F. Muell., Fragm. Pl. Filip. 6: 101. 1867. *G. grandiflora* Retz., Observ. Bot. 4: 8. 1786. *Bonnaya veronicifolia* (Retz.) Spreng., Syst. Veg. 1: 41. 1825; Hook.f., Fl. Brit. India 4: 285. 1884. *Ihsanthes veronicifolia* (Retz.) Urban, Berl. Deutsch. Bot. Ges. 2: 436. 1884. *Bonnaya veronicifolia* var. *grandiflora* (Retz.) Hook.f., Lc. *Vandellia veronicifolia* (Retz.) Haines, Bot. Bihar Orissa, Pt.4: 633. 1922 [2: 664. 1961(Repr.) as *V. veronaecifolia*].

Herb, annual, ascending to 30 cm high; stems slender, suberect, simple or many branched, channelled, quadrangular, glabrous, with rooting at nodes. Leaves shortly petioled, 1–3 x 0.4–1cm, oblanceolate or elliptic-lanceolate, acute-subacuminate at apex, cuneate, decurrent at base, serrate or dentate along the margins, glabrous. Flower purple with dark streaks, 2–20-flowered, in terminal racemes; bracts subulate; calyx lobes 5, linear-lanceolate, hispidulous on midrib; corolla lobes 5, bilipped, subequal, lower 3-lobes, suborbicular; stamens 2, staminode 2; filament unapendaged. Capsule c. 2 cm long, cylindric, as long as persistent calyx; seed brown, irregularly triangular-ovoid.

Flowering & Fruiting: August–December.

Occasional in marshy places and found associated with *Dopatrium junceum*, *Lindernia* spp., etc.

Distribution: India (almost throughout the country), Australia, Bhutan, Cambodia, China, Japan, Laos, Malaysia, Myanmar, Nepal, Pacific Islands, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: On way to Vatanvasa, R Manikandan 125558 (BSD).

3. ***Lindernia ciliata*** (Colsm.) Pennell, Brittonia 2: 182. 1936; Philcox, Kew Bull. 22: 51, f. 10 (12–15). 1968; P.C. Pant, Fl. Corbett Natl. Park: 114. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 352, f. 354 f–g. 1996; R.D. Gaur, Fl. Distr. Garhwal: 492. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 186. 2007. *Gratiola ciliata* Colsm., Prodr. Descr. Gratiol.: 14. 1793. *Bonnaya brachiata* Link & Otta, Icon. Pl. Select. 2: 25, t. 11. 1820; Hook.f., Fl. Brit. India 4: 284. 1884. *Ilysanthes serrata* (Roxb.) Urban, Berl. Deutsch. Bot. Ges. 2: 436. 1884.

Herb, annual, erect or diffuse, to 10 cm high; stems decumbent, diffusely much branched, sometimes rooting from last node. Leaves sessile or subsessile, oblong to lanceolate-oblong, 0.5–4 x 0.2–1 cm, obtuse or subacute at apex, base amplexicaul, spinous-serrate along margins, glabrous. Flower bluish-pink, lax, in terminal racemes; bracts lanceolate, as long as pedicels; calyx deeply 5-partite, lobes lanceolate, with a spinelike tip corolla bilipped, subequal, middle lobe larger than other lobes; stamen 2, staminode 2, as long as style. Capsule c. 6 mm long, narrowly oblong, acute; seed irregularly triangular, truncate at both ends.

Flowering & Fruiting: August–December.

Occasional in wet sandy areas, damp and grassy places.

Distribution: India (almost throughout the country), N. Australia, Cambodia, China, Japan, Laos, Malaysia, Myanmar, Philippines, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125588, 122457 (BSD); Samir Sinha (2001).

4. ***Lindernia crustacea*** (L.) F. Muell., Syst. Census Austral. Pl. 1: 97. 1882; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 29. 1943; Philcox, Kew Bull. 22: 47, f. 1(9–12). 1968; P.C. Pant, Fl. Corbett Natl. Park: 114. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 353, f. 355 a–d. 1996; R.D. Gaur, Fl. Distr. Garhwal: 493. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 186. 2007. *Capraria crustacea* L., Mant. Pl. 1: 87. 1767. *Vandellia crustacea* (L.) Benth., Scroph. Ind.: 35. 1835; Hook.f., Fl. Brit. India 4: 279. 1884. [Plate-14a]

Herb, annual, suberect to 8 cm high; stems much branched, suberect or diffuse, widely spreading, subquadrangular, deeply sulcate, glabrous. Leaves sessile, to 2 x 1 cm, triangular-ovate to broadly ovate, subacute at apex, rounded to cuneate at base, shallowly crenate-serrate or subentire along margins, subglabrous. Flower pinkish-purple, in axillary solitary or terminal racemes; calyx lobes triangular-ovate, outside sparsely pubescent; corolla tube slightly longer than calyx, lower lip trilobed. Capsule c. 5 mm long, ellipsoid-oblong, obtuse, with persistent calyx; seed ellipsoid, pale yellow-brown.

Flowering & Fruiting: August–December.

Occasional in wet places.

Distribution: India (almost throughout the country), widely distributed in tropics and subtropical countries.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125589 (BSD); Sona River Bank, H.C. Pande 220813 (LWG); Samir Sinha (2001).

5. ***Lindernia nummulariifolia*** (D. Don) Wettst. Nat. Pflanzenfam. 4(3b): 79. 1891(1891); Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 30. 1943; P.C. Pant, Fl. Corbett Natl. Park: 114. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 356, f. 359 a–c. 1996; R.D. Gaur, Fl. Distr. Garhwal: 493. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 187. 2007. *Vandellia nummulariifolia* D. Don, Prodr. Fl. Nepal. 86. 1825; Hook.f., Fl. Brit. India 4: 292. 1884. *Pyxidaria nummulariifolia* (D. Don) Kuntze, Revis. Gen. Pl. 2: 464. 1891. *Bryodes perrieri* Bonati in Bull. Soc. Bot. Genève 15: 104. 1924. *Lindernia sessiliflora* (Benth.) Wettst. Nat. Pflanzenfam. 4(3b): 79. 1891; P.C. Pant, *l.c.*; R.D. Gaur, *l.c.*; Uniyal & al., *l.c.* *Vandellia sessiliflora* Benth., Scroph. Ind. 37. 1835. *V. chinensis* T. Yamaz., J. Jap. Bot. 30(6): 178–179, f. s.n. 1955. *V. corymbosa* Baker in J. Bot. 20: 221. 1882.

Herb, annual, to 15 cm high; stems slender, erect or decumbent-ascending, simple or much branched, subquadrangular, sparsely spreading hairy on angles, often creeping, with rooting at nodes. Leaves sessile, opposite, broadly ovate to suborbicular, to 0.8–2 x 0.8–2 cm, broadly cuneate to cordate at base, shallowly crenate to undulate or toothed along the margins, sparsely hairy only on midribs. Flower violet, rarely blue or white, in axillary solitary or terminal few-flowered, subumbellate or clusters; calyx lobes ovate to lanceolate-ovate; corolla bilipped, upper lip brown, lower lip purplish at centre, spreading, flat, trilobed. Capsule c 9 mm long, ovoid-oblong, cylindric, beaked, much exserted, with persistent calyx. Seed brown.

Flowering & Fruiting: August–October.

Occasional in moist shady places, along roadsides and on gravelly hill top.

Distribution: India (Jammu & Kashmir, Sikkim, Uttarakhand), China, Myanmar, Nepal, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

6. ***Lindernia viscosa*** (Horn.) Bold., Zakfl. Java.: 165. 1916; P.C. Pant, Fl. Corbett Natl. Park: 115. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 360, f. 362 d–g. 1996; R.D. Gaur, Fl. Distr. Garhwal: 494. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 187. 2007. *Gratiola viscosa* Hornem., Enum. Pl. Hort. Hafn. 19. 1807. *Hornemannia viscosa* (Hornem.) Willd., Enum. Hort. Berol. Alt. 2: 653. 1809. *Lindernia cruciformis* Hayata, Icon. Pl. Formosan 9: 78. 1920. *Vandellia viscosa* (Hornem.) Merr., Philipp. J. Sci. 7: 246. 1912. *V. hirsuta* Buch.-Ham. ex Benth., Scoph. Ind. 36. 1835; Hook.f., Fl. Brit. India 4: 280. 1883.

Herb, annual, erect or sparsely diffuse, striate, to 12 cm high; stems with coarse spreading long hairs, without long stolons. Leaves short petiolate below, sessile above, ovate-oblong, 1.5–5 x 1–4.5 cm, sparsely coarsely hairy, base decurrent, margin undulate and toothed, apex obtuse to rounded, base semi-amplexicaul and sometimes broadly cordate. Flower white or yellowish, lax, 6–10-flowered, in axillary and terminal racemes; bracts small, lanceolate; calyx lobed narrowly lanceolate, outside coarsely hairy; corolla lobes bilipped, subequal; stamens 4, all fertile; stigma 2-lamellate, lobes unequal. Capsule globose, almost as long as persistent calyx. Seed ellipsoid-oblong, numerous, yellowish.

Flowering & Fruiting: May–November.

Grows on rocky slopes and shady localities under the Sal forests, between 900–1300 m.

Distribution: India (almost throughout the country), Cambodia, Indonesia, Laos, Myanmar, New Guinea, Philippines, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

6. *Mazus* Lour.

Mazus pumilus (Burm.f.) Steenis, Nova Guinea, n.s., 9(1): 31. 1958; P.C. Pant, Fl. Corbett Natl. Park: 115. 1986; R.D. Gaur, Fl. Distr. Garhwal: 494. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 187. 2007; Pusalkar & D.K. Singh, Fl. Gangotri Natl. Park: 487. 2012. *Lobelia pumila* Burm.f., Fl. Indica 186, pl. 60, f. 3. 1768. *Lindernia japonica* Thunb., Syst. Veg. (ed. 14) 567. 1784. *Mazus japonicus* (Thunb.) Kuntze, Revis. Gen. Pl. 2: 462. 1891. *M. rugosus* Lour., Fl. Cochinch. 2: 385. 1790; Hook.f., Fl. Brit. India 4: 259. 1884.

Mastyar

Herb, annual, erect or ascending, to 20 cm high; stems simple or branched, glabrous or sparsely hairy, with rooting at nodes. Leaves sessile, opposite, radical ones crowded, oblong or obovate-spathulate, obtuse to acute at apex, cuneate to decurrent at base, irregularly toothed or pinnately parted rarely subentire along the margins, membranous; cauline leaves often alternate. Flower white-blue, 3–20-flowered, lax, in terminal racemes; calyx campanulate, lobes ovate, almost as long as tube, apex acute; corolla lower lip middle lobe smaller than lateral lobes, slightly exserted, obovate. Capsule globose, with persistent, large calyx.

- 1a. Stems glabrouscent or sparsely hairy; calyx lobes ovate6.2. *M. pumilus* var. *pumilus*
 1b. Stems densely hirsutulose; calyx lobes triangular6.1. *M. pumilus* var. *delavayi*

6.1. ***Mazus pumilus* var. *delavayi*** (Bonati) T.L. Chin ex D.Y. Hong, Novon 6(4): 374. 1996. *M. delavayi* Bonati, Bull. Herb. Boiss. Ser. 2, 8: 530. 1908; Pennell in Acad. Nat. Sci. Philadelphia Monogr. 5: 34. 1943; P.C. Pant, Fl. Corbett Natl. Park: 115. 1986; R.D. Gaur, Fl. Distr. Garhwal: 494. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 187. 2007. *M. divaricatus* Bonati, l.c. 534. *M. japonicus* var. *delavayi* (Bonati) Tsoong, Fl. Reipubl. Popularis Sin. 67(2): 189, pl. 25, f. 3. 1979.

Herb, erect, annual, rosulate, to 10 cm high; stems short, stout, densely hirsutulose. Leaves sessile, opposite, to 1.3–3.5 x 0.5–2 cm, oblanceolate to narrowly obovate, obtuse at apex, cuneate at base, irregularly dentate along the margins, densely hirsutulose, veins not prominent. Flower white, many-flowered, in terminal racemes; calyx lobes 5, lobes half as long as calyx, triangular, longer than pedicels.

Flowering & Fruiting: November–April.

Grows on borders of rice fields, other plants, along ditches and moist shady rocky places.

Distribution: India (Jammu & Kashmir, Himachal Pradesh, N.W. India, Sikkim, Uttarakhand), Bhutan, China, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

6.2. *Mazus pumilus* var. *pumilus*

Flowering & Fruiting: April–October.

Occasional in waste places, moist open places, cultivated fields and along borders of ponds.

Distribution: India (Jammu & Kashmir, Sikkim, Uttarakhand), Bhutan, China, Indonesia, Japan, Korea, New Guinea, Philippines, Russia, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. Pande 220821; On way to Halduparao, R Manikandan 122577, 1224714, 122345, 122447 (BSD); Samir Sinha (2001).

Uses: Leaf poultice applied on burns; infusion of plant with zinger extract given in coli.

7. *Misopates* Raf.

Misopates orontium (L.) Raf., Autik. Bot.: 158. 1840; P.C. Pant, Fl. Corbett Natl. Park: 115. 1986; R.D. Gaur, Fl. Distr. Garhwal: 495. 1999. *Antirrhinum orontium* L., Sp. Pl.: 617. 1753; Hook.f., Fl. Brit. India 4: 253. 1884; Pennell in Acad. Nat. Sci. Philadelphia Monogr. 5: 61. 1943; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 185. 2007. *Kuttmuhi*

Herb, annual, erect, to 60 cm high; stems slender, angled, with decumbent branches from below, glandular upwards. Leaves subsessile or sessile, 2.5–7 x 0.1–0.4 cm, linear, acute to acuminate at apex, cuneate at base, entire often recurved along the margins, glandular hairy. Flower white, pale pink or bluish, in axillary solitary. Capsule ϵ 1 x 0.5 cm, obliquely ovoid, characteristic.

Flowering & Fruiting: May–December.

Common on exposed rocks, as weed in the spring grain fields and waste places.

Distribution: India (Himalayan regions), Africa, Europe, Madagascar, New World.

Specimens examined: Mundiapani, H.C. Pande 220809 (LWG).

Uses: Plant believed to be poisonous.

8. *Scoparia* L.

Scoparia dulcis L., Sp. Pl.: 116. 1753; Hook.f., Fl. Brit. India 4: 289. 1884; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 22. 1943; P.C. Pant, Fl. Corbett Natl. Park: 115. 1986; R.D. Gaur, Fl. Distr. Garhwal: 497. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 189. 2007.

Herb, erect, annual or biannual, to 65 cm high; stems branched, angled, semiwoody at base, glabrous. Leaves opposite or whorled, 0.5–3.5 x 0.2–0.8 cm, elliptic-obovate or rhomboid, acute at apex, cuneate at base, serrate along the margins, gland punctulate. Flower white, in axillary solitary or 2–3 in fascicles; calyx deeply 4-lobed, oblong, ciliate; corolla hairy at throat, rotate, lobes 4, oblong-spathulate; stamens 4, didynamous. Capsule ϵ 3.5 mm across, subglobose, septical, brownish.

Flowering & Fruiting: Throughout the year.

Common in cultivated fields, along road sides and waste places.

Distribution: India (Throughout the country), throughout tropics and subtropics of the world.

Specimens examined: Sonanadi WLS, R. Manikandan 125717 (BSD).

Notes: It is a native of tropical America and naturalized elsewhere.

9. *Striga* Lour.

Striga angustifolia (D. Don) C.J. Saldanha, Bull. Bot. Surv. India 5: 70. 1963; P.C. Pant, Fl. Corbett Natl. Park: 116. 1986; R.D. Gaur, Fl. Distr. Garhwal: 498. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 189. 2007. *Buchnera angustifolia* D. Don, Prodr. Fl. Nepal.: 91. 1825. *Striga euphrasioides* (Vahl) Benth., Companion Bot. Mag. 1: 364. 1835, *nom. utique rejic.*; Hook.f., Fl. Brit. India 4: 299. 1884; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 96. 1943. *Buchnera euphrasioides* Vahl, Symb. Bot. 3: 81. 1794.

Herb, annual, erect, to 45 cm high; stems subquadrangular, simple, rarely apically branched, hispidulous. Leaves sessile, 1.5–3.5 x 0.1–0.2 cm, linear, lower ones smaller, scabrous hairy. Flower white, bracteolate, in 3–many-flowered spikes; bracts similar to leaves in shape and size, linear; calyx lobes almost as

long as tube, subulate, 15-ribbed, hispidulous along rib; corolla tube apically curved forward. Capsules 4.5 x 3 mm, obovoid-oblong; seeds minute, brown.

Flowering & Fruiting: September–December.

Occasional in among grasses in cultivated fields.

Distribution: India (almost throughout the country), Bhutan, China, Myanmar, Nepal, Sri Lanka, Vietnam.

Specimens examined: Mundiapani, *H.C. Pande* 220809 (LWG).

10. *Torenia* L.

Torenia cordifolia Roxb., Pl. Coromandel 2: 52, pl. 161. 1798; Hook.f., Fl. Brit. India 4: 276. 1884; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 32. 1943; P.C. Pant, Fl. Corbett Natl. Park: 116. 1986; R.D. Gaur, Fl. Distr. Garhwal: 498. 1999. *T. indica* Saldahna, Bull. Bot. Surv. India 8: 126, f. 1. 1967; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 189. 2007. [Plate-14b]

Herb, erect, annual, to 20 cm high; stems branched from base, decussate, ascending, sparsely diffuse, sparsely white villous. Leaves petioled, 2–3.5 x 1–2.5 cm, ovate to cordate, cuneate and decurrent at base, coarsely triangular-serrate along the margins, sparsely villous. Flowers blue-purple, 3–5-flowered, in axillary fascicles; bracts linear; calyx ovate-oblong, truncate at base, 5-winged, wings subundulate; corolla lobes subequal, upper lip wider than long, emarginated at apex. Capsules oblong.

Flowering & Fruiting: August–November.

Common in moist grassy places and along the roadsides.

Distribution: India (Jammu & Kashmir, Sikkim, Uttarakhand, West Bengal), Bhutan, Cambodia, China, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124945, 122347 (BSD); Samir Sinha (2001).

11. *Verbascum* L.

- 1a. Stems sparsely glandular pilose; stamens 4 1. *V. chinense*
 1b. Stems with densely greyish-yellow stellate hairs; stamens 5 2. *V. thapsus*

1. ***Verbascum chinense*** (L.) Santapau, Fl. Purandhar: 90. 1958; P.C. Pant, Fl. Corbett Natl. Park: 116. 1986; R.D. Gaur, Fl. Distr. Garhwal: 499. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 189. 2007. *Scrophularia chinensis* L., Mant. Pl. 2 : 250. 1771. *Celsia coromandeliana* Vahl, Symb. Bot. 3: 79. 1794. *Verbascum coromandelianum* (Vahl) Kuntze, Revis. Gen. Pl. 2 : 468. 1891; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 39. 1943. *Gaderi-Tamakhu*

Herb, annual or biennial, to 90 cm high; stems branched apically, sparsely glandular pilose. Leaves radical petiolate, pandurate, lobes 3–5, terminal lobe ovate, elliptic-oblong, serrate-serrulate or lobed along the margins; cauline leaves sessile or subsessile, pandurate, ovate-elliptic or ovate-triangular, 2.5–6.5 x 1–3.5 cm, acute at apex. Flowers yellow, in solitary at each node or simple or branched racemes; bracts glandular pilose; calyx lobes elliptic-oblong; stamens 4, didynamous. Capsules ovoid, longer than persistent calyx, glandular.

Flowering & Fruiting: April–July.

Grows near Sandy areas along rivers, up to 1300 m.

Distribution: India (Jammu & Kashmir, Uttarakhand), Afghanistan, Cambodia, China, Laos, Pakistan, Sri Lanka, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122554, 124902 (BSD); Samir Sinha (2001).

Uses: Leaf juice applied on cuts to check bleeding, believed to be poisonous to livestock.

2. **Verbascum thapsus** L., Sp. Pl.: 177. 1753; Hook.f., Fl. Brit. India 4: 250. 1884; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 40. 1943; R.D. Gaur, Fl. Distr. Garhwal: 499. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 189. 2007; Pusalkar & D.K. Singh, Fl. Gangotri Natl. Park: 505. 2012.

Akulbir, Bantambacco, Geedartamaku, Kakri tamakhu, Soottamakoo

[Plate-14c]

Herb or undershrubs, biennial, to 1.5 m high; stems with densely greyish-yellow stellate hairs. Leaves petiolate, radical, to 5–15 x 2–6 cm, oblanceolate-oblong, crenate along the margins; cauline leaves sessile, gradually decreasing in size upward, oblong to ovate-oblong, base decurrent into wings. Flowers yellow, dense, in cylindric, spicate-panicles or usually few fascicled; calyx lobes lanceolate; stamens 5. Capsule ovoid, as long as persistent calyx.

Flowering & Fruiting: March–November.

Common on dry rocky places, open slopes, along the edges of water channels, moist fields and in wastelands.

Distribution: India (Jammu & Kashmir, Uttarakhand), Asia, Europe, naturalized throughout the Northern Hemisphere.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124972 (BSD).

Uses: Plant extract taken in bronchitis, asthma and also used in fish-poisoning; seeds used as narcotic and rarely flower used as dye.

12. **Veronica** L.

Veronica anagallis-aquatica L., Sp. Pl.: 12. 1753; Pennell, Acad. Nat. Sci. Philadelphia Monogr. 5: 89. 1943; P.C. Pant, Fl. Corbett Natl. Park: 116. 1986; R.D. Gaur, Fl. Distr. Garhwal: 500. 1999; C.D.K. Cook, Aquat. Wetl. Pl. India: 362, f. 366 a–d. 1996; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 189. 2007. *V. Anagallis-aquatica* var. *brittonii* (Porter ex Pennell) Pennell, Rhodora 23(266): 36. 1921. *V. Brittonii* Porter ex Pennell, Torrey 19(9): 168–170. 1919. *V. catenata* Pennell, Rhodora 23(266): 37. 1921. *V. anagallis* var. *latifolia* Britton, Bull. Torrey Bot. Club 12: 49. 1895. *Sada, Sadevi*

Herb, erect or procumbent, to 85 cm high; stems simple or branched, succulent, with inclined rhizomes. Leaves sessile, elliptic-ovate or ovate-oblong, 2–9.5 x 1–3.5 cm, upward amplexicaul, entire or sparsely serrate along the margins. Flower pale blue, pale purple, or white, many-flowered, in axillary racemes, longer than leaves; calyx 4-lobed, lobes ovate-lanceolate, equal, acute at apex; corolla rotate, tube short, lobes broadly ovate, slightly unequal. Capsule subglobose, slightly compressed, as long as calyx, rounded, slightly notched at tip; seeds numerous, slightly flattened.

Flowering & Fruiting: February–July.

Occasional in marshy areas, ditches, cultivated places and along ponds.

Distribution: India (Jammu & Kashmir, Uttarakhand), China, Europe, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, North America, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125766, 122478 (BSD); Vatanvasa- Halduparao, H.C. *Pande* 220797; Samir Sinha (2001).

Uses: Plant juice applied on cuts, burns and sores.

67. OROBANCHACEAE

Aeginetia L.

Aeginetia indica L., Sp. Pl. 2: 632. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 320. 1884; P.C. Pant, Fl. Corbett Natl. Park 116. 1986; R. D. Gaur, Fl. Distr. Garhwal: 502. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 190. 2007. *Orobanche aeginetia* L., Sp. Pl.: 883. 1763.

Herb, leafless, saprophytic, tinged, to 20 cm high; stems branched from near the base, glabrous. Scales ovate-lanceolate, 10–15 x 4–5 mm. Flowers dark pink or purplish, in solitary on the top of each nasal scape; bracts absent; calyx spathaceous, apex acuminate; corolla tubular-campanulate, incurved, lobes subequal, reniform; stamens included; anthers glabrous; style short; stigma reddish-brown, peltate. Capsules ovoid, c. 2.5 cm long, enclosed in calyx.

- 1a. Flowers dark pink or purplish 1.2. *A. indica* var. *indica*
 1b. Flowers white 1.1. *A. indica* var. *alba*

1.1. ***Aeginetia indica*** L. var. ***alba*** Santapau, Kew Bull. 1948: 491. 1949; B.A. Razi, Lloydia 20: 238–254. 1957; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 190. 2007. [Plate-14d]

Herb, leafless, saprophytic, tinged, to 20 cm high; stems branched from near the base, glabrous. Flowers white, in solitary on the top of each nasal scape; bracts absent; calyx spathaceous; corolla tubular-campanulate, incurved, lobes subequal, reniform; stamens included. Capsules enclosed in calyx.

Flowering & Fruiting: August–October.

Rare on moist shade places, up to 1000 m.

Distribution: India (Maharashtra, Uttarakhand). Endemic.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124947 (BSD).

1.2. ***Aeginetia indica*** var. ***indica*** L.

Aankuri bankuri [Plate-14e]

Flowering & Fruiting: August–October.

Common, exposed hills on moist slopes and growing in the shade & humus of damp leaves of Pinus; up to 3100 m.

Distribution: India (Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttarakhand), Bangladesh, Bhutan, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125539, 122458 (BSD).

68. LENTIBULARIACEAE**Utricularia L.**

Utricularia striatula Sm. in Rees, Cyclop. 37: n. 17. 1819; M.K. Janarth. & A.N. Henry, Bladderw. India: 106. 1992; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 191. 2007. *U. orbiculata* Wall. ex. A. DC. in DC. Prodr. 8: 18. 1844; C.B. Clarke in Hook.f., Fl. Brit. India 4: 334. 1884. [Plate-14f]

Herb, terrestrial, insectivorous, to 10 cm high; stolons filiform, creeping, bearing bladders, with rhizoids capillary. Foliar organs orbicular or reniform; traps globose or ovoid. Flowers violet, pink, with a yellow spot at the base, in racemes erect, scapose, many-flowered, with or without scales; bracts oblong, medifixed; bracteoles 2, shorter than bracts, oblong-lanceolate; calyx-lobes unequal, upper lobes orbicular, emarginate, obtuse, lower oblong, rounded, reflexed; corolla upper lip suborbicular, small, emarginate, truncate; lower lip 5-toothed, rounded; spursubulate, deflexed, retuse; stamens small; filaments curved; anther thecae subdistinct; style short; stigma semicircular. Capsule globose; seeds ovoid, glochidiate, minute.

Flowering & Fruiting: August–February.

Rare on moist shady spots as on walls in between in mosses, mossy rocks.

Distribution: India (Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand), tropical Africa, Bhutan, China, India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122434 (BSD).

69. GESNERIACEAE

- 1a. Leaves opposite or subopposite; flowers in cymes 2
 1b. Leaves alternate; flowers in second racemes 3. **Rhynchoglossum**

- 2a. Leaf base oblique, cuneate to cordate; stigma flabellate, bilobed 1. **Chirita**
 2b. Leaf base regular, rounded or attenuate; stigma emarginated 2. **Didymocarpus**

1. Chirita Buch.-Ham.

Chirita pumila D. Don, Prodr. Fl. Nepal.: 90. 1825. *Bonnaya pumila* (D. Don) Spreng., Syst. Veg. 4(2): 15. 1827. *Chirita flava* R. Br., Pl. Jav. Rar.: 117. 1838. *C. sphagnicola* H. Lév. & Vaniot, Bull. Soc. Bot. France 53: 550. 1906. *Didymocarpus anthonyanus* Hand.-Mazz., Symb. Sin. 7(4): 881. 1936. *Henckelia pumila* (D. Don) A. Dietr., Sp. Pl. (ed. 6) 1: 574. 1831. *Roettlera pumila* (D. Don) Kuntze, Revis. Gen. Pl. 2: 476. 1891.

Herb, annual, erect, to 40 cm high; stems pubescent to sparsely pilose. Leaves petioled, 4–8, opposite, lanceolate to ovate-elliptic, 2–15 x 1.2–5 cm, herbaceous, puberulent to pilose, eglandular, abaxially purple spotted, base oblique, cuneate to cordate, margin denticulate to serrulate, apex acute to acuminate, veins conspicuous. Flowers white to purple with yellow or purple markings, in 2–7-flowered cymes; bracts 2, free, ovate to lanceolate or obovate, pubescent, margin entire to shallowly denticulate, apex acute; calyx 5-lobed, slightly unequal, narrowly triangular to ovate, horn-like, spreading; corolla outside puberulent to pilose, tube narrowly funnel-form; staminodes 2; stigma flabellate, bilobed. Capsules erect, to 12 cm long, cylindrical.

Flowering & Fruiting: July–October.

Forests, streamsides, rocks, cliffs, or among grassy clumps; 800–2800 m.

Distribution: India (Himalayas, N & N.E India, Sikkim), Bhutan, China, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Adnala area, *R. Manikandan* 122476, 122509 (BSD); Samir Sinha (2001).

2. *Didymocarpus* Wall.

Didymocarpus aromaticus D. Don, Prodr. Fl. Nepal.: 123. 1825; C.B. Clarke in Hook.f., Fl. Brit. India 4: 347. 1884 (as *aromatica*); Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 192. 2007. *D. aromaticus* Wall., Numer. List: no. 785. 1829 & Pl. Asiat. Rar. 2: t. 141, f. 4–7. 1831. *D. subalternans* Wall., Numer. List: no. 782. 1829, *nom. nud.* *D. subalternans* Wall. ex R. Br., Cyrtandreae: 118. 1839. *D. subalternans* Wall. ex DC., Prodr. 9: 266. 1845; C.B. Clarke in Hook.f., *l.c.*

Herb, erect, pubescent, to 30 cm high. Leaves petiolate, upper pair sessile, opposite or subopposite, ovate or elliptic, sometimes rhomboid, 2.5–8 x 1.3–5 cm, apex obtuse, base rounded or attenuate, margins irregularly crenate or serrate-dentate, pubescent on both surfaces. Flowers violet or deep purple, 3–11, in terminal biparous cymes; bracts ovate-oblong, pubescent; calyx campanulate, 5-lobed, glabrous, lobes ovate-triangular, obtuse; corolla tubular, salver-shaped, to 2 cm long, lobes suborbicular; stamens 2, included; staminodes 2; stigma emarginate. Capsules linear, curved, to 3 cm long, longitudinally dehiscent, glabrous. Seeds many, oblong-ovoid, glabrous, brown.

Flowering & Fruiting: August–September

Common in shady rocky slopes and boulders in temperate forests; from 1500 to 2000 m.

Distribution: India (Sikkim, Uttarakhand, West Bengal), Bhutan, China, Nepal.

Specimens examined: Rathuadhab-Vatanvasa, *R. Manikandan* 125575, 125517 (BSD).

3. *Rhynchoglossum* Blume

Rhynchoglossum obliquum Blume, Bijdr.: 741. 1826; C.B. Clarke in Hook.f., Fl. Brit. India 4: 361. 1884 (as *serrata*); P.C. Pant, Fl. Corbett Natl. Park: 103. 1986; R.D. Gaur, Fl. Distr. Garhwal: 505. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 192. 2007.

Herb, erect, glabrous, to 45 cm high; stems simple or branched, terete. Leaves petioled, alternate, elliptic-oblong, 5–12 x 2.5–5.5 cm, base oblique, apex acuminate, margins entire, membranous, glabrous, punctate beneath. Flowers blue or violet, many, in racemes; bracts absent; calyx tube to 5 mm long, tinged blue, lobes triangular, acute, ciliate; corolla tubular, funnel-shaped, to 1.3 cm long, bilipped, lobes unequal, suborbicular; stamens 2+2; style linear; stigma obscurely bilobed. Capsules ellipsoid, membranous, to 1 cm long, included in the calyx.

Flowering & Fruiting: July–October.

Common, on moist, shady hill slopes, in rock crevices and stone walls; from 900 to 2500 m.

Distribution: India (Himachal Pradesh, Sikkim, Uttarakhand), Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: On way to Rathuadhab, *R. Manikandan* 125515, 122301 (BSD); Samir Sinha (2001).

70. BIGNONIACEAE

- 1a. Shrubs or small trees; flowers yellow 3. **Tecoma**
 1b. Medium sized trees; flowers other than yellow 2
 2a. Leaves ternately bipinnate, oblique or attenuate at base, stamens 5 1. **Oroxylum**
 2b. Leaves pinnate, acute at base, stamens 4 2. **Stereospermum**

1. **Oroxylum** Vent.

Oroxylum indicum (L.) Kurz, Forest Fl. Burma 2: 237. 1877; C.B. Clarke in Hook.f., Fl. Brit. India. 4: 378. 1884; R.D. Gaur, Fl. Garhwal 521. 1999; Uniyal & al., Fl. Pl. Uttarakhand: 135. 2007. *Bignonia indica* L., Sp. Pl. 2: 625. 1753. *Shyonaka* [Plate-14g]

Tree, deciduous, to 15 m high. Leaves long petioled, tufted, ternately bipinnate; primary pinnae 5 pairs; leaflets broadly ovate or nearly rotundate, 7–10 x 3–8 cm, entire, oblique or attenuate at base, acuminate at apex, papery. Flowers reddish-purple to dull-violet outside, dull-yellowish to pinkish inside, in terminal raceme; calyx 5, campanulate or truncate, inner surface purple, glabrous; corolla lobes 5, bilipped, lobes crisped or undulate-crenate, inside with dense papillose hairs; stamens 5, sub-exserted; filaments inserted in throat, hairy at base; style dark violet as the subentire large disk. Capsules to 100 x 9 cm, pendulous, woody flattened, parallel to septum, turning black; seeds broadly ellipsoid with broad hyaline wing around.

Flowering & Fruiting: August–March.

Found in mixed deciduous forests up to altitude of 1700 m.

Distribution: India (Andaman, Assam, Bihar, Kerala, Himachal Pradesh, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan, Sikkim, West Bengal), Borneo, Java, Malacca, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Sumatra.

Specimens examined: Morghatty & its surroundings, R. Manikandan 124925 (BSD).

2. **Stereospermum** Cham.

Stereospermum colais (Buch.-Ham. ex Dillwyn) Mabb., Taxon 27: 553. 1978. *Bignonia colais* Buch.-Ham. ex Dillwyn Rev. Hort. Malab. 6 (26): 28. 1839. *Stereospermum suaveolens* (Roxb.) A. DC., Prodr. 9: 211. 1845; C.B. Clarke in Hook.f. Fl. Brit. India. 4: 382. 1884. *Bignonia suaveolens* Roxb., Fl. Ind. 3: 104. 1832. *Stereospermum chelonoides* Biblioth. Universelle Genève 17: 124. 1838; P.C. Pant, Fl. Corbett Natl. Park: 117. 1986; Uniyal & al., Fl. Pl. Uttarakhand: 135. 2007. *Padal* [Plate-14h]

Medium sized deciduous trees, to 25 m high. Leaves petioled, opposite, pinnate 30–60 cm long, leaflets 7–9, oblong to elliptic-lanceolate, to 15 x 7 cm, entire, sub-coriaceous, base acute, margin slightly serrulate or entire, apex acuminate. Flowers dull crimson, fragrant, downy and viscid, in terminal panicles; calyx campanulate, yellowish-purple, bilabiate, slightly curved with oblique truncate mouth; corolla bell-shaped, purplish, pubescent or villous, limb oblique, lobes 5; stamens 4, filaments in pairs, curved; style yellowish; stigma ovate-oblong. Capsules terete, dark grey, 30–70 x 1–1.5 cm, elongate, cylindrical or somewhat angled, rough with elevated pale or white specks, valves thick, hard; seeds compressed, trigonous, grooved, corky.

Flowering: March–May and Fruiting: April–July

Grows primarily in tropical deciduous forests and an important accessory species particularly in sal forests.

Distribution: India (Arunachal Pradesh, Bihar, Meghalaya, Punjab, Sikkim, Tamil Nadu, West Bengal), Indo-China, Java, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand.

Specimens examined: Way to Kanekal, R. *Manikandan* 124890 (BSD).

3. *Tecoma* Juss.

Tecoma stans* (L.) Juss. ex Kunth, Nov. Gen. Sp. Pl. 3: 144. 1818; R.D. Gaur, Fl. Garhwal: 522. 1999; Uniyal & al., Fl. Pl. Uttarakhand: 135. 2007. *Bignonia stans* L. Sp. Pl. 2: 871. 1763. *Yellow bells

Shrubs or small tree, to 10 m high. Leaves petioled, opposite, simple or imparipinnately compound; leaflets 3–5-foliate, 5–8 x 1.5–2.5 cm, acuminate at base and apex, serrate at margins. Flowers yellow, in axillary or terminal compound racemes; calyx 5, elongate-cupular, 5 dentate, puberulus; corolla tubular, 5 lobed; stamens 4, attached, 2 unequal pairs, included staminodes; style cylindrical, filiform, glabrous; stigma flat, elliptic, bilobed, indentate. Capsules linear, to 18 x 1.2 cm, tapering at the end; seeds flat, oblong membranous transparent wing on each end.

Flowering & Fruiting: September–May.

Planted in gardens and temples, also along road sides as an avenue shrub. It is almost naturalized in India.

Distribution: India (Andhra Pradesh, Bihar, Delhi, Madhya Pradesh, Maharashtra, Nicobar, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal). Widely planted in tropics.

Specimens examined: Vatanvasa, B. *Datta* & H.C. *Pande* 220896 (LWG).

Cultivated species:

1. ***Fernandoa adenophylla* (Wall. ex G. Don) V. Steenis, Blumea 23 (1): 135. 1976; Uniyal & al., Fl. Pl. Uttarakhand: 135. 2007. *Bignonia adenophylla* Wall. ex G. Don, Gen. Syst. 4: 221. 1838. *Spathodea adenophylla* DC., Prodr. 9: 206. 1845. *Heterophragma adenophylla* Seem. ex Benth. & Hook.f., Gen. Pl. 2: 1047. 1876; C.B. Clarke in Hook.f., Fl. Brit. India 4: 381. 1884. *Haplophragma adenophyllum* (Wall.) P. Dop, Bull. Soc. Bot. France 72: 890. 1926. *Katsagon***

Trees, deciduous, to 15 m high. Leaves opposite, 20–30 cm long, pinnae rusty tomentose; leaflets 5–7, lateral, elliptic-oblong, entire, acute, rusty tomentose-brown. Flowers large, in terminal panicles. Capsule cylindrical, curved, dehiscing loculicidally. Seeds discoid, winged.

Flowering & Fruiting: November–April.

Native of Andaman Islands, Assam, E. Bengal, Myanmar.

Uses: Sparingly cultivated as an ornamental tree. The wood is elastic and is used for making bows and also for furniture.

2. ***Jacaranda mimosifolia* D. Don, Bot. Reg. 8: 631. 1822; Sandwith, Kew Bull.: 456. 1953; R.D. Gaur, Fl. Garhwal: 522. 1999; Uniyal & al., Fl. Pl. Uttarakhand: 135. 2007. *J. ovalifolia* R. Br. in Curtis, Bot. Mag. 49: t. 2327. 1822. *Niligulmohar***

Medium sized deciduous trees. Leaves opposite, bipinnate, imparipinnate, pinnae 16–20 pairs, leaflets 12–26 pairs, dark green. Flowers light blue, mauve or purple in lax, pyramidal panicles. Capsules oblong-ovate, loculicidal, 5–8 cm long, flat, hard and woody. Seeds many.

Flowering & Fruiting: April–December.

Commonly planted in gardens and along roads as avenue trees.

71. PEDALIACEAE

Sesamum L.

Sesamum orientale L., Sp. Pl.: 634. 1753; P.C. Pant, Fl. Corbett Natl. Park: 117. 1986; R.D. Gaur, Fl. Distr. Garhwal: 519. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 193. 2007. *S. indicum* L., Sp. Pl.: 634. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 387. 1884. *Til*

Herb, annual, to 1.5 m high; stems sulcate, glandular-pubescent, becoming glabrous. Leaves petioled, trifoliate or palmtisect; lamina ovate or lanceolate or oblong-lanceolate, 3.5–10 x 0.8–3.5 cm, base obtuse or cuneate, apex acute or acuminate, margin entire, pubescent or glabrous. Flowers purplish or white or pinkish-white, solitary, axillary, rarely 2 per axil; sepals free, persistent, lanceolate, apex acuminate, pubescent; corolla, tubular, funnel-shaped, limb obscurely bilipped, limb lobe suborbicular; stamens included, didymous. Capsules tetragonous, oblong, to 3 cm long, shortly beaked, minutely pubescent; seeds many, obliquely oblong, white or black.

Flowering & Fruiting: August–November.

Common, usually in waste places, in loamy soil, usually cultivated, up to 1500 m.

Distribution: India (almost in all states), cultivated worldwide, especially in the tropics.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125544 (BSD).

Uses: It is an oil-yielding plant. Seeds are believed as aphrodisiac; seed oil useful in body massage (Gaur, 1999). The oil extracted from seeds is used for culinary purposes, for burning lamps and in the manufacture of soap and perfumes. The seeds are used in piles; seeds and oil are used in dysentery and urinary complaints.

72. MARTYNIACEAE

Martynia L.

Martynia annua L., Sp. Pl.: 618. 1753; P.C. Pant, Fl. Corbett Natl. Park: 117. 1986; R.D. Gaur, Fl. Distr. Garhwal: 520. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 193. 2007. *M. diandra* Gloxin, Observ. Bot. Univ. Arg.: 14, t. 1. 1785; C.B. Clarke in Hook.f., Fl. Brit. India 4: 386. 1884. *Bichu*

Herb or undershrubs, annual, erect, to 1 m high; stems thick, fistular, glandular-pubescent. Leaves petioled, opposite, broadly ovate-suborbicular, 5–12 x 5–12 cm, base subcordate, apex mucronate, margins mucro-dentate, glandular-pubescent. Flowers purple-pink with yellow spots, in short axillary, lax racemes; bracts ovate, membranous; sepals free, unequal, lanceolate, apex acuminate, glandular-pubescent; corolla tubular, bilipped, lobes broadly rounded; stamens 2+2. Capsules oblong-obovoid, to 2.5 cm long, shortly beaked, beaks 2, curved, glandular-pubescent, spiny along suture.

Flowering & Fruiting: August–December.

Common, usually in waste places, roadsides, inhabited areas, up to 2000 m.

Distribution: India (Himachal Pradesh, Jammu & Kashmir, Rajasthan, Uttar Pradesh, Uttarakhand, West Bengal), Cambodia, China, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Vietnam.

Specimens examined: Rathuadhap, H.C. *Pande* 220725 (LWG).

Uses: Leaf powder taken in epilepsy; fruit powder given in cough and cold; the paste used in inflammations (Gaur, 1999).

73. ACANTHACEAE

- 1a. Seeds supported on retinacula 2
- 1b. Seeds not supported on retinacula 9. **Nelsonia**

- 2a. Stamens 4 3
- 2b. Stamens 2 7

- 3a. Corolla lobes distinctly bilipped 8. **Lepidagathis**
- 3b. Corolla lobes subequal 4

- 4a. Calyx 4-lobed, lobes imbricate 2. **Barleria**
- 4b. Calyx 5-lobed, lobes valvate or contorted 5

- 5a. Scrambling or trailing shrubs 1. **Asystasia**
- 5b. Erect or diffuse herbs 6

- 6a. Inflorescence in axillary and terminal heads 5. **Hemigraphis**
- 6b. Inflorescence axillary solitary or in triads 11. **Ruellia**

- 7a. Ovary with 6–10 ovules; capsules 6–10 seeded 10. **Phlogacanthus**
- 7b. Ovary with 1–2 ovules; capsules 2–4 seeded 8

- 8a. Corolla bilipped 9
- 8b. Corolla 5, subequal 4. **Eranthemum**

- 9a. Flowers in lax cymes or panicles; anther cells usually without spur 3. **Dicliptera**
- 9b. Flowers in lax cymes, panicles or spicate racemes; anther cells usually with spur 10

- 10a. Seeds 2–4 11
- 10b. Seeds more than 15 6. **Hygrophila**

- 11a. Flowers arranged in one side of spikes 12. **Rungia**
- 11b. Flowers arranged in all sides of spikes 7. **Justicia**

1. **Asystasia** Blume

Asystasia macrocarpa Nees in Wall., Pl. Asiat. Rar. 3: 89. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 501. 1884; P.C. Pant, Fl. Corbett Natl. Park: 119. 1986; R.D. Gaur, Fl. Distr. Garhwal: 507. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 193. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 5. 2009. *MacKayaya macrocarpa* (Nees) Das in Kanjilal & al., Fl. Assam 3: 447. 1939.

Scrambling or trailing shrubs, perennial, evergreen, to 3.5 m long; stems weak, purple tinged, quadrangular. Leaves petioled, opposite, ovate-lanceolate or oblong, 3.5–12.5 x 1.5–4 cm, base acute, apex acuminate, margins entire, glabrous. Flowers purplish or pinkish, in one sided, terminal racemes; bracts linear, pubescent; bracteoles linear, hairy; calyx linear, glandular hairy, acute; corolla tubular, pubescent, lobes oblong, glandular hairy; stamens 4; filaments hairy. Capsules cylindrical, clavate, to 2.5 cm long, glandular-hairy; seeds 4, rugose, glabrous.

Flowering & Fruiting: January–June.

Common in wasteland in tropical to subtropical regions.

Distribution: India (Himalaya to North East India), Asia, Bhutan, Sri Lanka.

Specimens examined: Rathuadhap forest, Rana, *Dutt & Pande* 220264 (LWG); Samir Sinha (2001).

2. *Barleria* L.

1a. Stems quadrangular; capsules oblong or ovoid-oblong 1. *B. cristata*

1b. Stems subterete; capsule oblong-ellipsoid 2. *B. strigosa*

1. ***Barleria cristata*** L., Sp. Pl.: 636. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 488. 1884; P.C. Pant, Fl. Corbett Natl. Park: 119. 1986; R.D. Gaur, Fl. Distr. Garhwal: 508. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 193. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 5. 2009. *B. ciliata* Roxb., Fl. Ind. ed. 2, 3: 38. 1832. *B. nepalensis* Nees in Wall., Pl. Asiat. Rar. 3: 91. 1832. Saundi

Undershrubs, perennial, deciduous, suberect, hairy, to 1.5 m high; stems quadrangular, branched, hairy. Leaves petioled, opposite, elliptic-oblong or oblong-lanceolate, 3.5–15 x 2–4 cm, base cuneate, apex acute-acuminate, margins entire, hairy above, glabrous beneath. Flowers purple, violet, or white, in subterminal or axillary short spikes or heads; bracts and bracteoles linear, with spinule apex; calyx 4-lobed, with sharp spinule; corolla tubular to 3.5 cm long, lobes rounded. Capsules oblong or ovoid-oblong, 3.5 cm long, glabrous, beaked; seeds 4, blackish-brown.

Flowering & Fruiting: September–October

Common on road side areas, grassy and waste places, river beds up to 1400 m.

Distribution: India (Bihar, Gujrat, Jammu & Kashmir to North East India, Karnataka, Maharashtra, Manipur, Meghalaya, North India to South India, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh), Africa, Bangladesh, China, Myanmar, Nepal, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124848 (BSD); On way to Rathuadhap, Rana, *Dutt & Pande* 220127 (LWG); Way to Rathuadhap, T.S. Rana & Party 220127 (LWG).

2. ***Barleria strigosa*** Willd., Sp. Pl. 3: 379. 1800 emend. S.K. Malhotra & Moorthy in Indian Forester 107: 449. 1981; C.B. Clarke in Hook.f., Fl. Brit. India 4: 489. 1884; P.C. Pant, Fl. Corbett Natl. Park: 119. 1986; R.D. Gaur, Fl. Distr. Garhwal: 508. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 193. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 7. 2009.

Undershrubs, perennial, to 1.2 m high, branched; stems subterete, fulvous-strigose. Leaves petioled, elliptic to ovate, 6.5–14.5 x 3–7.5 cm, base cuneate, narrowed, apex acute, glabrous on both surfaces, strigosely hairy on nerves beneath. Flowers 4–6 cm long, mauve or pinkish in axillary and terminal dense bulbous spikes; bracts oblong to elliptic-oblong; bracteoles elliptic; sepals outer lobes purple, ovate; inner sepals lobes yellowish-brown, linear-lanceolate; corolla funnel-shaped, lobes obovate-oblong; stamens 4. Ovary ovoid. Capsule oblong-ellipsoid, 1.8–2 cm long, glabrous, shining; seeds 4, silky-hairy.

Flowering & Fruiting: September–March.

Common in wasteland and shady ravines, grassy slopes in tropical to subtropical regions.

Distribution: India (Himalaya to North India), Bhutan, Cambodia, China, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Halduparao, H.C. Pande 220858 (LWG); Way to Halduparao, R. *Manikandan* 122571 (BSD); Samir Sinha (2001).

3. *Dicliptera* Juss.

- 1a. Leaf base acuminate1. *D. bupleuroides*
 1b. Leaf base subrounded or cuneate 2
 2a. Flowers pink or purple, in trichotomous, lax, paniced cymes 2. *D. paniculata*
 2b. Flowers pink or mauve, in pedunculate axillary or terminal cymes3. *D. rani*

1. ***Dicliptera bupleuroides*** Nees in Wall., Pl. Asiat. Rar. 3: 111. 1832; Hara, J. Jap. Bot. 55: 224. 1980; P.C. Pant, Fl. Corbett Natl. Park: 119. 1986; R.D. Gaur, Fl. Distr. Garhwal: 509. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 193. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 11. 2009. *Dicliptera roxburghiana sensu* C.B. Clarke in Hook.f., Fl. Brit. India 4: 553. 1885, *non* Nees 1867. *D. roxburghiana* Nees var. *bupleuroides* (Nees) C.B. Clarke in Hook.f., *l.c.* *Kuthii*

Herb or undershrubs, perennial, to 1.5 m high; stems ridged, tufted. Leaves petioled, ovate or ovate-lanceolate, 3.5–12.5 x 1.8–6.7 cm, base acuminate, apex cuneate to acuminate, entire on margins, glabrous above, thinly pubescent on nerves beneath. Flowers 1.5–2.2 cm long, pinkish-white, in sessile or pedunculate axillary or terminal cymes; bracts linear-oblong, apiculate, 3-nerved, glandular; calyx 5-lobed, subulate; corolla tubular, to 1.8 cm long, unilipped, with yellow spot on throat. Capsules ellipsoid, 0.8–1.3 cm long; seeds two.

Flowering & Fruiting: September–March.

Common in wasteland or grassy slopes towards streams on margins of tropical to subtropical forest.

Distribution: India (Himalaya to North India), Afghanistan, Bangladesh, Bhutan, China, Nepal, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124924 (BSD); Samir Sinha (2001).

2. ***Dicliptera paniculata*** (Forssk.) I. Darbysh., Apud I. Darbysh. & Vollesen, Kew Bull. 62: 122. 2007. *Dianthera paniculata* Forssk., Fl. Aeg.-Arab.: 7. 1775. *D. bicalyculata* Retz., Acta Holm. 1775: 279. 1776. *Peristrophe paniculata* (Forssk.) Brummitt, Kew Bull. 38: 451. 1983; R.D. Gaur, Fl. Distr. Garhwal: 515. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 193. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 11. 2009. *Peristrophe bicalyculata* (Retz.) Nees in Wall., Pl. Asiat. Rar 3: 113. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 554. 1885; P.C. Pant, Fl. Corbett Natl. Park: 122. 1986.

Herb, erect or spreading, to 60 cm high; stems slender, branched, scabrous, pubescent. Leaves petioled, ovate-lanceolate, 3–6.8 x 1.5–3.5 cm, base subrounded, apex acuminate, entire on margins, hairy on both surfaces. Flowers pink or purple, in trichotomous, lax, paniced cymes; bracts 2, linear, acute, opposite; calyx 5-lobed, linear-lanceolate, ciliated.

Flowering & Fruiting: September–December.

Common in wasteland or grassy slopes towards streams on margins.

Distribution: India (Himalaya to North India), Afghanistan, Africa, Bangladesh, Bhutan, China, Nepal, Pakistan.

Specimens examined: Mundiapani, R. *Manikandan* 124917, 125713 (BSD); Samir Sinha (2001).

3. **Dicliptera raui** Karthik. & Moorthy in Karthik. & al., Flow. Pl. India Dicot. 1: 12. 2009. *Justicia speciosa* Roxb., Fl. Ind. 1: 122. 1820. *Peristrophe speciosa* (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3: 113. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 556. 1885; P.C. Pant, Fl. Corbett Natl. Park: 122. 1986; R.D. Gaur, Fl. Distr. Garhwal: 515. 1999.

Herb or undershrubs, erect, perennial, profusely branched, to 1.2 m high; stems much branched, ribbed, pubescent, thickened at nodes. Leaves petioled, ovate-lanceolate or elliptic-ovate, 3.5–12 x 1.5–5.5 cm, base subrounded or cuneate, apex acute, glabrous above, pubescent on nerves beneath. Flowers pink or mauve, in pedunculate axillary or terminal cymes; bracts linear, pubescent; bracteoles ciliated, pale brown; calyx 5-lobed, linear, pubescent; corolla bilipped, pinkish, ovate-elliptic, lower lip 3-lobed. Capsules ellipsoid, 1–1.5 cm long, beaked, pubescent; seeds 4, dark brown.

Flowering & Fruiting: October–March.

Grows in wasteland, moist places, river streams, on bunds of crop fields, in tropical to subtropical regions.

Distribution: Throughout in tropical to subtropical regions. India (Himalaya, N.E. India), Afghanistan, Bangladesh, Bhutan, China, Nepal, Pakistan.

Specimens examined: Mundiapani, R. *Manikandan* 122529 (BSD); Samir Sinha (2001).

4. **Eranthemum** L.

Eranthemum pulchellum Andrews, Bot. Repos. 2: t. 88. 1800; P.C. Pant, Fl. Corbett Natl. Park: 120. 1986; R.D. Gaur, Fl. Distr. Garhwal: 510. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 193. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 16. 2009. *Justicia nervosa* Vahl, Enum. Pl. 1: 164. 1804. *Daedalacanthus nervosus* (Vahl.) T. Anderson, J. Linn. Soc. Bull. 9: 487. 1867; C.B. Clarke in Hook.f., Fl. Brit. India 4: 418. 1884. *Eranthemum nervosum* (Vahl) R. Br. Ex Roem. & Schult., Syst. Veg. 1: 174. 1817.

Undershrubs or shrubs, perennial, erect, evergreen, to 2 m high; stems branched, thick, quadrangular, glabrous. Leaves petioled, elliptic-ovate, 6.5–20.5 x 1.5–9.5 cm, base attenuate, apex acute, entire on margins, glabrous on both surfaces. Flowers tubular, 3–4 cm long, blue, in trichotomously branched panicles; bracts oblong or oblanceolate, foliaceous, variegated with green and white; bracteoles linear; calyx 5–8 mm long, lobed, hairy; corolla tubular, 3–3.5 cm long, lobed, bluish; stamens 2. Capsules clavate, glabrous, 1–1.2 cm long, with persistent bracts.

Flowering & Fruiting: September–June.

Common in moist places of wasteland in tropical to subtropical regions.

Distribution: India (Himalaya to North India), Asia, Bhutan, China, Myanmar, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122600 (BSD).

5. **Hemigraphis** Nees

Hemigraphis rupestris B. Heyne ex T. Anderson, J. Linn. Soc., Bot. 9: 462. 1867; P.C. Pant, Fl. Corbett Natl. Park: 120. 1986; R.D. Gaur, Fl. Distr. Garhwal: 511. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 20. 2009. *H. latebrosa* Nees var. *rupestris* (B. Heyne ex T. Anderson) C.B. Clarke in Hook.f., Fl. Brit. India 4: 424. 1884.

Herb, perennial, diffusely branched, white-pubescent, to 70 cm long; stems quadrangular, woody, branched, white-pubescent. Leaves petioled, ovate to ovate-elliptic, 1.2–4.5 x 1–2.5 cm, base cuneate to subrounded, apex acute, crenate-serrate on margins, densely pubescent on both surfaces. Flowers bluish-white or blue, in dense, axillary or terminal heads; bracts ovate or elliptic; calyx lobes linear; corolla tube 1–1.2 mm long. Capsule oblong-ovoid, to 7 mm long, pubescent; seeds 6, brown, hairy.

Flowering & Fruiting: March–December.

Common in dry areas in tropical to subtropical regions.

Distribution: India (Central Himalaya to South India, Madhya Pradesh), Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

6. *Hygrophila* R. Br.

Hygrophila polysperma (Roxb.) T. Anderson, J. Linn. Soc. Bot. 9: 456. 1867; C.B. Clarke in Hook.f., Fl. Brit. India 4: 406. 1884; Maheshwari, Fl. Delhi: 269. 1963. *Justicia polysperma* Roxb., Fl. Ind. 1: 119. 1820. *Hemidelphis polysperma* (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3: 80. 1832.

Herb, small, much branched, unarmed, procumbent, to 30 cm long; branches rooting at the nodes and pubescent near apex. Leaves subsessile, opposite, oblong-ovate, 1–3.5 x 0.4–1 cm, mostly glabrous or puberulous, margins entire, obtuse at apex. Flowers white to pale-blue or violet, in axillary and terminal spikes; bracts broadly elliptic, subacute; bracteoles linear, pubescent; calyx 5-lobed, linear, hairy, scarious-ciliate on margins, acute; corolla pubescent, limb 2-lipped, upper lip 2-lobed, patent, lower lip shortly 3-lobed; stamens 2 fertile and 2 staminodial; style filiform. Capsule narrowly oblong, glabrous except the tip, more than 15-seeded. Seeds minute, orbicular.

Flowering & Fruiting: November–April.

Rare in moist shady places near deciduous forests.

Distribution: India (Himalaya, C. India), Afghanistan?, Bangladesh, Bhutan, Indo-China, Myanmar, Nepal, Pakistan.

Specimens examined: Sona river bank, H.C. Pande 220841 (LWG).

7. *Justicia* L.

1a. Herbs; flowers pinkish or purple or pinkish-white 2
1b. Shrubs; flowers white 1. *J. adhatoda*

2a. Stems erect; bracts linear-lanceolate 3. *J. procumbens*
2b. Stems suberect, diffuse; bracts ovate 2. *J. diffusa*

1. ***Justicia adhatoda*** L., Sp. Pl.: 15. 1753; Roxb., Fl. Ind. 1: 127. 1820; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 24. 2009. *Adhatoda zeylanica* Medik. in Hist. & Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 393. 1790; P.C. Pant, Fl. Corbett Natl. Park: 119. 1986; R.D. Gaur, Fl. Distr. Garhwal: 506. 1999. *Adhatoda vasica* Nees in Wall., Pl. Asiat. Rar. 3: 103. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 540. 1885. Russa [Plate-15a]

Shrubs, erect, evergreen, to 2 m high; stems greenish-white, glabrous, fragrant. Leaves petioled, ovate-lanceolate, 3.5–18 x 1.5–8 cm, base cuneate or attenuate, apex acuminate, entire on margins, glabrous above, pubescent on nerves beneath. Flowers white, in dense axillary and terminal bracteate spikes; bracts elliptic-

ovate, glabrous; bracteoles oblong-ovate; calyx 5-lobed, lobes pubescent; corolla with sweet nectar, glabrous. Capsules woody, 2–3.5 cm long.

Flowering & Fruiting: March–October.

Common in wasteland, but abundant in open places near village proximity and secondary forest areas.

Distribution: India (Almost throughout the country), S.E. Asia, Indo-Malaysia, Pakistan.

Specimens examined: Morghatty, R. *Manikandan* 124915 (BSD).

2. ***Justicia diffusa*** Willd., Sp. Pl. 4: 87. 1805; C.B. Clarke in Hook.f., Fl. Brit. India 4: 538. 1885; P.C. Pant, Fl. Corbett Natl. Park: 120. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 25. 2009. *Rostellularia diffusa* (Willd.) Nees in Wall., Pl. Asiat. Rar. 3: 100. 1832. *J. diffusa* var. *prostrata* C.B. Clarke, in Hook.f., l.c.; R.D. Gaur, Fl. Distr. Garhwal: 513. 1999.

Suberect, diffused herb, to 50 cm long; stems quadrangular, much branched from base, woody, sparsely hairy. Leaves petioled, elliptic-lanceolate, 1.8–3.5 x 1–2.2 cm, base narrowed, apex acute, margins entire, almost glabrous on both surfaces. Flowers pinkish or purple, in terminal or axillary spikes; bracts ovate, glabrous; calyx 4-lobed; lobes lanceolate; corolla tubular, blipped, upper lip narrowed, lower lip broad, 3-lobed. Capsules oblong, c. 5 mm long, pubescent; seeds ovate, dull brown.

Flowering & Fruiting: March–October.

Common in wasteland in tropical to subtropical regions along river banks.

Distribution: India (Almost throughout the country), Myanmar, Nepal, Pakistan, Sri Lanka, Thailand.

Specimens examined: Morghatty, R. *Manikandan* 125586, 125632 (BSD); Samir Sinha (2001).

3. ***Justicia procumbens*** L., Sp. Pl.: 15. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 539. 1885; P.C. Pant, Fl. Corbett Natl. Park: 120. 1986; R.D. Gaur, Fl. Distr. Garhwal: 513. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 27. 2009. *Rostellularia procumbens* (L.) Nees in DC., Prodr. (Ed. A.DC.) 11: 371. 1847.

Herb, annual, erect, to 80 cm high; stems angular, much branched, pubescent. Leaves petioled, elliptic-lanceolate, 2.5–8.5 x 1.5–5.5 cm, base attenuate, apex acute-acuminate, margins entire, pubescent above, hairy beneath. Flowers pinkish-white, in short terminal hirsute spikes; bracts linear-lanceolate, acute; bracteoles pubescent; calyx lobed, lobes linear, pubescent or hirsute; corolla glabrous. Capsules c. 6 mm long, oblong, hairy; seeds ovate.

Flowering & Fruiting: August–December.

Common in grassy, moist shady slopes in forest.

Distribution: India (Throughout the country), Australia, Malaysia, Pakistan, Sri Lanka.

Specimens examined: Morghatty, R. *Manikandan* 122387 (BSD); Samir Sinha (2001).

8. ***Lepidagathis*** Willd.

- 1a. Shrubs or undershrubs; stems erect; leaf apex cuspidate 1. *L. cuspidata*
 1b. Herbs; stems decumbent; leaf apex acuminate 2. *L. incurva*

1. ***Lepidagathis cuspidata*** Nees in Wall., Pl. Asiat. Rar. 3: 97. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 519. 1885; P.C. Pant, Fl. Corbett Natl. Park: 121. 1986; R.D. Gaur, Fl. Distr. Garhwal: 513. 1999;

Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 28. 2009. *Ruellia cuspidata* Wall., Numer. List: 2405. 1830.

Shrub or undershrub, perennial, erect, spiny, to 1 m high; stems branched, pubescent. Leaves petioled, elliptic-lanceolate or ovate, 2.5–10 x 1–3 cm, base cuneate, apex cuspidate, margins entire, glabrous above, glandular-pubescent beneath. Flowers white, tinged with purple, in axillary or subterminal dense, spiny spikes; bracts elliptic, spine on apex; bracteoles oblong-lanceolate, cuspidate at apex; calyx 5-lobed, lobes upto 9 mm long; corolla bilipped; stamens 4. Capsules $\approx$ 1 cm long, ovoid-ovate; seeds 4, ovoid.

Flowering & Fruiting: March–December.

Common in open dry, rocky slopes in tropical to temperate regions.

Distribution: India (N. India to N.W. India, Central India), Nepal.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 122550 (BSD); Vatanwasa, H.C. Pande 220723; Samir Sinha (2001).

2. **Lepidagathis incurva** Buch.-Ham. ex D. Don, Prodr. Fl. Nep.: 119. 1825; P.C. Pant, Fl. Corbett Natl. Park: 121. 1986; R.D. Gaur, Fl. Distr. Garhwal: 514. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 31. 2009. *Lepidagathis hyalina* Nees in Wall., Pl. Asiat. Rar. 3: 95. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 521. 1885. [Plate-15b]

Herb, perennial, decumbent, to 60 cm high; stems angular, branched at base, glabrous. Leaves petioled, ovate or ovate-lanceolate, 2.5–10.5 x 1.5–4.5 cm, base subrounded, apex acuminate, margins entire, glabrous above or hairy, glandular-pubescent on nerves beneath. Flowers white or pinkish-white, in dense axillary or terminal heads; bracts elliptic-ovate, glandular; bracteoles smaller than bracts, ovate, ciliated; calyx 5-lobed; corolla bilipped. Capsules oblong-ovoid, glabrous or hairy; seeds 4.

Flowering & Fruiting: February–December

Common in open dry, rocky slopes in tropical to temperate regions.

Distribution: India (N. India to N.W. India, Central India), Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 125679, 125702, 124913 (BSD); Samir Sinha (2001).

9. **Nelsonia** R. Br.

Nelsonia canescens (Lam.) Spreng., Syst. Veg. 1: 42. 1825; P.C. Pant, Fl. Corbett Natl. Park: 121. 1986; R.D. Gaur, Fl. Distr. Garhwal: 514. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 194. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 33. 2009. *Justicia canescens* Lam., Tabl. Encycl. 1: 41. 1791. *Nelsonia campestris* R. Br., Prodr.: 481. 1810; C.B. Clarke in Hook.f., Fl. Brit. India 4: 394. 1884.

Herb, annual or perennial, diffuse, to 30 cm high; stems angular, villous, often rooting at nodes, with fasciculated roots. Leaves petioled, elliptic-ovate or obovate, 1–4.5 x 0.5–1.2 cm, base obtuse, apex acute, margins entire, hairy on both surfaces. Flowers mauve or violet, in axillary spikes; bracts elliptic-ovate, ciliate; calyx lobed, 4–5 mm long; corolla 6–7 mm long, tube cylindric; stamens inserted. Capsule $\approx$ 5 mm long; seeds 8–16, ellipsoid.

Flowering & Fruiting: March–June.

Common in moist places, wasteland in tropical to subtropical regions.

Distribution: India (Himalaya, N. India, S. India), Africa, Bhutan, China, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, *R. Manikandan* 124964, 122552, 125700, 125716 (BSD); Below Rathuadhab, *H.C. Pande* 220780 (LWG); Samir Sinha (2001).

10. *Phlogacanthus* Nees

Phlogacanthus thyrsoformis (Roxb. ex Hardw.) Mabb. in Manilal Bot. & Hist. Hort. Malab.: 83. 1980; P.C. Pant, Fl. Corbett Natl. Park: 122. 1986; R.D. Gaur, Fl. Distr. Garhwal: 516. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 195. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 35. 2009. *Justicia thyrsoformis* Roxb. ex Hardw., Asiat. Res. 6: 349. 1799. *J. thyrsoflorus* Roxb., Fl. Ind. 1: 116. 1820. *Phlogacanthus thyrsoflorus* Nees in Wall., Pl. Asiat. Rar. 3: 99. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 4: 512. 1885.

Undershrub or shrub, perennial, erect, to 3 m high; stems branched, angular, pubescent. Leaves petioled, elliptic-ovate or oblanceolate, 10–20 x 3–7.5 cm, base attenuate, apex acuminate, margins entire, glabrous above, pubescent beneath. Flowers brick red, in 10–20 cm long, terminal panicles; bracts linear-lanceolate, 1–1.2 cm long; calyx 5-lobed, lobes to 9 mm long; corolla tube broad from base, curved; stamens 2. Capsules oblong, c. 3.5 cm long, glabrous; seeds 8–16, ovoid, glabrous, compressed.

Flowering & Fruiting: February–June.

Common in shady, moist slopes, wasteland in tropical to subtropical regions.

Distribution: India (Himalayas). Endemic.

Specimens examined: Way to Halduparao, *R. Manikandan* 122558, 125680 (BSD); Halduparao, *H.C. Pande* 22075 (LWG).

11. *Ruellia* L.

- 1a. Leaves ovate-lanceolate or elliptic-lanceolate 1. *R. beddomei*
 1b. Leaves oblong-obovate to oblanceolate 2. *R. tuberosa*

1. ***Ruellia beddomei*** C.B. Clarke in Hook.f., Fl. Brit. India 4: 413. 1884; Karthik. & al., Flow. Pl. India Dicot. 1: 37. 2009. *Dipteracanthus beddommei* (C.B. Clarke) Santapau in Indian Forester 79: 322. 1953; P.C. Pant, Fl. Corbett Natl. Park: 122. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 195. 2007.

Suffrutescent herb, perennial, erect, to 60 cm high; stems branched, quadrangular, glabrous or hairy. Leaves petioled, ovate-lanceolate or elliptic-lanceolate, 8.5–20.5 cm long, base subrounded, apex acuminate, oblique, margins entire, ciliate, hairy on both surfaces. Flowers pale-purple, paired on the axil of leaves; bracteoles lanceolate; calyx 5-lobed, lobes linear-lanceolate; corolla lobes to 7 cm long, hairy on upper surface. Capsules subcylindric, c. 3 cm long; seeds 6–12.

Flowering & Fruiting: July–October.

Rare in moist shady places, along river banks, forest undergrowth in tropical to subtropical regions.

Distribution: India (Himalayas, Central and Eastern India). Endemic.

Specimens examined: Corbett National Park, *P.C. Pant* 43051 (BSD); Vatanvasa forest, *Hussian Chaudhary*, 218782 (LWG).

2. **Ruellia tuberosa** L., Sp. Pl.: 635. 1753; Maheshw., Fl. Delhi: 272. 1963; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 137. 2007.

Herb, erect, to 65 cm high; stem stout, 4-angled, swollen and purplish at the nodes; with elongated, tuberous roots. Leaves petioled, oblong-obovate to oblanceolate, 5–10 x 2–4 cm, shining, basally cuneate to attenuate, entire to undulate, obtuse to somewhat acute, often mucronulate. Flowers blue-violet, showy, solitary or in 1–3-flowered, terminal or axillary cymes; bracts and bracteoles linear-lanceolate; calyx lobes equal, linear, ciliate, acute; corolla pubescent outside, tube abruptly narrowed at base, 5-lobed; stamens with oblong-sagittate. Capsule oblong, c. 3 cm long, glabrous or scabrescent, many-seeded, minutely beaked at tip; seeds flattened, orbicular, hairy.

Flowering & Fruiting: Almost throughout the year.

Common in waste places near gardens.

Distribution: India (almost throughout the country), China, Pakistan, Tropical America, Africa, S.E. Asia.

Specimens examined: Vatanvasa, H.C. Pande 220817 (LWG).

Notes: It is a native of Tropical America.

12. **Rungia** Nees

Rungia pectinata (L.) Nees in DC., Prodr. 11: 470. 1847; P.C. Pant, Fl. Corbett Natl. Park: 122. 1986; R.D. Gaur, Fl. Distr. Garhwal: 517. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 195. 2007; Karthik. & al., Flow. Pl. India Dicot. 1: 35. 2009. *Justicia pectinata* L., Amoen. Acad. 4: 299. 1759. *Rungia parviflora* var. *pectinata* C.B. Clarke in Hook.f., Fl. Brit. India 4: 550. 1885.

Herbs, annual, diffuse, to 30 cm high; stems decumbent, often rooting at nodes, minutely pubescent. Leaves petioled, oblong-elliptic or oblong-lanceolate, 1–3.2 x 0.3–1.2 cm, base cuneate, apex acute, margins entire, glabrous above, pubescent on nerves beneath, apex acute. Flowers blue, in axillary or terminal spikes; bracts dimorphic, elliptic; bracteoles elliptic, apex bifid; calyx pubescent, lobes linear-lanceolate; corolla bilipped, lower lip 3-lobed, upper lip ovate. Capsules ovoid, to 3 mm long, glabrous; seeds 2–4, orbicular.

Flowering & Fruiting: October–June.

Common in moist places as weed throughout foot paths and along wasteland in tropical to subtropical regions.

Distribution: India (throughout the country), Bhutan, China, Myanmar, Nepal, Sri Lanka.

Specimens examined: Vatanwasa-Rathuadhab, R. Manikandan 122329, 125720 (BSD); Samir Sinha (2001).

Uses: It is used in treating bone fracture.

74. VERBENACEAE

- | | |
|--------------------------------------|------------------------|
| 1a. Stems creeping or scandent | 2 |
| 1b. Stems erect | 3 |
| 2a. Creeping herbs | 7. Phyla |
| 2b. Scandent shrubs | 5. Holmskioldia |
| 3a. Plants armed | 6. Lantana |

- 3b. Plants unarmed 4
- 4a. Leaves 3–5-foliolate10. **Vitex**
- 4b. Leaves simple 5
- 5a. Large trees 6
- 5b. Shrubs or small trees 7
- 6a. Flowers creamy-white, in dichotomously branched axillary or subterminal cymose panicles 9. **Tectona**
- 6b. Flowers yellow, in axillary or terminal panicles 4. **Gmelina**
- 7a. Usually small trees; leaves chartaceous 8
- 7b. Usually shrubs, leaves non- chartaceous8. **Premna**
- 8a. Stems reddish-brown, pubescent 9
- 8b. Stems greenish, stellately-pubescent 1. **Callicarpa**
- 9a. Flowers white, with red centre, in terminal corymbose cymes 3. **Clerodendrum**
- 9b. Flowers purple, in terminal, dense, peduncled cymes 2. **Caryopteris**

1. **Callicarpa** L.

Callicarpa macrophylla Vahl, Symb. Bot. 3: 13, t. 53. 1794; Willd., Sp. Pl. 1: 621. 1798; Roxb., Fl. Ind. 1: 408. 1820; C.B. Clarke in Hook.f, Fl. Brit. India 4: 568. 1885; P.C. Pant, Fl. Corbett Natl. Park: 123. 1986; R.D. Gaur, Fl. Distr. Garhwal: 449. 1999; A. Rajendran & P. Daniel, Ind. Verbenaceae: 43. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 196. 2007. *C. incana* Roxb., Fl. Ind. 1: 408. 1820. *C. roxburghii* Wall. ex Walp., Repert. Bot. Syst. 4: 127. 1845. *C. macrophylla* Vahl var. *sinensis* C.B. Clarke in Hook.f., Fl. Brit. India 4: 568. 1885.

Daiya, Motia

[Plate-15c]

Shrubs, perennial, to 4 m high; stems quadrangular, branchlets stellate-pubescent. Leaves petioled, elliptic-lanceolate, 8–22 x 2.5–8.5 cm, base obtuse, apex acuminate, pubescent above, stellate-tomentose beneath, margins crenate. Flowers pink, in crowded axillary, dichotomously branched corymbs; calyx cupular, 4-angular, pubescent; corolla 4-lobed, pubescent; stamens 4, inserted, glabrous. Ovary subglobose or globose 2–4 mm across, glabrous. Drupes *c.* 3 mm across, subglobose, white; seeds 4, glabrous.

Flowering & Fruiting: October–November.

Common in moist shady places and along roadsides near deciduous forests.

Distribution: India (Assam to Andaman & Nicobar Island, N.W. Himalaya to Eastern Himalaya, Punjab, Uttar Pradesh, West Bengal), Asia, Bhutan, Myanmar, Nepal.

Specimens examined: Sonanadi WLS, R. Manikandan 122371, 124966 (BSD); Vatanvasa, T.S. Rana & Party 220110 (LWG).

Uses: Fruits are edible and used in treating oral aphthae.

2. **Caryopteris** Bunge

Caryopteris bicolor (Hardw.) Mabb. in Manilal, Bot. Hist. Hort. Malab.: 83. 1980; A. Swami & B.K. Gupta, in Indian J. Forest. 11: 245. 1988; A. Rajendran & P. Daniel, Ind. Verbenaceae: 63. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 196. 2007. *Volkameria bicolor* Hardw., Asiat. Res. 6: 366. 1799. *Caryopteris wallichiana* Schauer in DC., Prodr. 11: 625. 1847, *nom. illeg.*; C.B. Clarke in Hook.f., Fl. Brit. India 4: 597. 1885.

C. odorata (D. Don) C.B. Robinson, Proc. Amer. Acad. Arts 51: 531. 1961; P.C. Pant, Fl. Corbett Natl. Park: 124. 1986; R.D. Gaur, Fl. Distr. Garhwal: 450. 1999.

Shrubs, perennial, to 6.5 m high; stems quadrangular, pubescent, reddish-brown. Leaves petioled, ovate-lanceolate or oblong, 3.5–10.5 x 1.5–3.5 cm, base cuneate, apex acuminate, subglabrous above, glandular-pubescent on nerves beneath, margins crenate. Flowers purple, in terminal, dense, peduncled cymes; calyx campanulate, 5-lobed; corolla lobes cylindric, bilipped, purple or bluish; stamens 4, exserted. Ovary subglobose, glandular. Capsules *c.* 4 mm across, globose, 4-lobed, blue; seeds oblong, numerous.

Flowering & Fruiting: March–October.

Occasional on hilly slopes and along river banks.

Distribution: India (Bihar, Himachal Pradesh, Jammu & Kashmir, Punjab, West Bengal, W. Himalaya to Sikkim), Asia, China, Nepal, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124854, 124942 (BSD); Samir Sinha (2001).

3. *Clerodendrum* L.

Clerodendrum cordatum D. Don, Prodr. Fl. Nepal.: 103. 1825; A. Rajendran & P. Daniel, Ind. Verbenaceae: 96. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 196. 2007. *C. viscosum* Vent., Jard. Malm. 1: 25, t. 25. 1804; C.B. Clarke in Hook.f, Fl. Brit. India 4: 594. 1885; P.C. Pant, Fl. Corbett Natl. Park: 124. 1986; R.D. Gaur, Fl. Distr. Garhwal: 451. 1999. *C. infortunatum* auct. Non L. 1753; Blume, Bijdr.: 811. 1825. *Volkameria petasites* auct. Non (Lour.) S. Moore J. Bot. 63: 285. 1925. *Bhanua*, *Bhant* [Plate-15d]

Shrubs, to 2.5 m high; stems obtusely quadrangular, pubescent, reddish-brown. Leaves petioled, ovate or ovate-cordate, 8.5–20.5 x 5.5–15.5 cm, base rounded or subcordate, apex acuminate, subglabrous above, glandular-pubescent on nerves beneath, margins serrate-dentate. Flowers white, with red centre, in terminal corymbose cymes; calyx campanulate, 5 lobed, pubescent, bright red; corolla cylindric, tube 2–2.5 cm long; stamens 4, exserted. Ovary subglobose, glandular. Drupes *c.* 8 mm long, subglobose, black; seeds 4, oblong.

Flowering & Fruiting: March–October.

Common in sal forest as under growth.

Distribution: India (Bihar, W. Himalaya to Sikkim, Jammu & Kashmir, Himachal Pradesh, Punjab, Uttar Pradesh, West Bengal), Asia, Bhutan, Nepal, Sri Lanka.

Specimens examined: Way to Halduparao, R. *Manikandan* 122561, 125704 (BSD); Vatanvasa, H.C. Pande 220790 (LWG).

Uses: Leaves are used as vermifuge and in treating skin diseases.

4. *Gmelina* L.

Gmelina arborea Roxb. ex Sm. in A. Rees, Cycl. 16: no. 4. 1810; Roxb., Hort. Bengal: 46. 1814; Pl. Coromandel 3: 41, t. 246. 1815 & Fl. India 3: 84. 1832; Sm. in Rees, Cycl. 16: no. 4. 1810; C.B. Clarke in Hook.f, Fl. Brit. India 4: 581. 1885; P.C. Pant, Fl. Corbett Natl. Park: 124. 1986; R.D. Gaur, Fl. Distr. Garhwal: 452. 1999; A. Rajendran & P. Daniel, Ind. Verbenaceae: 155. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 196. 2007. *Premna arborea* Farw., Druggist Circ. 63: 50. 1919.

Tree, deciduous, to 20 m high; stems lenticellate, obtusely quadrangular. Leaves petioled, ovate-cordate or suborbicular, 7.5–15 x 5.5–10 cm, cuneate at base, entire at margins, acuminate or caudate at apex,

glabrous above, subcoriaceous tomentose beneath. Flowers yellow, in axillary or terminal panicles; calyx campanulate 5-lobed; corolla infundibular, 5-lobed. Stamens 4, didynamous. Ovary subglobose, 4-locular, glabrous. Drupes obovoid, pale-orange at maturity.

Flowering & Fruiting: April–October.

Occasional in deciduous forests.

Distribution: India (N.W. Himalaya to Arunachal Pradesh, S. India, Punjab, Maharashtra), Asia, China, Myanmar, Pakistan, Sri Lanka.

Specimens examined: Vatanvasa, *H.C. Pande* 220710 (LWG).

5. *Holmskioldia* Retz.

Holmskioldia sanguinea Retz., Obs. Falc. 6: 31. 1791; C.B. Clarke in Hook.f, Fl. Brit. India 4: 596. 1885; P.C. Pant, Fl. Corbett Natl. Park: 124. 1986; R.D. Gaur, Fl. Distr. Garhwal: 452. 1999; A. Rajendran & P. Daniel, Ind. Verbenaceae: 173. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 196. 2007. *Holmskioldia scandens* Roxb. ex Sweet, Hort. Brit.: 323. 1826, *nom. nud.*

Scandent or straggling shrub, to 7 m long; stems quadrangular, pubescent. Leaves petioled, elliptic-ovate or ovate, 4–10 × 3–8 cm, rounded or subcordate at base, crenate at margins, caudate at apex, glabrous above, pubescent on nerves beneath, glandular, chartaceous. Flowers scarlet-red or yellow, in cymose racemes; bracts elliptic-ovate, reddish-brown, glabrous; calyx campanulate, 5-lobed; corolla lobes infundibular, bilipped. Stamens 4, didynamous. Ovary triangular, glabrous. Drupes c. 1 cm across, subglobose, reddish or yellowish at maturity. Seeds 1–4, verrucose or rugose.

Flowering & Fruiting: Almost throughout the year.

In tropical to subtropical secondary forest areas on shady slopes.

Distribution: India (W. Himalaya to N.E. India, S. India, Maharashtra, Madhya Pradesh, Punjab), Asia, Mexico, Sri Lanka.

Specimens examined: Vatanvasa, *H.C. Pande* 218751 (LWG); Samir Sinha (2001).

6. *Lantana* L.

Lantana camara L., Sp. Pl.: 627. 1753; Juss., Gen. Pl.: 109. 1789; C.B. Clarke in Hook.f., Fl. Brit. India 4: 562. 1885; P.C. Pant, Fl. Corbett Natl. Park: 124. 1986; R.D. Gaur, Fl. Distr. Garhwal: 453. 1999; A. Rajendran & P. Daniel, Ind. Verbenaceae: 180. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 196. 2007. *L. aculeata* L., Sp. Pl.: 627. 1753. *L. camara* L. var. *aculeata* (L.) Moldenke, Torreya 34: 9. 1934.

Kurri [Plate-15e]

Scandent shrub, evergreen, aromatic, to 3 m high; stems quadrangular, hairy with recurved prickles. Leaves petioled, ovate or ovate-oblong, 2–8.5 × 1.2–6.5 cm, subcordate or cuneate at base, crenate or serrate at margins, apex acuminate at apex, chartaceous, scabrid above, pubescent on nerves beneath. Flowers reddish-pink or orange, fragrant, 4–5 mm long, in dense, bracteate, subglobose heads; calyx cupular, pubescent; corolla tubular, bilipped, 5-lobed; stamens 4, with ovoid anthers. Ovary conical, pubescent. Drupes subglobose or obovoid, glaucous, pulpy, blackish-brown.

Flowering & Fruiting: Throughout the year.

Common almost throughout the sanctuary.

Distribution: India (Almost throughout the country), usually throughout the world.

Specimens examined: Seen throughout the sanctuary.

7. *Phyla* Lour.

Phyla nodiflora (L.) Greene, *Pittonia* 4: 46. 1899; Moldenke, *Lilloa* 4: 296. 1939; R.D. Gaur, *Fl. Distr. Garhwal*: 453. 1999; A. Rajendran & P. Daniel, *Ind. Verbenaceae*: 206. 2002; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.*: 196. 2007. *Verbena nodiflora* L., *Sp. Pl.*: 20. 1753. *Lippia nodiflora* A. Rich. in Michx., *Fl. Bor. Amer.* 2: 15. 1803; C.B. Clarke in Hook.f., *Fl. Brit. India* 4: 563. 1885; P.C. Pant, *Fl. Corbett Natl. Park*: 125. 1986. *Jal pipali*.

Herb, perennial, creeping, to 80 cm long; stems branched, often rooting at nodes. Leaves subsessile, ovate-obovate or oblanceolate, 0.4–2.5 × 0.3–1.5 cm, obtuse at base, spatulate, glabrous above, pubescent on nerves beneath, margins serrate at apex. Flowers yellow, 4–5 mm across, in dense, globose clusters; calyx cupular, pubescent; corolla bilipped, 5-lobed; stamens 4, didynamous. Ovary globose, pubescent. Drupes subglobose, compressed, with persistent calyx; seed 1, brown.

Flowering & Fruiting: March–December.

Common in moist land or wasteland areas.

Distribution: India (W. Himalaya to Assam, S. India, Maharashtra, Madhya Pradesh, Orissa, Punjab, West Bengal), throughout world.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122568, 125745 (BSD); Vatanvasa, H.C. Pande 220810 (LWG); Samir Sinha (2001).

8. *Premna* L.

- 1a. Leaf base subrounded; flowers greenish-purple; calyx cupular 1. *P. barbata*
 1b. Leaf base cuneate; flowers creamy white; calyx campanulate 2. *P. latifolia* var. *mucronata*

1. ***Premna barbata*** Wall. ex Sch. in DC., *Prodr.*: 11. 636. 1847; C.B. Clarke in Hook.f., *Fl. Brit. India* 4: 579. 1885; P.C. Pant, *Fl. Corbett Natl. Park*: 125. 1986; R.D. Gaur, *Fl. Distr. Garhwal*: 454. 1999; A. Rajendran & P. Daniel, *Ind. Verbenaceae*: 217. 2002; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.*: 197. 2007.

Bakhara

Shrubs or trees, deciduous, to 8 m high, stems subterete with terete branches, glabrous with grayish-corky bark. Leaves petioled, elliptic-ovate or lanceolate, 4.5–15.5 × 2.2–10.5 cm, base subrounded, apex acuminate, glabrous above, pubescent on nerves beneath, chartaceous, margins serrate on upper half, membranous. Flowers greenish-purple, in corymbose heads; calyx cupular; corolla infundibular, bilipped; stamens 4, didynamous. Ovary ovoid, glabrous. Drupes subglobose, greenish, purple-black or orange at maturity, 2–3.5 cm across.

Flowering & Fruiting: March–December.

Common in tropical deciduous forests.

Distribution: India (W. Himalaya to N.E. Himalaya, Assam, S. India, Bihar, Madhya Pradesh, Maharashtra, Orissa, Punjab, West Bengal), Bhutan, Nepal, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124851 (BSD); Samir Sinha (2001).

2. **Premna latifolia** var. **mucronata** (Roxb.) C.B. Clarke in Hook.f., Fl. Brit. India 4: 578. 1885; A. Rajendran & P. Daniel, Ind. Verbenaceae: 252. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 197. 2007. *Premna mucronata* Roxb., Fl. Ind. 3: 80. 1832; P.C. Pant, Fl. Corbett Natl. Park: 125. 1986; R.D. Gaur, Fl. Distr. Garhwal: 454. 1999. *Bakascha*

Trees, to 10 m high; stems subterete or quadrangular, with lenticellate branches. Leaves petioled, elliptic-ovate or ovate-oblong, 3.5–14.5 x 2.5–7.5 cm, base cuneate, rarely truncate, apex acute-acuminate with a prominent mucro, dark green on both surfaces, glabrous above, pubescent on nerves beneath, margins undulate, chartaceous. Flowers creamy white, in terminal corymbs; calyx campanulate, 5-lobed; corolla infundibular, bilipped; stamens 4, didynamous. Ovary subglobose or obovoid, pubescent. Drupes subglobose, c. 5 mm across, blackish at maturity.

Flowering & Fruiting: April–August.

Occasional in tropical deciduous forests.

Distribution: India (W. Himalaya to N.E. Himalaya, Bihar, Madhya Pradesh, Punjab, West Bengal), Asia, Bangladesh, Bhutan, China, Nepal.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 122320 (BSD); Sona River Bank, H.C. *Pande* 220718 (LWG); Samir Sinha (2001).

9. **Tectona** L.f. *nom.cons.*

Tectona grandis L.f., Suppl. Pl.: 151. 1781; C.B. Clarke in Hook.f., Fl. Brit. India 4: 581. 1885; R.D. Gaur, Fl. Distr. Garhwal: 455. 1999; A. Rajendran & P. Daniel, Ind. Verbenaceae: 206. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 197. 2007. *Theka grandis* (L.f.) Lam., Tabl. Encycl. 2: 211. 1797.

Sagavan [Plate-15f]

Trees, to 30 m high; stems terete with quadrangular branched. Leaves petioled, elliptic-ovate or lanceolate, 10–60 x 10–35 cm, base subrounded, apex acute-acuminate, margins entire, scabrous above, pale beneath; lateral nerves 7–14 pairs. Flowers creamy-white, in dichotomously branched axillary or subterminal cymose panicles; calyx campanulate, 6–8-lobed; corolla 6–8-lobed, glabrous, fragrant; stamens inserted. Ovary globose, 4-locular, glabrous. Drupes subglobose to globose, spongy, to 2 cm across, with enlarged fruiting calyx.

Flowering & Fruiting: March–December.

Common in almost throughout the sanctuary.

Distribution: India (N.W. Himalaya to N.E. Himalaya, S. India, Gujarat, Rajasthan, Nicobar, West Bengal), Africa, America, Asia, Australia.

Specimens examined: Seen throughout the sanctuary.

10. **Vitex** L.

Vitex negundo L., Sp. Pl.: 638. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 4: 583. 1885; P.C. Pant, Fl. Corbett Natl. Park: 125. 1986; R.D. Gaur, Fl. Distr. Garhwal: 456. 1999; A. Rajendran & P. Daniel, Ind. Verbenaceae: 331. 2002; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 197. 2007. *V. incisa* Lam., Encycl. 2: 611. 1788; Roxb., Fl. Ind. 3: 72. 1832. *V. negundo* L., var. *incisa* (Lam.) C.B. Clarke in Hook.f., Fl. Brit. India 4: 584. 1885. *Shimali* [Plate-15g]

Shrubs or small trees, deciduous, aromatic, to 5 m high; stems subterete, branches quadrangular, greyish-white, tomentose. Leaves petioled, 3–5-foliate; leaflets elliptic-ovate or lanceolate, 4.2–13 x 2–3.5 cm, base cuneate, apex acuminate, sparsely pubescent above, purple or greyish-pubescent beneath, chartaceous. Flowers purple, fragrant, in terminal elongated peduncled cymes; calyx campanulate, white-tomentose, 5-lobed; corolla 2-lipped, 5-lobed; stamens 4, didynamous. Ovary oblong-ovoid, glabrous. Fruits globose, to 4 mm across, blackish-brown at maturity, with persistent calyx.

Flowering & Fruiting: January–June.

In wasteland areas at humid places, along water channels.

Distribution: India (Andaman and Nicobar Island, Bihar, Gujrat, W. Himalaya to N.E. Himalaya, S. India, Madhya Pradesh, Maharashtra, Punjab, Uttar Pradesh), Asia, China, Japan, Nepal, Pakistan.

Specimens examined: Morghatty area, R. *Manikandan* 124939 (BSD).

75. LAMIACEAE (= LABIATAE)

- 1a. Corolla less than 5 mm long.....2
- 1b. Corolla 5 mm long or more.....6

- 2a. Plant robust shrubs; calyx teeth plumose; corolla early caducous.....5. **Colebrookea**
- 2b. Plant herbs, subshrubs or shrubs; calyx teeth not plumose; corollas not as above.....3

- 3a. Leaves arranged in ternate or whorls.....14. **Pogostemon**
- 3b. Leaves usually arranged in opposite.....4

- 4a. Calyx lips not distinguished into upper and lower during flowering.....12. **Perilla**
- 4b. Calyx lips distinguished into upper and lower during flowering.....5

- 5a. Flowers in crowded heads..... 1. **Acrocephalus**
- 5b. Flowers in distant whorls.....9. **Mosla**

- 6a. Calyx distinctly bilabiate; lobes unequal.....7
- 6b. Calyx indistinctly bilabiate; lobes equal or subequal.....14

- 7a. Corolla lower lip entire, upper 4-lobed; stamens declinate.....8
- 7b. Corolla lower lip 3-lobed, upper 2-lobed or entire; stamens not declinate.....10

- 8a. Calyx throat densely villous or bearded within.....13. **Plectranthus**
- 8b. Calyx throat glabrous or finely pilose within.....9

- 9a. Calyx upper 1-lobed, decurrent; corolla lower lip flat.....11. **Orthosiphon**
- 9b. Calyx upper 3-lobed, not decurrent; corolla lower lip cucullate.....6. **Isodon**

- 10a. Stamens 2; staminal connectives separating the thecae.....15. **Salvia**
- 10b. Stamens 4; staminal connectives not separating the thecae.....11

- 11a. Calyx upper and lower lips entire, rounded.....16. **Scutellaria**
- 11b. Calyx upper and lower lips divided into teeth or lobes.....12

- 12a. Corolla upper lip absent; lower lip 5-lobed.....17. **Teucrium**
- 12b. Corolla upper lip present, emarginate or entire; lower lip 3-lobed.....13

- 13a. Calyx distinctly 15-veined or ribbed; posterior stamens longer than anterior.....10. **Nepeta**
 13b. Calyx 10–15-veined; posterior stamens shorter than anterior.....4. **Clinopodium**
- 14a. Corolla upper lip minute or absent; nutlets prominent oblique or lateral scar.....2. **Ajuga**
 14b. Corolla upper lip present; nutlets with a basal attachment scar.....15
- 15a. Stamens included; staminal filaments glabrous or sparsely villous.....3. **Anisomeles**
 15b. Stamens exserted; staminal filaments densely villous.....16
- 16a. Corolla upper lip shorter than lower.....8. **Leucas**
 16b. Corolla upper lip longer than lower.....7. **Leonotis**

1. **Acrocephalus** Benth.

Acrocephalus hispidus (L.) Nicolson & Sivad., Taxon 29: 324. 1980; P.C. Pant, Fl. Corbett Natl. Park: 126. 1986; R.D. Gaur, Fl. Distr. Garhwal: 458. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 197. 2007. *Gomphrena hispida* L., Sp. Pl.: 326. 1753. *Acrocephalus capitatus* (Roth) Benth., Edward's Bot. Reg. 15: 1300. 1829; Hook.f., Fl. Brit. India 4: 611. 1885. *Ocimum capitatum* Roth, Nov. Pl. Sp.: 276. 1821. *Acrocephalus indicus* (Burm.f.) Kuntze, Revis. Gen. Pl. 2: 511. 1891; S.K. Mukerjee, Rec. Bot. Surv. India 14: 29. 1940. *Prunella indicus* Burm.f., Fl. Indica: 130. 1768. Utkund, Ustukundus

Herbs, annual, slender, ascending or descending, to 30 cm high; stem simple or often branched from the base, obtusely quadrangular, glabrous or pubescent. Leaves subsessile, elliptic-lanceolate, 1–2.5 x 0.4–1 cm, subacute at apex, decurrent at base, coarsely serrate along the margins, glabrous above, finely gland-dotted below. Flower pale purple, small, in terminal globose or cylindric heads, with pair of spreading leaves at base; calyx bilipped, tubular, ovoid-tubular, tube with white eglandular hairs at base, teeth ciliate-fringed, pubescent outside; corolla 4 or shortly 5-lobed, subequal, suberect; stamens 4, projecting, included within corolla. Nutlets minute, oblong-ellipsoid, smooth, brownish-black.

Flowering & Fruiting: September–December.

Common in moist shady places, roadsides, grassy fields and hilly regions, up to 1300 m.

Distribution: India (South West India, Malabar, Himalayas), Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam.

Specimens examined: Rathuadhap, *Hussian* & *Pande* 218745 (LWG); Samir Sinha (2001).

Uses: Plant extract used as an expectorant; roots chewed in cold and sore throat.

2. **Ajuga** L.

- 1a. Flowers pale blue, pink or white; calyx campanulate 1. *A. bracteosa*
 1b. Flowers blue to purple; calyx funnel-form 2. *A. macrosperma*

1. *Ajuga bracteosa* Wall. ex Benth. in Wall., Pl. Asiat. Rar. 1: 59. 1830; Hook.f., Fl. Brit. India 4: 702. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 224. 1940; P.C. Pant, Fl. Corbett Natl. Park: 127. 1986; R.D. Gaur, Fl. Distr. Garhwal: 458. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 197. 2007. *A. bracteosa* var. *densiflora* (Wall. ex Benth.) Hook.f., Fl. Brit. India 4: 703. 1885; S.K. Mukerjee, *l.c.*; Uniyal & al., *l.c.* *A. densiflora* Wall. ex Benth. in Wall., Pl. Asiat. Rar. 1: 59. 1830. *A. remota* Wall. ex Benth. in Wall., Pl. Asiat. Rar. 1: 59. 1830.

Neel kanthi, Kadwipatti

Herbs, perennial, prostrate or erect, stoloniferous, softly villous or glabrate, to 30 cm high; stems much branched, from woody root-stocks. Leaves lower ones petioled, upper sessile, oblanceolate or subspathulate, 2.5–8 x 1–3 cm, subrounded to obtuse at apex, cuneate at base, sinutely toothed along the margins; pubescent on both sides. Flowers pale blue, pink or white, many-flowered, in axillary whorls or short, dense spikes; calyx campanulate, 5-toothed, villous, ovate-lanceolate; corolla bilipped, tubular, slightly exserted, puberulent, yellowish glandular, villous annulate inside; upper lip straight, apex emarginate; middle lobe of lower lip obcordate, lateral lobes oblong. Nutlets ellipsoid, deeply rugose.

Flowering & Fruiting: April–October.

Common on rocky slopes and along the roadsides.

Distribution: India (Himalayas), Afghanistan, China, Japan, Myanmar, Nepal.

Specimens examined: Mundiapani *H.C. Pande* 220748 (LWG); Sonanadi WLS, *R. Manikandan* 124964, 124969, 124829 (BSD); Samir Sinha (2001).

Uses: It is used as a stimulant, diuretic, aperients and to stop bleeding and reduce inflammation. Leaf extract used in malarial fever, bitter extract as a tonic, astringent and febrifuge.

2. *Ajuga macrosperma* Wall. ex Benth., *Pl. Asiat. Rar.* 1: 58. 1830; Hook.f., *Fl. Brit. India* 4: 704. 1885; S.K. Mukerjee, *Rec. Bot. Surv. India* 14: 225. 1940; P.C. Pant, *Fl. Corbett Natl. Park*: 127. 1986; R.D. Gaur, *Fl. Distr. Garhwal*: 459. 1999; Uniyal & al., *Fl. Uttarakhand Checkl.*: 197. 2007. *Bulga macrosperma* (Wall. ex Benth.) Kuntze, *Revis. Gen. Pl.* 2: 512. 1891.

Herbs, erect or prostrate, at times stoloniferous, to 50 cm long; stems pilose hairy or glabrous or subglabrous when old, young parts densely white villous. Leaves with narrowly winged petiole, sometimes purplish, pilose; oblanceolate, ovate-lanceolate to elliptic-ovate, 4–12.5 x 1.8–5.5 cm, villous to strigose, base cuneate-decurrent, margin undulate to irregularly undulate-crenate, ciliate, apex obtuse to acute. Flower blue to purple, in 6–12-flowered, verticillasters, in axillary and terminal forming spikes; bract foliaceous, ovate-lanceolate; calyx funnel-form, veins strigose, teeth ovate, apically rounded, strigose, gray villous-ciliate at margin; corolla tubular, obliquely spreading, slightly curved near middle, glabrous or pilose, villous; upper lip oblong or subovate; middle lobe narrowly cordate, emarginate at apex; lateral lobes oblong, as long as or slightly longer than upper lip. Nutlet areole.

Flowering & Fruiting: January–June.

Shady areas in forests, limestone forests, ravines, grassy roadsides, up to 2500 m.

Distribution: India (Himalayas, N.E. India), Bhutan, China, Laos, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Rathuadhab, *R. Manikandan* 124829, 125699 (BSD); Samir Sinha (2001).

3. *Anisomeles* R. Br.

Anisomeles indica (L.) Kuntze, *Revis. Gen. Pl.* 2: 512. 1891; S.K. Mukerjee, *Rec. Bot. Surv. India* 14: 152. 1940; P.C. Pant, *Fl. Corbett Natl. Park*: 127. 1986; R.D. Gaur, *Fl. Distr. Garhwal*: 460. 1999; Uniyal & al., *Fl. Uttarakhand Checkl.*: 197. 2007. *Nepeta indica* L., *Sp. Pl.*: 571–572. 1753. *Anisomeles ovata* R. Br. in *Ait.f., Hort. Key* (ed. 2) 3: 364. 1811; Hook.f., *Fl. Brit. India* 4: 672. 1885. *Marrubium indicum* (L.) Burm.f., *Fl. Indica*: 227. 1768.

Herbs, suffrutescent, erect, pubescent, to 1.2 m high; stems branched, quadrangular, densely appressed white pubescent. Leaves petiolate, broadly ovate, 3.5–9 x 2–5 cm, acute or short acuminate at apex, broadly

truncate to subcordate at base, crenate-serrate along the margins, pubescent on both sides. Flowers bluish-purple, rarely yellow, dense, many-flowered, in axillary interrupted whorls below, upper in spikes; calyx 5-toothed, hirsute, lanceolate, glandular pubescent, yellow glandular, teeth purple-red, triangular-lanceolate, ciliate; corolla bilipped, glabrous outside, tube funnel-form, upper lip oblong, margin entire; lower lip spreading, middle lobe obcordate, slightly undulate, bearded; lateral lobes ovate. Ovary glabrous. Nutlets smooth, shining, black.

Flowering & Fruiting: April–October.

Common along banks of canals, irrigation channels and roadsides, up to 2400 m.

Distribution: India (Himalayas), Cambodia, China, Laos, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Halduparao-Vatanwasa, R. *Manikandan* 122362, 122422 (BSD); Samir Sinha (2001).

Uses: Whole plant is used for rheumatism, colds, fevers, a Vatanvasaominal pain, skin sores, and snake bites; root powder with milk or extract given to avoid nocturnal emission; flowers as source of bee forage.

Notes: Shiny black nutlets are one of the distinctive features of the species.

4. *Clinopodium* L.

Clinopodium umbrosum (M. Bieb.) C. Koch., *Linnaea* 2: 673. 1848; P.C. Pant, *Fl. Corbett Natl. Park*: 127. 1986; R.D. Gaur, *Fl. Distr. Garhwal*: 460. 1999; Uniyal & al., *Fl. Uttarakhand Checkl.*: 198. 2007; Pusalkar & D.K. Singh, *Fl. Gangotri Natl. Park*: 513. 2012. *Melissa umbrosa* M. Bieb., *Fl. Taur.-Caucas.* 2: 63. 1808. *Calamintha umbrosa* (M. Bieb.) Fisch. & C.A. Mey. in *Index Sem. (St. Petersburg)* 6: 6. 1839; Hook.f., *Fl. Brit. India* 4: 650. 1885, *p.p.*; S.K. Mukerjee, *Rec. Bot. Surv. India* 14: 98. 1940. *Birchee*

Herbs, procumbent or decumbent, perennial, with a slender rootstock, to 40 cm high; stems few or several, branched, erect or ascending, slender, pilose with white spreading or retrorse hairs. Leaves shortly petioled, 1–3 x 0.5–2 cm, broadly ovate to ovate-oblong, subentire, crenulate to serrate, rounded at base, acute at apex, sparingly pilose especially on veins beneath, with or without scattered sessile oil globules. Flower white or pink to purple, 10–30-flowered, loose, remote, in terminal and axillary verticillasters; bracts 1.5–4 mm long; calyx curved, with long spreading eglandular hairs, teeth of upper lip triangular, teeth of lower lip subulate, ciliate; corolla tube included within or scarcely exerted from calyx teeth. Nutlets $\approx$ 0.8 x 0.5 mm, smooth, subglobose, with a white attachment scar.

Flowering & Fruiting: March–September.

Common in forest shade and damp places.

Distribution: India (Himalaya, South India), Afghanistan, Bhutan, Caucasus, China, Europe, Iran, Islands of S.E Asia, Malaysia, Myanmar, N.E. Sri Lanka, Taiwan, Turkey.

Uses: Plant extract used as astringent, carminative and as a blood purifier; leaf infusion used in gastric troubles.

Notes: Included on the authority of Samir Sinha (2001).

5. *Colebrookea* Sm.

Colebrookea oppositifolia Sm., *Exot. Bot.* 2: 111, t. 115. 1804; Hook.f., *Fl. Brit. India* 4: 642. 1885; S.K. Mukerjee, *Rec. Bot. Surv. India* 14: 84. 1940; P.C. Pant, *Fl. Corbett Natl. Park*: 127. 1986; R.D. Gaur, *Fl.*

Distr. Garhwal: 460. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 198. 2007; Pusalkar & D.K. Singh, Fl. Gangotri Natl. Park: 514. 2012. *C. temifolia* Roxb., Fl. Ind. Ed. 1832, 3: 25–26. 1832. *Binda, Bindu*

Shrubs, to 3.5 m high; stems much branched, subquadrangular, grooved, white-tomentose. Leaves petiolate, crowded at end of branches, elliptic-oblong, 10–20 x 3–10 cm, long acuminate at apex, broadly cuneate to rounded at base, crenate along margins, pubescent above, grey-white with woolly tomentose beneath. Flowers white, numerous, minute, 10–18-flowered, globose verticillasters, in paniculate spikes; calyx deeply divided up to base, campanulate, tube very short, becoming conspicuously ribbed; teeth subulate, spinescent, purple or white-plumose; corolla lobes subequal, pubescent, straight, emarginate; lower lip elongated, spreading, middle lobe ovate-oblong; stamens inserted on apical part of tube, included; style 2, as long as corolla. Nutlets obovoid-oblong, pubescent, hairy at tip, yellow-brown, with a small basal white scar.

Flowering & Fruiting: January–October.

Common in ravines, open rocky places, along borders of fields and as forest undergrowth.

Distribution: India (Himalayas, Central and South India), Bhutan, China, Indonesia, Myanmar, Nepal, Pakistan, Thailand.

Uses: Leaf paste applied on wounds, dried leaves as adulterant to tobacco, flowers an important sources of bee-forage in apiculture.

Notes: Commonly seen in the sanctuary.

6. *Isodon* (Schr. ex Benth.) Schr. ex Spach

Isodon coetsa (Buch.-Ham. ex D. Don) Kudo, Mem. Fac. Sci. Taihoku Imp. Univ. 2 (2): 131. 1929; Murata, Acta Phytotax. Geobot. 24: 82. 1969; H.W. Li, J. Arn. Arbor. 69(4): 368, f. 8 A–G. 1988; S. Suddee & al., Kew Bull. 59: 354. 2004. *Plectranthus coetsa* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 117. 1825; Hook.f., Fl. Brit. India 4: 619. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 44. 1940. *Rabdosa coetsa* (Buch.-Ham. ex D. Don) Hara, J. Jap. Bot. 47: 194. 1972; R.D. Gaur, Fl. Distr. Garhwal: 474. 1999. *Plectranthus coetsa* var. *hookeri* Hook.f., *l.c.* 620. *P. menthoides* Benth. in Wall., Pl. Asiat. Rar. 2: 17. 1830; Hook.f., *l.c.* 620. *Ocimum coetsa* (Buch.-Ham. ex D. Don) Spreng, Syst. Veg. 4(2): 223. 1827. *Plectranthus maddenii* Benth. ex Hook.f., *l.c.* 620; S.K. Mukerjee, *l.c.* 45. *Isodon maddenii* (Benth. ex Hook.f.) Murata, Acta Phytotax. Geobot. 22: 21. 1966. *Rabdosa maddenii* (Buch.-Ham. ex D. Don) Hara, J. Jap. Bot. 47: 198. 1972; R.D. Gaur, *l.c.* 475.

Herbs or undershrubs, erect, aromatic, to 2 m high; stems stout, simple or branched, pubescent or nearly glabrous. Leaves with slightly winged or wingless petioles, 3–15 x 1.2–7 cm, ovate, acuminate at apex, cuneate at base, crenate-serrate along the margins, glabrescent or softly pubescent, often hoary beneath. Flowers pale lavender or purple, few-flowered, lax, in axillary and terminal, paniculate racemes, subsecund; calyx campanulate, 10-ripped, teeth subequal, glabrous or hoary-pubescent; corolla tubular, deflexed, much shorter than lower saccate lips. Nutlets oblong or subglobose.

Flowering & Fruiting: September–January.

Common along the roadsides, moist shady places.

Distribution: India (Himalayas, Central India, Deccan Peninsula), China, Myanmar, Nepal, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

7. **Leonotis** (Pers.) R. Br.

Leonotis nepetifolia (L.) R. Br., Prodr. Fl. Nov. Holland.: 504. 1810 (as '*nepetaefolia*'); Hook.f., Fl. Brit. India 4: 691. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 185. 1940; P.C. Pant, Fl. Corbett Natl. Park: 128. 1986; R.D. Gaur, Fl. Distr. Garhwal: 465. 1999; Iwarsson & Y. Harvey, Kew Bull. 58: 632, 634. 2003 (as var. '*nepetifolia*'); Uniyal & al., Fl. Uttarakhand Checkl.: 199. 2007. *Phlomis nepetifolia* L., Sp. Pl.: 589. 1753.

Hejurchei, Lal-guma

Undershrubs, woody, to 2.5 m high; stems simple or branched, pubescent, stout, subquadrangular, grooved, with long internodes. Leaves petioled, opposite, 3.5–14.5 x 1.8–9 cm, ovate-lanceolate, acute-subacuminate at apex, cuneate to truncate at base, membranous, pubescent on both sides. Flowers scarlet or orange-red, many-flowered, in axillary, dense whorls; bracts linear-lanceolate, tip spiny; calyx tubular, incurved, ribbed, puberulose below, densely hispid above, mouth oblique, throat glabrous, teeth unequal, spine tipped, lower teeth triangular, shorter than upper; corolla bilipped, tube hairy inside with 3-parallel rings of white hairs, lower lip short; stamens didynamous. Nutlets *c.* 3.5 mm long, ovoid, obliquely truncate, pitted at apex, black.

Flowering & Fruiting: September–January.

Occasional along the roadsides and hedges in dry deciduous forests.

Distribution: India (almost throughout the country), America, Africa, S.E. Asia, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

8. **Leucas** R. Br.

- 1a. Stems terete; leaves leathery.....5. *L. lanata*
- 1b. Stems subquadrangular to quadrangular; leaves chartaceous or membranous.....2
- 2a. Bracts imbricating and forming involucre, covering floral heads.....2. *L. cephalotes*
- 2b. Bracts neither imbricating nor forming involucre3
- 3a. Calyx tube straight, mouth truncate.....3. *L. decemdentata*
- 3b. Calyx tube bent, mouth oblique.....4
- 4a. Herbs perennial; leaves with recurved margins4. *L. hyssopifolia*
- 4b. Herbs annual; leaves without recurved margins.....1. *L. biflora*

1. **Leucas biflora** (Vahl) R. Br., Prodr. Fl. Nov. Holland.: 504. 1810; Hook.f., Fl. Brit. India 4: 683. 1885; V. Singh, J. Econ. Taxon. Bot. Addit. Ser. 20: 49. 2001. *Phlomis biflora* Vahl, Symb. Bot. 3: 77. 1794.

Herbs, perennial, to 70 cm high; stems quadrangular, grooved, much branched, often procumbent with long internodes. Leaves petioled, ovate to elliptic, 1.2–4 x 0.8–2.8 cm, obtuse to subacute at apex, truncate at base, crenate-serrate along margins, hirsute above, tomentose beneath. Flowers white, 2–4-flowered, in axillary verticillasters; bracts *c.* 2 mm long, setaceous; calyx campanulate, lobes 10, unequal; corolla bilipped, upper lip white-woolly; stamens didynamous. Nutlets *c.* 3 mm across, ovoid, irregularly tuberculate, blackish.

Flowering & Fruiting: August–December.

Rare in moist places.

Distribution: India (Peninsular India, N. India), Sri Lanka.

Specimens examined: Rathnadhab, R. *Manikandan* 122572 (BSD); Vatanvasa, T.S. *Rana & Party* 218772 (LWG).

2. ***Leucas cephalotes*** (Koen. ex Roth) Spreng., Syst. Veg. 2: 743. 1825; Hook.f., Fl. Brit. India 4: 679. 1885; P.C. Pant, Fl. Corbett Natl. Park: 128. 1986; R.D. Gaur, Fl. Distr. Garhwal: 466. 1999; V. Singh, J. Econ. Taxon. Bot. 20: 53, f. 6. 2001; Uniyal & al., Fl. Uttarakhand Checkl.: 199. 2007. *Phlomis cephalotes* Koen. ex Roth, Nov. Pl. Sp.: 262. 1821. *Leucas capitata* Desf., Mem. Hist. Nat. 11: 8, t. 4. 1824. *L. plukenetii* auct. non (Roth) Spreng. 1825. *Bhidoo*

Herbs, erect, stout, scaberulous or pubescent, with spreading hairs, to 90 cm high; stems branched, subquadrangular. Leaves petioled, ovate-lanceolate, 3.5–9 x 1–3 cm, subacute at apex, cuneate at base, crenate-serrate along the margins, soft pubescent on upper sides, glandular-punctate beneath. Flowers white, many-flowered, dense, in terminal, globose whorls; bracts many, imbricate, forming involucre, covering floral heads, equal or slightly longer than sepals; calyx 6–10-toothed, teeth minute, unequal, tubular, pubescent above; corolla bilipped, lower lip slightly longer than upper. Nutlets smooth, brown.

Flowering & Fruiting: August–November.

Grows in waste places, along roadsides and near cultivated fields, up to 2500 m.

Distribution: India (Himalayas, Jammu & Kashmir, Punjab, Shiwalikh plains and almost other part country), Afghanistan, Bangladesh, Bhutan, China, Fizi, Nepal, Pakistan, Sri Lanka.

Specimens examined: Rathnadhab, R. *Manikandan* 122401 (BSD); Samir Sinha (2001).

Uses: Plant used as diaphoretic, anthelmintic and antiseptic as well as an antidote to snake-bite. The flowers are used in religious rites during Pitra paksha.

3. ***Leucas decemdentata*** (Willd.) R. Br. ex Sm. in Rees, Cycl.: 20. 1819; Benth., Labiat. Gen. Sp. 609. 1834 & in DC., Prodr. 12: 526. 1848; V. Singh, J. Econ. Taxon. Bot. Addit. Ser. 20: 67, f. 10. 2001. *Phlomis decemdentata* Willd., Sp. Pl. (ed. 4) 3: 124. 1800. *Leucas mollissima* Wall. ex Benth. in Wall., Pl. Asiat. Rar. 1: 62. 1830; Hook.f., Fl. Brit. India 4: 682. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 183. 1940; P.C. Pant, Fl. Corbett Natl. Park: 128. 1986; R.D. Gaur, Fl. Distr. Garhwal: 466. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 199. 2007. *L. mollissima* var. *scaberula* Hook.f., Fl. Brit. India 4: 682. 1885; S.K. Mukerjee, *l.c.* 184; Uniyal & al., *l.c.* *L. flaccida* var. *scaberula* (Hook.f.) S.R. Sriniv. in A.N. Henry & al., Fl. Tamil Nadu-Anal. 2: 176. 1987. *L. mollissima* subsp. *scaberula* (Hook.f.) Murti & Panigrahi, Fl. Bilaspur distr. 2: 487. 1999. *L. mollissima* subsp. *scaberula* Hook.f., *l.c.* 682. *L. montana* f. *scaberula* (Hook.f.) S.R. Paul, Bangladesh J. Bot. 6: 41. 1977. *L. mollissima* var. *pilosa* (Haines) S.K. Mukerjee, *l.c.* 184. *L. montana* var. *pilosa* Haines, Bot. Bihar Orissa 4: 749. 1922. *L. pilosa* var. *pubescens* Benth. in DC., Prodr. 12: 526. 1848. *L. pilosa* Benth. in Wall., Pl. Asiat. Rar. 1: 61. 1830. *L. pilosa* var. β Wall. ex Benth. in Wall., *l.c.* 62. *L. angularis sensu* Hook.f., *l.c.* 684, *p.p.*, non Wall. ex Benth. 1830. *Guma, Geeta Kushir, Halkhusa*

Herbs, slender, with straggling branches, to 80 cm high; stems subquadrangular, pubescent, hoary-tomentose or almost glabrous. Leaves petioled, ovate or ovate-lanceolate, 1.5–6 x 1–2.5 cm, acute at apex, cuneate at base, serrate along the margins, strigosely villous on upper surface, white-tomentose beneath. Flowers white, many-flowered, distant, in axillary whorls; calyx subsessile, 6–10-toothed, teeth minute, subequal, hispid or softly silky villous outside; corolla bilipped. Nutlets obliquely truncate at tip, brown.

Flowering & Fruiting: January–October.

Grows among bushes on clay soil in shady places on rocky areas, up to 2500 m.

Distribution: India (Himalayas, Central India, Sikkim), Australia, China, Europe, Fizi, Indo-China, Indonesia, Iran, Malesia, Myanmar, Nepal, Pakistan, Sri Lanka, Taiwan, Thailand.

Specimens examined: Way to Vatawasu, R. *Manikandan* 124960 (BSD); Samir Sinha (2001).

4. ***Leucas hyssopifolia*** Benth. in Wall., Pl. Asiat. Rar. 1: 60. 1832; Hook.f., Fl. Brit. India 4: 690. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 166. 1940; P.C. Pant, Fl. Corbett Natl. Park: 128. 1986; R.D. Gaur, Fl. Distr. Garhwal: 466. 1999; V. Singh, J. Econ. Taxon. Bot. Addit. Ser. 20: 93. 2001; Uniyal & al., Fl. Uttarakhand Checkl.: 199. 2007.

Suffruticose herbs, erect, perennial, to 80 cm high; stems many, much hispid, branched from a stout, woody root-stocks. Leaves subsessile, linear, obtuse at apex, entire or recurved along the margins, pubescent with stiff hairs on both sides. Flowers white, in axillary and terminal whorls; bracts spinulose, almost equal to calyx; calyx obconic, teeth erect, minute, equal, mucroniform, glabrous; corolla tube slender, slightly longer than calyx, pubescent above. Nutlets glandular-punctate, grayish-brown.

Flowering & Fruiting: June–September.

Grows in open grassy fields and shady slopes, up to 1600 m.

Distribution: India (Bihar, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Punjab, Sikkim, Uttar Pradesh, Uttarakhand, West Bengal), Myanmar, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

5. ***Leucas lanata*** Benth. in Wall., Pl. Asiat. Rar. 1: 61. 1832; Hook.f., Fl. Brit. India 4: 681. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 178. 1940; P.C. Pant, Fl. Corbett Natl. Park: 128. 1986; R.D. Gaur, Fl. Distr. Garhwal: 466. 1999; V. Singh, J. Econ. Taxon. Bot. Addit. Ser. 20: 97, f. 18, pl. 19. 2001; Uniyal & al., Fl. Uttarakhand Checkl.: 199. 2007. *Marrubium mollissimum* D. Don, Prodr. Fl. Nepal.: 112. 1825. *Leucas lanata* Baker, Fl. Trop. Afr. 5: 481. 1900, *nom. illeg.* *L. lanata* var. *nagpurensis* C.B. Clarke in Haines, Bot. Bihar Orissa 4: 747. 1922.

Herbs, erect, soft woolly or subsilky, with erect, spreading hairs, to 30 cm high; stems terete, soft tomentose, stout, much branched from woody root-stocks. Leaves subsessile or sessile, 2.5–6 x 1.2–3 cm, ovate, obtuse to acute at apex, rounded or cuneate at base, crenate-serrate along the margins, leathery, silky on both sides. Flowers white, many-flowered, dense, in axillary whorls; calyx 6–10-toothed, teeth minute, unequal, tube campanulate, densely silky villous; corolla bilipped. Nutlets oblong-ovoid.

Flowering & Fruiting: January–June.

Locally common in moist sunny and dry places.

Distribution: India (almost throughout the country), China, Indo-China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand.

Specimens examined: Way to Vatawasu, R. *Manikandan* 122583 (BSD); Samir Sinha (2001).

Uses: Plant infusion given with honey in the treatment of whooping cough, young shoots cooked as vegetables.

9. **Mosla** (Benth.) Buch.-Ham. ex Maxim.

Mosla dianthera (Buch.-Ham. ex Roxb.) Maxim., Bull. Acad. Petersb. 20: 457. 1865; Hook.f., Fl. Brit. India 4: 647. 1885; P.C. Pant, Fl. Corbett Natl. Park: 129. 1986; R.D. Gaur, Fl. Distr. Garhwal: 468. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 200. 2007. *Lycopus diantherus* Buch.-Ham. ex Roxb., Fl. Ind., ed. 1820, 1: 144. 1820. *Orthodon diantherus* (Buch.-Ham. ex Roxb.) Hand.-Mazz., Symb. Sin. 7(4): 933. 1936. *Mosla ocyroides* Buch.-Ham. ex Benth. in Wall., Pl. Asiat. Rar. 1: 66. 1830; S.K. Mukerjee, Rec. Bot. Surv. India 14: 101. 1940.

Herbs, erect, slender, strong aromatic, to 100 cm high; stems quadrangular, sparsely pubescent. Leaves petioled, 1.5–3.5 cm long, ovate, acute at apex, cuneate at base, entire or serrate along the margins, conspicuously glandular beneath. Flowers white or purplish, lax, few-flowered, in terminal, slender racemes; calyx much enlarged in fruits, teeth unequal, pubescent with ring of hairs; corolla bilipped, lips short; stamens perfect posterior, staminodes anterior. Nutlets reticulate, brown or black.

Flowering & Fruiting: August–October.

Common; way sides, grass slopes, vacant cropfields.

Distribution: India (submontane to montane Himalaya), Bhutan, China, Myanmar.

Notes: Included on the authority of Samir Sinha (2001).

10. **Nepeta** L.

Nepeta graciliflora Benth. in Wall., Pl. Asiat. Rar. 1: 65. 1830; Hook.f., Fl. Brit. India 4: 663. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 134. 1940; P.C. Pant, Fl. Corbett Natl. Park: 129. 1986; R.D. Gaur, Fl. Distr. Garhwal: 470. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 200. 2007.

Herbs, erect or ascending, slender, annual or short-lived perennial, to 60 cm high; stems quadrangular, simple or many, branching from the base, pubescent or nearly glabrous. Leaves long petioled, rather flaccid, 2–5 x 1–3 cm, ovate to ovate-triangular, acute at apex, truncate or cordate at base, crenate-serrate along the margins, glabrescent on both sides. Flowers pale bluish-purple, with deeper dots, few-flowered, in axillary and terminal whorls, forming loose, drooping panicles; bracts linear-subulate, ciliate, shorter than calyx; calyx teeth aristate, unequal, shorter than tube; corolla bilipped, tube exerted. Nutlets $c.$ 1.2 x 0.6 mm, broad ellipsoid, flat-tuberculate, somewhat flattened, with a bibbed areole, brown.

Flowering & Fruiting: March–November.

Common on hillslopes near mixed forests and along the roadsides.

Distribution: India (Submontane to montane Himalaya, Punjab to Kumaon), Pakistan.

Specimens examined: Rathuadhab, R. *Manikandan* 124964, 124919 (BSD); Samir Sinha (2001).

Uses: Flowers an important source of bee forage.

11. **Orthosiphon** Benth.

Orthosiphon rubicundus (D. Don) Benth. in Wall., Pl. Asiat. Rar. 2: 14. 1830; Hook.f., Fl. Brit. India 4: 614. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 25. 1940; P.C. Pant, Fl. Corbett Natl. Park: 129. 1986; R.D. Gaur, Fl. Distr. Garhwal: 472. 1999; S. Suddee & al., Kew Bull. 60: 8. 2005; Uniyal & al., Fl. Uttarakhand Checkl.: 201. 2007. *Plectranthus rubicundus* D. Don, Prodr. Fl. Nepal.: 116. 1825.

Undershrubs, erect, to 60 cm high; stems and branches pubescent, slender, quadrangular, slightly grooved, with stout, tuberous, fusiform root-stocks. Leaves sessile, ovate-oblong, acute at apex, cuneate at

base, serrate along the margins, often glaucous beneath. Flowers white or pinkish, few-flowered, whorls in racemes; calyx tubular, teeth subulate, throat naked; corolla bilipped, tube exserted, twice as long as calyx, pubescent; stamens didynamous, slightly exserted. Nutlets obovoid or ellipsoid, compressed, brownish.

Flowering & Fruiting: June–October.

Grows in moist shady places near deciduous forests.

Distribution: India (Himalaya, Bihar, North and South India), Myanmar, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

12. *Perilla* L.

Perilla frutescens (L.) Britt., Mem. Torr. Bot. Club 5: 277. 1894; P.C. Pant, Fl. Corbett Natl. Park: 129. 1986; R.D. Gaur, Fl. Distr. Garhwal: 472. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 201. 2007. *Ocimum frutescens* L., Sp. Pl. 2: 597. 1753. *Perila ocyroides sensu* Hook.f., Fl. Brit. India 4: 646. 1885, *non* L. 1764; S.K. Mukerjee, Rec. Bot. Surv. India 14: 85. 1940. Bhang Jeera

Herbs, bushy, annual, aromatic, to 120 cm high; stems branched, grooved, quadrangular, villously hairy, often shaggy. Leaves long petioled, 4.5–15 x 2–6.5 cm, broadly ovate, acuminate at apex, rhomboid or cuneate at base, coarsely serrate or crenate along the margins, hairy above and on nerves beneath. Flowers white, few-flowered, lax, in axillary and terminal, whorls forming racemes; calyx 5-toothed, campanulate, teeth equalling tube, glabrous outside, with a ring of hairs on throat; corolla bilipped, tube slightly exserted, villous. Nutlets rounded, with reticulate marks, pale brown.

Flowering & Fruiting: August–October.

Grows in moist shady places and disturbed areas and along roadside.

Distribution: India (Himalaya), Bhutan, China, Japan, Malaysia, Myanmar, Nepal.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122512 (BSD); Samir Sinha (2001).

Uses: Leaves and flower tops used as flavouring; seeds edible or used as condiments. Plant extract or dried parts used for cough, bronchitis and uterine ailments; leaf paste applied on rheumatic arthritis; flowers important.

13. *Plectranthus* L' Her.

Plectranthus japonicus (Burm.f.) Koidz., Bot. Mag. Tokyo 43: 386. 1929; Andrews, Bot. Repos. 9: t. 594. 1809; Willemse, Blumea 25: 509. 1979; P.C. Pant, Fl. Corbett Natl. Park: 129. 1986; S. Suddee & al., Kew Bull. 59: 389. 2004; Uniyal & al., Fl. Uttarakhand Checkl.: 201. 2007. *Scutellaria japonica* Burm.f., Fl. India: 130. 1768. *Coleus forskohlii sensu auctt.* Briq. (*non Plectranthus forskohlaei* Willd. 1800) in Engler & Prantl, Nat. Pflanzenfam. 4 (3A): 359. 1897; S.K. Mukerjee, Rec. Bot. Surv. India 14: 53. 1940, *p.p.*; R.D. Gaur, Fl. Distr. Garhwal: 461. 1999, *p.p.*

Herbs, ascending, perennial, to 60 cm high; stems stout, woody at the base, arising from thick, fleshy root-stocks. Leaves short petioled, 5–10 cm long, ovate or obovate, obtuse at apex, narrowed at base, crenate along the margins, densely pubescent on both surfaces, faintly gland dotted beneath. Flowers bluish, with red gland outside, 6–10-flowered, in spiciform racemes; bracts conspicuous, broadly ovate, deciduous; calyx bilipped, subulately pointed teeth, pungent, glandular hairy outside, with ring hairs within; corolla tube bent at right angle, bilipped, upper subequally 4-lobed. Nutlets smooth, dark brown.

Flowering & Fruiting: June–October.

Grows in open places and moist shady places.

Distribution: India (Deccan Peninsula, Gujrat, Himalayas, Konkan, Madhya Pradesh), Nepal.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124857 (BSD).

14. *Pogostemon* Desf.

Pogostemon benghalensis (Burm.f.) Kuntze, Revis. Gen. Pl. 2: 529. 1891; P.C. Pant, Fl. Corbett Natl. Park: 130. 1986; Bhatti & Ingrouille, Bull. Nat. Hist. Mus. Lond. (Bot.) 27: 89, f. 4a, 14a. 1997; R.D. Gaur, Fl. Distr. Garhwal: 473. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 202. 2007. *Origanum benghalensis* Burm.f., Fl. Indica: 128, t. 38, f. 3. 1768. *Pogostemon parviflorus* Benth. in Wall., Pl. Asiat. Rar. 1: 31. 1831; Hook.f., Fl. Brit. India 4: 632. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 68. 1940. *P. plectranthoides* Desf., Ann. Mus. Paris. 2: 155. 1815; Benth. in DC., Prodr. 12: 151. 1848; Hook.f., Fl. Brit. India 4: 632. 1885; S.K. Mukerjee, *l.c.* 69. *P. pubescens* Benth. in DC., Prodr. 12: 152. 1848. *Kalisuhali*

Undershrubs, aromatic, to 1.5 m high; stems and branches quadrangular, purple, puberulous or glabrous. Leaves petioled, 4.5–15 x 2.5–7.5 cm, ovate or ovate-lanceolate, acute at apex, truncate at base, irregularly crenate-dentate along margins, glabrous. Flowers white with purple spots, in terminal, dense, cylindrical or one sided, paniculate spikes; bracts ovate, foliaceous, pubescent; calyx purplish, lobes lanceolate, teeth triangular, glandular-pubescent; corolla bilipped, tube exserted. Nutlets minute, ellipsoid, brownish.

Flowering & Fruiting: March–September.

Common in shady and moist places along the edges of fields.

Distribution: India (Himalayas, C. & S. India), Nepal.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122538, 124830, 122438 (BSD); Vatanvasa forest, H.C. Pande 218042 (LWG).

Uses: Leaf extract with water given in colic and fever; flowers an important source of bee forage, plant is a good soil binder.

15. *Salvia* L.

Salvia plebeia R. Br., Prodr.: 500–501. 1810; Hook.f., Fl. Brit. India 4: 655. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 111. 1940; P.C. Pant, Fl. Corbett Natl. Park: 130. 1986; R.D. Gaur, Fl. Distr. Garhwal: 476. 1999; Rana & al., Fl. Tons valley: 278. 2003; Uniyal & al., Fl. Uttarakhand Checkl.: 202. 2007. *S. brachiata* Roxb., Fl. Ind. 1: 146–147. 1820. *Ocimum virgatum* Thunb., Fl. Jap.: 250. 1784. *Lumnitzera fastigiata* (Roth) Spreng., Syst. Veg. 2: 67. 1825. *Ocimum fastigiatum* Roth, Nov. Pl. Sp.: 277. 1821. *Samundar sokh*

Herbs, small, annual, erect, to 45 cm high; stems suffrutescent, fastigately branched, obtusely quadrangular, grooved, purplish at base, roughly pubescent. Leaves petioled, 3–7 x 1–3 cm, ovate or oblong-lanceolate, narrowed at base, crenate along the margins, glabrous or sparsely hairy. Flowers white or lilac, 6-flowered, distant whorls, in erect, glandular, spicate racemes, forming panicles; calyx bell-shaped, accrescent in fruit; corolla tube exserted, annulate within. Nutlets minute, ovoid, brown.

Flowering & Fruiting: February–July.

Grows in depressed places and dried up ditches, up to 1200 m.

Distribution: India (almost throughout the country), Australia, China, Malaysia.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125600, 122566 (BSD); Vatanvasa, H.C. Pande 220734 (LWG).

16. *Scutellaria* L.

Scutellaria repens Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 110. 1825; Hook.f., Fl. Brit. India 4: 669. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 146. 1940; P.C. Pant, Fl. Corbett Natl. Park: 130. 1986; R.D. Gaur, Fl. Distr. Garhwal: 478. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 203. 2007. *S. cana* Wall. ex Benth., Pl. Asiat. Rar. 1: 67. 1830. *S. walliana* A. Ham., Monogr. Scutellaria: 28, t. 2, f. 1. 1832. [Plate-15h]

Herbs, annual, stout; stems much branched, branches diffuse, ascending, pubescent or tomentose. Leaves petioled, 1.5–4.5 x 0.7–2 cm, ovate, acute at apex, truncate or rounded at base, crenate-serrate or subentire along the margins, rough with minute stiff hairs on both sides. Flowers dull yellow or purple, in simple or branched racemes; calyx bilipped; corolla tube slender, recurved, equal to lips, puberulous. Nutlets minutely granulate.

Flowering & Fruiting: April–July.

Grows along the waysides in shady places.

Distribution: India (Sumontane and montane Himalaya), Myanmar.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125635 (BSD); Samir Sinha (2001).

Uses: Paste of leaves used in arthritis and muscular strains, bathing by leaf infusion of plants keeps away diseases from infants.

17. *Teucrium* L.

Teucrium quadrifarium Buch.-Ham. in D. Don, Prodr. Fl. 235 quam. 108. 1825; Hook.f., Fl. Brit. India 4: 701. 1885; S.K. Mukerjee, Rec. Bot. Surv. India 14: 218. 1940; Raizada, Suppl. Fl. Upper Gangetic Plain: 227. 1976; R.D. Gaur, Fl. Distr. Garhwal: 479. 1999; Rana & al., Fl. Tons valley: 279. 2003; Uniyal & al., Fl. Uttarakhand checkl.: 203. 2007. *Bilmga* [Plate-16a]

Herb, erect, stout, to 110 cm high; stems simple or branched, terete, tomentose or villous. Leaves petioled, often turn reddish-pink, 2.5–7 x 1.4–5 cm, broadly ovate or oblong-ovate, acute at apex, cordate at base, serrate-serrulate along the margins, hirsute above, grayish-tomentose beneath. Flowers pale pink or purple, in terminal racemes; bracts prominent, purple, leafy, much larger than calyx, broadly ovate-cordate; calyx 5-toothed, upper one larger, pubescent outside, campanulate; corolla twice as long as calyx, lower lip only with 5-lobes. Nutlets triquetrous, sub globose, rugose.

Flowering & Fruiting: June–November.

Rare in open moist places and on rocky slopes near deciduous forests.

Distribution: India (Himalaya, Kashmir, Sikkim), Asia, China.

Specimens examined: Pauri: On way to Rathudhab, T.S. Rana & party 220197, 220265 (LWG); Rathuadhap-Vatanvasa; Sonanadi WLS, R. *Manikandan* 124970, 124950, 124968 (BSD).

Uses: Root chewed for sore throat; infusion of leaves used as abortification.

76. PLANTAGINACEAE

Plantago L.

Plantago erosa Wall. in Roxb., Fl. Ind. 1820, 1: 423. 1820; R.K. Gupta, Fl. Nainital: 283. 1968; R.D. Gaur, Fl. Distr. Garhwal: 480. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 203. 2007. *P. major sensu* Hook.f., Fl. Brit. India 4: 705. 1885, *p.p.*, *non* L., 1753. *Luburya*

Herbs, perennial, erect, to 60 cm high. Leaves petioled, all basal, ovate-elliptic or obovate, 6–16 x 4–6 cm, base decurrent, apex acute or obtuse, margin entire or obscurely dentate, glabrous, 5–7-nerved. Flowers yellowish-green, many, in spicate racemes on 5–12 scapes; rachis glabrous; bracts ovate, *c.* 1.5 mm long, persistent; calyx persistent, 4-lobed, glabrous, lobes ovate, mid rib ridged; corolla tubular, 4-lobed, ovate, glabrous; stamens 4, exserted. Ovary glabrous. Capsules ovoid, *c.* 5 mm long, glabrous, brown; seeds 8–16, compressed, ovoid, glabrous, dark brown.

Flowering & Fruiting: May–October.

Common in wet and marshy places across subtropical hills to temperate forests, up to 2000 m.

Distribution: India (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand, West Bengal), Afghanistan, Bhutan, China, Nepal, Sri Lanka.

Specimens examined: Vatanvasa-Halduparao, *H.C. Pande* 220798 (LWG), *R. Manikandan* 124951, 125690 (BSD).

Use: Leaves and seed paste applied on cuts, wounds and piles.

77. NYCTAGINACEAE

Boerhavia L.

Boerhavia diffusa L., Sp. Pl.: 3. 1753; P.C. Pant, Fl. Corbett Natl. Park: 130. 1986; R.D. Gaur, Fl. Distr. Garhwal: 111. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 203. 2007. *B. repens* L., Sp. Pl.: 3. 1753. *B. repens* var. *diffusa* Hook.f., in Hook.f., Fl. Brit. India 4: 709. 1885. *B. procumbens* Banks ex Roxb., Fl. Indica (ed. 1820) 1: 148. 1820, *nom. superfl.* *Pundera*, *Punarnava*, *Sant*

Herbs, perennial, creeping or hanging on walls, to 60 cm high; stems glabrous or rusty puberulous, swollen at the node, green, often tinged with purple. Leaves petioled, ovate-rounded or suborbicular, 3–5 x 0.5–4 cm, apex rounded or acute, base subcordate to truncate, margin entire or slightly undulate. Flowers rose to pale pink, in terminal or axillary panicle, glandular-viscid, heads or umbels; bracts 1–3, linear-lanceolate, deciduous; perianth campanulate, tube glandular hairy, limb 5-lobed; stamens 1–3, filaments wiry, free above, slightly exserted; style erect, terminal; stigma peltate, slightly exserted. Fruits clavate, club-shaped, obovoid or fusiform, bluntly 5-ribbed, *c.* 4 x 2 mm, pubescent, glandular-viscid outside; seed 1, minute.

Flowering & Fruiting: June–December.

Common usually in open waste places and margin of crop fields.

Distribution: India (throughout the country), Africa, Australia, Central America, China, Europe, Malaya Peninsula, Malaysian Islands, Myanmar, Nepal, North America, Pacific Islands, Pakistan, Philippine Islands, South America, Sri Lanka, Vietnam, Yunan.

Specimens examined: On way to Mundiapani, *H.C. Pande* 220709 (LWG); *R. Manikandan* 124834, 125640, 122449 (BSD).

Uses: Root decoction is used as an expectorant, diuretic, laxative, purgative, anthelmintic and febrifuge. It is also used effectively in asthma, heart and kidney diseases. Leaves and tender shoots are often eaten as vegetables; leaf extract is used as antidote of snake-bite, eye complaints, skin diseases and jaundice. Infusion of plants is used in bronchitis and asthma.

Cultivated Species:

Bougainvillea spectabilis Willd., Sp. Pl. ed. 4, 2(1): 348. 1799; Bailey, Stand. Cycl. Hort. 1: 533. 1919.

Straggling shrubs, armed, pubescent. Leaves ovate-elliptic to oblong, subcordate to acute at base, entire along margins. Flowers pale yellow, white within, purplish-black, in 1–7-flowered paniculate cymes.

Flowering & Fruiting: February–June.

Distribution: Cultivated in gardens and as a hedge plant. Adjoining villages of the Sanctuary.

Specimens examined: Mundiapani, T.S. Rana & Party 220869 (LWG).

78. AMARANTHACEAE

- 1a. Leaves alternate 2
- 1b. Leaves opposite 4
- 2a. Herbs 3
- 2b. Subshrubs or shrubs 5. **Deeringia**
- 3a. Flowers white, in spikes; utricles oblong 2. **Aerva**
- 3b. Flowers greenish, in racemes; utricles ovoid 4. **Amaranthus**
- 4a. Herbs; utricles usually glabrous 5
- 4b. Shrubs; utricles surrounded by hooked bristles 8. **Pupalia**
- 5a. Stems erect; flowers in elongated spikes 1. **Achyranthes**
- 5b. Stems usually prostrate or decumbent 6
- 6a. Flowers yellowish or white 7
- 6b. Flowers pink- violet 7. **Psilotrichum**
- 7a. Utricles obcordate; seed 1 3. **Alternanthera**
- 7b. Utricles ovoid; seeds more than 1 6. **Gomphrena**

1. **Achyranthes** L.

- 1a. Flowers light pink 1. *A. aspera*
- 1b. Flowers greenish 2. *A. bidentata*

1. **Achyranthes aspera** L., Sp. Pl. 1: 204. 1753; Hook.f., Fl. Brit. India 4: 730. 1885; P.C. Pant, Fl. Corbett Natl. Park: 131. 1986; R.D. Gaur, Fl. Distr. Garhwal: 116. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 204. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 68. 2009. *A. aspera* var. *porphyristachya* Hook.f., Fl. Brit. India 4: 730. 1753; R.K. Gupta, Fl. Nainital: 285. 1968. *Latjiri, Lichkuri*

Herbs, perennials, erect, to 60 cm high; stems stout, few-branched, pubescent. Leaves sessile or subsessile, opposite, ovate-elliptic or obovate, 3–9 x 1–4 cm, base cuneate, apex acuminate, margins entire, sparsely pubescent. Flowers light pink, in axillary and terminal spicate racemes, rachis appressed pubescent; bracts ovate-lanceolate, acuminate, spinescent; tepals 5, scarious, lanceolate, *c.* 2 x 0.5 mm, acuminate, awned. Utricles oblong-ovoid, *c.* 1.5 mm long, glabrous, black.

Flowering & Fruiting: March–December.

Common in gardens, roadsides and waste places, up to 2300 m.

Distribution: India (throughout the country), Pantropics.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124886, 122335 (BSD).

Uses: Root infusion is taken to cure malarial fever; plant decoction used in dropsy and bronchitis (Gaur, 1999).

2. ***Achyranthes bidentata*** Blume, Bijdr. Fl. Ned. Ind. 11: 545. 1826; Hook.f., Fl. Brit. India 4: 730. 1885; R.K. Gupta, Fl. Nainital.: 286. 1968; P.C. Pant, Fl. Corbett Natl. Park: 131. 1986; R.D. Gaur, Fl. Distr. Garhwal: 117. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 204. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 68. 2009.

Chicheree, Latjira

Herbs or a weak undershrubs, perennials, erect, to 70 cm high; stems striated. Leaves subsessile to shortly petiolate, opposite, obovate or obovate-elliptic or ovate-lanceolate, 2.5–14 x 0.8–4.5 cm, base cuneate, apex acuminate, margin entire, pubescent; petioles to 1 cm long. Flowers in axillary and terminal spicate racemes, greenish; rachis appressed pubescent; bracts lanceolate, aristate; tepals 5, lanceolate, *c.* 1.5 x 0.5 mm, acuminate. Utricles oblong, *c.* 1.5 mm long, glabrous, brownish-black.

Flowering & Fruiting: August–October.

Common, on open hill slopes in sandy soil, in shady and moist places, in margin of forests.

Distribution: India (Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand, West Bengal), Bhutan, China, Japan, Indonesia, Sri Lanka.

Specimens examined: Sandikhal-Vatanvasa, H.C. Pande 220132 (LWG); Samir Sinha (2001)

2. ***Aerva*** Forssk.

Aerva sanguinolenta (L.) Blume, Bijdr. Fl. Ned. Ind. 11: 547. 1826; R.K. Gupta, Fl. Nainital.: 285. 1968; P.C. Pant, Fl. Corbett Natl. Park: 131. 1986; R.D. Gaur, Fl. Distr. Garhwal: 117. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 204. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 69. 2009. *Achyranthes sanguinolenta* L., Sp. Pl., ed. 2, 1: 294. 1762. *A. scandens* Roxb., Fl. Ind., ed. Carey & Wall. 2: 503. 1824 & Fl. Ind., ed. Carey, 1: 676. 1832; Hook.f., Fl. Brit. India 4: 727. 1885. *Aerva scandens* (Roxb.) Wight, Icon. Pl. Ind. Orient. 2(4): t. 724. 1840.

Safed fulia

Herbs or undershrubs, perennials, erect or straggling, to 80 cm high; stems pubescent. Leaves subsessile to shortly petiolate, alternate, rarely opposite, ovate or ovate-elliptic, 1.5–6 x 0.4–2.5 cm, base cuneate, apex acute or apiculate or shortly acuminate, margin entire, pubescent; petioles to 6 mm long. Flowers polygamous, clustered, in axillary and terminal, ovoid-oblong, short spikes, white; rachis appressed-pubescent; bracts ovate, obtuse; tepals 5, lanceolate, acuminate, pubescent without. Utricles oblong, *c.* 1 mm long, glabrous, black.

Flowering & Fruiting: September–May.

Common, on open ravines, on open hill slopes, in sandy soil, in margin of forests, up to 1500 m.

Distribution: India (almost throughout the country), Bhutan, China, Japan, Myanmar, Pakistan, Philippines, Sri Lanka.

Specimens examined: Rathuadhab-Vatanvasa, R. *Manikandan* 125746, 122396, 122449, 122462 (BSD); Vatanvasa, H.C. Pande 220733 (LWG).

3. *Alternanthera* Forssk.

***Alternanthera sessilis* (L.) R. Br.** Ex DC., Cat. Pl. Horti Monsp.: 77. 1813; Hook.f., Fl. Brit. India 4: 731. 1885; P.C. Pant, Fl. Corbett Natl. Park: 131. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India 42, f. 22 c–d. 1996; R.D. Gaur, Fl. Distr. Garhwal: 118. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 204. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 71. 2009. *Gomphrena sessilis* L., Sp. Pl.: 225. 1753. *Alternanthera sessilis* R. Br., Prodr. Fl. Nov. Holland.: 417. 1810, *nom. invalid.*

Herbs, erect or prostrate or decumbent-ascending, to 70 cm long; stems branched, quadrangular, pubescent and rooting at nodes near base. Leaves petioled, opposite, equal, ovate-elliptic or oblanceolate-oblong, 1.3–6 x 0.2–2 cm, base cuneate, apex acute or obtuse, margins subentire or denticulate, glabrous or pubescent. Flowers white, 1–4, in axillary, cylindric spikes; bracts ovate, acuminate, glabrous; bracteoles same as bracts; tepals 5, subequal, ovate, acuminate, glabrous. Utricles obcordate; seed 1, brown.

Flowering & Fruiting: Throughout the year.

Abundant, in fields, marshy places, road sides, waste places, ditches and on the edges of aquatic grassland, to 800 m.

Distribution: India (throughout), Bangladesh, Bhutan, China, Japan, Indonesia, Myanmar, Nepal, Pakistan, Sri Lanka; Pantropical.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122576 (BSD)

Notes: This species is very variable with regard to habit, shape and size of leaves, degree of pubescence, and number of spikes.

4. *Amaranthus* L.

- 1a. Flowers in axillary clustered spikes; bracts mucronate; tepals 5 1. *A. spinosus*
 1b. Flowers in axillary and terminal spicate racemes; bracts acute; tepals 3 2. *A. viridis*

1. ***Amaranthus spinosus* L.**, Sp. Pl. 2: 991. 1753; Hook.f., Fl. Brit. India 4: 718. 1884; P.C. Pant, Fl. Corbett Natl. Park: 131. 1986; R.D. Gaur, Fl. Distr. Garhwal: 119. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 24. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 73. 2009. *Chaulai*, *Jangli chaulai*

Herbs, annual, erect or decumbent, branched, to 25 cm high. Leaves petiolate, ovate or rhomboid-ovate, 1.5–12 x 1–5.5 cm, base cuneate or attenuate, apex subacute or obtuse or mucronate, margins entire, glabrous or sparsely pubescent on veins below. Flowers greenish, in axillary clustered spikes, female flowers at base; male flowers at above; bracts membranous, ovate, mucronate; tepals 5, oblong-spathulate or oblong, acute or obtuse. Utricles ovoid, c. 2 mm long, smooth; seeds black, shining, faintly reticulate.

Flowering & Fruiting: July–September.

Common, found in waste places, roadsides, fields, open dry places, between 1000 to 3100 m.

Distribution: India (throughout the country), Cosmopolitan.

Specimens examined: Way to Adnala, R. *Manikandan* 122584 (BSD).

Uses: Leaves used as vegetable; infusion of leaves with salt is given in dismenorrhoea.

2. **Amaranthus viridis** L., Sp. Pl.: 1405. 1763; Hook.f., Fl. Brit. India 4: 720. 1884; P.C. Pant, Fl. Corbett Natl. Park: 132. 1986; R.D. Gaur, Fl. Distr. Garhwal: 119. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 204. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 73. 2009. *A. gracilis* Desf., Tabl. École Bot.: 43. 1804.
Jangli chaulai

Herbs, annual, erect, much branched, glabrous, to 60 cm high; stems striate. Leaves alternate, petiolate, obovate or deltoid-ovate, 1.5–7 x 1–3 cm, base cuneate or decurrent, apex acute or obtuse, margins subentire-repand, glabrous; petioles to 4 cm long. Flowers greenish, in axillary and terminal spicate racemes; bracts ovate, acute; tepals 3, oblong-lanceolate, acute or mucronate. Utricles compressed, ovoid, c. 2 mm long, smooth, glabrous; seeds dark brown.

Flowering & Fruiting: January–December.

Common in open waste places, as an escape, in roadsides and edges of forests, up to 1500 m.

Distribution: India (almost throughout the country), Africa, America, Bhutan, China, Indonesia, Japan, Myanmar, Nepal, Pakistan.

Specimens examined: Mundiapani, H.C. Pande 220824, 220723 (LWG).

Use: Young shoots and leaves used as vegetables.

5. **Deeringia** R. Br.

Deeringia amaranthoides (Lam.) Merr., Interpr. Rumph. Herb. Amboin. 9: 211. 1917; P.C. Pant, Fl. Corbett Natl. Park: 132. 1986; R.D. Gaur, Fl. Distr. Garhwal: 121. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 204. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 74. 2009. *Achyranthes amaranthoides* Lam., Encycl. 1: 548. 1785. *Deeringia celosioides* R. Br., Prodr. Fl. Nov. Holland.: 413. 1810; Hook.f., Fl. Brit. India 4: 714. 1885.

Kalalori, Wali

Shrubs or undershrubs, erect or scandent, much-branched, to 2 m high; branches often drooping. Leaves petiolate, alternate, ovate or ovate-lanceolate, 4–12 x 3–7 cm, base rounded or oblique or cuneate, apex acute-acuminate, margins subentire to obscurely crenulate, glabrescent. Flowers white or pink, in axillary racemes or terminal panicles; bracts ovate, triangular, acute; tepals 5, ovate, concave, c. 2 x 1 mm, obtuse; stigma 3-lobed; style absent. Fruits ellipsoid or subglobose, c. 5 mm long, glabrous, scarlet red; seeds 2 or 3, black.

Flowering & Fruiting: March–December.

Common, on open slopes, in margins of forests, in hedges, ravines, to 1300 m.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, China.

Specimens examined: Vatanvasa, Hussian & Pande 218774 (LWG); Samir Sinha (2001).

6. **Gomphrena** L.

Gomphrena serrata L., Sp. Pl.: 224. 1753; J.A. Mears, Taxon 29: 86. 1980; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 145. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 75. 2009. *G. celosioides* auct. non Mart. 1826.

Herbs, prostrate to erect, to 30 cm high; young parts with dense white appressed hairs; much branched. Leaves sessile, opposite, 1.2–3.8 x 0.6–1.2 cm, elliptic-oblong, subacute at apex, cuneate at base, entire along the margins. Flowers yellowish-white, in axillary and terminal heads or spikes; perianth segments 5, free. Utricles indehiscent, smooth; seeds ovoid, notched on one side.

Flowering & Fruiting: Almost throughout the year.

Common weed in dry open situations.

Distribution: India (almost throughout the country), Native to Americas.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124943 (BSD).

7. *Psilotrichum* Blume

Psilotrichum ferrugineum (Roxb.) Voigt, Hort. Suburb. Calcutt.: 318. 1845. *P. ferrugineum* (Roxb.) Moq. in DC., Prodr. 13(2): 279. 1849; Hook.f., Fl. Brit. India 4: 725. 1885; P.C. Pant, Fl. Corbett Natl. Park: 132. 1986; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 145. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 76. 2009.

Herbs, annual, diffused or decumbent, to 10 cm high. Leaves subpetiolate, opposite, ovate-elliptic, 5–28 x 3–12 mm, base cuneate, apex acute-mucronate, margins entire, glabrous. Flowers pink to violet, solitary heads, in axillary ovoid spikes or 2–3, in terminal ovate-oblong spikes; bracts oblong-ovate, obtuse. Tepals 5, ovate-lanceolate, $\approx$ 2 x 1 mm, acuminate, base rounded, dorsally striated. Utricles indehiscent, compressed, globose, $\approx$ 1.5 mm long, glabrous; seeds subglobose, black, shining.

Flowering & Fruiting: August–October.

Rare, in grassy slopes, on shady moss covered rocks, around 1800 m.

Distribution: India (Uttarakhand, West Bengal), Bhutan, China, Nepal.

Notes: Included on the authority of Samir Sinha (2001).

8. *Pupalia* Juss.

Pupalia lappacea (L.) Juss., Ann. Mus. Natl. Hist. Nat. 2: 132. 1803; Hook.f., Fl. Brit. India 4: 724. 1885; P.C. Pant, Fl. Corbett Natl. Park: 132. 1986; R.D. Gaur, Fl. Distr. Garhwal: 122. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 145. 2007; Karthik. & al., Flow. Pl. India-Dicot. 1: 76. 2009. *Achyranthes lappacea* L., Sp. Pl.: 204. 1753.

Undershrubs, erect, to 1 m high; stems hard, appressed pubescent. Leaves petiolate, opposite, ovate or elliptic or elliptic-lanceolate, 4–10 x 1.5–4 cm, base cuneate or rounded, apex acute or shortly acuminate, margins entire, glabrescent above, pubescent beneath. Flowers greenish-white, in laxly arranged heads of axillary or terminal spikes; rachis slender, pubescent; bracts ovate, acuminate; bracteoles ovate-oblong, apiculate; tepals 5, lanceolate, aristate, 3-nerved, woolly tomentose; sterile reduced to hooked awns. Utricles indehiscent, membranous, ovoid, $\approx$ 1.5 mm long, beaked at apex, surrounded by hooked bristles; seed 1, subglobose, black, shining.

Flowering & Fruiting: September–December.

Common or scattered, in waste places, edges of forests, road sides, to 1200 m.

Distribution: India(almost throughout throughout the country), Africa, Bangladesh, Bhutan, China, Nepal, Pakistan, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

79. CHENOPODIACEAE

Chenopodium L.

- 1a. Leaves ovate-oblong or rhombic-ovate; acute at apex; stigmas 21. *C. album*
 1b. Leaves lanceolate or oblong-lanceolate; obtuse at apex; stigmas 3–5 2. *C. ambrosioides*

1. ***Chenopodium album*** L., Sp. Pl.: 219. 1753; Hook.f., Fl. Brit. India 5: 3. 1886; P.C. Pant, Fl. Corbett Natl. Park: 132. 1986; R.D. Gaur, Fl. Distr. Garhwal: 114. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 205. 2007.

Herbs, annual, erect, to 90 cm high; stems simple or much branched, terete, greenish-white. Leaves petioled, alternate, variable, ovate-oblong or rhombic-ovate, 2–8 x 1–3 cm, base cuneate, apex acute, glabrous above, farinose beneath, margins usually entire or dentate-serrate. Flowers greenish, bisexual, in axillary divaricate cymes arranged into small or large panicles; perianth segments 5-parted; stamens 5; anthers exserted; stigmas 2. Fruits enclosed in perianth segments; seeds horizontal, small, black.

Flowering & Fruiting: April–October.

Grows in cultivated fields and gardens.

Distribution: India (throughout in tropical part of the country), throughout the world.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Chenopodium ambrosioides*** L., Sp. Pl.: 219. 1753; Hook.f., Fl. Brit. India 5: 4. 1886; P.C. Pant, Fl. Corbett Natl. Park: 133. 1986; R.D. Gaur, Fl. Distr. Garhwal: 115. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 205. 2007.

Herbs, annual, erect, aromatic, to 1 m high; stems ribbed, much branched, pubescent. Leaves petioled, lanceolate or oblong-lanceolate, 2.5–7.5 x 0.5–1.8 cm, base attenuate, apex obtuse, margins irregularly serrate-dentate, glabrous above, pale-green, glandular beneath. Flowers small, greenish, in clusters in distant or slender axillary or terminal elongate panicles; tepals 5, glandular, hairy, connate at base; stamens 4 or 5; stigmas 3–5. Fruits globose; seeds 3–5 mm across, blackish-brown smooth.

Flowering & Fruiting: July–October.

In open waste places, road side places, cultivated fields and on mountain slopes.

Distribution: India (throughout in tropical), America, Asia, China, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

Cultivated species:

Beta vulgaris L., Sp. Pl.: 222. 1753; Hook.f., Fl. Brit. India 5: 5. 1886; R.D. Gaur, Fl. Distr. Garhwal: 114. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 205. 2007.

Herbs, annual, erect with tuberous, napiform or fusiform root; stems branched at upper part, ribbed, pubescent. Leaves alternate, base subcordate, apex acuminate. Flowers greenish, in axillary or terminal panicles. Uricle subsucculent; seeds smooth, reddish-brown, horizontal.

Flowering & Fruiting: April–October.

Cultivated in fields and gardens.

Distribution: India (throughout in tropical), N. Africa, Asia, China, Europe, Nepal, Pakistan.

80. POLYGONACEAE

- 1a. Stems leafy; stamens upto 6 2
 1b. Stems not as above; stamens upto 8 1. **Persicaria**
 2a. Nuts ovoid, black 2. **Polygonum**
 2b. Nuts trigonous, dark brown 3. **Rumex**

1. **Persicaria** Mill.

- 1a. Inflorescence a corymbose head 4. *P. nepalensis*
 1b. Inflorescence a raceme 2
 2a. Flowers in erect racemes 3
 2b. Flowers in drooping racemes 3. *P. hydropiper*
 3a. Leaves sessile; nuts trigonous 1. *P. barbata*
 3b. Leaves petioled; nuts biconvex 2. *P. glabra*

1. **Persicaria barbata** (L.) Hara, Fl. E. Himal.: 70. 1966; Hara & al., Enum. Fl. Pl. Nepal 3: 175. 1982; P.C. Pant, Fl. Corbett Natl. Park: 133. 1986; R.D. Gaur, Fl. Distr. Garhwal: 136. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 207. 2007. *Polygonum barbatum* L., Sp. Pl.: 362. 1753; Hook.f., Fl. Brit. India 5: 37. 1886. *P. barbatum* L. subsp. *gracile* Dansk, Bull. Jard. Bot. Buitenz. (ser.3) 8: 146, 1927. *P. serrulatum* Hook.f., Fl. Brit. India 5: 38. 1890 (*non* Lagasc.), excl. var. *donii* Hook.f.). *P. barbatum* L. var. *gracile* (Danser) Steward, Contrib. Gay. Herb. 5(88): 55. 1930.

Herbs, perennial, erect or ascending, to 70 cm high; stems red-tinged at lower nodes, simple or branched, glabrous. Leaves sessile, linear-lanceolate or lanceolate, 4.5–13.5 x 0.5–3.5 cm, base cuneate, apex acute, glabrous above, margins ciliate, midrib strigose beneath; ochrea 1.5–3.5 cm long. Flowers white, 1–2 mm across, in 1.5–4.5 cm long, slender racemes; perianth segments 5, oblanceolate; stamens 5–8. Ovary ovate-orbicular. Nutlets trigonous, c. 2 mm long, black.

- 1a. Stems robust; spikes 5–6 in each raceme, broader 1.1. *P. barbata* var. *barbata*
 1b. Stems weak and slender; spikes 1–3 in each raceme, narrower 1.2.. *P. barbata* var. *gracilis*

1.1. **Persicaria barbata** var. **barbata**

Flowering & Fruiting: July–October.

Common in lakes and near water bodies in temperate-subalpine region.

Distribution: India (Jammu & Kashmir to Eastern Himalaya), Africa, Australia, China, Japan, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

1.2. **Persicaria barbata** var. **gracilis** (Danser) Hara in Hara & al., Enum. Fl. Pl. Nepal 3: 175. 1982; P.C. Pant, Fl. Corbett Natl. Park: 133. 1986; R.D. Gaur, Fl. Distr. Garhwal: 136. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 207. 2007. *Polygonum barbatum* subsp. *gracile* Danser, Bull. Jard. B. Buitenzorg Ser. 3, 8: 146. F. 2. 1927. *Polygonum barbatum* var. *gracile* (Danser) Steward in Contr. Gray Herb. 88: 55. 1930. *Persicaria*

barbata subsp. *gracilis* (Danser) Sojak, Preslia 46: 152. 1974. *Polygonum serrulatum sensu* Hook.f., Fl. Brit. India 5: 38. 1886, *non* Lag. 1816 *p.p.*

Flowering & Fruiting: July–October.

Common in lakes and near water bodies, paddy fields in temperate-subalpine region.

Distribution: India (Jammu & Kashmir to Eastern Himalaya), Africa, America, China, Europe, Japan, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Persicaria glabra*** (Willd.) M. Gomes, Ann. Inst. Segunda Enseñ. Habana 2: 278. 1896; P.C. Pant, Fl. Corbett Natl. Park: 134. 1986; R.D. Gaur, Fl. Distr. Garhwal: 137. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 207. 2007. *Polygonum glabrum* Willd., Sp. 2: 447. 1799; Hook.f., Fl. Brit. India 5: 34. 1886.

[Plate-16b]

Herbs, annual or perennial, erect or ascending, glabrous, to 90 cm high; stems branched, glabrous, reddish. Leaves petioled, elliptic-lanceolate or ovate-lanceolate, 11–24.5 x 1.5–4.5 cm, base cuneate, apex acuminate, glabrous above, glandular punctuate beneath, margins entire. Flowers pink or white, in dense erect racemes; perianth segments 5; stamens 6–8, exserted. Ovary biconvex. Nuts biconvex, blackish-brown, glaucous.

Flowering & Fruiting: March–October.

Uncommon in waste places, river side's in subtropical secondary forest areas.

Distribution: India (Jammu & Kashmir to Eastern Himalaya), Africa, America, China, Europe, Japan, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122553, 122432, 122433 (BSD); Samir Sinha (2001).

3. ***Persicaria hydropiper*** (L.) Spach, Hist. Veg. 10: 536. 1841; Hara, Fl. E. Himal. 2: 23. 1971; P.C. Pant, Fl. Corbett Natl. Park: 134. 1986; R.D. Gaur, Fl. Distr. Garhwal: 137. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 208. 2007. *Polygonum hydropiper* L., Sp. Pl.: 361. 1753; Hook.f., Fl. Brit. India 5: 39. 1886.

Herbs, erect or prostrate, to 90 cm high; stems slender, branched, glabrous. Leaves sessile, linear-lanceolate or ovate-oblong, 1.8–7.5 x 0.5–2.2 cm, base cuneate, apex acute, margins ciliate, pubescent on both surfaces; ochrea tubular, 1–1.2 cm long, puberulous. Flowers pinkish-white, in axillary or terminal, drooping racemes; perianth segments 5, oblanceolate, glandular; stamens 6; anthers dorsifixed. Ovary trigonous; styles 3; anthers dorsifixed. Ovary trigonous; styles 3, free. Nuts biconvex or trigonous, glabrous, brown.

Flowering & Fruiting: March–October.

Common in waste places, river beds, crop fields in subtropical region.

Distribution: India (Jammu & Kashmir to Eastern Himalaya, Sikkim), Africa, America, China, Europe, Japan, Nepal, Pakistan.

Specimens examined: Sonanadi river bank, R. *Manikandan* 124956, 122575 (BSD); Samir Sinha (2001).

4. ***Persicaria nepalensis*** (Meisn.) H. Gross, Bull. Jahrb. 49: 277. 1913; P.C. Pant, Fl. Corbett Natl. Park: 134. 1986; R.D. Gaur, Fl. Distr. Garhwal: 138. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 208.

2007. *Polygonum nepalense* Meisn., Monogr. Polygo. 84. T. 7, f. 2, 1826; Hook.f., Fl. Brit. India 5: 41. 1886. *P. alatum* var. *nepalense* (Meisn.) Hook.f., Fl. Brit. India 5: 42. 1886.

Herbs, annual, decumbent, soft, to 50 cm high; stems branched at base, angular or slender, glabrous or pubescent. Leaves petioled, ovate or deltoid ovate, 1–6.5 x 0.5–3.5 cm, base cuneate, apex acute, glabrous above, rough beneath, margins entire; ochrea truncate, 6–10 mm long. Flowers pale-pink or white, in terminal corymbose heads, subtended with lanceolate, involucre leaf; perianth 4–5-lobed; stamens 5 or 6; anthers dorsifixed. Ovary biconvex. Nuts biconvex, brown, glaucous.

Flowering & Fruiting: July–December.

Common in waste places, moist places, crop fields in subtropical region.

Distribution: India (Jammu & Kashmir to Sikkim, S. India), Africa, China, Myanmar, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

2. *Polygonum* L.

Polygonum plebejum R. Br., Prodr.: 420. 1810; Hook.f., Fl. Brit. India 5: 27. 1890; P.C. Pant, Fl. Corbett Natl. Park: 134. 1986; R.D. Gaur, Fl. Distr. Garhwal: 139. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 209. 2007. *P. berniarioides* Spreng., Syst. Veg. 2: 256. 1825. *Dondya*

Herbs, annual or perennial, prostrate, to 40 cm high; stems leafy, branched from base, grooved. Leaves petioled, linear or linear-lanceolate to obovate, 0.8–2.5 x 0.2–0.3 cm, base cuneate, apex acute or obtuse, margins entire, glabrous above, pubescent on nerved beneath; ochrea ovate, tubular. Flowers minute, white or pinkish-white, in axillary clusters; perianth segments 5; stamens 4 or 5; anthers lobed. Ovary trigonous-ovate; styles 3, stigma capitate. Nuts ovoid, glaucous, black.

Flowering & Fruiting: June–October.

Common in river beds, waste places, as a weed in crop fields.

Distribution: India (Jammu & Kashmir to Sikkim), Africa, Asia, Australia, China, Pakistan.

Specimens examined: Sonanadi river bank, R. Manikandan 125546 (BSD); Samir Sinha (2001).

3. *Rumex* L.

Rumex hastatus D. Don, Prodr. Fl. Nep.: 74. 1825; Meisn. in DC., Prodr. 14 (1) : 72. 1856; Hook.f., Fl. Brit. India 5: 60. 1885; P.C. Pant, Fl. Corbett Natl. Park: 135. 1986; R.D. Gaur, Fl. Distr. Garhwal: 140. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 209. 2007. *Bhilmora*

Herbs, perennial, erect or prostrate-ascending, to 80 cm high; stems terete, ribbed, with leafy branches. Leaves petioled, triangular-hastate, 2.5–10.5 x 0.7–3.5 cm, trilobed, lobes acute-acuminate, base hastate, margins entire, glabrous on both surfaces, coriaceous; 6-nerved at base; ochrea tubular. Flowers pinkish, polygamous, arranged in small whorls, in long paniced racemes; valves orbicular, notched; stamens 6; stigma usually capitate. Ovary trigonous. Nuts trigonous, 2–2.5 mm across, dark brown, glaucous; pedicels thin, 2–3 mm long.

Flowering & Fruiting: May–October.

Common in rocky places along cultivated fields in subtropical to temperate region.

Distribution: India (Jammu & Kashmir to Sikkim), Asia, Bhutan, China, Nepal, Pakistan.

Specimens examined: On way to Halduparao, *R Manikandan* 125676, 124878, 125676 (BSD).

81. LAURACEAE

- 1a. Leaf base cuneate or obtuse; flowers usually in umbels 1. **Litsea**
 1b. Leaf base attenuate and decurrent; flowers in panicles 2. **Phoebe**

1. **Litsea** Lam.

- 1a. Leaf base cuneate to obtuse; fruits globose 1. *L. glutinosa*
 1b. Leaf base rounded or acute; fruits ovoid 2. *L. monopetala*

1. **Litsea glutinosa** (Lour.) C.B. Rob., Philipp. J. Sci. 6: 321. 1911; P.C. Pant, Fl. Corbett Natl. Park: 135. 1986; R.D. Gaur, Fl. Distr. Garhwal: 57. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 211. 2007. *Sebifera glutinosa* Lour., Fl. Cochinch. 2: 638. 1790. *Litsea sebifera* Pers., Syn. Pl. 2: 4. 1807. *L. chinensis* Lam., Encycl. 3: 574. 1791. *Maida-lakri, Singrau*

Medium sized trees, to 15 m high; young branchlets gray-yellow tomentose. Leaves petioled, alternate, obovate-oblong or elliptic-lanceolate, 4.5–25 x 3.5–10 cm, obtuse or rounded at apex, cuneate to obtuse at base, tomentose or pubescent on both surfaces, lateral veins 8–12 pairs. Flower pale yellow, few-flowered umbels, in solitary or many on short branchlets. Male flowers: perianth lobes imperfect or lacking; fertile stamens often 15 or more; filaments pubescent, with 2 long stipitate glands at base; rudimentary pistil glabrous. Fruit globose, c. 7 mm across, with slightly thickened, fruiting pedicel.

Flowering & Fruiting: May–October.

Grows along the forest margins, streamlines or thickets on mountains, up to 1800 m.

Distribution: India (Himalayas), Bhutan, China, Nepal, Philippines, Vietnam.

Specimens examined: Morkhatty region, *R. Manikandan* 122594 (BSD); Samir Sinha (2001).

Uses: The wood used for making furniture. The bark and wood contain gluten, which is used as binders or plaster on fractured bones. Seed oil used to make soap. The root, bark and leaves are used medicinally to reduce fever, reduce swelling, and treat diarrhoea and furunculosis.

2. **Litsea monopetala** (Roxb.) Pers., Syn. Pl. 2: 4. 1807; P.C. Pant, Fl. Corbett Natl. Park: 135. 1986 R.D. Gaur, Fl. Distr. Garhwal: 57. 1999; Uniyal & al., Fl. Uttarakhand Checkl.: 211. 2007. *Tetranthera monopetala* Roxb., Pl. Coromand. 2: 26. T. 148. 1798; Roxb., Fl. Ind. 3: 821. 1832; Nees, Syst. Laur. 525. 1836. *Litsea polyantha* Jussieu, Ann. Mus. Hist. Nat. Paris. 6: 211. 1805; Hook.f., Fl. Brit. India 5: 162. 1886; Brandis, Ind. Trees: 536. 1906. *Ghian, Katmara, Karka, Katmala, Meda*

Trees, evergreen, to 18 m high; branchlets densely ferruginous pubescent. Leaves petioled, spirally arranged, alternate, broadly ovate-obovate or ovate-oblong, 5.5–20 x 2.5–12 cm, obtuse or rounded, rarely acute at apex, rounded or acute at base, lower surface glaucous, sparsely, minutely pilose, denser on the nerves, 8–12 pairs of erect-patent, prominulous nerves. Flowers yellow-white, 4–6-flowered or more, in clustered umbels on shortest branchlets. Male flowers: perianth lobes 5 or 6, lanceolate; stamens fertile 9; filaments pubescent, with 2 stipitate glands at base. Female flower: perianth to 1.5 mm long; staminodes slightly shorter than perianth; ovary glabrous; style thick, stigma peltate, lobed. Fruit ovoid, c. 7 x 5 mm, seated on shallowly discoid perianth tube.

Flowering & Fruiting: May–November.

Grows in thickets or sparse forests on sunny hillslopes, up to 1200 m.

Distribution: India (Himalayas), Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122585, 124807, 122585, 125675 (BSD).

Uses: The wood is used for furniture. Seed oil is used for industrial oil. The bark is mildly astringent and powdered bark and roots are used externally against bruises and pains. Leaves are used for the treatment of arthritis, silkworm and as cattle fodder.

2. *Phoebe* Nees

Phoebe lanceolata (Nees) Nees, Syst. Laur.: 109. 1836; P.C. Pant, Fl. Corbett Natl. Park: 136. 1986; Uniyal & al., Fl. Uttarakhand Checkl.: 211. 2007. *Ocotea lanceolata* Nees in Wall., Pl. Asiat. Rar. 2: 71. 1831; Hook.f., Fl. Brit. India 5: 141. 1886. *Laurus lanceolaria* Roxb., Fl. Ind. (ed. 1832) 2: 309–310. 1832. *O. ligustrina* Nees in Wall., *l.c.* *Kaula, Kekra* [Plate-16c]

Medium sized trees, to 15 m high; branchlets gray-brown or yellowish-brown puberulent become glabrous soon, with densely yellowish-gray tomentose bud scales. Leaves petioled, lanceolate or elliptic-lanceolate, 10–25 x 3–6.5 cm, acuminate or long acuminate, summit usually falcate, attenuate and decurrent at base, usually purplish-red on both surfaces when young, thickly papery, glabrous, lateral veins 9–15 pairs. Flowers pale green or yellowish-green, in panicles; perianth lobes subequal, ovate, glabrous outside, gray-white pubescent inside; filament gray-white pubescent at base, with sessile glands at base. Fruit ovoid, c. 1.2 x 0.7 cm, with short rostrum at tip, fruiting pedicel slightly thickened, with straw-yellow, leathery persistent perianth lobes, clasping base of fruit.

Flowering & Fruiting: April–September.

Common in almost throughout the sanctuary especially along the riversides.

Distribution: India (Siwalik regions Himalaya), Bhutan, Indonesia, Malaysia, Nepal, Thailand.

Specimens examined: Rathudhab-Vatanwasa, R. *Manikandan* 124995, 122482, 122534, 122582, 122480 (BSD).

82. LORANTHACEAE

- 1a. Stems leaf bearing2
1b. Stems leafless3. ***Viscum***

- 2a. Flowers regular; corolla tube not split on one side 1. ***Dendrophthoe***
2a. Flowers irregular; corolla tube split on one side 2. ***Scurrula***

1. *Dendrophthoe* Mart.

Dendrophthoe falcata (L.f.) Etting., Denkschr. Akad. Wiss. Math. Naturwiss Klasse 32: 52, 58. 1872; P.C. Pant, Fl. Corbett Natl. Park: 136. 1986; R.D. Gaur, Fl. Distr. Garhwal: 325. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 212. 2007; Rajasek. in N.P. Balakr. & al., Fl. India 23: 3. 2012. *Loranthus falcatus* L.f., Suppl. Pl.: 211. 1781. *Loranthus longiflorus* Desrous., Lam., Encycl. 3: 598. 1789; C.B. Clarke ex Hook.f., Fl. Brit. India 5: 214. 1886. *Vanda*

Parasitic undershrub, evergreen, glabrous, to 1 m high with terete branches. Leaves petioled, inconstantly opposite, leathery, ovate-lanceolate to elliptic-oblong or spatulate, 6–14 x 2.5–7 cm, rounded at the base, tip obtuse or rounded, ample. Flowers scarlet or orange, in densely racemes, often clustered in axil

of fallen leaves; buds cylindric, slightly acute; calyx produced on top of the ovary; corolla curved, glabrous, 4 cm long; lobes 5, short, reflexed, green within. Fruits ovoid-oblong, to 1.2 cm long, glabrous, crowned with persistent calyculus, black when ripe.

Flowering & Fruiting: September–February.

Common; found in mixed forests, epiphytic on *Anogeissus*, *Ficus* and *Shorea*; up to 2700 m.

Distribution: India (Himalayas tracts, Himachal Pradesh, Kashmir, Punjab, Uttarakhand, Uttar Pradesh), Southeast Asia, Australia, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001)

2. *Scurrula* L.

- 1a. Leaves broadly ovate or suborbicular; flowers red or orange1. *S. cordifolia*
 1b. Leaves ovate-lanceolate or oblong; flowers white with dark purple-brown 2. *S. pulverulenta*

1. ***Scurrula cordifolia*** (Wall.) G. Don, Gen. Syst. 3: 421. 1834; P.C. Pant, Fl. Corbett Natl. Park: 136. 1986; R.D. Gaur, Fl. Distr. Garhwal: 326. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 212. 2007; Rajasek. in N.P. Balakr. & al., Fl. India 23: 23. 2012. *Loranthus cordifolius* Wall. in Roxb., Fl. Indica 2: 222. 1824; C.B. Clarke ex Hook.f., Fl. Brit. India 5: 209. 1886. Bannu

Parasitic, bushy, undershrubs to 1.5 m high; bark dark brown, smooth, pale lenticels; young shoots densely clothed with white or buff-coloured tomentose. Leaves petioled, opposite, broadly ovate or suborbicular, 5–9 x 3–6 cm, obtuse, subcordate or rounded at the base, rather fleshy, lower surface tomentose. Flowers red or orange, in axillary fascicles or short racemes, densely tomentose; bracts ovate, obtuse, obtuse. Perianth tube slightly curved, tomentose outside; lobes 4, linear, short, reflexed. Fruits clavate, ovoid, to 1 cm long, black when ripe.

Flowering & Fruiting: November–April.

Common; parasitic on Mango, *Melia*, *Cedrela*; up to 2500 m.

Distribution: India (almost throughout the country), Australia, Myanmar, Nepal, Pakistan, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Scurrula pulverulenta*** (Wall.) G. Don, Gen. Syst. 3: 421. 1834; R.D. Gaur, Fl. Distr. Garhwal 326. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 213. 2007; Rajasek. in N.P. Balakr. & al., Fl. India 23: 27. 2012. *Loranthus pulverulentus* Wall. in Roxb., Fl. Indica 2: 221. 1824; C.B. Clarke ex Hook.f., Fl. Brit. India 5: 211. 1886.

Parasitic, bushy-undershrubs, to 2.5 m high; bark dark-grey; young shoots densely clothed with white or greyish, mealy tomentose. Leaves petioled, opposite, ovate-lanceolate or oblong, 3–9 x 2–3 cm, acute or obtuse, rounded at the base, thick, rather fleshy, glabrous above, tomentose beneath. Flowers white with dark purple-brown, green inside, in axillary, sessile, 3–6-together; bracts ovate, obtuse; perianthmealy tomentose outside, tube slender, tubular, curved, lobes 4, linear, much shorter than tube, reflexed. Fruits clavate, to 8 mm long, mealy tomentose, 1-seeded.

Flowering & Fruiting: May–September.

Common; parasites on Oak and other trees.

Distribution: India (Sub-Himalayas tracts, Assam, Himachal Pradesh, Kashmir, Punjab, Uttarakhand), Bhutan, China, Myanmar, Nepal, Pakistan, Thailand.

Notes: Included on the authority of Samir Sinha (2001).

3. *Viscum* L.

Viscum articulatum Burm.f., Fl. Indica: 311. 1768; C.B. Clarke ex Hook.f., Fl. Brit. India 5: 226. 1886; P.C. Pant, Fl. Corbett Natl. Park: 136. 1986; R.D. Gaur, Fl. Distr. Garhwal: 327. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 213. 2007; Sanjai & N.P. Balakr., Rheedia 16: 90, f. 6. 2006; Sanjai & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 50. 2012. *V. Nepalense* Spreng., Syst. Veg. (ed. 16) 4 (2, Cur. Post.): 47. 1827; Danser, 4: 283. 1941. *Budu*

Parasitic shrubs, much-branched, tufted, leafless, to 50 cm high; stems flattened; branches jointed, dichotomous, yellowish-green, longitudinally striate and wrinkled, narrow at the both ends, pendulous; internodes widening upwards. Flowers monoecious, sessile, 1–5-flowered clusters; bracts cup-shaped; perianth segments 4, triangular, erect in female flowers; spreading in male flowers, deciduous. Berries subglobose, smooth, *c.* 5 mm long, yellowish-green.

Flowering & Fruiting: May–June.

Not common parasitic on host trees.

Distribution: India (Siwaliks & outer Himalayas, Himachal Pradesh, Uttarakhand), Southeast Asia, Australia, China.

Notes: Included on the authority of Samir Sinha (2001).

83. SANTALACEAE

Santalum L.

Santalum album L., Sp. Pl.: 349. 1753; Hook.f., Fl. Brit. India 5: 231. 1886; R.D. Gaur, Fl. Distr. Garhwal: 324. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 213. 2007; Sanjai & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 64. 2012. *Chandan, Safed chandan* [Plate-16d]

Trees, to 15 m high, usually semi-parasitic, with slender drooping branchlets; bark is tight, dark brown, reddish, dark grey or nearly black, smooth in young trees, rough with deep vertical cracks in older trees, red inside. Leaves petioled, opposite, 4–8.5 x 1.5–4 cm, elliptic-ovate, acute at apex, cuneate at base, and shining green above, glaucous and slightly paler beneath, glabrous, venation noticeably reticulate, membranous. Flowers brownish-purple, in terminal and axillary paniculate cymes, shorter than leaves; perianth lobes ovate, minutely ciliate. Drupes *c.* 8 mm across, subglobose, fleshy, reddish-purple to black when ripe, with hard ribbed endocarp and crowned with a scar, almost stalkless, smooth, single seeded.

Flowering & Fruiting: Almost throughout the year.

Grows in scrub to dry deciduous forests and sometimes cultivated as hedge-plant.

Distribution: India (Himalayas, Central and South India), Africa, Australia, Bhutan, Cambodia, China, S. Europe, Indonesia, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125590, 125678, 125765 (BSD).

84. EUPHORBIACEAE

1a. Ovules 1 per locule, seeds usually carunculate 8

- 1b. Ovules 2 per locule, seeds usually arillate 2
- 2a. Stigmas dilated, peltate or reniform. Fruits usually with persistent flap like stigmas 13. **Putranjiva**
- 2b. Stigmas usually bifid not dilated. Fruits without persistent flap like stigmas 3
- 3a. Leaves trifoliate 4. **Bischofia**
- 3b. Leaves simple 4
- 4a. Inflorescence in spikes, racemes or pseudoracemes 2. **Antidesma**
- 4b. Inflorescence in glomerules or fascicles 5
- 5a. Flowers with petals; stamens usually 5 6
- 5b. Flowers without petals; stamens 2–6 7
- 6a. Sepals imbricate 10. **Leptopus**
- 6b. Sepals valvate 5. **Bridelia**
- 7a. Flowers with prominent disk 12. **Phyllanthus**
- 7b. Flowers without disk 8. **Glochidion**
- 8a. Big trees 9
- 8b. Herbs, shrubs or small trees 10
- 9a. Leaf margins serrate or undulate 7. **Falconeria**
- 9b. Leaf margins entire or serrulate 11. **Mallotus**
- 10a. Inflorescence a cyathium, resembling a single flower 6. **Euphorbia**
- 10b. Inflorescence elongated, usually with female flowers at base and male flowers toward apex 11
- 11a. Herbs 1. **Acalypha**
- 11b. Shrubs or small trees 12
- 12a. Leaves 5–10-lobed; fruits schizocarps, prickly 14. **Ricinus**
- 12b. Leaves 3–5-lobed; fruits capsule, non-prickly 13
- 13a. Leaf blade palmately veined; male flowers with petals; plants mostly monoecious 9. **Jatropha**
- 13b. Leaf blade pinnately veined; male flowers without petals; plants dioecious 3. **Baliospermum**

1. **Acalypha** L.

Acalypha ciliata Forssk., Fl. Aegypt.-Arab.: 162. 1775; Hook.f., Fl. Brit. India 5: 417. 1890; P.C. Pant, Fl. Corbett Natl. Park: 138. 1986 R.D. Gaur, Fl. Distr. Garhwal: 334. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 213. 2007; Susila & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 94. 2012.

Herbs, erect, annual, to 60 cm high; stems ascending, branched, pubescent. Leaves petioled, ovate or ovate-lanceolate, 4.5–9.5 x 2.5–5.5 cm, base subrounded, apex acuminate or caudate, margins serrate, glabrous above, pubescent beneath; stipules subulate. Flowers greenish, in axillary spikes; bracts campanulate, pubescent, pale-brown. Male flowers terminal, minute, few; sepals 4, ovate-orbicular; stamens 8–12. Female flowers 3-valved, ovate, numerous. Capsules ovate, 3-lobed, glabrous; seedsovoid or subglobose, smooth, glaucous.

Flowering & Fruiting: August–October.

Occasional in open places along boulders and foot paths.

Distribution: India (Himalaya), Africa, Asia, Nepal, Pakistan, Sri Lanka.

Specimens examined: On way to Halduparao, R. *Manikandan* 125603, 125597, 124811 (BSD).

2. *Antidesma* L.

Antidesma acidum Retz., Observ. Bot. 5: 30. 1788; P.C. Pant, Fl. Corbett Natl. Park: 138. 1986 R.D. Gaur, Fl. Distr. Garhwal: 334. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 213. 2007; Chakrab. & M. Gangop. in N.P. Balakr. & al., Fl. India 23: 356. 2012. *Stilago diandra* Roxb., Pl. Coromandel 2: 35, t. 166 1802. *Antidesma diandrum* (Roxb.) Roth, Nov. Pl. Sp.: 369. 1821; Hook.f., Fl. Brit. India 5: 361. 1887.

Amlī [Plate-16e]

Large shrubs or small trees, deciduous, to 10 m high; stems slender, branched, young parts rusty pubescent. Leaves petioled, elliptic-lanceolate or oblong, 3.5–9.5 x 2.5–4.8 cm, base cuneate, apex acute-acuminate, margins entire, glabrous above, pubescent on nerves beneath. Flowers small, green, in glabrous racemes; bracts ovate. Male flowers pedicellate; perianth 4-lobed, lobes ovate, obtuse; stamens 2, rarely 3. Female flowers shortly pedicellate; calyx urceolate. Fruits ovoid or suborbicular, purple or red, 4–6 mm long.

Flowering & Fruiting: May–October.

Occasional in open places in tropical to subtropical forests.

Distribution: India (N.W. Himalaya to E. Himalaya, South India, Gujarat, Maharashtra, Orissa, West Bengal), Asia, Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Halduparao, Morkhatty, R. *Manikandan* 124887, 125582, 124928, 125674, 125696 (BSD).

3. *Baliospermum* Blume

Baliospermum solanifolium (J. Burm.) C.R. Suresh in Nicolson & al., Interpr. Van Rheede's Hort. Malab.: 106. 1988; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 214. 2007; Chakrab. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 216, f. 31. 2012. *Croton solanifolius* J. Burm., Fl. Malab.: 6. 1769. *Jatropha montana* Willd., Sp. Pl. 4: 563, 1805. *Baliospermum axillare* Blume, Bijdr. Fl. Ned. Ind.: 604. 1826; Hook.f., Fl. Brit. India 5: 461. 1887. *B. montanum* (Willd.) Muell. Arg. in DC., Prodr. 15(2): 1125. 1866; P.C. Pant, Fl. Corbett Natl. Park: 138. 1986; R.D. Gaur, Fl. Distr. Garhwal: 335. 1999.

Danti, Jamalgota

Shrubs or undershrubs, to 2 m high; stems branched from base, glabrous. Leaves petioled, variable, ovate-lanceolate or oblong or palmately 3–5-lobed, 4.5–18.5 x 2.3–9.5 cm, base cuneate or subrounded, apex acute-acuminate, margins serrate. Flowers small, greenish-yellow, in 2.5–8.5 cm long, axillary or subterminal panicles; sepals 5; stamens 14–25. Ovary subglobose, tomentose. Capsules obovoid, 3-dymous, c. 1 cm across; seeds oblong, 7–8 mm long, blackish-brown, smooth.

Flowering & Fruiting: May–October.

Rare in open places in tropical to subtropical forests.

Distribution: India (N.W. Himalaya to E. Himalaya, South India, Gujarat to Maharashtra, Orissa, West Bengal), Asia, Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Vatanvasa, H.C. Pande 220781 (LWG).

4. **Bischofia** Blume

Bischofia javanica Blume, Bijdr. Fl. Ned. Ind.: 1168. 1826; Hook.f., Fl. Brit. India 5: 345. 1887; P.C. Pant, Fl. Corbett Natl. Park: 138. 1986; R.D. Gaur, Fl. Distr. Garhwal: 336. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 213. 2007; N.P. Balakr. & Chakrab. in N.P. Balakr. & al., Fl. India 23: 375. 2012.

Kath Semel

Trees, evergreen, to 30 m high; stems straight, branched; branchlets glabrous. Leaves petioled palmately 3–5-foliolate; leaflets ovate or elliptic-ovate, 5.5–13.5 x 4–7.5 cm, base cuneate, apex acuminate, margins crenate; glabrous on both surfaces; stipules membranous, lanceolate. Flowers yellowish, in axillary or subterminal paniculate racemes. Male flowers: sepals 5, membranous, semiorbicular, pubescent. Female flowers: sepals 5, oblong-ovate, margins membranous. Fruits fleshy berry, subglobose, c. 1 cm across, brownish; seeds oblong.

Flowering & Fruiting: March–December.

Occasion in open places in deciduous tropical to subtropical forests.

Distribution: India (N.W. Himalaya to E. Himalaya, Himachal Pradesh, South India, Maharashtra, Orissa, West Bengal), Asia, Australia, Bhutan, China, Myanmar, Nepal, Sri Lanka .

Specimens examined: Sonanadi WLS, R. *Manikandan* 124709 (BSD).

5. **Bridelia** Willd.

1a. Leaf base subrounded or subcordate, apex retuse, acute or obtuse1. *B. retusa*

1b. Leaf base cuneate, apex abruptly acuminate 2. *B. verrucosa*

1. **Bridelia retusa** (L.) A. Juss., Euphorb. Gen.: 109, t. 7, f. 22. 1824; P.C. Pant, Fl. Corbett Natl. Park: 140. 1986; R.D. Gaur, Fl. Distr. Garhwal: 337. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 214. 2007; Chakrab. & al. in N.P. Balakr. & al., Fl. India 23: 380. 2012. *Clusia retusa* L., Sp. Pl. ed. 4, 4 : 1042. 1753. *B. retusa* var. *roxburghiana* Muell.-Arg. in DC., Prodr. 15(2): 493. 1866, *nom superfl.*; Hook.f., Fl. Brit. India 5: 268. 1887. *B. squamosa* (Lam.) Encycl. Meth. Bot. 2: 54. 1786. *Gauli* [Plate-16f]

Large shrubs or trees, to 8 m high; stems with drooping branches, rugose, branchlets spinous. Leaves petioled, ovate-obovate, 3.2–15.5 x 2–9.8 cm, base subrounded or subcordate, apex retuse, acute or obtuse, margins entire, glabrous above, glaucous beneath, pinnately nerved; stipules lanceolate or linear-lanceolate, small. Flowers small, greenish in axillary or spicate clusters. Male flowers 3–4 mm long; calyx 5 parted, valvate; petals 5, minute. Female flowers 4–5 mm long. Ovary ovoid. Fruits subglobose, 6–10 mm across, bilobed, purple-black; seeds 2.

Flowering & Fruiting: March–October.

Common in margins of tropical to subtropical forests along open slopes.

Distribution: India (N.W. Himalaya to E. Himalaya, South India, Gujarat, Maharashtra, Orissa, West Bengal), Asia, Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Halduparao, R. *Manikandan* 124801, 122413 (BSD); Samir Sinha (2001).

2. **Bridelia verrucosa** Haines, J. Bot. 59: 189, 193. 1921; P.C. Pant, Fl. Corbett Natl. Park: 140. 1986; R.D. Gaur, Fl. Distr. Garhwal: 337. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 214. 2007; Chakrab. & al. in N.P. Balakr. & al., Fl. India 23: 384. 2012. *B. montana sensu* Hook.f., Fl. Brit. India 5: 269. 1887, *non* Willd. 1806. *Goya*

Shrub or small tree, to 10 m high; stems terete, lenticellate, verrucose, blackish-brown. Leaves petioled, ovate-obovate or oblong, 6–22 x 4–15 cm, base cuneate, apex abruptly acuminate, margins entire, glabrous above, pale, glaucous beneath; stipules lanceolate. Flowers small, greenish-white in dense axillary clusters on main leafy branches. Male flowers sessile; sepals oblong. Female flowers sessile; sepals linear-oblong. Fruits subglobose or ellipsoid, to 9 mm long, unilocular, pale brown; seed solitary, brown, smooth.

Flowering & Fruiting: January–October.

In tropical to subtropical deciduous forests along open slopes.

Distribution: India (Arunachal Pradesh, N. W. Himalaya to E. Himalaya, Sikkim, West Bengal), Asia, Bhutan, Nepal, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

6. *Euphorbia* L.

- 1a. Herbs 2
 1b. Shrubs or small trees 3
 2a. Stems pubescent; seeds oblong, reddish-brown 1. *E. hirta*
 2b. Stems glabrouscent; seeds ovoid, yellowish-pink 2. *E. hypericifolia*
 3a. Peduncles 4–5 mm long; male flowers 3–4 3. *E. nerifolia*
 3b. Peduncles 2.5 cm long; male flowers 6–7 4. *E. nivulia*

1. *Euphorbia hirta* L., Sp. Pl.: 454. 1753; P.C. Pant, Fl. Corbett Natl. Park: 141. 1986; R.D. Gaur, Fl. Distr. Garhwal: 339. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 214. 2007; Binojk. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 287. 2012. *E. pilulifera sensu* Hook.f., Fl. Brit. India 5: 250. 1890, *non* L. 1753. *Chamaesyce hirta* (L.) Millsp., Publ. Field Columbian Mus., Bot. Ser. 2: 303. 1909.

Herbs, annual, erect or ascending, to 40 cm long; stems branched, pubescent. Leaves petioled, elliptic-lanceolate or ovate-oblong, 1.2–2.5 x 0.3–1.2 cm, base oblique, apex acute, margins serrate, glabrous, purple above, pubescent, whitish-beneath. Cyathia glomerulate in axillary globose heads; involucre crowded in pedunculate, capitate cymes with 4 small glands. Male flowers pedicellate, 4–6. Anthers subglobose. Female flowers: gynophore to 1 cm long. Fruits subglobose, obtusely 3-keeled; seeds oblong, tetragonous, reddish-brown, wrinkled.

Flowering & Fruiting: March–December.

Common as weed in open wasteland, along roadsides, in tropical to temperate regions.

Distribution: India (throughout the country), Asia, tropics and subtropics of world.

Specimens examined: Halduparao, R. *Manikandan* 124908, 125715 (BSD); Rathuadhap, H.C. Pande 220801; Samir Sinha (2001).

2. *Euphorbia hypericifolia* L., Sp. Pl.: 454. 1753; P.C. Pant, Fl. Corbett Natl. Park: 141. 1986; R.D. Gaur, Fl. Distr. Garhwal: 339. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 214. 2007; Binojk. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 289. 2012. *Chamaesyce hypericifolia* (L.) Millsp., Publ. Field Columbian Mus., Bot. Ser. 2: 302. 1909.

Herb, annual, erect, glabrous, to 1 m high; stems branched at top, pinkish-brown. Leaves petioled, elliptic-oblong or obliquely-oblong, 0.6–2.5 x 0.2–2.5 cm, base oblique, apex acute or obtuse, glabrous above, glaucous beneath, margins serrate; stipules broad. Cyathia terminal or subterminal, solitary or paired; involucre campanulate, pinkish in subterminal or terminal clusters; glands 4. Male flowers pedicellate. Female flowers: gynophore to 2 mm long. Fruits subglobose, obtusely keeled, 4–5 mm across, smooth, glabrous; seeds ovoid, yellowish-pink, wrinkled.

Flowering & Fruiting: July–December.

As weed in cultivated fields, gardens in tropical to temperate regions.

Distribution: India (Jammu & Kashmir to Uttarakhand, Punjab, S. India), Asia, America, Mexico, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124894, 125715 (BSD).

Notes: Included on the authority of Samir Sinha (2001).

3. **Euphorbia nerifolia** L., Sp. Pl.: 454. 1753, *p.p.*; Hook.f., Fl. Brit. India 5: 255. 1887; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 215. 2007; Binojk. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 323. 2012. *E. ligularia* Roxb. ex Buch.-Ham., Trans. Linn. Soc. London 14: 285. 1825, *nom. illeg.*

Shrubs or small trees, to 5 m high; stems branched, fleshy, ribbed, spinous. Leaves petioled, broadly ovate-oblong or oblanceolate, 5–20 x 2–4 cm, base cuneate, apex acute or obtuse, margins entire, glabrous above, pubescent beneath. Cyathia subterminal, single, peduncles 4–5 mm long. Male flowers 3–4; bracts linear. Female flowers: gynophores 2–3 mm long; styles connate; stigma papillose. Fruits deeply 3-lobed, 5–8 mm long; seeds globose, 2–3 mm across, white.

Flowering & Fruiting: December–June.

In rocky areas, thorny scrubs, in tropical, deciduous Forests.

Distribution: India (Punjab to S. India, N.E. India), S.E. Asia, China, Myanmar.

Specimens examined: Rathudhab-Vatanvasa, R. *Manikandan* 125536 (BSD).

4. **Euphorbia nivulia** Buch.-Ham., Trans. Linn. Soc. London 14: 286. 1825; Hook.f., Fl. Brit. India 5: 255. 1887; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 215. 2007; Binojk. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 324. 2012. *E. nerifolia* auct. non. L. 1753. [Plate-16g]

Shrubs or small trees, to 10 m high; stems branched, woody, subterete, spinous. Leaves petioled, broadly ovate-oblong or oblanceolate, 5–17 x 2–7 cm, fleshy, base cuneate, apex obtuse, margins entire, glabrous above, pubescent beneath. Cyathia subterminal, single, peduncles to 2.5 cm long, yellow. Male flowers 6 or 7; bracts linear. Female flowers: gynophores 1–2 mm long. Ovary subglobose; styles connate. Fruits globose, to 6 mm long; seeds globose, 2–3 mm across, smooth.

Flowering & Fruiting: December–April.

In rocky areas, thorny scrubs, in tropical, deciduous forests.

Distribution: India (Bihar, Madhya Pradesh, Punjab to S. India, N.E. India), S.E. Asia, Bangladesh, Myanmar, Pakistan, Sri Lanka.

7. *Falconeria* Royle

Falconeria insigne Royle, Ill. Bot. Himal. Mts.: 354. 1839; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 215. 2007; Chakrab. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 347. 2012. *F. malabarica* Wight, Icon Pl. Ind. Orient. 5: t. 1866. *Sapium insigne* (Royal) Trimen, Syst. Cat. Fl. Pl. Ceylon 83. 1885; Benth. in Hook.f., Fl. Brit. India 5: 471. 1890, *non* L. 1753. P.C. Pant, Fl. Corbett Natl. Park: 142. 1986.

Khirmi, Shirwa [Plate-16h]

Trees, dioecious, to 20 m high; stems straight, branched, glabrous, with poisonous sap. Leaves petioled, alternate, ovate or elliptic to ovate-lanceolate, 8.5–20.5 x 4–10.5 cm, base cuneate, apex acuminate or caudate, margins crenate-serrulate, glabrous on both surfaces; stipules membranous, lanceolate. Flowers yellowish-green, appearing before leaves, in axillary or subterminal fleshy spikes. Male flowers many, in globose clusters; sepals 2, fused, orbicular, pubescent. Female flowers solitary; sepals oblong-ovate. Ovary ovoid, smooth, glabrous. Fruits ovoid or subglobose, to 1 cm across, trilobed, red; seeds ovoid, 4–5 mm across, yellowish-brown with oily endosperm.

Flowering & Fruiting: March–June.

In open rocky places in deciduous tropical to subtropical forests.

Distribution: India (N.W. Himalaya to E. Himalaya, Himachal Pradesh, South India, Maharashtra, Orissa, West Bengal), Asia, Bhutan, China, Myanmar, Nepal, Sri Lanka.

8. *Glochidion* J.R. Forst. & G. Forst.

Glochidion heyneanum (Wight & Arn.) Wight ex Bedd., Forman. Bot.: 195. 1873; Hook.f., Fl. Brit. India 5: 323. 1887; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 215. 2007; Chakrab. & al., N.P. Balakr. & al., Fl. India 23: 421. 2012. *Gynoon heyneanum* Wight & Arn., Edinb. New Phil. J. 14: 300. 1833. *Glochidion velutinum* Wight, Icon. Pl. ind. Orient. 5 (2): 29, t. 1907, f. 2. 1852; Hook.f., *l.c.* 322; R.D. Gaur, Fl. Distr. Garhwal: 342. 1999. [Plate-17a]

Shrubs or small trees, to 8.5 m high; stems terete, young parts softly tomentose, velutinous, scabrid. Leaves petioled, alternate, ovate-elliptic or ovate-oblong, 3.2–12 x 2–7.5 cm, base subrounded, apex acute or cuspidate, margins entire, chartaceous, pubescent above, velvety on nerves beneath. Flowers yellowish, in axillary clustered. Male flowers: pedicels filiform, 5–15 mm long; sepals oblong. Anthers subglobose, 1–1.5 mm long. Female flowers: pedicel 3–5 mm long. Ovary subglobose, glabrous. Fruits subglobose with 8 furrows, orange, 3–5 mm across; seeds red.

Flowering & Fruiting: July–October.

In evergreen or deciduous tropical to subtropical forest area.

Distribution: India (S. India, Uttarakhand to Arunachal Pradesh, Maharashtra, Uttar Pradesh), S.E. Asia, Bangladesh, Bhutan, China, Nepal, Pakistan.

Specimens examined: Adnala-Halduparao, R. *Manikandan* 122592, 125592, 122488 (BSD).

9. *Jatropha* L.

Jatropha curcas L., Sp. Pl.: 1006. 1753; Hook.f., Fl. Brit. India 5: 383. 1887; P.C. Pant, Fl. Corbett Natl. Park: 141. 1986; R.D. Gaur, Fl. Distr. Garhwal: 342. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007; Chakrab. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 250. 2012. *Jamal Ghoti* [Plate-17b]

Shrubs or small trees, to 4 m high; stems terete, glabrous, grey, wrinkled, with yellow sap. Leaves petioled, alternate, variable, palmatifid, triangular-ovate, suborbicular-ovate, 3–5-lobed, 7.5–30.5 x 5–16.5 cm, base cordate, apex acute or obtuse, margins entire, glabrous on both surfaces; palmately nerved. Flowers yellowish-green, in axillary corymbose cymes. Male flowers: sepals 5, ovate-elliptic, imbricate; petals 5–10; stamens 10. Female flowers: sepals longer than male flowers; petals absent. Fruit globose or subglobose-ovoid, to 2.5 cm across, cluster; seeds 2–4, ellipsoid with oily endosperm.

Flowering & Fruiting: January–October.

In moist evergreen or deciduous tropical to subtropical forest area, often escape also.

Distribution: India (Assam, Jammu & Kashmir to Arunachal Pradesh, Madhya Pradesh, Maharashtra, S. India, West Bengal); Native of America, cultivated and naturalised in world.

Specimens examined: On way to Halduparao, R. *Manikandan* 125603, 124811 (BSD).

10. *Leptopus* Decne.

Leptopus cordifolius Wall. ex Decne. in Jacq., Voy. Inde Bot. 4: 155, t. 156. 1836; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007; Chakrab. & al., N.P. Balakr. & al., Fl. India 23: 434. 2012. *Phyllanthus cordifolius* Wall. ex Decne., *l.c.* 155. 1844, *nom. invalid., pro syn. Andrachne cordifolia* (Decne.) Mull.-Arg. in DC., Prodr 15: 234. 1866; Hook.f., Fl. Brit. India 5: 283. 1890. *Arachne cordifolia* (Decne.) Hurus, J. Fac. Sci. Univ. Tokyo Bot. 6: 339. 1954.

Scandent shrub, perennial, to 3 m high; stems branched, terete, glabrous. Leaves petioled, 3.5–10 x 1.5–4.5 cm, ovate obovate-oblong, apex acuminate, base subcordate, Margins entire, glabrous above, hairy beneath; stipules triangular. Flowers yellow, on long, slender stalks, dioecious. Male flowers: calyx 5-lobed; corolla lobes 5, spatulate; stamens 5. Female flowers: calyx 5-lobed; corolla lobes glandular. Ovary 3-celled, glabrous. Capsules subglobose, 3-lobed, brown.

Flowering & Fruiting: April–November.

Grows in open forest area near deciduous forests.

Distribution: India (Jammu & Kashmir to Arunachal Pradesh, N.E. Himalaya), Nepal, Pakistan.

Specimens examined: Way to Halduparao, R. *Manikandan* 122490, 122514 (BSD); Samir Sinha (2001).

11. *Mallotus* Lour.

Mallotus philippensis (Lam.) Muell.-Arg., Linnaea 34: 196. 1865; Hook.f., Fl. Brit. India 5: 442. 1890; P.C. Pant, Fl. Corbett Natl. Park: 141. 1986; R.D. Gaur, Fl. Distr. Garhwal: 343. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007; Susila & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 159. 2012. *Croton philippensis* Lam., Encycl. 2: 206. 1786. *Rottlera tinctoria* Roxb., Pl. Coromandel 2: 36, t. 168. 1802.

Rohini, Roli

Trees, dioecious, evergreen, to 15 m high; stems terete, branched; young branchlets rusty pubescent. Leaves petioled, ovate-oblong or ovate-lanceolate, 5.8–15.5 x 3.5–7.5 cm, base cuneate or truncate, apex caudate, margins sub entire, glabrous above, tomentose on nerves beneath; stipules obsolete. Male flowers yellow, in axillary racemes; sepals 3–4, ovate-elliptic. Female flowers red, sessile, solitary, in spikes; sepals 3–5; styles 3. Capsules subglobose, trilobed, c. 1cm across, covered with bright red powder; seeds subglobose-ovoid, 4–5 mm across, blackish.

Flowering & Fruiting: October–March.

In evergreen tropical to subtropical forests.

Distribution: India (Assam, Uttarakhand to Arunachal Pradesh, Sikkim, S. India, West Bengal, Andaman & Nicobar Islands), Australia, Bangladesh, Bhutan, China, Myanmar, Sri Lanka.

Specimens examined: Way to Adnala, R. *Manikandan* 122342, 122448 (BSD).

12. *Phyllanthus* L.

- 1a. Trees; stems pubescent2. *P. emblica*
 1b. Herbs or undershrubs; stems glabrouscent2
 2a. Stipules ovate-triangular 3
 2b. Stipules linear1. *P. debilis*
 3a. Flowers pale-white or yellowish; capsules subglobose, smooth 3. *P. simplex*
 3b. Flowers red; capsules globose, warty4. *P. urinaria*

1. ***Phyllanthus debilis*** Klein ex Willd., Sp. Pl. ed, 4,4: 582. 805; Hook.f, Fl. Brit. India 5: 299. 1887; P.C. Pant, Fl. Corbett Natl. Park: 141. 1986; R.D. Gaur, Fl. Distr. Garhwal: 344. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007; Chakrab. & al., N.P. Balakr. & al., Fl. India 23: 484. 2012. *P. niruri* var. *debilis* (Klein ex Willd.) Mull.-Arg., Linnaea 32: 43. 1863. *P. mukerjeeanus* D. Mitra & Bennet, Bull. Bot. Soc. Bengal 19: 145. 1967.

Herbs, annual, erect, to 40 cm high; stems simple or branched, glabrous. Leaves petioled, elliptic-oblong or oblong-lanceolate, 5–18 x 1.5–6.5 mm, base cuneate, apex obtuse or rounded, glabrous on both surfaces; lateral nerves 4–6 pairs; stipules linear. Flowers yellowish-green, in axillary, fascicled. Male flowers: 2–5 together; sepals 6 (3+3), elliptic or ovate, stamens 3. Female flowers: solitary, pedicel 1–2 mm long; sepals 6, obovate; styles 3, free. Capsules subglobose, c. 2 mm across, smooth; seeds trigonous, yellowish-brown, ribbed.

Flowering & Fruiting: January–December.

Common weed in cultivable wasteland, in shady localities of forest margins.

Distribution: India (Andaman & Nicobar Islands, Assam, Madhya Pradesh, Uttarakhand, Orissa, S. India), Africa, Asia, Sri Lanka.

Specimens examined: Way to Halduparao, R. *Manikandan* 122302 (BSD); Samir Sinha (2001).

2. ***Phyllanthus emblica*** L., Sp. Pl.: 982. 1753; Hook.f, Fl. Brit. India 5: 289. 1887; P.C. Pant, Fl. Corbett Natl. Park: 142. 1986; R.D. Gaur, Fl. Distr. Garhwal: 344. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007; Chakrab. & al., N.P. Balakr. & al., Fl. India 23: 446. 2012. *Emblica officinalis* Gaertn., Fruct. 2: 122, t. 108. 1791. *Aamwala, Aaonla, Anola* [Plate-17c]

Tree, deciduous, to 15 m high; stems branched, scaly; branches hairy or pubescent. Leaves petioled, pinnately compound, ovate-oblong, 6.5–20.5 x 1.5–5.5 mm, base rounded, apex obtuse, glabrous above, pubescent beneath. Flowers yellowish-brown, many, in axillary clusters. Male and Female flowers born on the same branches; sepals 3+3; stamens 3; anthers oblong. Ovary ovoid, 3-locular, glabrous. Fruits edible, globose, yellowish at maturity, fleshy; seeds solitary, crustaceous, with 4–5 ridges, brown.

Flowering & Fruiting: September–March.

Common in forest along shady places, also cultivated.

Distribution: India (throughout the country), Asia, China, Myanmar, Pakistan, Sri Lanka, Thailand.

Specimens examined: Way to Adnala, R. *Manikandan* 122367 (BSD).

3. **Phyllanthus simplex** Retz., Obs. 5: 29. 1789; Hook.f., Fl. Brit. India 5: 295. 1890; Chakrab. & al., N.P. Balakr. & al., Fl. India 23: 476. 2012. *P. virgatus* Forst.f., Fl. Ins. Austr. Prodr. 65. 1786; P.C. Pant, Fl. Corbett Natl. Park: 142. 1986; R.D. Gaur, Fl. Distr. Garhwal: 345.1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007.

Herb or undershrub, perennial, erect or suberect, to 60 cm high; stems glabrous, sparsely branched; branches flattened or winged. Leaves petioled, distichous, linear-oblong or elliptic-oblong, 1–2.2 x 0.2–0.6 cm, base obtuse, apex apiculate, margins entire, glabrous above, glaucous beneath; stipules ovate-triangular, peltate. Flowers pale-white or yellowish, in axillary. Male flowers 2–4, smaller than female flowers; stamens 3, filaments free. Female flowers solitary; sepals broadly oblong. Capsules subglobose, c. 5 mm across, crustaceous, smooth; seeds trigonous, tubercled, blackish-brown.

Flowering & Fruiting: March–October.

In open grassy slopes, sandy, rocky places along forest margins.

Distribution: India (Andaman & Nicobar Islands, Arunachal Pradesh, Jammu & Kashmir to Uttarakhand, N.E. India, S. India, Maharashtra, Rajasthan), Asia, China, Malaysia, Sri Lanka.

Specimens examined: Way to Halduparao, R. *Manikandan* 125627 (BSD); Samir Sinha (2001).

4. **Phyllanthus urinaria** L., Sp. Pl.: 982. 1753; Hook.f., Fl. Brit. India 5: 293. 1887; P.C. Pant, Fl. Corbett Natl. Park: 142. 1986; R.D. Gaur, Fl. Distr. Garhwal: 345. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 216. 2007; Chakrab. & al., N.P. Balakr. & al., Fl. India 23: 490. 2012.

Herb, annual or perennial, to 50 cm high; stems branched, slender, glabrous, reddish-brown. Leaves petioled, distichously imbricate, ovate-oblong or oblong, 0.4–1.2 x 0.3–0.7 cm, base cuneate, apex mucronate, glabrous above, pubescent on nerves beneath; stipules ovate-triangular. Flowers small, red, axillary, solitary, arranged beneath the branches. Male flowers 1–3 in axil of leaves; stamens 3. Female flowers solitary. Perianth 6-parted, greenish. Capsules globose, trilobed, to 3 mm across, warty, reddish-brown; seeds trigonous, ribbed, brown.

Flowering & Fruiting: June–October.

In humid, shady places as weedy undergrowth in forest and gardens.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir to Uttarakhand, N.E. India, S. India, Rajasthan, Andaman & Nicobar Islands), S. Asia; Pantropical.

Specimens examined: On way to Halduparao, R. *Manikandan* 125614, 122346, 124957, 125510 (BSD); Samir Sinha (2001).

13. **Putranjiva** Wall.

Putranjiva roxburghii Wall., Tent. Fl. Nep.: 61. 1826; Hook.f., Fl. Brit. India 5: 336. 1887; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 217. 2007; Chakrab. & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 405.

2012. *Drypetes roxburghii* (Wall.) Hurus., J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 6: 337. 1954; P.C. Pant, Fl. Corbett Natl. Park: 140. 1986; R.D. Gaur, Fl. Distr. Garhwal: 337. 1999.

Tree, evergreen, to 15 m high; stems branched, glabrous. Leaves petioled, alternate, ovate or elliptic-oblong, 3.5–12 x 1.5–4 cm, base obtuse or rounded, apex acute-acuminate, glabrous above, glaucous beneath; lateral nerves 9–17 pairs. Flowers small, yellowish. Male flowers in dense axillary clustered, 2–2.5 mm across; sepals 5–6, ovate; stamens 2–4. Female flowers solitary or in pairs; sepals 5–6, ovate elliptic. Fruits ovoid or sub-globose, to 1.5 cm across, brown; seed solitary, ovoid, crustaceous, wrinkled.

Flowering & Fruiting: March–December.

In tropical to subtropical, evergreen or deciduous forest margins.

Distribution: India (Arunachal Pradesh, Jammu & Kashmir to Uttarakhand, N.E. India, S. India, Maharashtra, Rajasthan), Asia, Bangladesh, China, Myanmar, Sri Lanka.

Specimens examined: Mundiapani, Morghatty, R. *Manikandan* 124926, 125757-B (BSD).

14. *Ricinus* L.

Ricinus communis L., Sp. Pl.: 1007. 1753; Hook.f, Fl. Brit. India 5: 457. 1887; P.C. Pant, Fl. Corbett Natl. Park: 142. 1986; R.D. Gaur, Fl. Distr. Garhwal: 345. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 217. 2007; Susila & N.P. Balakr. in N.P. Balakr. & al., Fl. India 23: 166. 2012.

Shrub or small tree, to 5 m high; stems branched, fistular. Leaves petioled, ovate-orbicular or suborbicular, 5–10 lobed, obliquely peltate, glabrous on both surfaces; stipules ovate-lanceolate. Flowers greenish-white, clustered, in axillary fascicles. Male flowers yellowish; pedicels 1–1.5 cm long; calyx membranaceous, 3–5 lobed; petals absent. Female flowers greenish, 7–8 mm across. Fruits schizocarpic, globose, prickly, 3-lobed, to 2.5 cm across; seeds ellipsoid, oily, dark brown.

Flowering & Fruiting: March–December.

Usually as an escape, in tropical to subtropical regions along wasteland and village proximity.

Distribution: India (Jammu & Kashmir to Uttarakhand, N.E. India, S. India, Arunachal Pradesh, Maharashtra, Rajasthan), Asia, Bangladesh, China, Myanmar, Sri Lanka; Pantropical.

Specimens observed: Seen along the riverside Pakhro forest division.

85. URTICACEAE

- | | |
|--|-----------------------|
| 1a. Herbs or undershrubs | 2 |
| 1b. Shrubs or trees | 7 |
| 2a. Stems erect | 3 |
| 2b. Stems creeping or decumbent | 5 |
| 3a. Leaves alternate | 4 |
| 3b. Leaves opposite | 10. Urtica |
| 4a. Leaves sessile, rhombic-ovate to obovate | 3. Elatostema |
| 4b. Leaves petioled, ovate-cordate or ovate-lanceolate | 6. Neodistimon |
| 5a. Perennials; stipules triangular or broadly ovate | 6 |
| 5b. Annuals; stipules lanceolate | 9. Pouzolzia |

- 6a. Leaf margins entire 4. **Gonostegia**
 6b. Leaf margins serrate-serrulate 8. **Pilea**
- 7a. Leaf margins dentate; stamens 5 5. **Maoutia**
 7b. Leaf margins serrate or serrulate; stamens 4 8
- 8a. Leaves usually alternate 9
 8b. Leaves usually opposite 1. **Boehmeria**
- 9a. Stipules oblong-lanceolate; achenes subglobose 2. **Debregeasia**
 9b. Stipules linear-lanceolate; achenes ovoid 7. **Villebrunea**

1. **Boehmeria** Jacq.

- 1a. Shrubs; leaves hispid above; flowers white 1. *B. macrophylla*
 1b. Trees; leaves glabrous above; flowers yellowish-green 2. *B. rugulosa*

1. **Boehmeria macrophylla** Hornem., Reg. Bot. Hafn 2: 890. 1815 (*non* Don 1825); P.C. Pant, Fl. Corbett Natl. Park: 144. 1986; Murti in Pusalkar & al., Fl. India 24: 15. 2022. *B. platyphylla* D. Don, Prodr. Fl. Nepal.: 60. 1825; Hook.f., Fl. Brit. India 5: 578. 1890; P.C. Pant, *l.c.*; R.D. Gaur, Fl. Distr. Garhwal: 96. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 217. 2007. *Bara-Siauru* [Plate-17d]

Shrubs, to 1.5 m high; stems quadrangular, branched, dark-brown, pubescent. Leaves petioled, obovate-orbicular or broadly ovate-lanceolate, 7.5–20.5 × 4–9.5 cm, base cuneate, apex caudate-acuminate, margins serrate, hispid above, pubescent on nerves beneath, 3-nerved at base. Flowers white, unisexual, in 7–10 cm long axillary, erect spikes; bracts lanceolate; perianth tubular, 4-lobed, 3–5 mm across; stamens 4, exserted. Achenes obovate, compressed, enclosed in dry perianth, brown.

Flowering & Fruiting: June–November.

Common in tropical to temperate mixed forest as undergrowth.

Distribution: India (Assam, Himachal Pradesh to Eastern Himalaya), Asia, China, Myanmar.

Specimens examined: On way to Halduparao, R. *Manikandan* 125503, 122479, 122518, 122419, 124899 (BSD); Samir Sinha (2001).

Uses: It is used as fodder for cattles.

2. **Boehmeria rugulosa** Wedd., Monogr. Urtic.: 378. 1856; Hook.f., Fl. Brit. India 5: 579. 1890; P.C. Pant, Fl. Corbett Natl. Park: 144. 1986; R.D. Gaur, Fl. Distr. Garhwal: 96. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 217. 2007. *Urtica rugulosa* Wall., Cat. 163. N. 4597. 1831. *nom. nud.* *Genthi* [Plate-17e]

Trees, evergreen, to 8 m high; stems and branches dark-brown, rough, glabrous. Leaves petioled, elliptic-lanceolate or ovate-lanceolate, 6.5–11.5 × 4–6.5 cm, base subrounded, apex acuminate, margins serrate-dentate, glabrous above, pale-velvety pubescent on nerves beneath. Flowers yellowish-green, clusters, in simple, 6–12 cm long axillary, erect spikes; bracts cordate-lanceolate; perianth 4-lobed, minute, ciliate; stamens 4, exserted. Achenes elliptic, stipitate, acute at both ends, ciliate at apex, brown.

Flowering & Fruiting: June–November.

Common in tropical to temperate mixed forest.

Distribution: India (W. Himalaya to Eastern Himalaya), Asia, Bhutan, Myanmar.

Specimens examined: On way to Morkhatty, R. *Manikandan* 124836, 124897 (BSD); Samir Sinha (2001).

Uses: Timber used for utensils; leaves used as fodder.

2. *Debregeasia* Gaudich.-Beaup.

- 1a. Leaf base rounded or subcordate; flowers creamy or greenish-yellow 1. *D. longifolia*
 1b. Leaf base cuneate or subrounded; flowers white or reddish-brown 2. *D. saeneb*

1. ***Debregeasia longifolia*** (Burm.f.) Wedd. in DC., Prodr. 16 (1): 235. 1869; P.C. Pant, Fl. Corbett Natl. Park: 144. 1986; R.D. Gaur, Fl. Distr. Garhwal: 97. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 217. 2007; Murti in Pusalkar & al., Fl. India 24: 32. 2022. *Urtica longifolia* Burm.f., Fl. Ind. 297. 1768. *Debregeasia velutina* Gaudich., Bonite. Bot. Atlas.: 90. 1844. Tusara

Shrubs or small trees, to 5 m high; bark with thin and dark-brown bark; branchlets slender, reddish-brown, hairy. Leaves petioled, oblong-lanceolate or obovate-lanceolate or linear, 6–16 x 1.5–4.6 cm, base rounded or subcordate, apex acuminate, greyish-tomentose or glabrous or above, white-tomentose beneath, margins serrulate; stipules oblong-lanceolate, 5–9 mm long. Flowers creamy or greenish-yellow, in axillary dichotomously branched globose heads; bracts triangular-ovate, membranous. Male flowers obovoid in bud; perianth lobes 4, broadly ovate, apex acute; stamens 4. Female flowers sessile, obovoid; perianth tube membranous. Achenes orange-yellow or reddish at maturity, enclosed in fleshy perianth.

Flowering & Fruiting: June–October.

Common in margins of subtropical to temperate mixed forest.

Distribution: India (Arunachal Pradesh, W. Himalaya to Eastern Himalaya, Sikkim), Asia, Bangladesh, Bhutan, Cambodia, China, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka.

Specimens examined: On way to Halduparao, R. *Manikandan* 124859 (BSD).

2. ***Debregeasia saeneb*** (Forssk.) Heeper & Wood, Kew Bull. 38 (1): 86. 1983. *Rhus saeneb* Forssk., Fl. Aegypt.-Arab.: 206. 1775; Murti in Pusalkar & al., Fl. India 24: 34. 2022. *Debregeasia salicifolia* (D. Don) Rendle in Prain, Fl. Trop. Afr. 6: 11(295). 1913; R.D. Gaur, Fl. Garhwal: 97. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 218. 2007. *Boehmeria salicifolia* D. Don, Prodr. Fl. Nep.: 60. 1825. *Debregeasia hypoleuca* Wedd., Monogr.: 463. t. 15, f. 10. 1886; Hook.f., Fl. Brit. India 5: 591. 1888. Syanru

Shrub or small tree, to 5 m high; stems branched, pubescent; branches purplish or reddish-brown. Leaves petioled, ovate-lanceolate or linear-oblong, 4.2–11.5 x 1.5–3.8 cm, base cuneate or subrounded, apex acuminate, margins serrate, glabrous above, whitish-pubescent beneath; trinerved at base; stipules oblong-lanceolate. Flowers white or reddish-brown, unisexual, small, in axillary or subterminal clusters; bracts obovate, membranous. Male flowers shortly pedicellate, flattened in bud. Female flowers sessile, obovoid; perianth, 4-partite; stamens 4. Achenes subglobose, yellowish-green, to 1 mm across, enclosed by fleshy perianth.

Flowering & Fruiting: February–June.

Common in margins of subtropical to temperate mixed forest in moist places.

Distribution: India (W. Himalaya to Eastern Himalaya, Sikkim, S. India), S.E. Asia, China, Myanmar, Nepal, Sri Lanka.

Specimens examined: Vatanvasa, T.S. Rana & Party 220252 (LWG); Samir Sinha (2001).

Uses: Fruits are edible.

3. *Elatostema* J.R. Forst. & G. Forst.

Elatostema cuneatum Wight, Icon. Pl. Ind. Orient. 6: 35, t. 2091, f. 3. 1853; P.C. Pant, Fl. Corbett Natl. Park: 146. 1986; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 218. 2007; Murti in Pusalkar & al., Fl. India 24: 48. 2022. *E. approximatum* Wedd., Prodr. Syst. Nat. Reg. Veg. 16. 1: 190. 1869.

Herbs, dioecious, annual, to 6 cm high; stems simple, pubescent. Leaves subsessile, alternate, rhombic-ovate to obovate, 1–3.7 x 0.5–1.8 cm, base cuneate, apex acute, margins dentate, pubescent above, thinly hairy on nerves beneath, stipules narrowly triangular, glabrous, without cystoliths. Flowers minute, white, crowded in axillary, sessile, 4–5 mm across heads. Female Perianth 3–4 mm across, sessile. Male perianth 2–4 mm across; bracts triangular. Achenes ovoid, ribbed.

Flowering & Fruiting: June–October.

Common in humid places on slopes.

Distribution: India (Himachal Pradesh to Eastern Himalaya), China, Japan, Korea.

Specimens examined: On way to Halduparao, R. Manikandan 125601, 122467 (BSD).

4. *Gonostegia* Turcz.

Gonostegia pentandra (Roxb.) Miq., Ann. Mus. Bot. Lugd. 4: 303, t. 10, f. 2. 1869; R.D. Gaur, Fl. Distr. Garhwal: 99. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 218. 2007; Murti in Pusalkar & al., Fl. India 24: 89. 2022. *Pouzolzia pentandra* (Roxb.) Bennet & Brown, Pl. Jav. Rar.: 64. t. 14. 1838; Hook.f., Fl. Brit. India 5: 583. 1890; P.C. Pant, Fl. Corbett Natl. Park: 146. 1986. *Urtica pentandra* Roxb., Fl. Ind. 3: 583. 1832.

Herbs, perennial, decumbent, ascending to 60 cm high; stems branched, young parts glabrous. Leaves petioled, alternate on upper stem, ovate-lanceolate or oblong-ovate or lanceolate, 2.5–5.5 x 0.5–1.7 cm, base subrounded or cuneate, apex acute-acuminate, margins entire, glabrous above, pubescent on nerves beneath. Flowers greenish-brown in clusters. Male perianth 5-lobed; stamens 5, short. Female perianth 3-winged, variable. Achenes blackish, glaucous.

Flowering & Fruiting: April–October.

Occasional in rocky, moist places on river banks.

Distribution: India (Western Himalaya, S. India), Asia, Bangladesh, China, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

5. *Maoutia* Wedd.

Maoutia puya (Hook.) Wedd., Ann. Sc. Nat. Ser. 4, 1: 193. 1854; Hook.f., Fl. Brit. India 5: 592. 1890; P.C. Pant, Fl. Corbett Natl. Park: 146. 1986; R.D. Gaur, Fl. Distr. Garhwal: 100. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 218. 2007. *Boehmeria puya* Hook., J. Bot. London 3: 316. t. 7 1851. *Phur-khagsa*

Shrubs, erect, to 1.5 m high; stems terete, branched, pubescent. Leaves petioled, alternate, ovate-obovate or ovate-lanceolate, 3.2–11.5 x 2.5–6.5 cm, base cuneate or subrounded, apex acuminate; margins dentate, scabrid, pubescent above, whitish tomentose beneath, subcoriaceous; trinerved at base; stipules

connate at base. Flowers greenish, minute, in axillary or subterminal, dichotomously branched cymes; sepals 5, valvate; stamens 5, inserted. Achenes subglobose, fleshy, blackish-brown at maturity.

Flowering & Fruiting: June–October.

Common in wasteland, shady grassy places.

Distribution: India (Western Himalaya to E. Himalaya), China, Myanmar, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

6. **Neodistimon** Babu & Henry

Neodistimon indicum (Wedd.) Babu & Henry, *Taxon* 19: 651. 1970; P.C. Pant, *Fl. Corbett Natl. Park*: 146. 1986; R.D. Gaur, *Fl. Distr. Garhwal*: 100. 1999; Uniyal & al., *Flow. Pl. Uttarakhand Checkl.*: 218. 2007; Murti in Pusalkar & al., *Fl. India* 24: 109. 2022. *Distemon indicum* Wedd., *Arch. Mus. Hist. Nat. Paris* 9: 551, t. 20 A. 1857; Hook.f., *Fl. Brit. India* 5: 588. 1890.

Herbs, annual, erect, to 50 cm high; stems subquadrangular, simple, pubescent. Leaves petioled, ovate-cordate or ovate-lanceolate, 3.5–10.5 x 2.5–6.5 cm, base cuneate or subrounded, apex acuminate; margins dentate-serrate, glabrous above, tomentose beneath; trinerved at base; cystolith punctiform. Flowers greenish, minute, in axillary or subterminal, branched spikes; bracts ovate; stamens 2–3, inflexed. Ovary included in perianth. Achenes ovoid, 3–4 mm long, beaked, brown.

Flowering & Fruiting: June–October.

Common in wasteland, shady, moist grassy places.

Distribution: India (Western Himalaya to E. Himalaya, Assam, S. India), Indonesia, Myanmar.

Specimens examined: On way to Halduparao, R. *Manikandan* 125519 (BSD); Samir Sinha (2001).

7. **Villebrunea** Gaudich.

Villebrunea frutescens (Thunb.) Blume, *Mus. Bot. Lugd.-Bat.* 2: 168. 1856; Wedd., *Monogr. Urtic.* 455. 1857; Brandis, *For. Fl.*: 406. 1874; Hook.f., *Fl. Brit. India* 5: 590. 1890. *Boehmeria frondosa* D. Don, *Fl. Nepal.*: 59. 1825. *B. frutescens* (Thunb.) Thunb., *Trans. Linn. Soc.* 2: 330. 1794. *Oreocnide frutescens* (Thunb.) Miq., *Ann. Mus. Bot. Lugd. Bat.* 3: 131. 1867. *Urtica frutescens* Thunb., *Fl. Jap.*: 70. 1784; Roxb., *Fl. Ind. ed.* 2, 3: 589. 1832.

Shrubs, to 3 m high, with pubescent young shoots. Leaves petioled, ovate or elliptic-ovate, 3–15 x 1.5–10 cm, acuminate-caudate, serrate, scabrous, hairy to glabrescent on both sides; stipules linear-lanceolate, densely tomentose, acuminate. Flowers minute, many-flowered, clusters; bracteolate; calyx hairy outside, 1.5–2 mm long; stamens 4, inflexed in bud; stigma exserted. Achenes ovoid, to 2 mm long, enveloped by persistent slightly fleshy calyx and bracteoles.

Flowering & Fruiting: March–August.

Grows along the riverbed side and streams near deciduous forests.

Distribution: India (Northern India, Himalayas), China, Indo-China, Japan, Myanmar, Pakistan.

Specimens examined: Vatanvasa, T.S. Rana & Party 220148 (LWG).

8. **Pilea** Lindl.

Pilea scripta (Buch.-Ham. ex D. Don) Wedd., Ann. Sci. Nat. Ser. 4, 1: 187. 1854; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 219. 2007; Murti in Pusalkar & al., Fl. India 24: 138. 2022. *Urtica scripta* Buch.-Ham. ex D. Don, Prodr.: 59. 1825; Hook.f., Fl. Brit. India 5: 556. 1888.

Herbs, perennial, creeping, to 75 cm high; stems erect, purple-streaked, basally woody, glabrous, with rooting at base; stipules triangular, persistent. Leaves petioled, subequal, 2.5–15 x 1.8–7 cm, elliptic-oblong, acute to long acuminate at apex, serrate-serrulate along the margins. Flowers minute, pale green or yellowish, in leaf opposed axillary or terminal panicle cymes; male flower in panicles much longer than female; segments 3, unequal in female flowers. Achenes c. 1 mm long, ellipsoid, minute, compressed, whitish, tuberculate, with prominent intramarginal ridges.

Flowering & Fruiting: August–November.

Occasional in wet places, along wet rocky places.

Distribution: India (Northern India, Himalayas), Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Vatanvasa, T.S. Rana & Party 220249 (LWG).

9. **Pouzolzia** Gaudich.

Pouzolzia zeylanica (L.) Bennett & Brown, Pl. Jav. Rar.: 67. 1854; P.C. Pant, Fl. Corbett Natl. Park: 147. 1986; R.D. Gaur, Fl. Distr. Garhwal: 102. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 219. 2007. *Parietaria zeylanica* L., Sp. Pl.: 1052. 1753. *Pouzolzia indica* Gaudich., Freyc. Voy. Uranie, Bot. 503. 1830; Hook.f., Fl. Brit. India 5: 581. 1888.

Herbs, annual, suberect or trailing, decumbent, often rooting at nodes, to 30 cm high; stems obscurely 4-gonous, branched from base, glabrous or pubescent. Leaves petioled, ovate or ovate-lanceolate, 1.2–3.2 x 0.5–1.2 cm, base cuneate, apex acute-acuminate, margins entire, glabrous or pubescent above, sparsely pubescent beneath; stipules lanceolate. Flowers white, 3–4 mm across, axillary in clusters, puberulous; perianth lobes 4; stamens 4. Achenes ovoid, small, greenish-white.

Flowering & Fruiting: July–October.

Common in moist, shady, places along forest.

Distribution: India (almost throughout the country), China, Japan, Malaysia, Myanmar.

Specimens examined: On way to Halduparao, R. Manikandan 122483, 122525, 124965 (BSD); Samir Sinha (2001).

10. **Urtica** L.

Urtica ardens Link., Enum. Hort. Berol.: 385. 1822; P.C. Pant, Fl. Corbett Natl. Park: 147. 1986; R.D. Gaur, Fl. Distr. Garhwal: 103. 1999; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 219. 2007; Murti in Pusalkar & al., Fl. India 24: 169. 2022. *U. parviflora* Roxb., Fl. Ind. ed. Carey 3: 581. 1832; Hook.f., Fl. Brit. India 5: 548. 1890. *U. himalayensis* Kunth & Bouche, Ann. Sci. Nat. Ser. 3, 7: 182. 1847. *Bichu*

Herbs or undershrubs, perennial, erect, to 2 m high; stems angular, sparsely pubescent, pale-green. with stinging bristles and hairs. Leaves petioled, ovate-lanceolate or oblong-lanceolate, 4.5–12.5 x 2–4.8 cm, base subrounded, apex acuminate, margins crenate, glabrous above, hairy beneath; stipules ovate-oblong, connate, pubescent. Flowers in clusters, small, pale-green, on panicle cymes. Male flowers hairy; perianth segments

4. Female flowers glabrous, sessile. Achenes ovoid-orbicular, blackish-brown, hairy, enclosed with persistent perianth.

Flowering & Fruiting: July–October.

Common in waste, shady places.

Distribution: India (W. Himalaya to N.E Himalaya), Bhutan, China, Pakistan.

Specimens examined: On way to Halduparao, R. *Manikandan* 122524 (BSD); Vatanvasa forest, Rana, Dutt & Pande 220244 (LWG); Samir Sinha (2001).

86. ULMACEAE

1a. Fruit a samara 2. **Holoptelea**

1b. Fruit a drupe..... 2

2a. Shrubs; drupes globose to ovoid 3. **Trema**

2b. Trees; drupes subglobose or ellipsoid 1. **Celtis**

1. **Celtis** L.

Celtis australis L., Sp. Pl.: 1043. 1753; Hook.f., Fl. Brit. India 5: 482. 1888; T.S. Rana & al., Fl. Tons Valley: 315. 2003; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 219. 2007. *Kharik*

Trees, deciduous, to 15 m high; branches slender, pendulous, pubescent, with pale-ashy grey bark and whitespecks. Leaves petioled, 4–10 x 2–5 cm, ovate-elliptic, acuminate at apex, unequal, rounded at base, coarselyserrate along the margins, coriaceous, glabrous or scabrid. Flowers greenish, in axillary or clusters towards base; male flowers: in clusters, towards the base; female flowers: in axil of leaves; perianth segments ovate, fringed with wooly hairs; stamens 4–5; with 2 unequal armed, pilose styles. Drupes c. 7 mm across, subglobose or ellipsoid, reddish-brown, stone slightly reticulately rugose glabrous, purplish-black.

Flowering & Fruiting: July–October.

Occasional in moist deciduous forests.

Distribution: India (Northern India, Himalayas), Afghanistan, Central Asia, Caucasus, Iraq, Iran, Nepal, Pakistan.

Specimens examined: Vatanvasa, H.C. Pande 220737 (LWG).

2. **Holoptelea** Planch.

Holoptelea integrifolia (Roxb.) Planch., Ann. Sci. Nat. Ser. 3. 10: 266. 1848; Hook.f., Fl. Brit. India 5: 481. 1887; P.C. Pant, Fl. Corbett Natl. Park: 143. 1986; R.D. Gaur, Fl. Distr. Garhwal: 85. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 219. 2007; R. Mathur in Pusalkar & al., Fl. India 24: 197. 2022. *Ulmus integrifolia* Roxb. in Willd., Sp. Pl. 1: 1326. 1797 et Fl. Indica (ed 2.) 2: 68. 1832. *Papri, Banchilla* [Plate-17f]

Large trees, spreading, deciduous, to 30 m high; bark grey; branchlets lenticellate, young shoots often pubescent. Leaves petioled, obliquely ovate, 5.5–12.5 x 3.5–7 cm, subcoriaceous or sometimes membranous, acuminate at apex, base unequally rounded or subcordate, entire or serrate when young, glabrous and shining above, pubescent beneath, 5–7-nerved. Flowers greenish-yellow, in short racemes or fascicles, on leafless branches; perianth campanulate, 4–8-lobed, often unequal, pubescent; stamens 6–8; filaments glabrous; styles short, bifid; stigma 2. Samara obliquely elliptic or suborbicular, to 3.5 x 2.5 cm, unequal sided, wing membranous, reticulately veined, notched at apex.

Flowering & Fruiting: February–May.

Very common in dry deciduous forests of sub-Himalayan tracts.

Distribution: India (sub Himalayan hills to Assam, Indian peninsula), Indo-China, Pakistan, Sri Lanka.

Specimens examined: Sona river bank, *H.C. Pande* 220837; On way to Pakhro, R. *Manikandan* 124808 (BSD).

Uses: Wood is used chiefly for fuel and charcoal; fruit is eaten by monkeys; decoction of bark is applied on rheumatic pain. It is an important trees of social forestry.

3. *Trema* Lour.

Trema politoria (Planch.) Blume, Ann. Mus. Bot. Ludg.-Bat. 2(1–8): 58. 1856; Hook.f., Fl. Brit. India 5: 484. 1888; P.C. Pant, Fl. Corbett Natl. Park: 143. 1986; R.D. Gaur, Fl. Distr. Garhwal: 85. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl: 219. 2007. *Sponia politoria* Planch., Ann. Sci. Nat. ser. 3. 10: 326. 1848.

Banbaria, Koeli, Khagshi, Kuri [Plate-17g]

Shrubs or small trees, to 8 m high; bark pale brown, tubercular with numerous small lenticels; branchlets slender, terete, scabridly pubescent-villous. Leaves petioled, oblong or ovate-lanceolate, 4.5–14 x 3.5–5.5cm, subcoriaceous, acute or acuminate at apex, rounded to subcordate base, margin serrulate, rough or scabrid on both surfaces, 3–5-nerved; stipules lateral, linear-subulate, caducous. Flowers in axillary clusters. Male flowers small, greenish; perianth 5-lobed, oblong, obtuse, with wooly margin; stamens 5. Female flowers smaller than male flowers; perianth 5-partite, ciliate. Drupes globose to ovoid, glabrous, black, seated on persistent perianth.

Flowering & Fruiting: July–December.

Common, found to grow in miscellaneous forests, exposed ravines, river banks, shady localities of sub Himalayan tracts.

Distribution: India (Assam, Bihar, Madhya Pradesh, Maharashtra, Sikkim, Uttarakhand, Uttar Pradesh), Bhutan, Nepal, Pakistan, S.W. China.

Specimens examined: On way to Halduparao, R. *Manikandan* 125577, 122305 (BSD); Samir Sinha (2001).

Uses: Bark yields strong fibre and often used for making ropes. The wood is used as fuel and charcoal. Leaves are considered as good fodder. Fruits are edible, sometimes jam, pickles etc are prepared from the fruits. The leaf extract is used to check vomiting.

87. CANNABACEAE

Cannabis L.

Cannabis sativa L., Sp. Pl.: 1027. 1753; Hook.f., Fl. Brit. India 5: 487. 1888; P.C. Pant, Fl. Corbett Natl. Park: 143. 1986; R.D. Gaur, Fl. Distr. Garhwal: 86. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl: 220. 2007; Uniyal in Pusalkar & al., Fl. India 24: 180. 2022. *C. indica* Lam., Encycl. 1: 695. 1783. *Bhang, Bhangla* [Plate-17h]

Herb or undershrub, annual-perennial, aromatic, dioecious, to 3 m high; bark fibrous; stems angular, erect; branches appressed pubescent, often purple-tinged. Leaves petioled, 3–10 foliate or partite; leaflets linear-lanceolate to elliptic, 2.5–10 × 0.2–1.5 cm, chartaceous, long acuminate at apex, narrow at base, margin coarsely serrated, glandular hairy above, punctate glandular beneath, 10–12-nerved; stipules subulate, filiform, 0.5–1 cm long. Flowers greenish-yellow. Male flowers pedicelled, in lax terminal panicked cymes; perianth

segment 5, oblong, obtuse, ciliate, margin whitish; stamens 5. Female flowers solitary, axillary, sessile, forming leafy spikes; bracts glandular-hairy, accrescent in fruiting; perianth segment 1, leafy. Achenes ovoid, smooth, enclosed with persistent perianth, grayish-brown; seed glabrous or ovoid.

Flowering & Fruiting: May–October.

Common in roadside, waste places, often cultivated with rainy season crops; regarded as a native of western and Central Asia.

Distribution: India (Jammu & Kashmir, Tamil Nadu), China, Iran, Pakistan, Russia.

Specimens Observed: Seen almost throughout the sanctuary.

Uses: A strong narcotic is derived from the resin of the stems, leaves, flowers and fruits and following products are made *viz.*, ganja, charas, bhang etc. Bark fibre is used for making ropes, sacs and rough clothes; stems are used as a fuel; seed oil is edible and used as luminant; also used in making paints, varnishes soaps etc. Seeds are eaten along with puffed rice and also as chutneys.

88. MORACEAE

- 1a. Male and female flowers borne inside a hypanthodium1. **Ficus**
 1b. Male and female flowers borne externally, in a dense to lax catkin, spike or head 2
- 2a. Leaves ovate; cordate at base; syncarp ovoid, ellipsoid2. **Morus**
 2b. Leaves elliptic- ovate or rhomboid, cuneate or subattenuate at base; drupes globose3. **Streblus**

1. **Ficus** L.

- 1a. Epiphytic stragglers14. *F. tinctoria* subsp. *gibbosa*
 1b. Terrestrial shrubs or trees 2
- 2a. Usually shrubs or small trees 3
 2a. Usually medium sized or big trees 8
- 3a. Stamens 1 or 2 4
 3b. Stamens 3–68. *F. palmata* subsp. *virgata*
- 4a. Stamen 1 5
 4b. Stamens 25. *F. bederacea*
- 5a. Leaves alternate or spiral 6
 5b. Leaves opposite6. *F. hispida*
- 6a. Stipules broadly ovate- lanceolate15. *F. virens*
 6b. Stipules lanceolate 7
- 7a. Leaves oblong to elliptic-lanceolate13. *F. subincisa*
 7b. Leaves oblanceolate to oblong12. *F. squamosa*
- 8a. Leaf base cordate, unequal sided; lateral nerves 9–14 pairs; figs sessile11. *F. semicordata*
 8b. Leaf base equal sided; lateral nerves 4–8 pairs; figs stalked9
- 9a. Stamens 2 or 3 10
 9b. Stamen 1 11
- 10a. Basal nerves 5–7; leaves suborbicular; figs with 10–12 longitudinal ridges 2. *F. auriculata*

- 10b. Basal nerves 3; leaves ovate or elliptic; figs without ribs.....9. *F. racemosa*
- 11a. Leaves acuminate at the apex; stipules 1–3 cm long..... 12
- 11b. Leaves caudate at the apex; stipules minute.....13
- 12a. Leaf base cordate, never narrowed into a petiole, 5–7-nerved; figs shortly.....1. *F. arnottiana*
- 12b. Leaf base truncate or narrowed, 5-nerved; figs sessile.....10. *F. rumphii*
- 13a. Aerial roots profuse; leaves large; nerves distinct, basal nerves 5–7.....3. *F. benghalensis*
- 13b. Aerial roots few when old or absent; leaves small; nerves 7–10, basal nerves 3.....14
- 14a. Leaves elliptic- obovate, base rounded or sub acute4. *F. benjamina*
- 14b. Leaves ovate or obovate, base cuneate7. *F. microcarpa*

1. **Ficus arnottiana** (Miq.) Miq., Ann. Mus. Bot. Lugd.-Bat. 3: 287. 1867; King in Hook.f., Fl. Brit. India 5: 513.1888; P.C. Pant, Fl. Corbett Natl. Park: 148. 1986; R.D. Gaur, Fl. Distr. Garhwal: 89. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., Taiwania 57(2): 207. 2012; Sudhakar & in Pusalkar & al., Fl. India 24: 243. 2022. *F. cordifolia* Graham, Cat. Bomb. Pl.: 192. 1839. *Urostigma arnottiana* Miq. in Hook., J. Bot. 6: 564. 1847. *U.cordifolium* Dalz. & Gibbs., Bombay Fl.: 242. 1861.

Kathpipal, Paras-pipal [Plate-18a]

Trees, evergreen, to 8 m high, often epiphytic; bark pale pink or yellowish-brown, rough, lenticellate, exfoliating in irregular woody scales; stipules narrowly elliptic-lanceolate, bright pink to reddish-brown, caducous. Leaves petioled, broadly ovate, 5–8.5 x 3–6 cm, subcoriaceous, apex shortly caudate-acuminate, base deeply cordate, margin entire, wavy, glabrous, 8–10 nerved. Figs purple with greenish, axillary, monoecious, in pairs or clusters, depressed-globose; basal bracts 3, membranous, orbicular. Male flowers: few, tepals 3, laxly arranged, inflated, broadly acuminate. Anthers ovate-rotund. Female flowers: perianth laxly arranged; style elongate; stigma flat. Gall flowers: similar to female flowers, pedicellate. Achenes subglobose, scarlet red when ripe.

Receptacle: July–November.

Common, along the miscellaneous forests of sub Himalayan tracts, on steep rocky ground, to 1370 m altitude.

Distribution: India (almost throughout the country), Nepal, Sri Lanka.

Specimens examined: Vatanvasa-Mundiapani, R. *Manikandan* 122595, 122507, 122318 (BSD).

Uses: The plant and its extract is extensively used in folk medicine; leaves used as fodder.

2. **Ficus auriculata** Lour., Fl. Cochinch.: 665. 1790; P.C. Pant, Fl. Corbett Natl. Park: 148. 1986; R.D. Gaur, Fl. Distr. Garhwal: 89. 1999; Uniyal & al., Flower Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., Taiwania 57(2): 203. 2012; Sudhakar & Pusalkar & al., Fl. India 24: 336. 2022. *F. macrophylla* Roxb., Fl. Indica 2. 3: 556. 1832. *F. roxburghii* Wall. ex Miq., Ann. Mus. Bot. Lugd.-Bat. 3: 296. 1867; King in Hook.f., Fl. Brit. India 5: 534. 1888.

Timal, Tirmal [Plate-18b]

Trees, subdeciduous, to 15 m high; bark grey, warty. Leaves broadly ovate or suborbicular, 8–12 x 4.5–15cm, subcoriaceous, apex acute or mucronate, base cordate or rounded, margin serrated, glabrous above, softly pubescent beneath, 3–6-nerved. Figs on short thick, leafless branchlets arising from trunk, stalked, in clusters of 6–20, obconic or pear-shaped, pubescent when young, tuberculate with 8–12 longitudinal ribs, red

to orange-purple on ripening; basal bracts 3, large, triangular-ovate, united, persistent. Male flowers: tepals 3, thinly membranous, transparent, spathulate; stamens 2 or 3; filaments long. Female flowers: tepals 3. Gall flowers: 2 or 3, apically free, covering ovary; style subterminal; stigma dilated. Achene granulate, viscid.

Receptacle: March–July.

Common, usually found in outer Himalaya ascending up to 2000 m, along ravines, edges of crop fields as an agro-forestry trees, often cultivated.

Distribution: India (Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Orissa, Sikkim, West Bengal), Bangladesh, Malaysia, Myanmar, Pakistan, S. China, Taiwan, Thailand.

Specimens examined: Sona river bank, way to Halduparao, R. *Manikandan* 122464 (BSD); Vatanvasa, H.C. *Pande* 220722 (LWG).

Uses: Leaves provide good fodder for cattle as well as elephants; sometimes it is used to make cup and plates; ripe fruits are edible, unripe fruits are made into vegetables; wood is used as fuel. The plants are conserved for its religious significance and utilization.

3. ***Ficus benghalensis*** L., Sp. Pl.: 1059. 1753; King in Hook.f., Fl. Brit. India 5: 499. 1888; P.C. Pant, Fl. Corbett Natl. Park: 148. 1986; R.D. Gaur, Fl. Distr. Garhwal: 89. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., Taiwania 57(2): 210. 2012; Sudhakar in Pusalkar & al., Fl. India 24: 247. 2022. *F. indica* L., Sp. Pl.: 1060. 1753 (non sensu King 1887). *F. umbrosa* Salisb., Prodr. Stirp. Chap. Allerton: 16. 1796. *Urostigma benghalensis* (L.) Gasp., Nov. Gen. Fic.: 7. 1844. *Bar, Bargad* [Plate-18c]

Trees, evergreen, to 30 m high, with numerous aerial roots from the branches; bark greyish-white, smooth, exfoliating in irregular flakes, young parts softly pubescent. Leaves petioled, ovate or orbicular-ovate to ovate-elliptic, 8–20 x 6–12 cm, subcoriaceous, apex obtuse, base rounded or subcordate, margin entire, glabrous above, puberulous below, 6–8-nerved. Figs axillary, monoecious, sessile, solitary or in pairs, globose, puberulous, orange to bright red at maturity. Male flowers: numerous, near mouth of the receptacles, tepals 3–5, lanceolate, shortly connate, brownish. Female flowers: perianth shorter than male flowers. Gall flowers: pedicellate, similar to female flowers. Achene subglobose, scarlet red when ripe.

Receptacle: April–June & December–February.

Fairly common, along the Sal forests of sub Himalayan tracts or planted along roadsides, near temples, wild in village surroundings and old walls, to 1200 m. It is native to Asia.

Distribution: India (planted in all parts of the country), Bangladesh, Malaysia, Nepal, Pakistan, Sri Lanka. Introduced and widely cultivated in tropics and elsewhere.

Specimens examined: Halduparao, R. *Manikandan* 124814 (BSD); Kanda village, Rana, Datt & Pande 220106 (LWG); Samir Sinha (2001).

Uses: Wood is used for tent poles, cart-yokes, boats etc.; leaves and young twigs are good fodder for cattle and elephants; fruits are edible, especially for wildlife; latex uses in diabetes; the plant is considered as sacred tree in Hindu mythology.

4. ***Ficus benjamina*** L., Mant. Pl. 1: 129. 1767; King in Hook.f., Fl. Brit. India 5: 508. 1888; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., Taiwania 57(2): 210. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 251. 2022.

Evergreen trees, to 20 m high, with drooping branches; bark grey to greyish white, smooth. Leaves petioled, elliptic to obovate, 5.5–8.5 x 1.5–3.5cm, leathery, apex abruptly shortly acuminate, base rounded or sub acute, entire, glabrous, 8–10-nerved. Figs axillary, on leaf branchlets, sessile, solitary or in pairs, globose to sub globose or pear-shaped, softly pubescent, red or yellow when ripe; basal bracts inconspicuous, triangular-ovate. Male flowers: few, shortly pedicellate; tepals 3 or 4, lobes broadly ovate; stamen 1; filament long; anther sub sessile. Female flowers: sessile, tepals 3, shortly spatulate; style lateral, short; stigma enlarged. Achenes ovoid-reniform. Gall flowers: numerous, mostly pedicellate; tepals 3–5, narrowly spatulate.

Receptacle: January–April.

Cultivated occasionally in the gardens. Introduced elsewhere as avenue plants.

Distribution: India(Cultivated), China, Malaysia to Solomon Islands, N. Australia.

Notes: Included on the authority of Samir Sinha (2001).

Uses: The ripe fruit is edible. The plant often planted as houseplant as it effectively removes gaseous formaldehyde from indoor air.

5. **Ficus hederacea** Roxb., Fl. Ind. (ed. 2) 3: 538. 1832; P.C. Pant, Fl. Corbett. Natl. Park. 148. 1986; P.C. Pant, Fl. Corbett Natl. Park: 148. 1986; R.D. Gaur, Fl. Distr. Garhwal: 90. 1999; L.B. Chowdhery & al., Taiwan 57(2): 200. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 392, f. 64. pl. 51. 2022. *F. fruticosa* Roxb., Fl. Ind. 3: 533.1832; Uniyal & al., Flowering Pl. Uttarakhand Checkl: 220. 2007. *F. scandens* Roxb., Fl. Ind. 3: 536. 1832 (*non* Lam. 1788); King in Hook.f., Fl. Brit. India 5: 526. 1888. *Beduli, Laduli.*

Shrubs, evergreen, rooting at nodes, trailing on rocks or ascending on tall trees; bark thick, horizontally wrinkled; stipules ovate, acuminate, caducous. Leaves petioled, ovate-elliptic, 2.5–6.5 x 1.5–3.5 cm, thickly coriaceous, apex obtuse or shortly acuminate to subacute, rounded or slightly narrowed at base, entire, with papillate cystolith on both side, glabrous, 4–5 lateral nerved. Figs axillary, stalked, on leafy or leafless branchlet, solitary or paired, globose, rough, often hairy outside, greenish-yellow when ripe. Male flowers: few, scattered, sessile; tepals 4; stamens 2. Female flowers: pedicellate or sessile; tepals 4, linear-lanceolate. Gall flowers: pedicellate, tepals 4, lanceolate. Achene oblong, pale white, dorsally keeled; stigma extended.

Receptacle: February–July.

Common, usually in humid forests, trailing on rocks or climbing on trees, to 1800m.

Distribution: India (Andaman Islands, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Jharkhand, Madhya Pradesh, Meghalaya, Orissa, Sikkim, Tripura, West Bengal), Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand.

Specimens examined: Vatanvasa-Mundiapani, R. *Manikandan* 124976, 122333, 122570, 125672 (BSD); Samir Sinha (2001).

Uses: Leaves used as fodder; inner bark is used for temporary binding.

6. **Ficus hispida** L.f., Suppl. Pl.: 442. 1781; King in Hook.f., Fl. Brit. India 5: 522. 1888; P.C. Pant, Fl. Corbett Natl. Park: 148. 1986; R.D. Gaur, Fl. Garhwal 90. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., Taiwan 57(2): 205. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 342. 2022. *F. oppositifolia* Roxb., Pl. Coromandel. 2: 14, t. 124. 1799. *F. daemonum* Koen. ex Vahl, Enum. Pl. 2: 198. 1805. *Ghogsha, Kathgular, Totmila* [Plate-18d]

Large shrubs or small evergreen trees, to 10 m high; bark pale ashy or greenish-grey, smooth, warty on old stems; branches hispidly hairy with hollow. Leaves petioled, opposite-decussate, rarely subopposite, broadly ovate or ovate-oblong, 6–18 x 3–12 cm, apex acute or shortly acuminate, base rounded, subcordate or subcuneate, margin toothed or rarely entire, scabrid, hairy on both surfaces, coriaceous, 4–7 lateral nerved. Figs usually in clusters from main stem or trunk or axillary on young parts, dioecious, shortly stalked, obovoid or globose, faintly ribbed, pubescent, pale yellow when ripe. Female flowers: sessile, tepals united into a tube around the ovary. Ovary depressed-globose; style subterminal, clavate at tip, hairy. Gall flowers: distinctly pedicellate, perianth obscure. Achenes ovoid or globose, pale green or greenish-yellow when ripe.

Flowering & Fruiting: March–June.

Common along moist-shady places, in hedges, thickets, on old walls.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, China, Indo-china, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka. Introduced and cultivated in USA.

Specimens examined: Vatanvasa, *H.C. Pande* 220726 (LWG); Vatanvasa, *Rana, Datt & Pande* 220117 (LWG); Vatanwasa-Rathuadhab, *R. Manikandan* 122310 (BSD); Samir Sinha (2001).

Uses: Young fruits are eaten in curries, ripe fruits are edible and made into jam, pickles etc. Bark yields strong fibres which is good for cordage. The leaves are lopped for cattle fodder.

7. ***Ficus microcarpa*** L.f., Suppl. Pl.: 442. 1782; P.C. Pant, Fl. Corbett Natl. Park: 149. 1986; R.D. Gaur, Fl. Garhwal: 90. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., *Taiwania* 57(2): 212. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 289. 2022. *F. retusa* Miq. in Hook., London J. Bot. 6: 582. 1847(*non* L. 1767); King in Hook.f., Fl. Brit. India 5: 511. 1888, *p.p.* *Kamrup, Sir*

Trees, evergreen, to 15 m high, often epiphytic, with a few aerial roots; bark dark grey, smooth. Leaves petioled, ovate or obovate, 5–10 x 3–6 cm, membranous, apex obtuse or abruptly acuminate, base cuneate, margin entire, glabrous, shining above. Figs axillary, sessile, on leafy branchlets or on leafless older branchlets, solitary or in pairs, depressed globose, smooth, yellow or red when ripe; basal bracts 3, spreading, ovate, tomentose, persistent. Male flowers: numerous, sessile or shortly pedicellate, scattered; tepals 3, subspathulate; stamen 1. Female flowers: sessile; tepals small; style short; stigma cylindric or clavate. Gall flowers: sessile or pedicellate; tepals 3, broadly spathulate. Achene ovoid.

Receptacle: April–July.

Common, usually grow inside sandstone ravines, along the submontane outer Himalaya, to 500 m.

Distribution: India (Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Peninsular Region, Punjab, Rajasthan, Sikkim), Australia, Bhutan, China, Indo-China, Japan, Malaysia, Nepal, Sri Lanka, Taiwan.

Specimens examined: Vatanwasa-Rathuadhab, *R. Manikandan* 124923 (BSD); Vatanvasa, *H.C. Pande* 220769; Samir Sinha (2001).

Uses: Leaves are used as fodder. Figs are eaten by wild animals. The root bark, root itself and leaves, boiled in oils form good applications for wounds and bruises.

8. ***Ficus palmata*** subsp. ***virgata*** Browicz, Fl. Iranica 153: 12. 1982; L.B. Chowdhery & al., *Taiwania* 57(2): 194. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 431, f. 67-68. 2022. *F. virgata* Roxb., *Fl. Ind.* ed 1832, 3. 530. 1832; Wight, *l.c.* 649. *Ficus palmata sensu* King in Hook.f., Fl. Brit. India 5: 530. 1888, *p.p.* (excl. syn. *F. pseudo-sycomorus* Decne.); Corner, Gard. Bull. Singapore 21(1): 36. 1965; Uniyal & al., Flow. Pl.

Uttarakhand Checkl.: 221. 2007. *F. caricoides* Roxb., Fl. Ind. ed. 1832, 3: 529. 1832; Wight, Icon. Pl. Ind. Orient.: t. 634. 1841.

Large shrub or small tree, deciduous, to 12 m high; branchlets tomentose, with bark smooth, brownishgrey, without aerial roots. Leaves petioled, 7–15 × 5.5–12 cm, broadly ovate to suborbicular or orbicular, acute at apex, truncate at base, dentate-serrate along the margins, membranous, lateral nerves 3–5 pairs, scabrid above, tomentose beneath. Figs $\approx$ 2 cm across, subglobose to pear-shaped, in axillary solitary or sometimes paired, hairy, yellow or purple when ripe.

Receptacle: May–November.

Common on hot dry slopes in clay-loam soils.

Distribution: India (North & N.W. India), Afghanistan, Arabian Peninsula, Egypt, Ethiopia, Iran, Nepal, Pakistan, Somalia, Sudan.

Specimens examined: Vatanvasa, H.C. Pande 220742 (LWG).

9. ***Ficus racemosa*** L., Sp. Pl.: 1060. 1753; P.C. Pant, Fl. Corbett Natl. Park: 149. 1986; R.D. Gaur, Fl. Garhwal: 91. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 221. 2007; L.B. Chowdhery & al., Taiwania 57(2): 203. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 347. 2022. *F. glomerata* Roxb., Pl. Coromandel 2: 13, t. 123. 1799; King in Hook.f., Fl. Brit. India 5: 535. 1888. *Gular*, *Udambar*, *Umra* [Plate-18e]

Tree, deciduous, to 30 m high; bark reddish-brown, smooth. Leaves petioled, ovate to ovate-oblong or elliptic-lanceolate, 8–15 × 4–7.5 cm, membranous, base obtuse, rarely acute, entire, apex acuminate to obtuse, glabrous above, pubescent beneath, 3–8 lateral nerved. Figs in clusters on warty, short leafless scaly branches or main stem, rarely axillary, stalked, globose or pyriform, softly pubescent, orange or pink; basal bracts 3, broadly triangular-ovate, brownish, small. Male flowers: tepals linear-oblong, apex 3–4-toothed; stamens 2. Female flowers: tepals linear, apex toothed. Gall flowers: tepals linear, apical part toothed; style lateral; stigma clavate. Achenes globose.

Receptacle: March–August.

Common, occurs in submontane Himalayan tract and outer hill ranges, to 900 m, along roadsides, in open shady places, edges of crop fields etc.

Distribution: India (throughout plains and low hills), Australia, Bangladesh, China, Indo-China, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Kanda village, Rana, Dutt & Pande 217105 (LWG); Vatanvasa-Mundiapani, R. Manikandan 124999, 124815 (BSD); Samir Sinha (2001).

Uses: Fruit is edible, eaten raw or cooked; leaves are used as fodder; wood is useful in religious fire. Several parts of the tree are used in Hindu medicine.

10. ***Ficus rumphii*** Blume, Bijdr. Fl. Ned. Ind.: 437. 1825; King in Hook.f., Fl. Brit. India 3: 512. 1888; P.C. Pant, Fl. Corbett Natl. Park: 149. 1986; R.D. Gaur, Fl. Garhwal: 92. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 221. 2007; L.B. Chowdhery & al., Taiwania 57(2): 208. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 302. 2022. *F. cordifolia* Roxb., Fl. Ind. 3: 548. 1832 (*non* Blume 1825). *Khobar*, *Kobar*

Tree, deciduous, to 20 m high, often epiphytic; bark pale yellowish or greenish-brown to pale orange, smooth; stipules ovate-lanceolate. Leaves petioled, broadly ovate to ovate-oblong, 5–14 × 3–9.5 cm,

membranous, apex acuminate, acumen less than 2.5 cm long, base truncate, rounded or narrowed, margin entire, 6–9-lateral nerved. Figs axillary, sessile, paired, globose, purplish-black with pale dots when ripe; basal bracts 3, orbicular, one of which is deeply 2-lobed. Male flowers: few, near the mouth of the receptacles; tepals 3, spatulate; stamen 1. Female flowers: tepals 3, oblong-lanceolate; style elongated. Gall flowers: tepals 3, lanceolate. Ovary obovoid, smooth. Achenes globose, minutely tubercled, mucilaginous.

Receptacle: April–December.

Common, associated with Sal-forests, often epiphytic when young.

Distribution: India (almost throughout the country), Bhutan, China, Indo-China, Malaysia, Myanmar, Nepal, Thailand.

Specimens examined: Vatanvasa-Mundiapani, R. *Manikandan* 125646 (BSD); Samir Sinha (2001).

Uses: Fruit is edible; leaves and branches are used as good fodder; trees act as a host for lac-insect; often planted as avenue tree.

11. ***Ficus semicordata*** Buch.-Ham. ex Sm., Rees Cyclop. 14: *Ficus* no. 71. 1810; P.C. Pant, Fl. Corbett Natl. Park: 149. 1986; R.D. Gaur, Fl. Garhwal: 92. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 221. 2007; L.B. Chowdhery & al., *Taiwania* 57(2): 204. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 352. 2022. *F. cunia* Buch.-Ham. ex Roxb., Fl. Indica 3: 561. 1832; King in Hook.f., Fl. Brit. India 5: 523. 1888. *Khain, Khaina, Jharphali* [Plate-18f]

Tree, evergreen or deciduous, with pubescent young shoots, to 12 m high; bark dark grey to reddish-brown, rough, exfoliating in irregular woody strips and scales; stipules linear-lanceolate, puberulous, acute. Leaves petioled, elliptic to oblong-lanceolate, 6.5–18.5 × 3.5–7.5 cm, coriaceous, apex acuminate, base unequally auricled, margin serrated, rarely entire, scabrid on both surfaces, pubescent beneath, 9–14 lateral nerved. Figs on leafless scaly shoots, in pairs or small clusters, globose or pyriform, pinkish or greenish-yellow when ripe; basal bracts 3; mouth surrounded by scattered bracts. Male flowers: tepals 3; stamens 1; anthers ovate. Female flowers: tepals 4, connate at base, lanceolate; style elongated, lateral. Gall flowers: perianth similar to female flowers; style short, lateral. Achenes broadly ovoid, tuberculate, viscid, pinkish-red at maturity.

Receptacle: May–October.

Common, usually in moist places associated with Sal forests, often along the river banks & rocky slopes, to 1400 m in submontane to montane Himalaya.

Distribution: India (throughout), Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. Pande 220826 (LWG); Vatanvasa forest, Rana, Datt & Pande 220146 (LWG); Vatanvasa-Mundiapani, R. *Manikandan* 124883, 122309 (BSD).

Uses: The leaves are good for fodder and can be used for polishing wood; fibre obtained from the bark is good for making coarse ropes; fruit is edible; it is an important element for agroforestry.

12. ***Ficus squamosa*** Roxb., Fl. Ind., ed. 1832. 3: 531. 1832; L.B. Chowdhery & al., *Taiwania* 57(2): 204. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 355. 2022. *Ficus saemocarpha* Miq., Ann. Mus. Bot. Lugduno-Batavi 3: 232. 1867; King in Hook.f., Fl. Brit. India 5: 523. 1888. *Ficus laminosa* Hardw. ex Roxb., Fl. Ind. (ed. 1832) 3: 531. 1832; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007. *Ficus pyrrhocarpa* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 106. 1873.

Shrubs, short, suberect, to 1 m high. Leaves petioled, spirally arranged, clustered; blade oblanceolate to oblong, 4.5–15 x 1.2–3.5 cm, base narrowly cuneate, margin entire, apex acuminate; stipules lanceolate, hairy on ridges. Figs solitary, globose, *c.* 2 cm across, with prominent longitudinal ridges, densely covered with thick rust-colored hairs or villous, basally attenuated; involucre bracts unequal. Male flowers: calyx lobes 3 or 4; stamen 1; anther ovoid to obovoid. Gall flowers: calyx lobes transparent; ovary smooth, enclosed by calyx lobes; style lateral, short; stigma tubular. Female flowers: similar to gall flowers; style persistent silk-like, with long hairs. Achenes rhombic-ovoid, with hairs.

Receptacle: April–June.

Occasional along the streams

Distribution: India (Himalaya), Bhutan, India, Myanmar, Nepal, Sikkim, Thailand.

Specimens examined: Vatanvasa, *H.C. Pande* 220773, *R. Manikandan* 125598, 122567, 122484 (BSD).

13. ***Ficus subincisa*** Buch.-Ham. ex J.E. Smith, Rees, Cycl.: 14. *Ficus* n. 91. 1810; Corner, Gard. Bull. Singapore 17(2): 420. 1960; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007; L.B. Chowdhery & al., Taiwan 57(2): 202. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 374. 2022. *F. trachycarpa* Miq. in Hook., Lond. J. Bot. 7: 430. 1848. *F. clavata* Will. ex Miq., Lond. J. Bot. 7: 431. 1848; King in Hook.f., Fl. Brit. India 5: 520. 1888 *F. caudata* Griff., Notul. 4: 396. 1854. *F. chincha* Roxb., Fl. Ind. 3: 534. 1932. *Ficus subincisa* var. *trachycarpa* (Miq.) Corner ex Chatter in Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3: 211. 1982.

Shrub or small tree, 30 m high; bark grey with scabrid young shoots. Leaves petioled, oblong to elliptic-lanceolate, 3-costate, cuneate-acute base, margins entire or sinuate-dentate, apex abruptly cuspidate, glabrous, scabrous on both sides, lateral nerves 4–6 pairs, punctate beneath; stipules lanceolate, caducous. Hypanthodia solitary axillary, rarely paired, dimorphic, subtended by 3 inconspicuous basal bracts. Male flowers: sepals red; stamen solitary free. Female flowers: sepals dark red, 5-toothed; ovary with a subterminal elongate, slender style, stigma often bifid. Figs *c.* 1.2 cm across, warty, yellow, ovoid-obovoid or globose.

Receptacle: April–November.

Rare in moist decuous forests.

Distribution: India (Himalaya), China, Indo-China, Myanmar, Nepal, Pakistan.

Specimens examined: Vatanvasa, *T.S. Rana & Party* 220167 (LWG).

14. ***Ficus tinctoria*** subsp. ***gibbosa*** (Blume) Corner, Gard. Bull. Singapore 17: 476. 1960; L.B. Chowdhery & al., Taiwan 57(2): 203. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 381. 2022. *Ficus gibbosa* Blume in Bijdr. Fl. Ned. Ind.: 466. 1825. *Ficus parasitica* subsp. *gibbosa* (Blume) M.R. Almeida in Fl. Maharashtra 4B: 376. 2003. *Ficus tinctoria* G. Forst.f. subsp. *parasitica* (Koenig ex Willd.) Corner, Gard. Bull. Singapore 17: 476. 1960 & Dassan. & Fosberg, Rev. Handb. Fl. Ceylon 3: 276, f. 26. 1981; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 220. 2007. *F. parasitica* Koenig ex Willd., Mem. Acad. Roy. Sci. Hist. (Berlin) 2: 102. 1798. *F. gibbosa* Blume var. *parasitica* (Koenig ex Willd.) King, Ann. Bot. Gard. (Calcutta) 1: 6, t. 2 a–b. 1887 & in Hook.f., Fl. Brit. India 5: 497. 1888. [Plate-18g]

Epiphytic straggler with copious aerial roots, often enclosing host tree with a network of branches. Leaves petioled, 6.5–9 × 3–4.5 cm, acute to subcaudate at apex, often unequal or cuneate at base, hispid, lateral 6–8 pairs; stipules ovate-lanceolate. Figs *c.* 6 mm across, in axillary pairs, globose, scabrid; basal bracts

3. Male flowers: calyx lobes 4–6, white, linear; stamen 1. Gall flowers: calyx similar to male flowers; style lateral. Female flowers: calyx lobes 4, thin, transparent, linear; style persistent, lateral, short; stigma enlarged. Achenes ellipsoid, keeled, with tubercles.

Receptacle: March–October.

Rare in deciduous forests and found epiphyte on other *Ficus* spp.

Distribution: India (Himalaya), Australia, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Vatanvasa-Mundiapani, R. *Manikandan* 125694, 124675 (BSD).

15. **Ficus virens** Aiton, Hort. Kew. 3: 451. 1789; P.C. Pant, Fl. Corbett Natl. Park: 149. 1986; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 221. 2007; L.B. Chowdhery & al., Taiwania 57(2): 209. 2012; Sudhakar & al. in Pusalkar & al., Fl. India 24: 318. 2022. *F. infectoria* Roxb., Fl. Indica 2, 3: 550. 1832; King in Hook.f., Fl. Brit. India 5: 515. 1888. *Kabimal, Keol, Pakhar, Pilkhan*

Tree or shrub, deciduous, to 15 m high; with spreading branches, often epiphytic; bark pale ash or dark grey, smooth or slightly rough. Leaves petioled, ovate to ovate-oblong, 5–15 × 3–5 cm, subcoriaceous, apex rather abruptly and shortly acuminate, base rounded or subcordate, margin entire or subundulate. Figs axillary, sessile, paired, globose, tubercled, whitish when ripe; basal bracts 2–3, ovate, minute, persistent, glabrous. Male flowers: few, sessile, linear, tepals 4; stamens 1; filaments short; anthers broadly ovate. Female flowers: tepals 3 or 4; style long, stigma elongated. Gall flowers: tepals 3 or 4; stigma elongated. Achene ovoid, dark brown.

Receptacle: February–May.

Not common, in moist deciduous forests.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, China, Indo-China, Japan, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Specimens examined: Vatanvasa, H.C. *Pande* 220703 (LWG); Samir Sinha (2001).

Uses: Wood is used for making charcoal; bark yields fibre which can be used for ropes; leaves and twigs are used as good fodder; young shoots are eaten in curries.

2. **Morus** L.

Morus alba L., Sp. Pl.: 986. 1783; Hook.f., Fl. Brit. India 5: 492. 1888; P.C. Pant, Fl. Corbett Natl. Park: 149. 1986; R.D. Gaur, Fl. Distr. Garhwal: 94. 1999; Uniyal & al., Flowering Pl. Uttarakhand Checkl.: 220. 2007; G.K. Upadhyay & al. in Pusalkar & al., Fl. India 24: 443. 2022. *Shebtut, Tooth, Tutri*

Tree, medium sized, monoecious, deciduous, to 15 m high; bark dark grey, brown, rough, vertically fissured. Leaves petioled, ovate to broadly ovate, 3.5–8 × 1.8–5 cm, membranous, acute at apex, base cordate, dentate or serrate, sometimes irregularly lobed. Male flowers: perianth broadly ovate, tepals 4, inner 2 flat or concave, outer ones keeled; staminal filaments inflexed in bud. Female flowers: tepals 4, suborbicular, outer elliptic, inner flat or concave with marginal hairs. Syncarp ovoid, ellipsoid or cylindrical, c. 2.5 × 0.8 cm, red turning blackish-purple or purple at maturity.

Flowering & Fruiting: February–June.

Uncommon, cultivated or run wild, introduced for sericulture, planted as avenue tree. Native of China and probably in temperate Asia.

Distribution: India (throughout), Afghanistan, China, Europe, N. & W. Asia.

Uses: Leaves are used for feeding silk-worm and sheeps. Fruits are edible and also used medicinally as a cure for sore throat, dyspepsia and melancholia. The wood is used for agricultural implements, building boats and furniture.

Notes: Included on the authority of Samir Sinha (2001).

3. *Streblus* Lour.

Streblus asper Lour., Fl. Cochinch. 2: 615. 1790; Hook.f., Fl. Brit. India 5: 489. 1888 ; P.C. Pant, Fl. Corbett Natl. Park: 150. 1986; R.D. Gaur, Fl. Distr. Garhwal: 95. 1999; Uniyal & al., Flowr. Pl. Uttarakhand Checkl: 220. 2007; G.K. Upadhyay & al. in Pusalkar & al., Fl. India 24: 450. 2022. *Dabia, Siora*

Tree or shrub, evergreen, unarmed, to 10 m high; bark soft, thick, greenish-grey or whitish. Leaves petioled, elliptic-ovate or rhomboid, 3–10 × 1.2–5.6 cm, harsely scabrid on both sides, acute or shortly acuminate at apex, cuneate to subattenuate at base, margin irregularly crenate, 4–7-veined. Male flowers: subsessile, perianth campanulate with 4 segments; pistillode conic to cylindric, apically tuberculate. Female flowers: solitary, perianth 4 segmented, embracing ovary, puberulous. Drupe globose, c. 7 mm across, yellow to orange, enclosed by enlarged, reflexed tepals; seeds grayish-white.

Flowering & Fruiting: February–July.

Common, along the riverbanks, roadside in the outer Himalayas.

Distribution: India (almost throughout the country), China, Malaysia, Myanmar, Sri Lanka, Thailand.

Specimens examined: Vatanvasa-Mundiapani, R. *Manikandan* 125759, 125763 (BSD).

Uses: Rough leaves are substituted for sand paper for polishing ivory, horns and wood. Leaves and branches are lopped for fodder. Leaf paste is useful in skin ailments. Wood is used for household articles. Twigs are chewed for cleaning teeth and to cure pyorrhea.

89. FAGACEAE

Quercus L.

Quercus leucotrichophora A. Camus., Riviera Sci. 22: 66. 1935; R.D. Gaur, Fl. Distr. Garhwal: 107. 1999; Uniyal & al., Flower. Pl. Uttarakhand Checkl.: 223. 2007; Shankh. Mitra in Pusalkar & al., Fl. India 24: 517. 2022. *Q. incana* Roxb., Fl. Indica 3: 642. 1832; Hook.f., Fl. Brit. India 5: 603. 1888; R.K. Gupta, Fl. Nainital.: 336. 1968. *Banj* [Plate-18h]

Large evergreen trees, to 25 m high; barks grey; young braches rough. Leaves petiolate, alternate, coriaceous, ovate-lanceolate or ovate or ovate-oblong, 6–14 × 2–5.5 cm, base rounded or truncate, apex acuminate, margins mucronate-serrate, glabrous above, densely whitish or brownish-tomentose beneath. Male spikes: pendent, tomentose, 4–5-lobed, ovate. Female flowers: axillary, 1–3, sessile; perianth reduced; styles linear-clavate. Acorns 1–2, ovoid or ellipsoid, c. 1.5 cm across, cup hemispheric, covering almost half nut in mature ones, with scale like bracts, tomentose. Nuts conical-ovoid, to 1.5 cm long, canescent, brown.

Flowering & Fruiting: April–October.

Rare in moist deciduous forests.

Distribution: India (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand, West Bengal), Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Vatanvasa-Rathuadhap, *H.C. Pande* 220830 (LWG); Samir Sinha (2001).

Uses: Wood used for various construction purposes, fuel, and for making ploughs; gum used for gonorrhea and digestive disorders; fruits eaten by wild animals; decomposed leaves used as organic manure.

MONOCOTYLEDONS

90. HYDROCHARITACEAE

Najas L.

Najas indica (Willd.) Cham., *Linnaea* 4: 501. 1829; Subr., *Aquat. Ang.*: 101. 1962; Karthik. & al., *Fl. Ind. Enum. Monocot.*: 105. 1989; C.D.K. Cook, *Aquat. Wetl. Pl. India* 269, f. 279 a–d. 1996. *Caulina indica* Willd., *Mem. Acad. Roy. Sci. Hist. (Berlin)* 89, f. 3. 1801. *C. fragilis* Willd., *Mem. Acad. Sc. Berl.* 94. 1798. *Najas fragilis* (Willd.) Delile, *Descr. Egypte, Hist. Nat.* 2: 175. 1813. *N. minor sensu* Hook.f., *Fl. Brit. India* 6: 569. 1893 *pro majore parte non* All. 1785. *N. indica* Cham., *Linnaea*. 4: 501. 1829. *N. ternata* Roxb. ex Griff., *Not. Pl. Asiat.* 3: 183. 1851.

Herb, submerged, monoecious, dark green, to 30 cm long; stems slender, branches dichotomous, internodes without spines. Leaves 1–2.5 × 0.1–0.15 cm, narrowly linear, acute at apex, recurved, serrulate to spinose-dentate with spreading teeth along margins, sometimes with spines on the back of the midrib; sheaths 1.5–3 mm long as well as broad, short rounded-truncate or spinulose, with auricles at apex. Flowers unisexual, solitary, in leaf axils. Male flowers: solitary, enclosed in a spathe, neck conical or cylindrical, anther 1-theous. Female flower without spathe, often 2–3 together; style with 2 stigmas; seeds slightly recurved at apex, with areoles arranged ladder-like.

Flowering & Fruiting: October–December.

Rare in ponds near moist deciduous forests.

Distribution: India (Southern, Central and N.E. India), Africa, America, Asia, Europe.

Specimens Observed: Seen Jorkhatty forest division found associated with *Lemna perpusilla*, *Wolffia arrhizal*, etc.

91. ORCHIDACEAE

- | | |
|--|----------------------|
| 1a. Plants epiphytic | 2 |
| 1b. Plants terrestrial | 4 |
| 2a. Flowers white | 2. Diplomeris |
| 2b. Flowers pink- purple | 3 |
| 3a. Leaves broadly ovate or suborbicular | 6. Nervilia |
| 3b. Leaves linear | 8. Pachystoma |
| 4a. Plants with monopodial growth | 5 |
| 4b. Plants with sympodial growth | 6 |
| 5a. Flowers dark purple, 4–5-flowered in clusters | 5. Luisia |
| 5b. Flowers pale yellow with purple lip, many-flowered, in racemes | 10. Vanda |
| 6a. Pseudobulbs absent; leaves equitant | 7. Oberonia |

- 6b. Pseudobulbs present; leaves not equitant 7
- 7a. Pseudobulbs short; pollinia 8 3. **Eria**
- 7b. Pseudobulbs conspicuous; pollinia 2 or 4 8
- 8a. Inflorescence 1–2-flowered 4. **Flickingeria**
- 8b. Inflorescence more than 2-flowered 9
- 9a. Flowers creamy-white, in axillary, drooping racemes 9. **Pholidota**
- 9b. Flowers white, tinged with pale purple, usually in pairs, lateral, cymose 1. **Dendrobium**

1. **Dendrobium** Sw.

Dendrobium aphyllum (Roxb.) C.E.C. Fisch. in Gamble, Fl. Madras: 1416. 1928 [3: 991. 1967 (Repr.)]; Karthik. & al., Fl. Ind. Enum. Monocot.: 126. 1989. *Limodorum aphyllum* Roxb., Pl. Coromandel 1: 34, t. 41. 1795. *Dendrobium pierardi* Roxb. in Hook., Exot. Fl. 1: t. 9. 1822; Hook.f., Fl. Brit. India 5: 738. 1890; Holtt., Rev. Fl. Malaya 1: 292, f. 70. 1957.

Epiphytic, pendulous herb; pseudobulbs, to 80 cm long. Leaves alternate, distichous, 6.5–10.8 × 1.2–2.2 cm, lanceolate, leathery, deciduous. Flowers white, tinged with pale purple, usually in pairs, lateral, cymose; petals obovate, broader than sepals; lip with irregularly dentate or serrated margins.

Flowering & Fruiting: April–June.

Rare in moist deciduous forests.

Distribution: India (Southern, C & N.E India), Bhutan, Myanmar, China, Cambodia, Laos, Malaysia, Nepal, Thailand, Vietnam.

Specimens examined: Halduparao, R. *Manikandan* 124818 (BSD).

2. **Diplomeris** D. Don

Diplomeris hirsuta (Lindl.) Lindl., Gen. Sp. Orchid. Pl. 331. 1835. *Diplochilus hirsutus* Lindl., Edwards's Bot. Reg. 18: ad t. 1499. 1832. [Plate-19a]

Herb, tuberous, terrestrial orchid, to 7 cm high; tubers subglobose to ellipsoid. Leaves usually solitary or occasionally with a second smaller subopposite leaf, basal, oblong, 3.5–8 × 1.3–3.6 cm, pubescent, sheathing at base, apex subacute. Flower solitary, erect, white, large; bracts broadly ovate, shorter than ovary, pubescent, apex acute; sepals spreading, ovate-oblong, outer surface sparsely pubescent, apex acute; petals spreading, orbicular-reniform, apex subacute; lip spreading, broadly obovate, apex entire to shallowly emarginate and with a small acute tooth; spur pendulous, strongly incurved, cylindric, slender, apex acute.

Flowering & Fruiting: July–October.

Rare on wet rocky slopes near moist deciduous forests.

Distribution: India (Himalaya, N.E India), China, Nepal.

Specimens examined: Hathikhund, R. *Manikandan* 122431 (BSD).

3. **Eria** Lindl., *nom. cons.*

Eria pubescens (Hook.) Lindl. ex Loudon, Bot. Reg. 11: sub t. 904. 1825; P.C. Pant, Fl. Corbett Natl. Park: 150. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 134. 1989; Uniyal & al., Fl. of Uttarakhand Checkl.: 227. 2007. *Dendrobium pubescens* Hook., Exot. Fl. 2: pl. 124. 1825. [Plate-19b]

Epiphyte; pseudobulbs to 1.5 cm across, discoid, veins with white and flabellate. Leaves 1.2–5.5 × 0.3–0.8 cm, elliptic to oblanceolate, subacute at apex, sheathed at base. Flowers greenish-yellow, in secund to subsecund racemes; sepals and petals to 6 mm long, ovate-lanceolate, hyaline, with capitate glands along margins; lip pandurate. Capsules ϵ 5 × 1 mm, ellipsoid to obovoid.

Flowering & Fruiting: August–November.

Occasional in moist deciduous forests.

Distribution: India (Himalaya, N.E. India), Bangladesh, Bhutan, China, Cambodia, Java, Laos, Malaysia, Myanmar, Nepal, Sumatra, Thailand, Vietnam.

Specimens examined: Khanda-Rathuadhab, R. *Manikandan* 122532, 125684 (BSD).

4. **Flickingeria** A.D. Hawkes

Flickingeria fugax (Rchb. f.) Seidenf., Dansk Bot. Arkiv 34 (1): 46. 1980; P.C. Pant, Fl. Corbett Natl. Park: 151. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 138. 1989; Uniyal & al., Fl. Uttarakhand Checkl.: 228. 2007. *Dendrobium fugax* Rchb.f., Gard. Chron.: 1257. 1871; Hook.f., Fl. Brit. India 6: 752. 1890.

Epiphytic herb, with creeping rhizomes; branches suberect or prostrate, plurinodal, shining, yellowish-brown, with pseudobulbs at irregular intervals, usually laterally compressed, clavate or fusiform. Leaves apical, leathery, base slightly contracted, subsessile, not sheathing, 3.5–10 × 1–1.8 cm, linear-oblong or elliptic. Flowers creamy white with maroon dots, bracteate; sepal subequal; petals sparsely gland-dotted; lip adnate to foot, reflexed, trilobed; column short, with a long foot; pollinia 4 in 2 pairs, without a stipe or caudicle, subglobose. Capsules ϵ 4.5 cm long, oblong, yellow, ridged.

Flowering & Fruiting: July–September.

Occasional along stream lines near moist deciduous forests.

Distribution: India (Himalaya), Indo-China.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125682 (BSD).

5. **Luisia** Gaudich.

Luisia trichorhiza (Hook.) Blume, Mus. Bot. 1: 63. 1849; P.C. Pant, Fl. Corbett Natl. Park: 151. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 151. 1989; Uniyal & al., Fl. of Uttarakhand Checkl.: 231. 2007. *Vanda trichorhiza* Hook.f., Exot. Fl. 1: t. 72. 1823. [Plate-19c]

Epiphytic herb, monopodial, to 40 cm long; stem stout, simple or branched, covered by leaf sheaths, with basal, clustered roots, hairy. Leaves distichous, fleshy, round, rugose, jointed, 8–13 × 0.1–0.3 cm. Flowers dark purple, 4–5-flowered clusters, on leaf-opposed; bracts persistent, broadly ovate-triangular, boat-shaped, tapering; sepals pale green with faint purple lines, lip base green lines, column purple; dorsal sepal oblong, blunt, 3-veined; lateral sepals spreading, obliquely ovate to spoon-shaped, pointed, keeled, 3-veined; petals oblong, blunt, spreading, 3-veined; lip 3-lobed, rounded to triangular; column stout. Fruit ϵ 3.5 × 0.8 cm, cylindric, ridged.

Flowering & Fruiting: November.

Locally common in moist deciduous forests.

Distribution: India (Western Himalayas, Eastern Himalayas), Bhutan, Myanmar, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124843 (BSD).

6. **Nervilia** Comm. ex Gaudich., *nom. cons.*

Nervilia crispata (Blume) Schltr. ex Kraenzl., Fl. Schutzgeb. Sudsee: 82. 1905; P.C. Pant, Fl. Corbett Natl. Park: 151. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 155. 1989; Uniyal & al., Fl. of Uttarakhand Checkl.: 231. 2007. *Pogonia crispata* Blume, Mus. Bot.: 32. 1849; Hook.f., Fl. Brit. India 6: 119. 1890.

Terrestrial herb; tubers to 18 cm across, globose, white. Leaves solitary, lying flat on ground, 4.5–15 × 4.8–15 cm, broadly ovate or suborbicular, obtuse to acute at apex, 13-nerved, velvety above and grooved stalk, pubescent beneath, crisped. Flowers pinkish, solitary; sepals with prominent mid-nerves on dorsal side; petals yellowish to white; lip is pink-purple, with fringed margin. Capsules $\approx 1.5 \times 0.8$ cm, oblong, ribbed, winged along ribs.

Flowering & Fruiting: May–August.

Occasional in moist deciduous forests especially under teak plantation.

Distribution: India (Himalayas, NE India), Bhutan, Myanmar, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122456 (BSD).

7. **Oberonia** Lindl., *nom. cons.*

Oberonia falconeri Hook.f., Icon. Pl. 18: t. 1780. 1888 & Fl. Brit. India 5: 679. 1890; Seidenf., Dansk Bot. Arkiv 25(3): 35, t. 17. 1968; P.C. Pant, Fl. Corbett Natl. Park: 152. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 156. 1989. Uniyal & al., Fl. of Uttarakhand Checkl.: 232. 2007. *Iridorkis falconeri* (Hook.f.) Kuntze, Revis. Gen. Pl. 2: 669. 1891. *Oberonia falconeri* Hook.f., Hooker's Icon. Pl. 18: ad t. 1780. 1888.

Epiphytic herb, to 16 cm long; stem short or somewhat inconspicuous. Leaves subbasal, 3–6, distichous-equant, laterally compressed, ensiform, usually slightly falcate, 1.5–10 × 0.7–1 cm, thick, veins inconspicuous, base articulate, apex acuminate. Flowers white or green to greenish yellow, whorled, many-flowered; bracts linear-lanceolate; dorsal sepal ovate or oblong-ovate, apex obtuse or acute; lateral sepals similar to dorsal sepal; petals suboblong, margin inconspicuously crisped or slightly obtusely incised, apex obtuse; lip oblong in outline, base with short auricles on either side, apex bilobed and sinus apiculate; lobules suboblong; column short, stout. Capsule obovoid-ellipsoid, $\approx 2.5 \times 0.15$ cm, obtusely 3-ridged.

Flowering & Fruiting: August–October.

Common epiphytic on tree trunks in deciduous forests or thickets.

Distribution: India (Himalaya), China, Laos, Malaysia, Nepal, Thailand, Vietnam.

Specimens examined: Khanda-Rathuadhab, R. *Manikandan* 122533, 125681 (BSD).

8. **Pachystoma** Blume

Pachystoma senile (Lindl.) Rchb. f., Bonpl. 3: 250. 1858; P.C. Pant, Fl. Corbett Natl. Park: 152. 1986; Uniyal & al., Fl. of Uttarakhand Checkl.: 232. 2007. *Aptaturia senilis* Lindl., Gen. Sp. Orch.: 130. 1831.

Terrestrial herb, to 40 cm long, with 'v'-shaped tuber, leafless when flowering. Leaves 1 or 2, linear, scape above ground portion. Flowers 3–8, towards the apex of scape, pink-purple; bracts 1.5–2.5 × 3.6–4 mm, ovate, long-acuminate; sepals pubescent outside, subsimilar; dorsal sepal elliptic-oblong, acute, 5-veined; lateral sepals, oblong-lanceolate, acute, 5-veined; petals oblanceolate-oblong, obliquely acute, 3–5-veined; lip 3-lobed; side lobes obliquely ovate, obtuse; midlobe oblong, obtuse; disc ridged, base saccate.

Flowering & Fruiting: August–October.

Grows as an epiphytic on tree trunks in deciduous forests.

Distribution: India (Himalaya, S. India), Indo-Malesia.

Notes: Included on the authority of Samir Sinha (2001).

9. *Pholidota* Lindl. ex Hook.

Pholidota imbricata Hook., Exot. Fl. 2: t. 138. 1825; Hook.f., Fl. Brit. India 5: 845. 1890; Sath. Kumar & Manilal in Manilal & Sath. Kumar, Orchid Memories: 213. 2004. *P. pallida* auct. non Lindl., 1836; Karthik. & al., Fl. Ind. Enum. Monocot.: 164. 1989.

Epiphyte; pseudobulbs, to 6 cm long, broadly ovoid-conical, subtetragonal, crowded. Leaves solitary, arising from apex of pseudobulbs, 10–25 × 2–5.5 cm, elliptic-oblong, acute at apex, many-nerved. Flowers creamy-white, in axillary, drooping racemes, bracteate; sepals unequal; petals linear; lip trilobed, mid-lobe bilobulate. Capsules *c.* 1.8 × 11 cm, ovoid, tumid, pale-brown, shining.

Flowering & Fruiting: June–May.

Common in moist deciduous forests.

Distribution: India (almost throughout the country), Australia, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Sri Lanka, Thailand, SW Pacific islands, Vietnam.

Specimens examined: Khanda-Rathuadhab, R. *Manikandan* 122534, 125685, 122497 (BSD).

10. *Vanda* Jones ex R. Br.

Vanda testacea (Lindl.) Rchb.f., Gard. Chron. 2: 166. 1877; P.C. Pant, Fl. Corbett Natl. Park: 152. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 175. 1989. *Aerides testacea* Lindl., Gen. Sp. Orchid. Pl.: 238. 1833. *Vanda parviflora* Lindl., Edwards's Bot. Reg. Misc. 30: 45. 1844; Hook.f., Fl. Brit. India 6: 50. 1890.

[Plate-19d]

Epiphyte, stems to 15 cm long, stout, non-pseudobulbous; roots large, thick, vermiform. Leaves 6.2–15 × 0.9–1.5 cm, linear-lorate, unequally lobed at apex, coriaceous. Flowers pale yellow with purple lip, many-flowered, in erect, racemes, bracteate; petals spatulate-oblong; lip trilobed, spurred. Capsules *c.* 2.5 × 0.7 cm, oblong-ellipsoid, angled.

Flowering & Fruiting: March–June.

Common in dry deciduous forests.

Distribution: India (Himalaya, C & S. India), China, Myanmar, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125683 (BSD).

92. ZINGIBERACEAE

1a. Herbs	2
1b. Undershrubs	5

- 2a. Flowers yellow 3
 2b. Flowers white 4. **Hedychium**
- 3a. Leaves petiolated 4
 3b. Leaves sessile 6. **Zingiber**
- 4a. Flowers in dense spikes 2. **Curcuma**
 4b. Flowers in racemes 3. **Globba**
- 5a. Plants c. 50 cm high; flowers pink 1. **Boesenbergia**
 5b. Plants c. 2 m high; flowers white to yellowish-white 5. **Phrynium**

1. **Boesenbergia** Kuntze

Boesenbergia rotunda (L.) Mansf, Kulturpflanze 6: 239. 1958; Karthik. & al., Fl. Ind. Enum. Monocot.: 174. 1989. *Curcuma rotunda* L., Sp. Pl. 1: 2. 1753. *Boesenbergia pandurata* (Roxb.) Schltr., Repert. Spec. Nov. Regni Veg. 12 (325–330): 316. 1913. *Gastrochilus panduratus* (Roxb.) Ridl., J. Straits Branch Roy. Asiat. Soc. 32: 114. 1899. *Kaempferia pandurata* Roxb., Asiat Res. 11: 328, pl. 2. 1910. [Plate-19e]

Undeshrub, perennial, erect, to 50 cm high; rhizomes bright yellow, ovoid-globose, strongly aromatic, with robust roots. Leaves petioled, 3–4, channeled, ovate-oblong or elliptic-lanceolate, 25–50 × 7–12 cm, glabrous except for sparsely hairy midvein abaxially, base rounded to cuneate, apex apiculate, sheath red; Flowers pink, aromatic, in terminal on pseudostems, appearing from within apical leaf sheaths, subsessile; bracts lanceolate, 4–5 cm long; calyx apex 2-cleft; corolla tube to 5.5 cm long, lobes oblong; lateral staminodes light pink, obovate; labellum white or pink with purple stripe, fiddle-shaped, concave, margin slightly crisped, apex entire. Filament short, connective appendage reflexed, 2-cleft.

Flowering & Fruiting: July–August.

Rare in moist dense forests.

Distribution: India (Himalaya), China, Indonesia, Malaysia, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122491 (BSD).

Notes: It is used in preparation of herbal medicinal.

2. **Curcuma** L.

Curcuma angustifolia Roxb., Asiat. Res. 11: 338, t. 3. 1810; Royle, Ill. Himal.: 357, 359. 1839; P.C. Pant, Fl. Corbett Natl. Park: 153. 1986.; Baker in Hook.f., Fl. Brit. India 6: 210. 1890; Karthik. & al., Fl. Ind. Enum. Monocot.: 292. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 234. 2007.

Herbs, to 1 m high; rootstock large, rhizomatous, yellow within, aromatic, tubers globose, yellow. Leaves with long petioled, lamina 30–60 × 8.5–19.5 cm, oblong-elliptic or oblong-lanceolate, caudate to acuminate at apex, deltoid at base; petioles as long as leaf blade. Flowers yellow, in dense spikes; fertile bracts green, 2–3 cm long, ovate; coma bracts pink. Capsules globose, 3-valved, with black many seeds.

Flowering & Fruiting: June–October.

Common as undergrowth near moist deciduous forests.

Distribution: India (Himalayan), Nepal, Pakistan.

Uses: The powdered rhizomes is used as a demulcent.

Notes: Included on the authority of Samir Sinha (2001).

3. *Globba* L.

Globba ophioglossa Wight, Icon. Pl. Ind. Orient.: t. 2002. 1853; Baker in Hook.f., Fl. Brit. India 6: 202. 1890; Karthik. & al., Fl. Ind. Enum. Monocot.: 293. 1989; P.C. Pant, Fl. Corbett Natl. Park: 152. 1986; M. Sabu, Zingiberaceae Costaceae S. India 109, f. 22, pl. 7, C–E. 2006. [Plate-19f]

Herbs, to 80 cm high; rhizomes slender. Leaves petioled, 8.5–15 x 2.2–4.5 cm, oblong-lanceolate, caudate at apex, cuneate at base, glabrous above, pubescent beneath. Flowers yellow, in terminal racemes; calyx funnelliform, ciliate; corolla lobes spreading, ovate. Capsules $\approx$ 4 mm across, globose.

Flowering & Fruiting: July–November.

Common as undergrowth in moist deciduous forests.

Distribution: India (Himalayan, S. India), Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122454 (BSD).

4. *Hedychium* J. König

Hedychium thyriforme Ham. ex Sm., Rees Cyclop. 17: 4. 1811; Baker in Hook.f., Fl. Brit. India 6: 225. 1892; P.C. Pant, Fl. Corbett Natl. Park: 153. 1986; Karthik. & al., Fl. Ind. Enum. Monocot. 294. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 234. 2007. *Gandasulium thyriforme* (Sm.) Kuntze, Revis. Gen. Pl. 2: 690. 1891. [Plate-19g]

Herbs, to 2 m high; rhizomes stout, creeping, fleshy. Leaves sessile, 20–42 x 3.5–6 cm, lanceolate, acuminate at apex, cuneate at base, densely pubescent, ligules to 2.5 m long. Flowers white, fragrant, in terminal dense spikes; bracts oblong, rounded; calyx tubular; corolla tube to 7 cm long, lobes linear. Capsules oblong, valves orange–yellow within, many-seeded. Seeds with crimson aril.

Flowering & Fruiting: August–October.

Infrequent in shady places near moist deciduous forests and found in colonies.

Distribution: India (Himalayan, S. India), Bangladesh, Bhutan, Nepal, Thailand.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122492 (BSD),

Notes: Flowers bright white, fragrant and it can be introduced in gardens for an ornamental purpose.

5. *Phrynium* Willd., *nom. cons.*

Phrynium placentarium (Lour.) Merr., Philipp. J. Sci. 15: 230. 1919; Karthik. & al., Fl. Ind. Enum. Monocot.: 298. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 235. 2007. *Phyllodes placentaria* Lour., Fl. Cochinch. 1: 13. 1790. *Phrynium parviflorum* Roxb, Fl. Ind., ed. 1820, 1: 7. 1820. *Maranta parviflora* (Roxb.) A. Dietr., Sp. Pl. 1: 30. 1831. *P.sinicum* Miq., J. Bot. Neerl. 1: 94. 1861. [Plate-19h]

Undershrubs, perennial, rhizomatous, to 2 m high. Leaves long petioled, ovate to elliptic, 25–55 x 7–20 cm, thinly leathery, glabrous, apex acuminate, base rounded, with sheath 3–5 cm long. Flowers white to yellowish-white, in sessile, composed of 4–5 or more spikelets, globose; bracts crowded, oblong, to 2.5 cm long, apex with a spinescent acumen; sepals linear, to 5 mm long; corolla tube to 8 mm long, lobes elliptic, outer staminodes obovate. Fruit oblong, $\approx$ 1.2 cm across, exocarp thin; seed 1, ellipsoid, with aril red.

Flowering & Fruiting: May–November.

Occasional as undergrowth in wet shaded places, often in valleys along streams up to 1500 m.

Distribution: India (Himalayas), Bhutan, China, Indonesia, Myanmar, Philippines, Thailand, Vietnam.

Specimens examined: Rathuadhab-Vatanvasa, R. *Manikandan* 122542 (BSD).

6. *Zingiber* Boehm., *nom. cons.*

Zingiber roseum (Roxb.) Rosc. Trans. Linn. Soc. Lond. 8: 348. 1807; Baker in Hook.f., Fl. Brit. India 6: 244. 1892; P.C. Pant, Fl. Corbett Natl. Park: 153. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 299. 1989; M. Sabu, Folia Malaysiana 4: 45. 2003; M. Sabu, Zingiberaceae Costaceae S. India 244, f. 64 H–J. 2006; Uniyal & al., Fl. of Uttarakhand Check.: 235. 2007. *Amomum roseum* Roxb., Pl. Coromand.: t. 126. 1800.

Herbs, to 1.5 m high; rootstock large, yellow inside, hard, root fibres vermiform. Leaves sessile, 18–30 × 4.8–7.2 cm, oblong-lanceolate, acuminate at apex, base narrowed into leafy stems. Flowers pale sulphur-yellow, in conico-oblong spikes, on separate, *c.* 45 cm long flowering stems. Capsules *c.* 2.5 cm long, ellipsoid, dehiscent, white; seeds *c.* 5 mm long, oblong, aril white.

Flowering & Fruiting: September–December.

Rare in partially shady situation near dry deciduous forests.

Distribution: India (almost throughout the country), China, Myanmar, Thailand.

Specimens examined: Rathuadhap, T.S. Rana & Party 220299 (LWG); Samir Sinha (2001).

Cultivated species:

Zingiber officinale Roscoe, Trans. Linn. Soc. London 8: 348. 1807; Baker in Hook.f., Fl. Brit. India 6: 246. 1892; Karthik. & al., Fl. Ind. Enum. Monocot.: 299. 1989; M. Sabu, Folia Malaysiana 4: 39, pl. 3 & 5. 2003; M. Sabu, Zingiberaceae Costaceae S. India 241, f. 64; pl. 18, D & E. 2006.

Herbs, perennial; stems leafy, to 2 m high. Leaves lanceolate to linear-lanceolate, narrowed at base. Flowers yellow, in ovoid inflorescence. Capsules red.

Flowering & Fruiting: September–January.

Cultivated for its rhizomes.

93. COSTACEAE

Cheilocostus C.D. Specht

Cheilocostus speciosus (J. König) C.D. Specht, Taxon 55(1): 159–160. 2006. *Banksia speciosa* J. König in Retz., Observ. Bot. 3: 75. 1783. *Costus speciosus* (J. König) J.E. Sm., Trans. Linn. Soc. London 1: 249. 1800; Baker in Hook.f., Fl. Brit. India 6: 249. 1892; P.C. Pant, Fl. Corbett Natl. Park: 152. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 291. 1989; M. Sabu, Zingiberaceae Costaceae S. India 259, f. 70; pl. 20, C & D. 2006.

[Plate-20a]

Herbs, to 2 m high; rootstock tuberous, creeping; stems slightly woody at base. Leaves spiral, subsessile, 10.5–28 × 2.5–7.5 cm, oblong-lanceolate, acute to acuminate at apex, narrowly rounded at base, glabrous above, white-pubescent beneath; sheaths tubular. Flowers pinkish-white, in terminal, dense spikes; bracts spirally arranged, ovate, acute at apex, puberulous, pinkish-red. Capsules *c.* 2 cm across, globose, trigonous, red. Seeds black with white aril.

Flowering & Fruiting: June–December.

Fairly common in moist deciduous forests.

Distribution: India (almost throughout the country), Australia, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Rathuadha-Haduparao, *R. Manikandan* 125536-a (BSD).

94. MUSACEAE

Musa L.

Musa paradisiaca L., Sp. Pl.: 1043. 1753; Cheesman, Kew Bull. 1948: 152, t. 1, f. 1.1948; Karthik. & al., Fl. Ind. Enum. Monocot. 292. 1989. *M. sapientum* L., Syst. ed. 10: 1303. 1759; Baker in Hook.f., Fl. Brit. India 6: 262. 1892. *Kela* [Plate-20b]

Pseudostems with tubular leaf sheaths, forming a thick trunk, to 7 m high. Leaves petioled, 90–150 x 18–30 cm, oblong, truncate at base, usually ragged in appearance, splitting between transverse parallel veins. Flowers unisexual, in pendulous or drooping spikes; bracts opening in succession, to 20 cm, ovate, concave, dark red, somewhat fleshy; outer tepals 2.5 cm long, 5-toothed, fleshy, tinged pink; inner tepals to 2 cm long, ovate, acute, concave; stamens 5. Fruits oblong, trigonous, yellow on ripe, edible. Seeds irregularly globose, black.

Flowering & Fruiting: March–October.

Rare along the hillslopes near moist deciduous forests.

Distribution: India (almost throughout the country), throughout the tropics.

Specimens examined: Rathuadhab-Kanda, *R. Manikandan* 124872 (BSD).

Notes: Wild plants are diploid and bear fruits containing numerous seeds making them inedible.

95. CANNACEAE

Canna L.

Cultivated species:

1. ***Canna indica*** L., Sp. Pl.: 1. 1753; Karthik. & al., Fl. Ind. Enum. Monocot.: 23. 1989. *C. indica* var. *orientalis* (Roscoe) Baker in Hook.f., Fl. Brit. India 6: 260. 1892.

Herbs, erect, to 1.5 m high; rootstocks tuberous, with many fibres. Leaves 12-45 x 8.5-18 cm, elliptic-lanceolate, caudate to acuminate at apex, sheathed at base. Flowers scarlet or red, distant, in terminal racemes. Capsules c 2.5 cm long, subspherical, obscurely trilobed. Seeds globose, shining black.

Flowering & Fruiting: June–December.

Commonly cultivated in gardens.

2. ***Canna × orchoides*** L.H. Bailey, Gentes Herb. 1(3): 120. 1923.

Herb, erect, to 1 m high, perennial, rhizomatous. Leaves broadly lanceolate, acuminate at apex. Flowers showy, red, rose, yellow or variously coloured, in spikes.

Flowering & Fruiting: July–October.

Planted in gardens as an ornamental.

96. AGAVACEAE

Cultivated species:

1. **Agave americana** L., Sp. Pl.: 323. 1753; Bailey, Man. Cult. Pl.: 239. 1949; Karthik. & al., Fl. Ind. Enum. Monocot.: 1. 1989.

Undershrubs. Leaves rosette, oblong-lanceolate, grey, prickly on edges. Flowers yellowish-green, in bracteate scapes. Fruits oblong-clavate.

Flowering & Fruiting: October–December.

Cultivated as a hedge plant in adjoining villages of the Sanctuary.

2. **Agave sisalana** Perrine ex Engelm., Trans. Acad. Sci. St. Louis 3: 316, t. 2–4. 1875; Karthik. & al., Fl. Ind. Enum. Monocot.: 1. 1989.

Herbs, to 3.5 cm high. Leaves with shallow-grooved spines and typically no prickles. Flowers c. 6 cm across, in ample inflorescence.

Flowering & Fruiting: June–September.

Generally cultivated as a hedge plant.

97. HYPOXIDACEAE

Curculigo Gaertn.

Curculigo orchioides Gaertn., Fruct. Sem. Pl. 1: 63, t. 13. 1788; Hook.f., Fl. Brit. India 6: 279. 1892; Karthik. & al., Fl. Ind. Enum. Monocot.: 82. 1989.

Herbs, perennial, acaulescent, with tuberous rootstock, thick. Leaves radical, subsessile, 5.6–10.5 x 0.7–1.5 cm, oblong-lanceolate, plicate, acuminate at apex, narrowed and sheathed at base, pilose. Flowers yellow, solitary; perianth lobes 6, petaloid, elliptic-oblong, outer 3-pilose without, inner pilose on nerves; ovary 3–4 mm long, trilocular, many ovuled. Berries c. 2 cm long, oblong; seeds globose.

Flowering & Fruiting: June–November.

Occasional in deciduous forests.

Distribution: India (almost throughout the country), Cambodia, China, Indonesia, Japan, Laos, Myanmar, Pakistan, Papua New Guinea, Philippines, Thailand, Vietnam.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 124920 (BSD).

Notes: Immediately, after first shower, it starts producing flowers directly (without leaves) from the tuberous rootstock.

98. DIOSCOREACEAE

Dioscorea Plum. ex L.

- 1a. Leaves sagittate-ovate, 5–7-nerved 1. *D. belophylla*
 1b. Leaves ovate to suborbicular, 9–11-nerved 2. *D. bulbifera*

1. **Dioscorea belophylla** (Prain) Voigt ex Haines, Forest Fl. Chota Nagpur: 530. 1910; Santapau, J. Bombay Nat. Hist. Soc. 49: 634, t. 2. 1951; Siddiqi in Nasir & Ali, Fl. W. Pakistan 53: 2, f. 1B–E. 1973; P.C.

Pant, Fl. Corbett Natl. Park: 154. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 73. 1989. *D. nummularia* Lam. var. *belophylla* Prain, Bengal Pl. 2: 1065, 1067. 1903 [2: 802. 1963 (Repr.)].

Climbing shrubs, unarmed; roots tuberous, 1–3 subfusiform. Leaves simple, alternate or opposite, 6–12.5 × 2–8 cm, sagittate-ovate, 5–7-nerved. Flowers in spikes; female longer than male spikes. Capsules $\approx$ 2 cm long, obovate with retuse at apex, winged.

Flowering & Fruiting: August–December.

Rare in moist deciduous forests.

Distribution: India (almost throughout the country), Pakistan.

Specimens examined: Vatanvasa forest to Rathuadhap, *Rana Dutt & Pande* 220109 (LWG); Samir Sinha (2001).

2. ***Dioscorea bulbifera*** L., Sp. Pl.: 1033. 1753; Hook.f., Fl. Brit. India 6: 296. 1892; P.C. Pant, Fl. Corbett Natl. Park: 154. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 73. 1989. [Plate-20c]

Climbers; stems unarmed, stout; roots tuberous. Leaves petioled, alternate, 6.5–12 × 5–9.5 cm, ovate to suborbicular, acuminate at apex, cordate at base, glabrous, 9–11-nerved. Male and female flowers in axillary panicles, pendulous; perianth lobes 6, lanceolate. Capsules $\approx$ 2 × 0.5 cm, reflexed, wings rounded at both ends. Seeds winged, brown.

Flowering & Fruiting: July–December.

Grows in moist deciduous forests.

Distribution: India (almost throughout the country), Africa, Bhutan, Cambodia, China, Japan, Korea, Myanmar, Oceania, Thailand, Vietnam;

Notes: Included on the authority of Samir Sinha (2001).

99. SMILACACEAE

***Smilax* L.**

1a. Leaf apex acute or obtuse with mucronate 1. *S. perfoliata*

1b. Leaf apex cuspidate or apiculate or acuminate 2

2a. Stamines 3 3. *S. zeylanica*

2b. Stamines 6 2. *S. ovalifolia*

1. ***Smilax perfoliata*** Lour., Fl. Cochinch.: 622. 1790; T. Koyama, Adv. Front. Pl. Sci. 4: 59. 1963; Karthik. & al., Fl. Ind. Enum. Monocot.: 287. 1989. *S. prolifera* Roxb., Fl. Ind. [Ed. Carey] 3: 795. 1832; Hook.f., Fl. Brit. India 6: 312. 1892.

Climbing shrubs, armed; branchlets angular. Leaves sessile or shortly petioled, 6.5–18 × 5.5–16 cm, orbicular-ovate, acute or obtuse with mucronate at apex, subacute or rounded at base; petiolar sheaths leafy, auricled, amplexicaul, sometime with tendrils. Flowers greenish-white, in umbels, on axils; perianth lobes 6, subequal, oblong with apiculate at apex. Berries $\approx$ 9 mm across, globose.

Flowering & Fruiting: September–March.

Occasional in moist deciduous forests.

Distribution: India (Himalaya), China, Laos, Myanmar, Thailand, Vietnam.

Specimens examined: Vatanvasato-Rathuadhap, *H.C. Pande* 220857, 220836 (LWG).

2. ***Smilax ovalifolia*** Roxb. ex D. Don, Prodr. Fl. Nep.: 49. 1825; P.C. Pant, Fl. Corbett Natl. Park: 156. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 287. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 241. 2007. *S. macrophylla* Roxb., Fl. Ind. ed. 2. 3: 793. 1832; Hook.f., Fl. Brit. India 6: 310. 1892, *non* Willd., 1805.

Climbing shrubs, armed, evergreen, to 10 m long; stems terete, ribbed, smooth, with small, scattered recurved prickles. Leaves petioled, with 2 auricled tendrils, elliptic or ovate to ovate-orbicular, 12–30 x 8–27 cm, cuspidate or apiculate at apex, rounded to subcordate at base, coriaceous, glabrous on both surfaces; 5–7 nerved at base. Flowers green, many-flowered, dense, in axillary peduncled umbels; bracteoles minute, ovate-lanceolate; sepals and petals 3–5 mm long, reflexed; staminodes 6. Fruits globose, to 8 mm across, orange or red at maturity; seed solitary, brown.

Flowering & Fruiting: April–October.

Occasional in moist shady areas near deciduous forest.

Distribution: India (N.W. Himalaya to E. Himalaya, S. India), China, Malaya, Myanmar, Nepal, Sri Lanka, Pakistan.

Specimens examined: Vatanwasa-Rathuadhab, *R. Manikandan* 122316, 122486 (BSD).

3. ***Smilax zeylanica*** L., Sp. Pl.: 1029. 1753; Hook.f., Fl. Brit. India 6: 309. 1892; Uniyal & al., Fl. Uttarakhand Check.: 241. 2007. *S. indica* Vitm., Summa Pl. 5: 422. 1879.

Climbing shrubs, evergreen, slender, to 10 m long; stems terete, smooth, with short scattered recurved prickles. Leaves petioled, elliptic-ovate to ovate-oblong, 8.5–15.5 x 3.5–7.5 cm, base subrounded to obtuse, apex acuminate or cuspidate, coriaceous, glabrous on both surfaces; 3–5-nerved at base. Flowers small, yellowish-green or white, 3–5 mm across, many, in dense axillary peduncled umbels. Male umbels with 2–3 or 1-flowered; stamens 6; sepals and petals up to 8 mm long; staminodes 3, in female flowers. Fruits globose, 6–8 mm across, red; seed solitary, brown.

Flowering & Fruiting: October–March.

Common in tropical to subtropical forest.

Distribution: India (Himalaya, C. & S. India), China, Myanmar.

Specimens examined: Vatanvasa, *H.C. Pande* 220859 (LWG); Samir Sinha (2001).

100. ASPARAGACEAE

Asparagus L.

Asparagus racemosus Willd., Sp. Pl. ed. 4, 2(1): 152. 1799; Hook.f., Fl. Brit. India 6: 316. 1892; P.C. Pant, Fl. Corbett Natl. Park: 154. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 91. 1989. *Musali*, *Satavar*

Undershrubs, subscandent, armed; roots tuberous. Leaves modified into cladodes, 2–6 per node, whorled or verticillate, 2.5 x 0.5 mm, linear, falcate. Flowers white, in axillary racemes; bracts to 1 mm long; perianth lobes 6, biseriate, outer linear-oblong, inner spatulate-linear; stamens 6. Berries c. 6 mm across, globose. Seeds smooth, black.

Flowering & Fruiting: July–December.

Common in deciduous forests.

Distribution: India (Himalaya, C. & S. India), Africa, Australia, Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124855, 122364 (BSD); Samir Sinha (2001).

101. ALOACEAE

Aloe L.

Aloe vera (L.) Burm. f., Fl. Indica: 83. 1768. *A. perfoliata* var. *vera* L., Sp. Pl.: 320. 1753.

Herbs, stemless, succulent, fleshy. Leaves radical, 35–60 x 2.5–7.8 cm, ensiform, acuminate at apex, sheathed at base, spiny along margins. Flowers yellow, in terminal long racemes, with 1–3 scapes; perianth lobes cylindric or campanulate, tube curved, free at tips; stamens 6. Capsules $\approx$ 1.5 x 1 cm, ellipsoid-oblong, loculicidal.

Flowering & Fruiting: December–May.

Occasional in waste places, along hedges and also cultivated.

Notes: All plant parts are highly medicinal having mainly cooling effect.

102. HYACINTHACEAE

Drimia Jacq.

Jessop (1977) reduced *Urginea* Steinh. to the synonymy of *Drimia* based on the colour of bulbs, the degree of fusion of perianth lobes and the tendency of stamens to be connivent which are common to both genera.

Drimia indica (Roxb.) Jessop, J.S. African Bot. 43: 272. 1977; Karthik. & al., Fl. Ind. Enum. Monocot. 94. 1989. *Scilla indica* Roxb., Fl. Ind. (Ed. Carey) 2: 147. 1832. *Urginea indica* (Roxb.) Kunth, Enum. Pl. 4: 333. 1843; Hook.f., Fl. Brit. India 6: 347. 1892; Deb & S. Dasgupta, Fasc. Fl. India 7: 16, f. 39–46. 1981.

Herbs, scapigerous; bulbs to 8 cm across, globose. Leaves radical, 10–32 x 1.2–3.3 cm, oblong-lanceolate, acute at apex, sheathed at base. Flowers reddish-green or brownish, dense, in racemes. Scapes $\approx$ 1 m high, erect, purplish-brown; perianth lobes 6, linear-oblong. Capsules $\approx$ 1.8 cm long, ellipsoid. Seeds black with scarious wings.

Flowering & Fruiting: December–March.

Common in open shady areas of plains and along road sides.

Distribution: India (Himalaya, C. & S. India), Africa, China, Kenya, Myanmar, Pakistan, Tanzania, Uganda.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122439 (BSD).

Notes: Camouflage, it blooms during hot season.

103. ALLIACEAE

Cultivated species:

1. ***Allium cepa*** L., Sp. Pl.: 300. 1753; Hook.f., Fl. Brit. India 6: 337. 1892; Karthik. & al., Fl. Ind. Enum. Monocot.: 88. 1989; S. Dasgupta in N.P. Singh & Sanjappa, Fasc. Fl. India 23: 43, f. 11.1a–1d. 2006.

Herbs, perennial; rootstocks bulbous. Leaves fistular, acute at apex. Scapes hallow, rounded. Flowers white, in many-flowered umbels. Capsules $\approx$ 2.5 cm across, membranous.

Flowering & Fruiting: January–March.

Widely cultivated for its edible bulbs.

2. **Allium sativum** L., Sp. Pl.: 296. 1753; Hook.f., Fl. Brit. India 6: 337. 1892; Karthik. & al., Fl. Ind. Enum. Monocot.: 88. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 239. 2007.

Herbs, perennial; rootstocks bulbous. Leaves fistular, acute at apex. Scapes hallow, rounded. Flowers white, in many-flowered umbels. Capsules $\approx$ 3.5 cm across, membranous.

Flowering & Fruiting: January–March.

Widely cultivated for its edible bulbs.

104. PONTEDERIACEAE

Monochoria C. Presl

Monochoria vaginalis (Burm. f.) C. Presl, Reliq. Haenk. 1: 128. 1827; Hook.f., Fl. Brit. India 6: 363. 1892; Subr., Aquat. Ang. 69, f. 47. 1962; P.C. Pant, Fl. Corbett Natl. Park: 156. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 284. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 330, f. 338 c–e. 1996. *Pontederia vaginalis* Burm. f., Fl. Indica: 80. 1768. *P. plantaginea* Roxb., Fl. Ind. (Ed. Carey) 2: 123. 1832. *Monochoria vaginalis* var. *plantaginea* (Roxb.) Solms in A. DC. & C. DC., Monogr. Phan. 4: 524. 1883; Hook.f., *l.c.*

Herbs, aquatic, perennial, to 40 cm high; stems erect or suberect with thick root stocks. Leaves 2.8–7.2 $\times$ 2.3–4.5 cm, ovate-oblong or ovate, caudate-acuminate at apex, rounded or subcordate at base. Flowers dark blue, in dense racemes, bracteate. Capsules $\approx$ 1 cm long, ellipsoid. Seeds oblong, brown, ribbed.

Flowering & Fruiting: June–November.

Rare on water pools and small ponds.

Distribution: India (Himalaya), Bhutan, Cambodia, China, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Vietnam.

105. COMMELINACEAE

- 1a. Flowers in cymes 2
- 1b. Flowers in panicles 3
- 2a. Cymes solitary, included in spathes; fertile stamens 3, staminodes 1–3.....1. **Commelina**
- 2b. Cymes clustered, enclosed in leaf-sheaths; fertile stamens 6, staminodes absent2. **Cyanotis**
- 3a. Flowers white; stamens 63. **Floscopa**
- 3b. Flowers blue- purple or pink; stamens 3 4. **Murdannia**

1. **Commelina** L.

- 1a. Leaves ovate-oblong or suborbicular; spathes 1–3-clustered; capsules ellipsoid 1. *C. benghalensis*
- 1b. Leaves lanceolate to ovate-lanceolate; spathes 1–8-clustered; capsules ovoid-globose..... 2. *C. paludosa*

1. **Commelina benghalensis** L., Sp. Pl.: 41. 1753; Hook.f., Fl. Brit. India 6: 370. 1892; P.C. Pant, Fl. Corbett Natl. Park: 157. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 24. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 86, f. 70 a–d. 1996.

Herbs, annual, to 90 cm long; stems diffuse or suberect, glabrescent. Leaves 2.5–8 x 1.8–5.2 cm, ovate-oblong or suborbicular, obtuse to acute at apex, truncate or inequilateral at base, ciliate along margins; sheaths to 1 cm long, rufous hairy. Spathes 1–3-clustered, ϵ 1.5 cm long, funnel-shaped, subsessile. Flowers blue. Capsules ϵ 5 mm long, ellipsoid.

Flowering & Fruiting: Almost throughout the year.

Occasional in moist places and cultivated fields.

Distribution: India (almost throughout the country), Africa, tropical and subtropical Asia.

Specimens observed: Seen Rathuadhab, Pakhro village areas.

2. **Commelina paludosa** Blume, Enum. Pl. Javae. 1: 2. 1827; P.C. Pant, Fl. Corbett Natl. Park: 157. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 25. 1989. *C. obliqua sensu* Buch.- Ham. ex D. Don, Prod. 45. 1825; Hook.f., Fl. Brit. India 6: 372. 1892, *non* Vahl 1805. [Plate-20d]

Herbs, perennial, erect, to 35 cm high; stems simple or branched distally, glabrous or sparsely hispidulous. Leaves sessile, lanceolate to ovate-lanceolate, 5–20 x 1.5–7 cm, glabrous on both surfaces or adaxially granular hairy and abaxially hirsute. Spathes 1–8-clustered, forming terminal heads, funnel-shaped, subsessile. Flowers blue or pale blue, rarely white; involucral bracts glabrous, proximal margins connate, apex acute or shortly so; sepals 3–6 mm long, membranous; petals 4.5–8 mm long. Capsules ovoid-globose, trigonous, ϵ 4 mm across, 3-valved; seeds 1 per valve, dark brown, ellipsoid, slightly flattened, finely reticulate.

Flowering & Fruiting: August–April.

Common along the streamsides in ravine sand moist places

Distribution: India (Himalaya, N.E. India), Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Vatanvasa forest, H.C. Pande 220248 (LWG).

2. **Cyanotis** D. Don, *nom. cons.*

- 1a. Leaves narrowly linear-lanceolate, obtuse at base 1. *C. axillaris*
 1b. Leaves ovate-oblong or elliptic-oblong, cordate or semi-amplexicaul at base 2. *C. cristata*

1. **Cyanotis axillaris** (L.) D. Don ex Sweet, Hort. Brit.: 430. 1826; Hook.f., Fl. Brit. India 6: 388. 1892; C.D.K. Cook, Aquat. Wetl. Pl. India 87, f. 72 a–c. 1996. *Commelina axillaris* L., Sp. Pl.: 42. 1753; Karthik. & al., Fl. ind. enum. Monocot. I. 1989. *Amischophacelus axillaris* (L.) R.S. Rao & Kammathy, J. Linn. Soc. Bot. 59: 306. 1966; Karthik. & al., Fl. Ind. Enum. Monocot.: 23. 1989.

Herbs, annual, to 60 cm long; stems fleshy, slender, diffusely branched, leafy, creeping below, rooting at nodes. Leaves sessile, 3.5–9.5 x 0.3–0.5 cm, narrowly linear-lanceolate, acute to acuminate at apex, obtuse at base; sheaths inflated, ciliate. Flowers violet-blue, in axillary cymose fascicles. Capsules ϵ 6 mm long, oblong-ellipsoid. Seeds oblong, compressed, shining, dark brown.

Flowering & Fruiting: September–January.

Occasional in marshy places.

Distribution: India (Himalaya, C. & S. India), Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Oceania, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Way to Hathikhund, R. *Manikandan* 122420 (BSD).

2. **Cyanotis cristata** (L.) D. Don, Prodr. Fl. Nepal.: 46. 1825; Hook.f., Fl. Brit. India 6: 385. 1892; P.C. Pant, Fl. Corbett Natl. Park: 157. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 26. 1989. *Commelina cristata* L., Sp. Pl.: 42. 1753.

Herbs, annual, to 40 cm long; stems diffuse or suberect, rooting at nodes. Leaves 2–5.5 x 0.5–1 cm, ovate-oblong or elliptic-oblong, acute at apex, cordate or semi-amplexicaul at base, finely hairy along margins. Flowers bluish-pink, much condensed, in axillary and terminal scorpioid cymes. Capsules *c.* 3 mm long, 6-seeded. Seeds pitted.

Flowering & Fruiting: July–December.

Occasional in moist places.

Distribution: India (Himalaya, C& S. India), Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Way to Adnala, R. *Manikandan* 122334, 122365, 122383 (BSD); Samir Sinha (2001).

3. **Floscopa** Lour.

Floscopa scandens Lour., Fl. Cochinch.: 193. 1790; Hook.f., Fl. Brit. India 6: 390. 1892; P.C. Pant, Fl. Corbett Natl. Park: 157. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 27. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 88, f. 73. 1996.

Herbs, annual, to 65 cm high; stems erect or subscandent, rooting at basal nodes. Leaves alternate, 3.5–6.2 × 1–2.2 cm, elliptic-lanceolate, acuminate at apex, narrowed at base; sheaths to 1 cm long, ciliate on mouth. Flowers white, in clustered panicles. Capsules *c.* 3 mm across, suborbicular, 2-seeded. Seeds ellipsoid, rugose.

Flowering & Fruiting: September–December.

Occasional along streams near moist deciduous forests.

Distribution: India (Himalaya, C. & S. India), Bhutan, China, Laos, Myanmar, Oceania, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

4. **Murdannia** Royle, *nom. cons.*

1a. Flowers bluish-purple or blue, in terminal panicles 2

1b. Flowers pink or purple, 1-many, in leaf axils 2. *M. edulis*

2a. Leaves linear-oblong or lanceolate; capsules subglobose..... 1. *M. nudiflora*

2b. Leaves broadly lanceolate-oblong; capsules ovoid-oblong 3. *M. spirata*

1. **Murdannia nudiflora** (L.) Brenan, Kew Bull. 1952: 189. 1952; P.C. Pant, Fl. Corbett Natl. Park: 157. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 29. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 90, f. 74 e–h. 1996. *Commelina nudiflora* L., Sp. Pl.: 41. 1753. *Aneilema nudiflorum* (L.) Sweet, Hort. Brit.: 430. 1826; Hook.f., Fl. Brit. India 6: 378. 1892. *A. compressum* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 138. 1851. *A. nudiflorum* var. *compressum* (Dalzell) C.B. Clarke in A. DC. & C. DC., Monogr. Phan. 3: 211. 1881; Hook.f., *l.c.* 379.

Herbs, annual, to 30 cm high; stems erect or suberect; roots fibrous. Leaves 4.5–8.5 x 0.6–1.2 cm, linear-oblong or lanceolate, acute to acuminate at apex, rounded or subcordate at base. Flowers bluish-purple or blue, in terminal panicles. Capsules *c.* 4 mm long, subglobose, trigonous, mucronate at apex. Seeds angular, dark brown.

Flowering & Fruiting: July–December.

Common in open grassy fields near deciduous forests.

Distribution: India (Himalaya, C. & S. India), Bhutan, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, New Guinea, Pacific Islands, Philippines, Sri Lanka.

Specimens examined: Way to Adnala, R. Manikandan 122334 (BSD); Samir Sinha (2001).

2. **Murdannia edulis** (Stokes) Faden, Taxon. 29: 77. 1980; Karthik. & al., Fl. Ind. Enum. Monocot.: 29. 1989. *Commelina edulis* Stokes, Bot. Mat. Med. 1: 184. 1812. *C. tuberosa* Lour., Fl. Cochinch. 1: 40. 1790, *nom. illeg. hom.* *C. scapiflora* Roxb., Fl. Ind., ed. 1820, 1: 178–179. 1820. *Murdannia scapiflora* (Roxb.) Royle, Ill. Bot. Himal. Mts. 403, pl. 95, f. 3. 1840. *Aneilema scapiflorum* (Roxb.) Wight, Icon. Pl. Ind. Orient. 6: t. 2073. 1853. *A. scapifolium* var. *latifolium* N.E. Br., J. Linn. Soc., Bot. 36(251): 154. 1903. *A. formosanum* N.E. Br., *l.c.* 152. *Murdannia formosanum* (N.E. Br.) K.S. Hsu, Fl. Taiwan 5: 170. 1978.

Herbs, perennial, spreading or rosette, to 25 cm long; stems several, scapiform, subequaling leaves, subglabrous to densely hispidulous, with fibrous, robust tuberous roots. Leaves all basal, rosulate, linear, 10–40 x 2–4.5 cm, glabrous or sparsely puberulent on both surfaces, margin hirsutulous-ciliate, often undulate, apex often acuminate or arcuate. Flowers pink or purple, 1-many, in leaf axils; involucral bracts sheath-like; bracts red, cupular, minute; sepals lanceolate, persistent; petals obovate-orbicular; fertile stamens 3; filaments pubescent; staminodes 3. Capsules *c.* 7 mm long, ellipsoid, trigonous; seeds slightly flattened, reticulate.

Flowering & Fruiting: June–October.

Infrequent in moist places.

Distribution: India (Himalaya, N.E. India), China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam.

Specimens examined: Way to Adnala, R. Manikandan 124870 (BSD); Samir Sinha (2001).

3. **Murdannia spirata** (L.) G. Bruckn. in Engler & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930; P.C. Pant, Fl. Corbett Natl. Park: 158. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 30. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 91, f. 76 a–d. 1996. *Commelina spirata* L., Mant. Pl. 2: 176. 1771. *Aneilema spiratum* (L.) Sweet, Hort. Suburb. London: 12. 1808; Hook.f., Fl. Brit. India 6: 377. 1892.

Herbs, annual, to 12 cm high; stems erect or spreading, often rooting at basal nodes. Leaves sessile, 1.2–2.5 x 0.4–0.8 cm, broadly lanceolate-oblong, acute at apex, amplexicaul at base. Flowers bluish-purple, in

terminal panicles. Capsules *c.* 4 mm long, ovoid-oblong, mucronate, trigonous, pilose; seeds straw coloured or white.

Flowering & Fruiting: September–February.

Occasional in moist places.

Distribution: India (Himalaya, C. & S. India), Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Pacific Islands, Philippines, Sri Lanka, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

106. ARECACEAE (= PALMAE)

1a. Usually trees, petioles spiny, fruits oblong 1. **Phoenix**

1b. Usually shrubs, petioles not spiny, fruits ellipsoid 2. **Wallichia**

1. **Phoenix** L.

1a. Stems bulbiform; spadix 15–25 cm long 1. *P. acaulis*

1b. Stems not as above; spadix 0.5–1 m long 2. *P. loureiroi*

1. **Phoenix acaulis** Roxb., Pl. Coromandel 3: 69. 1820; Becc. & Hook.f. in Hook.f., Fl. Brit. India 6: 426. 1892; Blatt., Palms Brit. Ind.: 15. 1978 (Repr.); P.C. Pant, Fl. Corbett Natl. Park: 158. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 20. 1989; S.C. Barrow, Kew Bull. 53: 553. 1998. [Plate-20e]

Undershrubs or dwarf trees, almost stemless; stems bulbiform, densely covered with persistent leaf base stumps. Leaves with long spiny petioled; leaflets 25–50 x 0.7–1.2 cm, stiff, acuminate and pointed at apex, thickened and decurrent at base. Spadix 15–25 cm long. Spathes *c.* 15 cm long, oblong-ellipsoid, ripens black. Fruits oblong, fleshy, orange or red, black when ripe; seeds grooved.

Flowering & Fruiting: November–May.

Infrequent in amidst grassy slopes

Distribution: India (Himalaya, N. India), China, Myanmar, Nepal.

Specimens examined: Way to Adnala, R. *Manikandan* 122591, 124869 (BSD); Mundiapani, T.S. Rana & Party 220254 (LWG).

2. **Phoenix loureiroi** Kunth, Enum. Pl. 3: 257. 1841; P.C. Pant, Fl. Corbett Natl. Park: 158. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 20. 1989; S.C. Barrow, Kew Bull. 53 : 553. 1998 (as '*loureiri*'). *P. humilis* Royle *ex* Becc., Malaysia 3: 373. 1890, *nom. illeg.*; Becc. & Hook.f. in Hook.f., Fl. Brit. India 6: 426. 1892; Blatt., Palms. Brit. Ind.: 17. 1978 (Repr.); Karthik. & al., *l.c.* *P. humilis* var. *loureiroi* (Kunth) Becc., Malaysia 3: 382. 1890; Becc. & Hook.f. in Hook.f., *l.c.* 427. *Khanjur* [Plate-20f]

Small trees; stems to 2 m high, densely clothed with leaf-base scars. Leaves 1–2 m long; leaflets many, 30–40 x 0.7–1.5 cm, linear, fasciculate, subquadriangular. Spadix 0.5–1 m long, interfoliar, much branched in fruits; spathes 25–60 cm long. Fruits *c.* 1.8 cm long, oblong, fleshy, orange, black when ripe. Seeds grooved.

Flowering & Fruiting: December–March.

Occasional in the fringes moist deciduous forests or open forests.

Distribution: India (Himalaya, C. & S. India), Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam.

Specimens examined: Way to Adnala, R. *Manikandan* 125729 (BSD).

2. *Wallichia* Roxb.

Wallichia oblongifolia Griff., Calcutta J. Nat. Hist. 5: 486. 1845. *Harina oblongifolia* (Griff.) Griff., Palms Brit. E. Ind. 175. 1850. *Wallichia densiflora* Mart., Hist. Nat. Palm. 3: 189. 1823. *Harina densiflora* (Mart.) Walp., Ann. Bot. Syst. 3: 1032. 1853. [Plate-20g]

Shrubs, erect, perennial, to 1 m high; stems clustered, short and subterranean to 40 cm across. Leaves petioled, spirally arranged; rachis 1.5–2.5 m long; pinnae 16 or 17 per side of rachis, oblong, with several lobes, regularly and alternately arranged, spreading in same plane, proximal 2 or 3 pinnae in a cluster, smallest erect. Flowers unisexual, male and female borne on separate stems; male inflorescences pendulous, not seen; rachillae many; male flowers $\approx$ 1 cm long; stamens 6; female inflorescences to 1 m, horizontally spreading; rachillae 16–32, to 35 cm long; female flowers to 6 mm across. Fruits ovoid to ellipsoid, to 1.5 cm long, greenish brown to reddish.

Flowering & Fruiting: December–March.

Rare in moist deciduous forests, especially in rocky places on steep slopes, up to 1200 m.

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

Specimens examined: Way to Adnala, R. *Manikandan* 122481 (BSD).

Notes: Its leaves are used for thatching and making brooms.

107. ARACEAE

- 1a. Herbs 2
- 1b. Climbers 4
- 2a. Plants epiphytic 4. **Remusatia**
- 2b. Plants terrestrial 3
- 3a. Leaves pinnatisect 1. **Amorphophallus**
- 3b. Leaves pedatisect 2. **Arisaema**
- 4a. Spathe inconspicuous, cymbiform 3. **Pothos**
- 4b. Spathes $\approx$ 10 cm long, oblong-ovate 5. **Rhaphidophora**

1. *Amorphophallus* Blume ex Decne.

- 1a. Bulbils present on leaves *A. bulbifer*
- 1b. Bulbils absent on leaves *A. sylvaticus*

1. ***Amorphophallus bulbifer*** (Roxb.) Blume, Rumphia 1: 148. 1835; Sivadasan, Araceae Silent Valley & Neighbourd.: 225–249. 1999; Sasikala & al. in V.J. Nair & P. Singh, Fasc. Fl. India 29: 32, f. 11. 2019. *Arum bulbiferum* Roxb., Fl. Ind. (ed. 1832) 3: 510–511. 1832, *nom. illeg. hom.* *Conophallus bulbifer* (Roxb.) Schott, Syn. Aroid. 1: 34. 1856. *Pythonium bulbiferum* (Roxb.) Schott, Melet. Bot.: 18. 1832. [Plate-20h]

Herbs, terrestrial, perennial, to 90 cm high; stem subterranean, with tuberous rhizome. Leaves petioled,

decompound, with bulbils on leaves. Spathe base convolute, rarely open or connate, variously colored and shaped. Spadix sessile or shortly stipitate; female zone contiguous with male zone or separated from it by a sterile zone; female flowers consisting of 1 pistil. Berries distant, ripening red, ovoid or narrowly elliptic, smooth, 1–4-seeded. Seeds usually with a distinct raphe.

Flowering & Fruiting: March–April.

Rare as forest undergrowth in moist deciduous.

Distribution: India (almost throughout the country), Europe, Myanmar, Nepal, United Kingdom.

Specimens examined: Way to Adnala, R. *Manikandan* 122485(BSD).

2. **Amorphophallus sylvaticus** (Roxb.) Kunth, Enum. Pl. 3: 34. 1841; Karthik. & al., Fl. Ind. Enum. Monocot.: 6. 1989; Sasikala & al. in V.J. Nair & P. Singh, Fasc. Fl. India 29: 61, f. 16. 2019. *Arum sylvaticum* Roxb., Fl. Ind. (Ed. Carey) 3: 511. 1832. *Synantherias sylvatica* Schott, Gen. Aroid.: t. 28. 1858; Hook.f., Fl. Brit. India 6: 518. 1893. *Pythonium sylvaticum* (Roxb.) Wight, Icon. Pl. Ind. Orient.: t. 802. 1844. [Plate-21a]

Herbs, to 75 cm high; tubers c 5 cm across, depressed globose, bulbiferous. Leaves petioled with green to purplish with maculations, pinnatisect, 30–65 cm across, segments lanceolate, acuminate at apex. Spathes 2–8 x 1–3.5 cm, pale pink spotted with green, purple within near base. Spadix c 30 cm long, stipitate; male flowers purplish; female flowers creamy turning to green; stigma yellow. Fruits dark green turning scarlet.

Flowering & Fruiting: May–September.

Rare as forest undergrowth in moist deciduous forests.

Distribution: India (Himalaya, C & S. India), Sri Lanka.

Specimens examined: Way to Adnala, R. *Manikandan* 12259 (BSD).

2. **Arisaema** Mart.

Arisaema tortuosum (Wall.) Schott in Schott & Endl., Melet. Bot. 1: 17. 1832; Hook.f., Fl. Brit. India 6: 502. 1893; Karthik. & al., Fl. Ind. Enum. Monocot.: 9. 1989; Sasikala & al. in V.J. Nair & P. Singh, Fasc. Fl. India 29: 144, f. 31a,b & 38d. 2019. *Arum tortuosum* Wall., Pl. Asiat. Rar. 2: 10, t. 114. 1830.

Herbs, perennial, deciduous; tubers c 3.5 cm across, subglobose; roots from upper side of tubers. Leaves 2, pedatisect; leaflets 5–7, 4.5–16 x 2.2–5.8 cm, lanceolate, caudate to acuminate at apex, tapering at base; petioles c 80 cm long; sheaths often reddish-brown mottled. Spathes dark green, purple striped externally. Spadix longer than or sometimes equal to spathe. Berries 2–5-seeded.

Flowering & Fruiting: July–November.

Occasional in moist deciduous forests.

Distribution: India (Himalaya, C.& S. India), Bhutan, China, Nepal, Pakistan.

Specimens observed: Seen in Rathuadhab-Vatanwas area.

3. **Pothos** L.

Pothos cathcartii Schott, Aroid 1: 22, t. 44–45. 1857; P.C. Pant, Fl. Corbett Natl. Park: 159. 1986; Hook.f., Fl. Brit. India 6: 551. 1893, *p.p.*; Karthik. & al., Fl. Ind. Enum. Monocot.: 12. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 245. 2007.

Climbing or creeping shrub, with adhesive roots, to 15 m long. Leaves petioled, simple, distichous, cordate or ovate-elliptic, acute-acuminate at apex, cordate at base, entire or wavy along the margins, glabrous, venation prominent. Spathe inconspicuous, cymbiform, spreading. Spadix sessile, varying in shape, with reduced flowers at very base, otherwise fertile. Flowers many, bisexual, sometimes reduced; tepals 6, with vaulted-truncate apex; stamens 6, filaments strap-shaped; stigma sessile, initially umbilicate. Berries 1–3-seeded; seeds large, without endosperm.

Flowering & Fruiting: February–August.

Common in thickets, mountain slopes near moist deciduous forests.

Distribution: India (Himalaya, Kashmir), Bhutan, China, Myanmar, Nepal, Pakistan.

Specimens examined: Halduparao-Vatanwasa, R. *Manikandan* 122363 (BSD); Samir Sinha (2001).

4. *Remusatia* Schott

Remusatia vivipara (Roxb.) Schott in Schott & Endl., Melet. Bot.: 18. 1832; Hook.f., Fl. Brit. India 6: 521. 1893; Suresh & al., Taxon 32: 128. 1983; Karthik. & al., Fl. Ind. Enum. Monocot.: 12. 1989; Sasikala & al. in V.J. Nair & P. Singh, Fasc. Fl. India 29: 263, f. 11. 2019. *Arum viviparum* Roxb., Hort. Bengal.: 65. 1814. [Plate-21b]

Epiphytic, deciduous, perennial herbs; stems bulbiferous, to 30 cm long, simple or shortly branched; tubers c. 4.5 cm across, clustered, depressed, rooting from crown. Leaves peltate, 10–27.5 × 8.7–25 cm, orbicular-ovate, acuminate at apex, deeply cordate at base, glabrous; petioles to 30 cm long. Spathes to 15 cm long, greenish-yellow, persistent. Spadix c. 3.5 cm long, with lower pistillate, middle sterile and terminal staminate flowers. Berries obovoid, minute.

Flowering & Fruiting: June–November.

Fairly common epiphytic in moist deciduous forests.

Distribution: India (almost throughout the country), Africa, SW Asia, Australia, Bangladesh, Bhutan, China, Indonesia, Laos, Madagascar, Nepal, Pacific islands, Sri Lanka, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122452, 122504 (BSD).

5. *Rhaphidophora* Hassk.

Rhaphidophora pertusa (Roxb.) Schott, Prodr. Syst. Aroid.: 382. 1860; Hook.f., Fl. Brit. India 6: 546. 1893; Suresh & al., Taxon 32: 127. 1983; Karthik. & al., Fl. Ind. Enum. Monocot.: 13. 1989; Sasikala & al. in V.J. Nair & P. Singh, Fasc. Fl. India 29: 285, f. 72. 2019. *Pothos pertusus* Roxb., Fl. Ind. (Eds. Carey & Wall.) 1: 455. 1820.

Large climbing shrub, to 12 m long; stems cylindrical, stout, with aerial roots. Leaves petioled with deeply channelled above, simple or pinnately lobed, 15–45 × 10–25 cm, broadly ovate, acute at apex, rounded or unequal at base, sheathed at base. Spathes c. 10 cm long, oblong-ovate, fleshy, yellow. Spadix sessile, 9.5 × 1.8 cm, cylindrical. Berries many-seeded; seeds oblong to reniform.

Flowering & Fruiting: October–December.

Occasional in moist deciduous forests.

Distribution: India (Himalaya, South & N.E. India), Bangladesh, Myanmar, Sri Lanka, Thailand.

Specimens examined: Rathuadhab-Vatanvasa, R. *Manikandan* 124867 (BSD); Samir Sinha (2001).

108. LEMNACEAE

- 1a. Fronds obovate1. **Lemna**
1b. Fronds ovate-orbicular 2. **Wolffia**

1. **Lemna** L.

Lemna perpusilla Torr., Fl. New York 1: 245. 1843; Plas in Steenis, Fl. Males., Ser. 1, Spermat. 7: 230, f. 4. 1971; Hepper in Dassan. & Fosberg, Revis. Handb. Fl. Ceylon 2: 398, f. 399, 1A–B. 1981; Karthik. & al., Fl. Ind. Enum. Monocot.: 87. 1989. [Plate-21c]

Herbs, small, aquatic, free floating, thalloid; roots solitary, sheathed, appendages. Fronds 2–3-together, to 2 mm long, obovate, asymmetric, entire; stripes hyaline, fugacious. Flowering cavity lateral; spathes naked. Utricles ellipsoid or ovoid, ribbed, 1-seeded.

Flowering & Fruiting: May–December.

Occasional in ponds and tanks.

Distribution: India (almost throughout the country); throughout all the warmer regions of both the hemispheres.

Specimens observed: Seen in Jorkhatty Forest division.

2. **Wolffia** Horkel ex Schleid., *nom. cons.*

Wolffia arrhiza (L.) Horkel ex Wimm., Fl. Schles. ed. 3, 140. 1857; Hook.f., Fl. Brit. India 6: 557. 1893; Subr., Aquat. Ang.: 79. 1962; Plas in Steenis, Fl. Males., Ser. 1, Spermat. 7: 237. f. 8c–c'. 1971; Hepper in Dassan. & Fosberg, Revis. Handb. Fl. Ceylon 2: 401, f. 399, 3A–B. 1981; Karthik. & al., Fl. Ind. Enum. Monocot.: 87. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 230, f. 238 c–d. 1996. *Lemna arrhiza* L., Mant. Pl. 2: 294. 1771.

Herbs, aquatic, free floating, thalloid; rootlets absent. Fronds minute, ovate-orbicular. Flowers opening on surface from simple median pit; stamen solitary. Utricles minute, ellipsoid, erect.

Flowering & Fruiting: June–October.

Infrequent in tanks, camouflage.

Distribution: India (almost throughout the country); Mostly subcosmopolitan.

Specimens observed: Seen in Jorkhatty Forest division.

109. APONOGETONACEAE

Aponogeton L.f., *nom. cons.*

Aponogeton crispus Thunb., Nov. Gen. Pl. 4: 73. 1781(as '*crispum*'); Hook.f., Fl. Brit. India 6: 564. 1893 *p.p.*; Bruggen, Blumea 18: 481, f. 6. 1970; Karthik. & al., Fl. Ind. Enum. Monocot.: 4. 1989; Sundararagh. in Hajra & Sanjappa, Fasc. Fl. India 22: 128. 1996; C.D.K. Cook, Aquat. Wetl. Pl. India 48, f. 30 a–d. 1996; S.R. Yadav & S.P. Gaikwad, Bull. Bot. Surv. India 45: 57. 2003. *A. echinatus* Roxb., Fl. Ind. (Ed. Carey) 2: 210. 1832 (as '*echinatum*'); Hook.f., *l.c.*; Bruggen, *l.c.* 483, f. 7. 1970; Karthik. & al., *l.c.*

Herbs, submerged, tuberous, acaulescent. Leaves 5–20 x 1–3.8 cm, elliptic-lanceolate, subacute to retuse at apex, cuneate or subcordate at base. Spathes to 2.5 cm long, caducous. Flowers white or bluish, in long spikes, dense; tepals 2, suborbicular; stamens 6. Follicles *c.* 1.2 cm long, ovoid, beaked, 1 or 2-seeded.

Flowering & Fruiting: August–December.

Grows in ponds and tanks.

Distribution: India (Himalaya, C. & S. India); cosmopolitan regions.

Notes: Included on the authority of Samir Sinha (2001).

110. POTAMOGETONACEAE

Potamogeton L.

Potamogeton nodosus Poir. in Lam., Encycl. Suppl. 4: 535. 1816; Subr., Aquat. Ang.: 95. 1962; P.C. Pant, Fl. Corbett Natl. Park: 159. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 284. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 333, f. 341a–b. 1996; Kothari, Bull. Bot. Surv. India 43: 172, f. 8. 2001. *P. indicus sensu* Hook.f., Fl. Brit. India 6: 565. 1893 *non* Roxb., 1832.

Herbs, aquatic, stoloniferous; stems branched, terete. Leaves alternate or subopposite, 5.6–12.8 x 2–4.2 cm, elliptic-lanceolate, acute or obtuse at apex, rounded at base, undulate or entire along margins, thinly coriaceous; many-nerved. Flowers greenish-white, dense, stout, axillary or leaf-opposed spikes. Drupelets *c.* 4 mm long, subovoid, beaked, spongy.

Flowering & Fruiting: October–January.

Grows in ponds and tanks.

Distribution: India (almost throughout the country), Africa, SW Asia, Bangladesh, China, Indonesia, Japan, Kazakhstan, Myanmar, Nepal, New Guinea, North and South America, Pacific islands, Pakistan, Russia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

111. ERIOCAULACEAE

Eriocaulon L.

Eriocaulon cinereum R. Br., Prodr. Fl. Nov. Holland.: 254. 1810; P.C. Pant, Fl. Corbett Natl. Park: 152. 1986; Karthik. & al., Fl. Ind. Enum. Monocot. 76. 1989; R. Ansari & N.P. Balakr., Eriocaul. India 179, f. 64 A–F. 1994 & 172, f. 79 A–F. 2009 (Rev. ed.); C.D.K. Cook, Aquat. Wetl. Pl. India: 191, f. 195. 1996; Das Das & N.P. Singh, J. Econ. Taxon. Bot. 25: 460. 2001. *E. sieboldianum* Siebold & Zucc. *ex* Steud., Syn. Pl. Glumac. 2: 272. 1855 (as '*sieboldianum*'); Hook.f., Fl. Brit. India 6: 577. 1893.

Herbs, to 10 cm high, glabrous. Leaves 1.2–4 x 0.1–0.3 cm, narrowly linear or capillary, acute at apex. Flowers white, in heads, *c.* 5 mm across, spherical; involucral bracts obovate, obtuse at apex, glabrous; floral bracts sparsely hairy, pale dark; male flowers perfect; female calyx spatulate. Seeds *c.* 0.7 mm long, ellipsoid, smooth, reddish-brown.

Flowering & Fruiting: September–December.

Occasional in marshy places and fallow fields.

Distribution: India (Assam, Himalayas, Kerala, Orissa, Rajasthan), Afghanistan, Africa, Australia, Bhutan, Cambodia, India, Indonesia, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Pakhro, R. *Manikandan* 122453(BSD).

112. CYPERACEAE

- 1a. Stems 3- angled or trigonous 2
- 1b. Stems 4–6 angled, grooved1. **Bulbostylis**
- 2a. All flowers unisexual 3
- 2b. Flowers usually bisexual 4
- 3a. Female flowers and nutlets hidden by a utricle2. **Carex**
- 3b. Female flowers and nutlets not hidden by a utricle10. **Scleria**
- 4a. Hypogynous scales absent 5
- 4b. Hypogynous scales absent 8
- 5a. Style continuing down to ovary without demarketed border; nutlets neither crowned nor jointed..... 6
- 5b. Styles jointed with the ovary; style base dilated or spongy thickened, clearly demarcated....5. **Fimbristylis**
- 6a. Spikelets 1 or 2-flowered6. **Kyllinga**
- 6b. Spikelets 3 to many-flowered 7
- 7a. Stigmas 2; nut laterally compressed8. **Pycnus**
- 7b. Stigmas 3; nut trigonous or triquetrous3. **Cyperus**
- 8a. Stamen 1 9
- 8b. Stamens 39. **Schoenoplectus**
- 9a. Perennials with thick woody rhizome4. **Eriophorum**
- 9b. Annuals with or without short rhizome7. **Lipocarpa**

1. **Bulbostylis** Kunth

Bulbostylis barbata (Rottb.) C.B. Clarke, Hook.f., Fl. Brit. India 6: 651. 1893; P.C. Pant, Fl. Corbett Natl. Park: 160. 1986. *Scirpus barbatus* Rottb., Descr. Pl. Rar. Progr.: 27. 1772. *Abildgaardia wallichiana* (Schult.) Lye, Nordic J. Bot. 3: 239. 1983. *Isolepis wallichiana* Schult. in Roem. & Schult., Mantissa: 533. 1824, non Beauv. 1807.

Herbs, annual, tufted, to 25 cm high; stems 4–6-angled, grooved, smooth, with fibrous roots. Leaves half of stem length; sheaths grey or yellowish-brown, soft, mouth oblique, margin densely fringed with white hairs; blades margins minutely scabrous, apex channelled, acute, scabrous. Inflorescence 3–20 sessile or subsessile spikes; bracts 1–2, lowest leaf-like, green, acute, scabrous, finally reflexed. Glumes spirally arranged, acute or acuminate, mid-nerve area green, strongly keeled, scabrous, mid-nerve and two strong side-nerve extend into mucro, sides scarious, brown, smooth or with scattered prickles, glossy, margin towards apex fringed; stamens 1–2. Nut *c.* 0.7 × 0.6 mm, obovoid, sharply triangular, sides very finely papillose, white, glossy.

Flowering & Fruiting: August–September.

Grows in moist sand and along the streams near deciduous forests

Distribution: India (Himalaya, C & S India), N. Africa, Atlantic Ocean islands, Australia, Bhutan, Cambodia, China, Indian Ocean islands, Indonesia, Japan, Kashmir, Korea, Laos, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

2. *Carex* L.

Carex myosurus Nees, Contr. Bot. India: 122. 1834; P.C. Pant, Fl. Corbett Natl. Park: 160. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 304. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 248. 2007. *C. eminens* Nees in Wight, Contr. Bot. Ind.: 122. 1834. *C. myosurus* Nees var. *eminens* (Nees) C.B. Clarke, Fl. Brit. India 6: 723. 1894.

Herbs, perennial, to 1.5 m high; stems noded with long internodes, obtusely trigonous, smooth, with conspicuous, lignified rhizomes. Leaves as long as stem; sheaths long, reddish, finally reticulate fibrous; blades longattenuate, flat or margins revolute, margins scabrous towards apex. Inflorescence paniculodium, simple or with 5–9 partial inflorescences; spikes 4–6 cm long, cylindrical, androgynous; bracts with long sheaths. Glumes to 4 mm long, oblong-ovate, mucronate to aristate, reddish-brown, hyaline margin narrow. Utricles $\approx$ 4.5 mm across, subovoid to ellipsoid, slightly scabrous above, stipitate, lateral nerves prominent, hispid above; beak abruptly contracted, bifid; stigmas 3. Nuts $\approx$ 3 mm long, ellipsoid to obovoid, trigonous.

Flowering & Fruiting: April–May.

Grows in marshy places.

Distribution: India (Himalaya, S. India), China, Indonesia, Myanmar, Nepal, Pakistan, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

3. *Cyperus* L.

There is no unanimity on the delimitation of the genus *Cyperus* L. (fide J.H. Kern in Steenis, Fl. Males., Ser. 1, Spermat. 7(3): 593. 1974). In Flora of North America and U.S. Dept. Agri. Plant list, *Cyperus* s.l. is recognized. Typically, *Cyperus* includes taxa with flattened spikelets and distichous glumes. However, *Kyllinga*, *Queenslandiella* and *Pycnus* have been segregated from *Cyperus* in having bicarpellate, laterally flattened nutlets. Plastid DNA sequence data are analysed to reconstruct the relationships among the cyperoid genera (Muasya & al., 2001). *Cyperus* s.l. forms a strongly supported clade that includes the cyperoid genera, such as *Courtoisina*, *Kyllinga*, *Lipocarpa* and *Pycnus*. Further work is needed in particular, using additional molecular data from different genes/gene regions as well as many more taxa, before conclusions can be drawn on the difficult issue of generic recognition in tribe Cyperae. In the present work we have followed the treatment of *Cyperus* s.str. as given in World Checklist (Govaerts & al., 2007).

- | | |
|--|-------------------------|
| 1a. Annual herbs | 2 |
| 1b. Perennial herbs | 3 |
| 2a. Glumes ovate; stamens 3 | 1. <i>C. compressus</i> |
| 2b. Glumes elliptic to suboblong; stamens 1 or 2 | 8. <i>C. tenuispica</i> |
| 3a. Stems upper part trigonous, lower terete | 4 |
| 3b. Stems trigonous or triquetrous throughout | 5 |

- 4a. Herbs upto 30 cm high; inflorescence single globose4. *C. niveus*
 4b. Herbs upto 120 cm high; Inflorescence conical compound spikes2. *C. corymbosus*
- 5a. Involucral bracts 2 to 5, shorter than inflorescence 6
 5b. Involucral bracts 3 to 5, longer than inflorescence 7
- 6a. Glumes oblong-ovate, *c.* 1.2 mm long; stamen 13. *C. haspan*
 6b. Glumes ovate, *c.* 3.8 mm long; stamens 37. *C. rotundus*
- 7a. Stems to 1.2 m high; inflorescence compound, lax5. *C. pangorei*
 7b. Stems to 80 cm high; inflorescence compound or decompound spikes6. *C. pilosus*

1. **Cyperus compressus** L., Sp. Pl.: 46. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 605. 1893; P.C. Pant, Fl. Corbett Natl. Park: 161. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 44. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 106, f. 92. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 84. 2002.

Herbs, annual, tufted; stem to 40 cm high, trigonous, striate. Leaves shorter than stem, linear, sheathed at base. Inflorescence simple; involucral bracts 3-5, lower ones longer than inflorescence. Spikes broadly ovoid, yellowish-green. Glumes 3.3–4 mm long, ovate, acute and mucronate at apex; stamens 3. Nuts *c.* 1.6 mm long, broadly obovoid, minutely apiculate, shining, dark brown.

Flowering & Fruiting: September–March.

Infrequent in marshy places.

Distribution: India (almost throughout the country), Afghanistan, Africa, Australia, Bangladesh, Bhutan, Central, North and South America, China, Indian Ocean islands, Indonesia, Japan, Laos, Madagascar, Myanmar, Nepal, Pacific Ocean islands, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Rathuadhab-Vatanvasa, R. *Manikandan* 122563 (BSD); Samir Sinha (2001).

2. **Cyperus corymbosus** Rottb., Descr. Pl. Rar.: 19. 1772; C.B. Clarke in Hook.f., Fl. Brit. India 6: 612. 1893; P.C. Pant, Fl. Corbett Natl. Park: 161. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 44. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 106, f. 92. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 84. 2002; Uniyal & al., Fl. of Uttarakhand Check.: 252. 2007. *C. diphyllus* Retz., Observ. Bot. 5: 11. 1789. *C. koenigii* Vahl, Enum. Pl. 2: 302. 1805.

Herbs, perennial, to 120 cm; stems trigonous above, smooth. Leaves reduced; sheaths greyish-green or brownish, often reddish tint, mouth margin oblique; blades to 8 x 0.4 cm, rigid, smooth or slightly scabrous. Inflorescence conical compound spikes; bracts 3–5 foliose, shorter than inflorescence, flat or margins slightly recurved, keel scabrous, apex smooth, rather obtuse. Glumes fusiform, terete, with spongy basis, loosely imbricating, cymbiform, straw coloured to reddish-brown, mucronate, apex rounded, margins widely scarious. Nuts not seen.

Flowering & Fruiting: November–March.

Occasional along streams and muddy areas.

Distribution: India (Himalaya, C & S. India), Africa, America, Myanmar, Pakistan, Sri Lanka.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124905 (BSD).

3. **Cyperus haspan** L., Sp. Pl.: 45. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 600. 1893; P.C. Pant, Fl. Corbett Natl. Park: 162. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 45. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 112, f. 100 a–c. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 97. 2002.

Herbs, perennial, tufted, to to 35 cm high; stems triquetrous, with short, woody rhizomes. Leaves shorter than stem; sheaths reddish-brown, membranous, sometimes all leaves reduced into an appendage. Inflorescence compound or decompound; involucre bracts 2 or 3, smaller than inflorescence; spikelets linear-lanceolate or oblong. Glumes $\approx$ 1.2 mm long, oblong-ovate, obtuse at apex, membranous; stamen 1. Nuts $\approx$ 0.5 mm long, obovoid, trigonous, apiculate at apex, stipitate, granulate, creamish-yellow.

Flowering & Fruiting: October–January.

Occasional in open Marshy places.

Distribution: India (almost throughout the country), Africa, Tropics of Old and New World.

Specimens examined: Sonanadi WLS, R. *Manikandan* 125759, 122360 (BSD); Samir Sinha (2001).

4. **Cyperus niveus** Retz., Observ. Bot. 5: 12. 1788; P.C. Pant, Fl. Corbett Natl. Park: 162. 1986; C.B. Clarke, Hook.f., Fl. Brit. India 6: 606. 1893; Karthik. & al., Fl. Ind. Enum. Monocot.: 45. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 114, f. 103. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 100. 2002; Uniyal & al., Fl. of Uttarakhand Check.: 252. 2007.

Herbs, perennial, to 30 cm high; stems smooth, grey-green, upper part trigonous, lower terete, base swollen, with short, horizontal rhizomes. Leaves nearly equalling stem, flexuous, to 20×0.2 cm, channelled or folded, often curved, grey-green, margins scabrous, apex long, acute, trigonous, scabrous; sheaths brown or greyish-brown, mouth wide, slightly concave. Inflorescence single globose, 4–10 sessile or subsessile spikes, white or yellowish-brown; bracts 2–3, foliose, channelled or folded, scabrous. Spikes narrowly ovoid, compressed, rachis quadrangular, angles rounded. Glumes tightly distichous, slightly keeled, white or yellow-brown, mucronate, sides with 4–5 rather inconspicuous veins, margins scarious; stamens 3. Nuts $\approx$ 1.5 mm across, obovoid, trigonous, dark brown or almost black, shiny, very weakly papillose.

Flowering & Fruiting: September–January.

Grows along the stream margins and in moist places near tanks.

Distribution: India (almost throughout the country), Afghanistan, tropical Africa, SW Asia, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Notes: It can easily be recognized by its yellowish fibrous roots and included on the authority of Samir Sinha (2001).

5. **Cyperus pangorei** Rottb., Descr. Icon. Rar. Pl.: 31, t. 7, f. 3. 1773; P.C. Pant, Fl. Corbett Natl. Park: 163. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 46. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 118, f. 110. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 113. 2002. *C. tegetum* Roxb., Fl. Ind.(Ed. Carey) 1: 208. 1832; C.B. Clarke in Hook.f., Fl. Brit. India 6: 613. 1893.

Herbs, perennial, subtufted; rhizome stout, woody, creeping, scales brownish with blackish fibrous hairs; stem to 1.2 m high, trigonous to triquetrous. Leaves usually reduced to 2–4 subphyllus sheaths at base,

purplish-brown. Inflorescence compound, lax; involucre bracts 3–5, longer than inflorescence; spikelets linear, subacute at apex, reddish-brown. Glumes $\approx$ 2.8 mm long, oblanceolate, membranous; stamens 3. Nuts $\approx$ 1.5 mm long, oblong-obovoid, trigonous, apiculate at apex, yellowish-brown.

Flowering & Fruiting: November–January.

Occasional along streams and muddy river banks.

Distribution: India (Himalaya, NE India), China, Myanmar, Nepal, Pakistan, Sri Lanka.

Specimens examined: Vatanvasa, *T.S. Rana & Party* 220758 (LWG); Samir Sinha (2001).

6. **Cyperus pilosus** Vahl, Enum. Pl. 2: 354. 1805; P.C. Pant, Fl. Corbett Natl. Park: 163. 1986; C.D.K. Cook, Aquat. Wetl. Pl. India: 122, f. 117. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 121. 2002; Uniyal & al., Fl. of Uttarakhand Check. 252. 2007.

Herbs, perennials, scattered, to 80 cm high; culms stout, acutely triquetrous, smooth or scabrid on angles, with slender rhizomes and stolons. Leaves shorter than culm; sheath brownish, short; leaf blade flat, margin serrulate scabrid. Inflorescence compound or decompound spikes; involucre bracts 3–5, longer than inflorescence, margin serrulate scabrid; spikes ovoid to oblong, with 10–20 or more spikelets; spikelets laxly distichous, narrowly linear-ovoid to linear, spreading, rachilla wings white, narrow, hyaline. Glumes pale, brown, reddish-brown on both surfaces, broadly ovate, 5–7-veined, margin white hyaline; stamens 3. Nutlet nearly black when mature, broadly ellipsoid to obovoid.

Flowering & Fruiting: August–November.

Occasional in marshy places, forest margins, grasslands on slopes.

Distribution: India (almost throughout the country), Bangladesh, Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, N. Australia, Pacific Islands, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

7. **Cyperus rotundus** L., Sp. Pl.: 45. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 614. 1893; P.C. Pant, Fl. Corbett Natl. Park: 163. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 47. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 123, f. 118. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 122. 2002.

Herbs, perennial, with slender, stolons, ending in tubers; stems usually solitary, to 30 cm high, triquetrous. Leaves shorter than stem; sheaths pale-brown, disintegrating into fibres. Inflorescence simple or compound; involucre bracts 2–5, shorter than inflorescence; spikelets linear, acute at apex, reddish-brown. Glumes $\approx$ 3.8 mm long, ovate, subobtuse at apex, membranous; stamens 3. Nuts $\approx$ 1.5 mm long, oblong-obovoid, trigonous, apiculate at apex, brownish.

Flowering & Fruiting: September–November.

Occasional along tanks and muddy river banks.

Distribution: India (almost throughout the country), Afghanistan, Africa, America, SW Asia, Australia, Bhutan, China, Europe, Indian Ocean Islands, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Madagascar, Malaysia, Myanmar, Nepal, Pacific Islands, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Tajikistan, Thailand, Uzbekistan, Vietnam.

Specimens examined: Rathuadhab-Vatanvasa, R. *Manikandan* 124882, 125761 (BSD); Samir Sinha (2001).

8. **Cyperus tenuispica** Steud., Syn. Pl. Glumac. 2: 11. 1854; Uniyal & al., Fl. of Uttarakhand Check.: 252. 2007. *C. flavidus* Retz., Obs. 5: 13. 1789; P.C. Pant, Fl. Corbett Natl. Park: 161. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 44. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 106, f. 92. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 84. 2002.

Herbs, annuals, tufted, to 30 cm high; culms flaccid, compressed triquetrous, smooth, base clothed with a few bladeless sheaths, with fibrous roots. Leaves shorter than culm, flat; sheaths to 6 cm long, reddish-brown to purplish-brown. Inflorescence compound or simple spikes; involucre bracts 2–3, leaf-like, equaling or longer than inflorescence; spikelets 3–12, digitately arranged, raylets linear, 10–40-flowered, rachilla wingless. Glumes dark brown on both surfaces, lax, elliptic to suboblong, membranous, veins inconspicuous, apex obtuse to truncate, slightly excurved; stamens 1 or 2; style long; stigmas 3. Nutlet yellowish, obovoid, tuberculate.

Flowering & Fruiting: September–November.

Occasional in marshy situations and edges of tanks.

Distribution: India (almost throughout the country), tropical Africa, Australia, Bhutan, China, Indonesia, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Tajikistan, Thailand, Uzbekistan, Vietnam.

Specimens examined: Vatanvasa, T.S. *Rana & Party* 220758 (LWG).

4. **Eriophorum** L.

Eriophorum comosum (Wall.) Wall. *ex* Nees, Wight, Contr. Bot. India 110. 1834; C.B. Clarke in Hook.f., Fl. Brit. India 6: 664. 1893; P.C. Pant, Fl. Corbett Natl. Park: 163. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 50. 1989; Manikandan & al., Phytotaxonomy 5: 93. 2006 (2005). *Scirpus comosus* Wall. in Roxb., Fl. Ind. (Eds. Carey & Wall.) 1: 234. 1820. *Trichophorum comosum* (Wall.) A. Dietr., Sp. Pl. 2: 202. 1832. *Erioscirpus comosus* (Wall.) Palla, Bot. Zeitung (Berlin) 54(1): 151. 1896.

Herbs, perennial, tufted, to 65 cm high; stems trigonous, glabrous, sheathed at base, purplish-brown, with woody, short rhizomes. Leaves equal or longer than stem. Inflorescence compound; involucre bracts 3, leafy, longer than inflorescence; spikelets ellipsoid or oblong-obovoid, obtuse at apex, reddish-brown. Glumes *c.* 4 mm long, oblong-lanceolate, mucronate at apex; stamen 1. Nuts *c.* 2 mm long, linear-oblong, acute at apex, triquetrous, greyish-black, with hypogynous scales divided into many bristles at base.

Flowering & Fruiting: November.

Occasional along the hill slopes.

Distribution: India (Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Bihar, Rajasthan, Gujarat, Karnataka, Maharashtra), Afghanistan, SW Asia, Bangladesh, Bhutan, China, Indonesia, Myanmar, Nepal, Pakistan, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

5. **Fimbristylis** Vahl, *nom. cons.*

1a. Inflorescence simple to compound corymbs of spikelets 1. *F. dichotoma*

1b. Inflorescence compound or decompound spikes2. *F. bisumbellata*

1. ***Fimbristylis dichotoma*** (L.) Vahl, Enum. Pl. 2: 287. 1805; P.C. Pant, Fl. Corbett Natl. Park: 164. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 51. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 141, f. 139. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 172. 2002. *Scirpus dichotoma* L., Sp. Pl. 1: 50. 1753. *Fimbristylis diphylla* (Retz.) Vahl, l.c. 289; C.B. Clarke in Hook.f., Fl. Brit. India 6: 636. 1893. *F. annua* var. *paucispiculata* Blatt. & McCann, J. Bombay Nat. Hist. Soc. 37: 544. 1934.

Herbs, perennial; rhizome short, woody; stem to 65 cm high, angular, striate. Leaves radical, flat, smaller than stem; sheaths glabrous to densely puberulous. Inflorescence simple to compound corymbs of spikelets; involucre bracts 2–5, much shorter or longer than inflorescence; spikelets ovoid to ellipsoid, acute at apex. Glumes c. 2.8 mm long, broadly ovate, dark brown; stamens 2. Nuts c. 1.2 mm long, obovate, biconvex, stipitate, verruculose, whitish.

Flowering & Fruiting: July–November.

Common amidst marshy grassland areas.

Distribution: India (almost throughout the country), Afghanistan, Africa, America, SW Asia, Australia, Bhutan, China, Indian Ocean islands, Indonesia, Japan, Korea, Kyrgyzstan, Madagascar, Malaysia, Nepal, Pacific islands, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Uzbekistan, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Fimbristylis bisumbellata*** (Forssk.) Bub., Doddec. 30: 1850; P.C. Pant, Fl. Corbett Natl. Park: 164. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 55. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 148, f. 148. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 205, f. 36. 2002; Uniyal & al., Fl. of Uttarakhand Check.: 253. 2007. *Scirpus bisumbellatus* Forsskål, Fl. Aegypt.-Arab.: 15. 1775.

Herbs, annuals, tufted, to 20 cm high; culms slender, flatly 3-angled, smooth, with few leaves at base. Leaves shorter than culm; sheaths yellowish-green with rust-colored flecks, short, white pilose; leaf blade flat, margin apically ciliate, sparsely hairy. Inflorescence compound or decompound spikes; involucre bracts 2–5, leaf-like, suberect, basal 1–2 equaling or longer than inflorescence; spikelets solitary, oblong-ovoid, ovoid or oblong, 10–20-flowered, apex acute. Glumes spirally imbricate, brown, broadly ovate, membranous, 3-veined; stamens 1 or 2; style long and compressed, ciliate, basally inflated; stigmas 2. Nutlet yellowish-white, very shortly stipitate, broadly obovoid, biconvex, with transversely oblong reticulation.

Flowering & Fruiting: July–October.

Grows along swampy areas.

Distribution: India (almost throughout the country), Afghanistan, Africa, SW Asia, Australia, China, Europe, Indian Ocean islands, Indonesia, Japan, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Turkmenistan, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

6. ***Kyllinga*** Rottb.

Kyllinga brevifolia Rottb., Descr. Icon. Rar. Pl.: 13, t. 4, f. 3. 1773; C.B. Clarke in Hook.f., Fl. Brit. India 6: 588. 1893; Karthik. & al., Fl. Ind. Enum. Monocot.: 60. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India

156, f. 159. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 234. 2002. *Cyperus brevifolius* (Rottb.) Hassk., Cat. Hort. Bot. Bogor.: 24. 1844; P.C. Pant, Fl. Corbett Natl. Park: 161. 1986.

Herbs, perennial; rhizome horizontally creeping, covered by brownish sheaths; stem to 30 cm long, triquetrous. Leaves radical, well developed, shorter than stem; sheaths brownish-purple. Spikes globose, greenish with numerous spikelets; involucre bracts 3–4, leafy, longer than inflorescence; spikelets elliptic-oblong. Glumes 1–3.2 mm long, elliptic-ovate to boat-shaped, mucronate at apex, membranous; stamens 1 or 2. Nuts 1.5 mm long, obovate or elliptic, compressed laterally, apiculate at apex, brown.

Flowering & Fruiting: September–March.

Occasional along river beds and open rocky areas.

Distribution: India (almost throughout the country), Afghanistan, tropical Africa, America, Atlantic Ocean islands, Australia, Bangladesh, Bhutan, China, Indian Ocean islands, Indonesia, Japan, Korea, Laos, Madagascar, Malaysia, Myanmar, Nepal, Pacific islands, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Thailand, Vietnam.

Specimens examined: Rathuadhab, Sonanadi WLS, R. Manikandan 124833, 122409, 124900 (BSD); Samir Sinha (2001).

7. *Lipocarpa* R. Br.

Lipocarpa chinensis (Osbeck) J. Kern, Blumea Suppl. 4: 167. 1958 & in Backer & Bakh.f., Fl. Java 3: 457. 1968; P.C. Pant, Fl. Corbett Natl. Park: 164. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 61. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 158, f. 162. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 247. 2002. *Scirpus chinensis* Osbeck, Dagbok. Ostind. Resa: 220. 1757. *Lipocarpa argentea* R. Br. ex Nees, Linnaea 9: 287. 1835; C.B. Clarke in Hook.f., Fl. Brit. India 6: 667. 1893.

Herbs, annual or short lived perennial, tufted; rhizome short; stem to 55 cm high, trigonous, striate-sulcate. Leaves shorter than stem, flat. Inflorescence a head of spikelets, terminal; involucre bracts 2–3, unequal, longer than inflorescence, reflexed; spikelets ovoid-oblong, obtuse at apex, whitish. Glumes $\approx$ 2.8 mm long, spatulate to oblong-obovate, triangular at apex, purplish; stamen 1. Nuts $\approx$ 1.5 cm long, oblong-obovate, apiculate at apex, brown.

Flowering & Fruiting: July–November.

Occasional in marshy areas and open grasslands.

Distribution: India (almost throughout the country), Africa, N. Australia, Bhutan, Cambodia, China, Indian Ocean islands, Indonesia, Japan, Korea, Laos, Madagascar, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

8. *Pycneus* P. Beauv.

Pycneus flavidus (Retz.) T. Koyama, J. Jap. Bot. 51: 313. 1976; Karthik. & al., Fl. Ind. Enum. Monocot.: 65. 989; C.D.K. Cook, Aquat. Wetl. Pl. India: 168, f. 175. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 270. 2002. *Cyperus flavidus* Retz., Observ. Bot. 5: 13. 1788; P.C. Pant, Fl. Corbett Natl. Park: 162. 1986. *C. globosus* All., Auct. Fl. Pedem.: 49. 1789 non Forssk., 1775. *Pycneus globosus* (All.) Rchb., Fl. Germ. Excurs.: 140. 1830. *P. capillaris* (Koenig ex Roxb.) Nees ex C.B. Clarke in Hook.f., Fl. Brit. India 6: 591. 1893.

Herbs, annual or rarely perennial, to 60 cm high; stems slender, trigonous, with short rhizomes. Leaves few, shorter than stem; sheaths reddish-brown at base. Inflorescence simple or subcompound at times congested in to head-like cluster; involucre bracts 2–4, suberect, lower ones overtopping inflorescence. Spikes ovoid to subglobose, purplish-brown. Glumes $\approx$ 2.3 mm long, oblong-ovate, obtuse and mucicous at apex, sides pale brown to dark reddish-brown; stamens 2. Nuts $\approx$ 1.2 mm long, biconvex, oblong-obovate, apiculate at apex, dark brown.

Flowering & Fruiting: July–March.

Occasional in marshy situations.

Distribution: India (almost throughout the country), Afghanistan, Africa, SW Asia, Australia, Bangladesh, Bhutan, Cambodia, China, S. Europe, Indian Ocean islands, Indonesia, Japan, Kazakhstan, Korea, Laos, Madagascar, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

9. *Schoenoplectus* (Rchb.) Palla

Schoenoplectus mucronatus (L.) Palla, Bot. Jahrb. Syst. 10: 299. 1889; P.C. Pant, Fl. Corbett Natl. Park: 164. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 69. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 178, f. 185 f–i. 1996; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 309. 2002. *Scirpus mucronatus* L., Sp. Pl.: 50. 1753; C.B. Clarke in Hook.f., Fl. Brit. India 6: 657. 1893.

Herbs, perennial, to 90 cm high; stem erect, stout, sharply triangular, with short, woody rhizomes. Leaves reduced to membranous sheaths, stramineous-brown. Inflorescence pseudolateral, hemispherical cluster of few to many spikelets; involucre bract much shorter than stem; spikelets sessile, ovoid or oblong; acute at apex, stramineous-brown. Glumes $\approx$ 5 mm long, ovate, boat-shaped, acute and mucronate at apex; perianth bristles 5–6, unequal; stamens 3. Nuts $\approx$ 2 mm long, planoconvex, broadly obovate, mucronate at apex, blackish-brown.

Flowering & Fruiting: November.

Rare in shallow water tanks.

Distribution: India (almost throughout the country), Africa, Australia, California, Europe, Japan, Malesia, Madagascar, Pakistan.

Notes: Included on the authority of Samir Sinha (2001).

10. *Scleria* Bergius

Scleria parvula Steud., Syn. Cyper. 2: 174. 1885; P.C. Pant, Fl. Corbett Natl. Park: 165. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 72. 1989; V.P. Prasad & N.P. Singh, J. Econ. Taxon. Bot. Addit. Ser. 21: 326. 2002; Uniyal & al., Fl. of Uttarakhand Check.: 257. 2007. *S. tessellata* auct. non. Willd. 1805.

Herbs, perennial, to 1.5 m high; stems triquetrous, glabrous to pubescent, with woody, short creeping rhizomes. Leaves evenly distributed on stems, linear, scabrous along margins; sheaths triquetrous, winged, scabrid on angles. Inflorescence 2–4 distinct compound panicles; bracts longer than inflorescence; spikelets solitary or 2–3 in groups; male spikelets oblong-lanceolate. Glumes $\approx$ 4.2 mm long, broadly ovate. Nuts $\approx$ 3 x 2 mm, broadly ovoid to subglobose, obtusely trigonous, white to greyish, reticulate-cancellate.

Flowering & Fruiting: September–January.

Infrequent in shady moist deciduous forests.

Distribution: India (almost throughout the country), tropical Africa, Bhutan, Cambodia, China, Japan, Korea, Laos, Nepal, Papua New Guinea, Philippines, Sri Lanka, N. Thailand, Vietnam.

Specimens examined: Rathuadhab, R. *Manikandan* 122443(BSD); Samir Sinha (2001).

113. POACEAE (= GRAMINEAE)

1a. Shrubs or trees	2
1b. Herbs	4
2a. Shrubs; c. 6 m high	3
2b. Trees; c. 20 m high	14. Dendrocalamus
3a. Culms c. 3.5 m high; glumes ovate	35. Thysanolaena
3b. Culms c. 6 m high; glumes lanceolate-elliptic	30. Phragmites
4a. Herbs c. 3 m high, robust	31. Saccharum
4b. Herbs usually less than 3 m high; slender	5
5a. Spikelets disarticulating at maturity above glumes	6
5b. Spikelets falling entire at maturity	7
6a. Spikelets disarticulating above glumes; both lemmas orbicular-broadly elliptic, awnless; leaves lanceolate- ovate	26. Isachne
6b. Spikelets disarticulating below fertile floret; lower lemma resembles upper glume, often awned; leaves linear	4. Arundinella
7a. Spikelets with 2-florets; upper bisexual and lower male or barren	8
7b. Spikelets with 1 to several florets	31
8a. Spikelets unisexual	9
8b. Spikelets bisexual	10
9a. Female spikelets enclosed in a modified leaf-sheaths.....	9. Coix
9b. Female spikelets not enclosed as above	7. Chionachne
10a. Spikelets similar, solitary or paired	11
10b. Spikelets dissimilar, often paired or in threes.....	21
11a. Spikelets awned or subtended by bristles or aristate	12
11b. Spikelets not as above	16
12a. Spikelets awned or aristate	13
12b. Spikelets subtended by a solitary bristle or an involucre of bristles	17
13a. Spikelets pubescent	6. Capillipedium
13b. Spikelets glabrous	14
14a. Inflorescence in long spikes	15. Desmostachya
14b. Inflorescence in panicles of several racemes	15

- 15a. Culms creeping or geniculate; leaves elliptic-lanceolate27. **Oplismenus**
 15b. Culms erect or suberect; leaves linear18. **Echinochloa**
- 16a. Spikelets elliptic- lanceolate, broadly ovate to ovate- oblong32. **Setaria**
 16b. Spikelets lanceolate- narrowly lanceolate5. **Arundo**
- 17a. Spikelets gibbous12. **Cyrtococcum**
 17b. Spikelets not gibbous 18
- 18a. Lower glume usually absent or reduced to scales 19
 18b. Lower glume well developed 20
- 19a. Racemes 3– 8; spikelets elliptic-oblong17. **Digitaria**
 19b. Racemes 2 or 3; spikelets ovate 29. **Paspalum**
- 20a. Lower glume broadly ovate; lower lemma ovate 28. **Panicum**
 20b. Lower glume obovate; lower lemma elliptic- oblong36. **Urochloa**
- 21a. Inflorescence of panicles 22
 21b. Inflorescence solitary, digitate or subdigitate spikes 28
- 22a. Panicles of racemes, interrupted by spathes 23
 22b. Panicles of racemes, not interrupted by spathes 26
- 23a. Aromatic grasses 10. **Cymbopogon**
 23b. Non aromatic grasses 24
- 24a. Basal joints of racemes bulbous1. **Apluda**
 24b. Basal joints of racemes not bulbous 25
- 25a. Involucral spikelets present 34. **Themeda**
 25b. Involucral spikelets absent25. **Imperata**
- 26a. Lower glumes muricate37. **Vetiveria**
 26b. Lower glumes smooth 27
- 27a. Spikelets paired33. **Sorghum**
 27b. Spikelets in threes 8. **Chrysopogon**
- 28a. Racemes solitary 29
 28b. Racemes two to many3. **Arthraxon**
- 29a. Racemes terete; callus pungent24. **Heteropogon**
 29b. Racemes and callus not as above 30
- 30a. Upper lemma of sessile spikelets awned 16. **Dichanthium**
 30b. Upper lemma of sessile spikelets unawned22. **Eulalia**
- 31a. Spikelets awned 32
 31b. Spikelets not awned 34
- 32a. Awns trifid2. **Aristida**

- 32b. Awns simple 33
- 33a. Florets similar11. **Cynodon**
- 33b. Florets dissimilar 20. **Enteropogon**
- 34a. Inflorescence in panicles or racemes35
- 34b. Inflorescence solitary or digitate or in subdigitate spikes 36
- 35a. Inflorescence in panicles21. **Eragrostis**
- 35b. Inflorescence in racemes23. **Hackelochloa**
- 36a. Lemmas aristate13. **Dactyloctenium**
- 36b. Lemmas not aristate 19. **Eleusine**

1. **Apluda** L.

Apluda mutica L., Sp. Pl.82. 1753; Bor, Grasses Burma, Ceylon, India & Pakistan: 93. 1960; P.C. Pant, Fl. Corbett Natl. Park: 169. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 183. 1989. *A. varia* Hack. in A. DC. & C. DC., Monogr. Phan. 6: 196. 1889; Hook.f., Fl. Brit. India 7: 150. 1896. *A. aristata* L., Amoen. Acad. 4: 303. 1756.

Herbs, annuals or perennials, to 2 m high; culms creeping or erect. Leaves 7.5–30 x 0.4–1.3 cm, elliptic-lanceolate or linear-lanceolate, attenuate at apex, petioled. Inflorescence of interrupted panicles, to 30 cm long; sessile spikelets 3–7 mm long, compressed, awned. Lower glumes 5–7 mm long, lanceolate, shortly bifid, many nerved. Upper glume boat-shaped, beaked. Lower lemma male, oblong, trinerved; upper bisexual, deeply bifid.

Flowering & Fruiting: October–January.

Occasional on gravelley soil, along stream near deciduous forests.

Distribution: India (almost throughout the country), Afghanistan, SW Asia, Australia, Bhutan, Cambodia, China, Indian Ocean Islands, Indonesia, Japan, Laos, Madagascar, Malaysia, Myanmar, Nepal, New Guinea, Pacific Islands, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Jorhatty, R. Manikandan 124892 (BSD).

2. **Aristida** L.

Aristida cyanantha Nees ex Steud., Syn. Pl. Glum. 1: 141. 1854; Hook.f., Fl. Brit. India 7: 225. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 407. 1960; P.C. Pant, Fl. Corbett Natl. Park: 169. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 183. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 258. 2007.

Herbs, densely tufted, robust, perennial, to 2 m high; culms erect, with rhizomatous roots. Leaf-blades linear, to 35 x 0.5 cm, flat, soon becoming inrolled. Inflorescence of very loose and open panicles, branches capillary; spikelets purplish, becoming straw-coloured. Glumes unequal, narrowly lanceolate, scaberulous, bifid, with awn to 5 mm long; lemma equalling or shorter than upper glume, terete, convolute, smooth, slightly narrowed, awn without articulation, callus narrowly oblong, acute.

Flowering & Fruiting: May–September.

Occasional in open grassy fields near deciduous forests.

Distribution: India (Himalaya, Northwest India), Afghanistan, Nepal, Pakistan.

Specimens examined: Rathuadhab, R. *Manikandan* 124816 (BSD); Samir Sinha (2001).

3. *Arthraxon* P. Beauv.

Arthraxon lancifolius (Trin.) Hochst., Flora 39: 188. 1856; Bor, Grasses Burma, Ceylon, India & Pakistan 100. 1960; Welzen, Blumea 27: 288. 1981; P.C. Pant, Fl. Corbett Natl. Park: 169. 1986; S.K. Jain, J. Indian Bot. Soc. 51: 173, f. 7. 1972; Karthik. & al., Fl. Ind. Enum. Monocot.: 185. 1989. *Andropogon lancifolius* Trin., Mem. Acad. Sci. Petersb. 6, 2: 271. 1832. *Arthraxon microphyllus sensu* Hook.f., Fl. Brit. India 7: 147. 1896 *p.p. non* (Trin.) Hochst., 1856.

Herbs, perennials, to 80 cm high; culms stoloniferous, geniculate. Leaves 1.2–5 x 0.2–0.7 cm, lanceolate, acuminate at apex, rounded at base, ciliate; ligules thinly membranous. Inflorescence of 2–4 racemes, digitate, 2–5 cm long, densely ciliate at joints; sessile spikelets lanceolate; lower glumes 7-nerved, echinate along margins; upper glume trinerved, margins hyaline, reticately ciliate; pedicelled spikelets lanceolate; lower glume scabrid. Lower lemma trinerved, glabrous. Grains c 3 mm long, terete.

Flowering & Fruiting: September–January.

Fairly common in open grass fields.

Distribution: India (almost throughout the country), Africa, SW Asia, Bhutan, China, Indonesia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Specimens examined: Vatanwasa-Rathuadhab, R. *Manikandan* 122327 (BSD); Samir Sinha (2001).

4. *Arundinella* Raddi

- 1a. Leaf base cordate; ligules ovate 1. *A. nepalensis*
 1b. Leaf base rounded; ligules truncate 2. *A. pumila*

1. ***Arundinella nepalensis*** Trin., Gram. Panic.: 62. 1826; Bor, Grasses Burma, Ceylon, India & Pakistan: 423. 1960; P.C. Pant, Fl. Corbett Natl. Park: 169. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 186. 1989. *A. brasiliensis sensu* Hook.f., Fl. Brit. India 7: 73. 1896 *non* Raddi, 1823.

Herbs, perennials, tufted, to 90 cm high; culms erect. Leaves to 20 x 1.1 cm, linear-lanceolate, shallowly cordate at base; sheaths tubercled based hairy; ligules ovate, membranous. Inflorescence of panicles oblong, densely speculate; spikelets 3–4 mm long, elliptic-lanceolate. Glumes 3–4 mm long, ovate-acuminate, tri-nerved. Lower lemma oblong-ovate, awned; palea oblong.

Flowering & Fruiting: October–November.

Occasional open grassy fields and hill thickets.

Distribution: India (almost throughout the country), Africa, Australia, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam.

Specimens examined: Adnala area, R. *Manikandan* 122465, 124818 (BSD); Samir Sinha (2001).

2. ***Arundinella pumila*** (Hochst. ex A. Rich.) Steud., Syn. Pl. Glumac. 1: 114. 1854; Bor, Kew Bull. 1955: 402. 1955 & Grasses Burma, Ceylon, India & Pakistan: 423. 1960; P.C. Pant, Fl. Corbett Natl. Park: 170. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 187. 1989. *Acratherum pumilus* Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 414, t. 100. 1851. *Arundinella tenella* Nees ex Steud., *l.c.* 115; Hook.f., Fl. Brit. India 7: 71. 1896.

Herbs, annuals, tufted, to 65 cm high; culms erect, slender. Leaves 6.5–20 × 0.4–1.5 cm, linear-lanceolate, acuminate at apex, rounded at base; sheaths compressed; ligules truncate, membranous. Inflorescence of panicles pyramidal, effuse; spikelets 1–2 mm long, elliptic. Glumes 1–2 mm long, ovate-lanceolate. Lower lemma elliptic, awned; palea oblong, delicate, hyaline. Grains subellipsoid.

Flowering & Fruiting: September–December.

Fairly common in grassy fields.

Distribution: India (North & South India), tropical Africa and Asia.

Specimens examined: Rathuadhab, R. *Manikandan* 122426, 122473 (BSD); Samir Sinha (2001).

Notes: It is easily identified by its very slender culms, leaves and smaller spikelets.

5. *Arundo* L.

Arundo donax L., Sp. Pl.: 81. 1753; Duthie, Fodder Grasses 60. 1888; Hook.f., Fl. Brit. India 7: 302. 1896; Blatter & McCann, Bombay Grasses: 204. 1935; Bor, Grasses Burma, Ceylon, India & Pakistan 413. 1960; P.C. Pant, Fl. Corbett Natl. Park: 170. 1986; Karthik. & al., Fl. Ind. Enum. Monocot. 187. 1989; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 259. 2007. *A. bengalensis* Retz., Observ. Bot. 5: 20. 1799. *A. bifaria* Retz., l.c. 4: 21. 1786. Nar, Nara

Herbs, perennial, to 2 m high; culms erect, with woody, creeping rhizomes. Leaves conspicuously distichous, linear-lanceolate, long attenuate at apex, rounded or cordate at base, glabrous. Inflorescence of panicles. Spikelets with subequal glumes; lemmas lanceolate, 3–5-nerved, hairy.

Flowering & Fruiting: June–December.

Fairly common along streams and in sandy ravines.

Distribution: India (almost throughout the country), Afghanistan, Africa, Asia, Bhutan, Cambodia, China, Europe, Indonesia, Japan, Kazakhstan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; elsewhere.

Specimens examined: Rathuadhab, R. *Manikandan* 122544, 122474 (BSD); Vatanvasa, H.C. *Pande* 221865; Samir Sinha (2001).

6. *Capillipedium* Stapf

Capillipedium assimile (Steud.) A. Camus in Lecomte, Fl. Gen. Indo-Chine. 7: 314. 1922; Blatter & McCann, Bombay Grasses: 80. 1935; Bor, Grasses Burma, Ceylon, India & Pakistan: 110. 1960; Bor in Rech.f., Fl. Iran. 70: 536. 1970. *Andropogon assimilis* Steud., Zoll., Syst. Verz.: 58. 1854 & Syn. Pl. Glum. 1: 397. 1854; Hook.f., Fl. Brit. India 7: 179. 1896. *A. glaucopsis* Steud., Syn. Pl. Glum. 1: 397. 1854. *A. subrepens* Steud., l.c. *A. montanus* Hack in DC., Monogr. Phan. 6: 490. 1889, non Roxb. 1820. *Capillipedium glaucopsis* (Steud.) Stapf in Hook., Icon. Pl. 31: t. 3085. 1922. *C. subrepens* (Steud.) Henr., Blumea. 3: 463. 1940.

Herbs, suffrutescent, perennial, erect or straggling, to 2.5 m high; culms slender or stout, often with a decumbent base. Leaf-blades to 20 × 0.8 cm, often conspicuously narrowed at base. Inflorescence racemes with 2–6 sessile spikelets, rarely reduced to 1 sessile and 2 pedicelled spikelets. Sessile spikelet narrowly oblong, scabrid or pubescent, blunt; lower glume concave or flat on the back, with 2–4 intercarinal nerves, awned. Pedicelled spikelet to 4.5 mm long, lanceolate.

Flowering & Fruiting: October–January.

Grows in open grassy fields.

Distribution: India (Shiwalikh Himalaya, N. India), China, Japan, Java, Myanmar, Pakistan, Thailand.

Notes: Included on the authority of Samir Sinha (2001).

7. *Chionachne* R. Br.

Chionachne koenigii (Spreng) Thwaites, Enum. Pl. Zeyl.: 357. 1864; Bor, Grasses Burma, Ceylon, India & Pakistan 262. 1960; P.C. Pant, Fl. Corbett Natl. Park: 171. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 196. 1989. *Coix koenigii* Spreng., Syst. Veg. (ed. 16) 1: 228. 1825 (1824). *Coix barbata* Roxb., Fl. Ind. (Ed. Carey) 3: 569. 1832. *Polytoca barbata* (Roxb.) Stapf in Hook.f., Fl. Brit. India 7: 102. 1896.

Herbs, perennials, tufted, to 2.5 m high; culms erect, nodes densely bearded. Leaves to 55 × 1.5 cm, linear, subcordate at base, midrib prominent, scabrid; sheaths ciliate at mouth; ligules row of hairs. Inflorescence of interrupted panicles, much branched with clusters of racemes, subtended by leaf like spathes. Racemes with a lower female spikelet and terminal male spikelet solitary or binate. Glumes 6–8 mm long, unequal. Lower lemma lanceolate, delicate; palea 2-nerved. Female spikelets ivory-white.

Flowering & Fruiting: November.

Very rare in shady places.

Distribution: India (Himalayas, N.E. India), Australia, Burma, Celebes, Java, Nepal, Pakistan, Sri Lanka.

Notes: Included on the authority of Samir Sinha (2001).

8. *Chrysopogon* Trin., *nom. cons.*

Chrysopogon serrulatus Trin., Mem. Acad. Sci. Petersb., ser. 6, 2: 318. 1832 & Sp. Gram. t. 331. 1836; Bor, Grasses Burma, Ceylon, India & Pakistan: 115. 1960; P.C. Pant, Fl. Corbett Natl. Park: 172. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 197. 1989; Uniyal & al., Fl. Uttarakhand Check. 361. 2007. *Andropogon monticola* var. *trinii* (Steud.) Hook.f., Fl. Brit. India 7: 193. 1896.

Herbs, perennial, to 90 cm high; culms erect, robust. Leaf-blades mostly cauline, to 30 × 0.5 cm, bluntly acute to acuminate, glabrous or few tubercle-based hairs. Inflorescence of panicle, ovate, to 12 cm long, with delicate capillary branches, fulvously bearded at tip; sessile spikelet narrowly oblong. Glume lower laterally compressed to rounded keel, hispidulous at tip; upper glume glabrous or few white hairs, awned; upper lemma minutely bidentate, awned. Pedicelled spikelets to 8 mm long, lower glume awned; pedicels fulvously villous.

Flowering & Fruiting: June–September.

Rare in open areas and along roadsides near deciduous forests.

Distribution: India (Himalaya, Kashmir, N. India, Punjab), Afghanistan, Africa, Madagascar, Myanmar, Nepal, Pakistan.

Specimens examined: Rathuadhab, R. *Manikandan* 124817 (BSD); Samir Sinha (2001).

9. *Coix* L.

Coix lacryma-jobi L., Sp. Pl.: 972. 1753; Hook.f., Fl. Brit. India 7: 100. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan 264. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 119. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 288, f. 296 c–e. 1996.

Herbs, annuals, tufted, to 1 m high; culms erect. Leaves 8.5–40 × 0.8–3.5 cm, linear-lanceolate, acuminate at apex, cordate at base; sheaths tubercle-based hairy; ligules ovate. Inflorescence racemes, flexuous, seated on a long peduncle. Males spikelets elliptic-lanceolate. Lower glume narrowly winged along margins. Female spikelets globose, shining, white to bluish-grey. Lower glumes ovate-oblong; palea delicate.

Flowering & Fruiting: August–November.

Infrequent in marshy habitats.

Distribution: India (almost throughout the country), Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: It can easily be recognized by its female spikelets enclosed in a modified leaf sheaths.

10. *Cymbopogon* Spreng.

- 1a. Leaves linear- lanceolate, narrowed at base 1. *C. citratus*
 1b. Leaves linear, rounded at base 2. *C. flexuosus*

1. ***Cymbopogon citratus*** (DC.) Stapf, Bull. Misc. Inform. 1906: 322, 357. 1906; Bor, Grasses Burma, Ceylon, India & Pakistan: 126. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 201. 1989. *Andropogon citratus* DC., Cat. Pl. Horti. Monsp.: 78. 1813. *Lemon Khass*

Herbs, perennials, to 2 m high; culms erect. Leaves 12–60 × 0.7–1.5 cm, linear-lanceolate, narrowed at base, glaucous; ligule membranous. Inflorescence of panicles, lax, densely villous; sessile spikelets 5–6 mm long, linear-lanceolate. Glumes lanceolate, 3–5-nerved, ciliate. Pedicelled spikelets linear-lanceolate. Lower lemma lanceolate, delicate, 2-nerved, ciliate along margins.

Flowering & Fruiting: November–January.

Generally cultivated for its aromatic oil and found as an escape.

Distribution: India (almost throughout the country), tropical Asia, elsewhere.

Uses: Leaf blades and sheaths have strong smell of lemon, cultivated on a large scale for the lemon-scented oil extracted from its leaves. The oil is used for both medicinal and culinary purposes.

2. ***Cymbopogon flexuosus*** (Nees *ex* Steud.) J.F. Watson, Gaz. N.W. Prov. India: 392. 1882; Bor, Grasses Burma, Ceylon, India & Pakistan: 127. 1960; Soenarko, Reinwardtia 9: 366, f. 39B. 1977; P.C. Pant, Fl. Corbett Natl. Park: 172. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 201. 1989. *Andropogon flexuosus* Nees *ex* Steud., Syn. Pl. Glumac. 1: 388. 1854. *A. nardus* subsp. *flexuosus* (Nees *ex* Steud.) Hack. in A. DC. & C. DC., Monogr. Phan. 6: 603. 1889; Hook.f., Fl. Brit. India 7: 207. 1896. *Cymbopogon travancorensis* Bor, J. Bombay Nat. Hist. Soc. 52: 174. 1954 & *l.c.* 132.

Herbs, perennials, tufted, to 3 m high; culms erect, robust. Leaves 12–60 × 1–2 cm, linear, rounded at base; ligules ovate, membranous. Inflorescence of panicles, lax, densely villous; sessile spikelets to 5 mm long, elliptic-lanceolate. Lower glume subcoriaceous, winged towards apex; upper ciliate along margins. Lower lemma deeply notched, awned, brownish. Pedicelled spikelets lanceolate, densely villous. Glumes ciliate; upper lemma, elliptic-lanceolate, delicate.

Flowering & Fruiting: September–December.

Rare in grassy fields and marshy places.

Distribution: India (almost throughout the country), China, Indonesia, Malaysia, Myanmar, Nepal, Thailand.

Specimens examined: Rathuadhab, R. *Manikandan* 122418, 122424 (BSD).

Notes: It can be easily recognized by its reddish culms and inflorescence.

11. *Cynodon* Rich., *nom. cons.*

Cynodon dactylon (L.) Pers., Syn. Pl. 1: 85. 1805; Hook.f., Fl. Brit. India 7: 288. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 469, f. 52. 1960; P.C. Pant, Fl. Corbett Natl. Park: 172. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 203. 1989. *Panicum dactylon* L., Sp. Pl.: 58. 1753.

Herbs, perennials, stoloniferous, to 50 cm high; culms slender, creeping, with slender rhizomes. Leaves 0.5–8.5 × 0.1–0.5 cm, linear-lanceolate, acuminate at apex, glaucous, sparsely hairy; sheaths keeled, ligules fimbriate. Inflorescence racemes 3–6, digitate. Spikelets 2–3 mm long. Glumes lanceolate, 1-nerved. Lemmas boat-shaped, silky pubescent along keels; palea boat-shaped.

Flowering & Fruiting: Throughout the year.

Occasional in grass lands along roadsides, and near the edge of forests.

Distribution: India (almost throughout the country), tropical and warm-temperate regions of the world.

Specimens examined: Vatanvasa, H.C. Pande 220803 (LWG); Samir Sinha (2001).

12. *Cyrtococcum* Stapf

Cyrtococcum accrescens (Trin.) Stapf, Hooker's Icon. Pl. 31(4): 2. t. 3096. 1922; Bor, Grasses Burma, Ceylon, India & Pakistan 291. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 203. 1989. P.C. Pant, Fl. Corbett Natl. Park: 173. 1986; Uniyal & al., Fl. of Uttarakhand Check.: 363. 2007. *Panicum dactylon* L., Sp. Pl.: 58. 1753. *Panicum accrescens* Trin., Sp. Gram. 1: t. 88. 1828.

Herbs, annuals, to 60 cm high; culm slender, branched. Leaf blade lanceolate or linear-lanceolate, appressed pubescent, to 15 × 2 cm; sheath margins ciliate, papillose, pilose all over, ligule membranaceous. Inflorescence of panicle open, diffuse at maturity, branches capillary. Spikelets to 1.3 mm long, compressed, minutely hispidulous on glumes and lower lemma; glumes 3-veined; lower glume half as long as spikelet; upper glume strongly gibbous, slightly shorter than spikelet; lower lemma as long as upper lemma, upper lemma indurate, minutely longitudinally striate, with a small crest on gibbous side.

Flowering & Fruiting: March–September.

Occasionally occurs as undergrowth in moist deciduous forests.

Distribution: India (C, N & South India), tropics of southeastern Asia and China.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122372, 122460 (BSD); Samir Sinha (2001).

13. *Dactyloctenium* Willd.

Dactyloctenium aegyptium (L.) Willd., Enum. Pl. 1029. 1809; Bor, Grasses Burma, Ceylon, India & Pakistan: 489. 1960; P.C. Pant, Fl. Corbett Natl. Park: 173. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 204. 1989. *Cynosurus aegyptius* L., Sp. Pl.: 72. 1753. *Eleusine aegyptius* (L.) Desf., Fl. Atlant. 1: 85. 1798; Hook.f., Fl. Brit. India 7: 295. 1896.

Herbs, annuals, to 60 cm high; culms creeping or ascending, rooting at nodes. Leaves to 25×0.6 cm, lanceolate or linear, acuminate at apex, subcordate at base, sparsely hispid; sheaths keeled; ligules fimbriate. Inflorescence of spikes digitate. Spikelets 2–4 mm long, ovate-oblong. Glumes subequal, awned. Lemmas ovate, aristate, keeled; palea hyaline. Grains ≈ 1 mm long, obovate or triangular, rugose.

Flowering & Fruiting: October–December.

Occasional along road sides and open grass lands.

Distribution: India (almost throughout the country), America, Europe, tropical and warm-temperate regions of the Old World.

Notes: It can easily be known by its star-like radiating spikes and included on the authority of Samir Sinha (2001).

14. *Dendrocalamus* Nees

Dendrocalamus strictus (Roxb.) Nees, *Linnaea* 9: 476. 1835; Gamble in Hook.f., *Fl. Brit. India* 7: 404. 1896 & *Ann. Roy. Bot. Gard. (Calcutta)* 7: 78. 1896; P.C. Pant, *Fl. Corbett Natl. Park*: 173. 1986; Karthik. & al., *Fl. Ind. Enum. Monocot.*: 276. 1989; Bennet & R.C. Gaur, *Thirty seven Bamb. India*: 61. 1990; D.N. Tewari, *Monogr. Bamboo*: 77. 1992; K.K. Seethal. & M.S.M. Kumar, *Bamb. India*: 129, f. 40. 1998. *Bambos stricta* Roxb., *Pl. Coromandel* 1: 58, t. 80. 1798.

Trees; culms to 20 m high, erect, densely branched from the woody rootstock. Leaves $9\text{--}20 \times 0.5\text{--}2.8$ cm, linear-lanceolate, acuminate at apex, cordate at base; sheaths large, auricled, brownish hairy. Inflorescence of heads, in elongate spikes. Spikelets 0.5–1 cm long, clustered, spinescent, dense. Glumes 2–3 mm long, ovate, hairy. Lemmas 2 to 3, ending in a sharp spine, clothed by tuft hairs; palea ovate, ciliate.

Flowering & Fruiting: December.

Fairly common in deciduous forests.

Distribution: India (almost throughout the country), Burma, China, Java, Nepal, Pakistan, Singapore.

Specimens observed: Rathudhab near Fores Rest House, but due to inaccessibility couldnot collected.

15. *Desmostachya* Stapf

Desmostachya bipinnata (L.) Stapf in *Thiselt.-Dyer, Fl. Cap.* 7: 632. 1900; Bor, *Grasses Burma, Ceylon, India & Pakistan*: 491. 1960; P.C. Pant, *Fl. Corbett Natl. Park*: 173. 1986; Karthik. & al., *Fl. Ind. Enum. Monocot.* 204. 1989; Uniyal & al., *Fl. of Uttarakhand Check.*: 363. 2007. *Eragrostis cynosuroides* (Retz.) P. Beauv., *Ess. Agrost.*: 162. 1812. Boiss., *Fl. Or.* 5: 583. 1884; Duthie, *Fodder Grasses*: 62. 1888; Hook.f., *Fl. Brit. India* 7: 324. 1896.

Herbs, perennial, to 1.2 m high; culms stout, with rhizomatous roots. Leafblade to 65×1.2 cm, when unrolled; lower leaf-sheaths leathery, often densely flabellate towards base of the culm. Inflorescence up to 60 cm long spikes, clustered or spaced. Spikelets 3–17-flowered, narrowly ovate to linear-oblong, 3–10 mm long; lower glume to 1.5 mm long, upper glume to 2 mm long; lemmas straw-coloured or suffused with purple.

Flowering & Fruiting: July–November.

Common in open grassy fields.

Distribution: India (Himalaya), Africa, Middle East to Indo-China, Pakistan.

Specimens examined: Rathuadhab, R. *Manikandan* 125743, 125750, 122470 (BSD).

16. **Dichanthium** Willemet

- 1a. Racemes upto 10 2
 1b. Racemes more than 10 2. *D. intermedium*
- 2a. Stems c. 15 cm high, sessile spikelets ovate 1. *D. annulatum*
 2b. Stems c. 70 cm high, sessile spikelets oblong- lanceolate 3. *D. pertusum*

Notes: Intergeneric hybridization has been found to occur and fertile hybrids have been produced between the genera *Dichanthium* Willd., *Capillipedium* Stapf, *Indochloa* Bor p.p., *Eremopogon* Stapf and *Bothriochloa* Kuntze. Hence, de Wet & Harlan (Amer. J. Bot. 53: 97. 1966 & Taxon 19: 339–340. 1970) have merged them. The generic epithet, *Dichanthium* is applicable to the composite genus as it was the earliest.

1. ***Dichanthium annulatum*** (Forssk.) Stapf in Oliver, Fl. Trop. Afr. 9 (Ed. Prain): 178. 1917; Bor, Grasses Burma, Ceylon, India & Pakistan: 133. 1960; Deshp., Fasc. Fl. India 15: 5. 1984; P.C. Pant, Fl. Corbett Natl. Park: 173. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 205. 1989. *Andropogon annulatus* Forssk., Fl. Aegypt.-Arab.: 173. 1775; Hook.f., Fl. Brit. India 7: 196. 1896. *Dichanthium nodosum* Willemet, Ann. Bot. (Usteri) 18: 11. 1796, *nom. illeg. superfl.* *Andropogon nodosus* Nash, Britton, N. Amer. Fl. 17(2): 122. 1912.

Herbs, perennials, to 1.5 m high; culms erect or geniculate, densely villous at nodes. Leaves 1.5–20 × 0.2–0.5 cm, linear-lanceolate; ligules ovate, membranous. Inflorescence of racemes 3–10, each 2–8 cm long. Sessile spikelets 2.5–4 mm long, ovate; lower glume oblong, 7–9-nerved, villous. Pedicelled spikelets oblong, unawned, lower glume densely bristly-hairy, many-nerved.

Flowering & Fruiting: October–February.

Occasional in open grass lands and along roadsides.

Distribution: India (Himalayas, C, South India), Africa, China, Indonesia, Malaysia, Myanmar, Nepal, Pacific Islands, Pakistan, Philippines; introduced in America and Australia.

Specimens examined: Rathuadhab, R. *Manikandan* 125703, 125751 (BSD); Samir Sinha (2001).

Notes: It can easily be known by presence of annular hairs at nodes.

2. ***Dichanthium intermedium*** (R. Br) De Wet & Harlan, Am. J. Bot. 53: 97. 1966. *Bothriochloa intermedia* var. *punctata* (Roxb.) Keng, Clay. Gram. Prim. Sin.: 244. 1957; Bor, Grasses Burma, Ceylon, India & Pakistan: 134. 1960; Hook.f., Fl. Brit. India 7: 196. 1896; P.C. Pant, Fl. Corbett Natl. Park: 170. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 205. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 363. 2007. *Andropogon punctatus* Roxb., Fl. Ind. 1: 268. 1820.

Herbs, perennial, tufted, to 1.5 m high; culms erect from a shortly rhizomatous base, often robust. Leaf-blades to 55 × 1.2 cm, linear. Inflorescence of racemes, numerous, borne loosely or densely in irregular whorls upon simple or branched peduncles; racemes the lowest shorter than the central axis, pubescent. Sessile spikelet narrowly elliptic, 3–4 mm long; lower glume chartaceous, sparse hairy below the middle, usually not glossy, with or without a pit, awned. Pedicelled spikelet glabrous, with 0–3 pits.

Flowering & Fruiting: October–February.

Occasional along river banks and open grasslands.

Distribution: India (Himalaya), Pakistan; Old World tropics.

Specimens examined: Way to Adnala, R. *Manikandan* 125730 (BSD); Samir Sinha (2001).

3. ***Dichanthium pertusum*** (L.) W.D. Clayton, Kew Bull. 32: 4. 1977; Deshp., Fasc. Fl. India 15: 22. 1984. *Holcus pertusus* L., Mant. Pl. 2: 301. 1771. *Andropogon pertusus* (L.) Willd., Sp. Pl. ed. 4, 4(2): 922. 1806; Hook.f., Fl. Brit. India 7: 173. 1896. *Amphilophis pertusa* (L.) Stapf, Agric. News W. Indies 15: 179. 1916. *Bothriochloa pertusa* (L.) A. Camus, Ann. Soc. Linn. Lyon, 1930. n.s. 76: 164. 1931; Bor, Grasses Burma, Ceylon, India & Pakistan: 109. 1960; P.C. Pant, Fl. Corbett Natl. Park: 170. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 189. 1989.

Herb, perennials, tufted, to 70 cm high; culms erect or ascending, bearded at nodes. Leaves 9.5–20 × 0.3–0.6 cm, linear-lanceolate, sparsely pubescent. Inflorescence of racemes 2–10, each 2–5 cm long, slender, silky. Sessile spikelets oblong-lanceolate. Glumes equal, lower 5–9-nerved; upper trinerved. Upper lemma reduced to linear stripe, awned. Pedicelled spikelets male or neuter. Glumes subequal. Lower lemma linear.

Flowering & Fruiting: December–March.

Occasional in open grass lands and along hedges.

Distribution: India (almost throughout the country), tropical Africa, Arabia eastwards, Southeast Asia, Pakistan.

Notes: This can easily be distinguished by its hairy racemes and lower glumes with 1 or 2 deep circular pits and included on the authority of Samir Sinha (2001).

17. ***Digitaria*** Haller, *nom. cons.*

- 1a. Lower glume present2. *D. ciliaris*
- 1b. Lower glume absent or very obscure 2
- 2a. Leaves elliptic-lanceolate; racemes 2 or 33. *D. longiflora*
- 2b. Leaves linear- lanceolate; racemes 3 to 15 3
- 3a. Racemes 3–8; spikelets elliptic-oblong1. *D. abludens*
- 3b. Racemes 3–15; spikelets lanceolate to elliptic-lanceolate4. *D. setigera*

1. ***Digitaria abludens*** (Roem. & Schult.) Veldkamp, Blumea 21: 53. 1973; Karthik. & al., Fl. Ind. Enum. Monocot.: 207. 1989. *Panicum abludens* Roem. & Schult., Syst. Veg. ed. 15 bis. 2: 457. 1817. *Digitaria pedicellaria* (Trin. ex Hook.f.) Prain, Bengal Pl.: 1182. 1903 (2: 890. 1963 (Repr.)). *Paspalum granulare* Trin., Neue Entdeck. Pflanzenk.: 2: 47. 1820. *P. pedicellare* Trin. ex Hook.f., Fl. Brit. India 7: 19. 1896. *Digitaria granularis* (Trin.) Henrard, Monogr. Digitaria: 302. 1950; Bor, Grasses Burma, Ceylon, India & Pakistan: 301. 1960.

Herb, annuals, tufted, to 1 m high; culms erect or geniculate. Leaves 5–10 × 0.3–0.5 cm, linear, acuminate at apex, rounded at base, scabrid; sheaths glabrous; ligules truncate, fimbriate. Inflorescence of racemes 3–8, each 3–12 cm long, lax, with secondary branches; rachis triquetrous, scabrid. Spikelets elliptic-oblong. Lower glume absent. Lower lemma ovate, apiculate at apex, yellowish-brown; palea elliptic, 2-nerved.

Flowering & Fruiting: November.

Occasional in open grassy fields.

Distribution: India (almost throughout the country), Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand.

Specimens examined: Rathuadhab, R. *Manikandan* 124837, 122374 (BSD).

Notes: It can easily be known by its loosely arranged spikelets and often branched, compound racemes.

2. ***Digitaria ciliaris*** (Retz.) Koel, Descr. Gram.: 27. 1802; Bor, Towns., Guest & Al-Rawi, Fl. Iraq 9: 478. 1968; Uniyal & al., Fl. of Uttarakhand Check.: 363. 2007. *D. biformis* Willd., Enum. Pl.: 92. 1809; P.C. Pant, Fl. Corbett Natl. Park: 174. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 207. 1989. *D. adscendens* (Kunth) Henr., Blumea. 1: 92. 1934. Bor, Fl. Assam 5: 204. 1940; Bor, Grasses Burma, Ceylon, India & Pakistan: 298. 1960.

Herb, annual, to 1 m high; culms decumbent, geniculately ascending. Leaf-blades to 25×1 cm, broadly linear. Inflorescence digitate, composed of 2–12 racemes; racemes stiff, 6–22 cm long, sometimes adorned with sparse long white hairs, spikelets binate, overlapping on winged rhachis with triquetrous midrib; scabrid, obtuse or slightly expanded at tip. Spikelets narrowly elliptic, to 3.5 mm long, sharply acute; lower glume distinct, triangular; upper glume at least half as long as the spikelet, typically two-thirds to three-quarters as long, 3-nerved; lower lemma as long as spikelet, 7-nerved, appressed puberulous, silky pubescent. Fruit ellipsoid, grey to light brown.

Flowering & Fruiting: July–October.

Common in open grassy fields and along the roadsides.

Distribution: India (almost throughout the country), Pakistan; throughout much of the tropics.

Specimens examined: Rathuadhab, R. *Manikandan* 122332 (BSD).

3. ***Digitaria longiflora*** (Retz.) Pers., Syn. Pl. 1: 85. 1805; Bor, Grasses Burma, Ceylon, India & Pakistan: 302. 1960; Veldkamp, Blumea 21: 66. 1973; P.C. Pant, Fl. Corbett Natl. Park: 174. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 208. 1989. *Paspalum longiflorum* Retz., Observ. Bot. 4: 15. 1786; Hook.f., Fl. Brit. India 7: 17. 1896 *p.p.* *P. preslii* Kunth, Enum. Pl. 1: 47. 1833. *Digitaria preslii* (Kunth) Henrard, Monogr. Digitaria: 589. 1950; Bor, *l.c.* 304.

Herb, annuals or perennials, to 50 cm high; culms slender, creeping or geniculate, rooting at nodes. Leaves $3.6\text{--}10 \times 0.2\text{--}0.9$ cm, elliptic-lanceolate, subcordate at base, acute at apex; sheaths keeled; ligules ovate, membranous. Inflorescence racemes 2 or 3, digitate, 2–10 cm long. Spikelets ovate-elliptic, solitary, greenish-yellow. Lower lemma acute, yellow to brownish in fruits.

Flowering & Fruiting: September–December.

Occasional in grassy fields.

Distribution: India (almost throughout the country), America, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; Old World tropics.

Specimens examined: Rathuadhab, R. *Manikandan* 125740, 122304 (BSD).

Notes: It is quite distinct by its slender, creeping culms, smaller leaves and pale fruits and included on the authority of Samir Sinha (2001).

4. ***Digitaria setigera*** Roth ex Roem. & Schult., Syst. Veg. 2: 474. 1817; Bor, Grasses Burma, Ceylon, India & Pakistan: 305. 1960; P.C. Pant, Fl. Corbett Natl. Park: 174. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 209. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 363. 2007. *Digitaria microbachne* (Presl) Henr.,

Med. Rijksherb. Leiden. 61: 13. 1930. *Paspalum sanguinale* var. *pruriens* (Trin.) Hook.f., Fl. Brit. India 7: 15. 1896.

Herb, annual, to 80 cm high; culms geniculately ascending from decumbent base. Leaf-blades broadly linear to lanceolate, $3-25 \times 0.3-1.2$ cm. Inflorescence composed of 3–15 racemes arranged on a common axis or digitate racemes to 15 cm long; spikelets binate and overlapping by two-thirds their length on a narrowly winged rhachis with triquetrous midrib. Spikelets lanceolate to elliptic-lanceolate, lower glume absent or very obscure; upper glume as long as the spikelet, oblong or triangular; lower lemma as long as the spikelet, 7-nerved, appressedly or silky pubescent. Fruit lanceolate, grey to yellowish-brown.

Flowering & Fruiting: September.

Occasional on hilly slopes and along forest edges.

Distribution: India (almost throughout the country), Asia to the Pacific Islands, Mauritius, Pakistan, Tanzania.

Specimens examined: Rathuadhab, R. Manikandan 124831 (BSD).

18. *Echinochloa* P. Beauv.

Echinochloa colona (L.) Link, Hort. Berol. 2: 209. 1833; Bor, Grasses Burma, Ceylon, India & Pakistan: 308, f. 34. 1960; P.C. Pant, Fl. Corbett Natl. Park: 174. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 211. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 290, f. 298 a–c. 1996. *Panicum colonum* L., Syst. Nat. ed. 10. 2: 870. 1759; Hook.f., Fl. Brit. India 7: 32. 1896.

Herb, annuals, tufted, to 1 m high; culms erect, glabrous at nodes. Leaves $2.8-28 \times 0.2-0.8$ cm, linear, subcordate at base, acuminate at apex, undulate; sheaths keeled; ligules absent. Inflorescence panicles spiciform, 2–15 cm long; spikelets ovate-lanceolate, hispid, yellowish-purple. Lower lemma ovate-elliptic, chartaceous; palea 2-nerved, mucronate at apex.

Flowering & Fruiting: August–March.

Frequent as weed in open situations and fallow fields.

Distribution: India (almost throughout the country), warm regions throughout the world.

Uses: A good fodder grass.

Notes: Included on the authority of Samir Sinha (2001).

19. *Eleusine* Gaertn.

Eleusine indica (L.) Gaertn., Fruct. Sem. Pl. 1: 8. 1789; Hook.f., Fl. Brit. India 7: 293. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 493. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 212. 1989. *Cynosurus indicus* L., Sp. Pl.: 72. 1753.

Herb, annuals, tufted, to 80 cm high; culms erect. Leaves $6-36 \times 0.1-0.7$ cm, linear, subcordate at base, blunt at apex, often folded; sheaths keeled ligules truncate, membranous. Spikes digitate or saggitate. Spikelets ovate-oblong, 3–6-flowered. Lower glume oblong, keeled, trinerved; palea delicate, 2-nerved.

Flowering & Fruiting: Almost throughout the year.

Common in open grass lands and marshy places.

Distribution: India (almost throughout the country), tropics and subtropics of the world.

Notes: It is a good fodder and can be distinguished by its loosely arranged vatanvasaigitate spikes with unexposed grains.

20. *Enteropogon* Nees

Enteropogon dolichostachyos (Lag.) Keng ex Lazarides, Austral. J. Bot. Suppl. Ser. 5: 31. 1972. *Chloris dolichostachya* Lag., Gen. Sp. Pl.: 5. 1816; Bor, Grasses Burma, Ceylon, India & Pakistan: 466. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 197. 1989. *C. incompleta* Roth in Roem. & Schult., Syst. Veg. ed. 15 bis. 2: 607. 1817; Hook.f., Fl. Brit. India 7: 290. 1896.

Herb, perennials, to 1.5 m high; culms erect. Leaves 5–20 × 0.5–1 cm, linear, acuminate at apex, glabrous; sheaths to 6 mm long. Inflorescence panicles like spikes, 5–20 cm long. Spikelets 3–10, 4–6 mm long, slender. Glumes aristate, lower one smaller, linear-lanceolate. Fertile lemma lanceolate, awned; palea narrow, equal to lemma; sterile lemma linear, short awned.

Flowering & Fruiting: March–October.

Common as forest undergrowth near deciduous forests.

Distribution: India (almost throughout the country), Southeast Asia, N Australia, China, Pakistan.

Notes: It is quite distinct by its stout culms, long racemes with extremely longer awns and included on the authority of Samir Sinha (2001).

21. *Eragrostis* Wolf

- 1a. Florets disarticulating from above downward, falling together with the rachilla joints 2
- 1b. Florets disarticulating from below upward, usually leaving the rachilla entire 3
- 2a. Panicle linear; Spikelets 4–14-flowered, ovate-oblong 2. *E. japonica*
- 2b. Panicle elliptic or pyramidal; spikelets 4–8-flowered, oblong-ovate 3. *E. tenella*
- 3a. Spikelets ovate-oblong, 10–20-flowered 4. *E. unioloides*
- 3b. Spikelets filiform, 10–40-flowered 1. *E. atrovirens*

1. ***Eragrostis atrovirens*** (Desf.) Trin. ex Steud., Nomencl. Bot. ed. 2, 1: 562. 1840; Bor, Grasses Burma, Ceylon, India & Pakistan: 503. 1960; P.C. Pant, Fl. Corbett Natl. Park: 175. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 215. 1989. *Poa atrovirens* Desf., Fl. Atlant. 1: 73, t. 14. 1798.

Herb, perennials, tufted, to 1 m high; culms erect. Leaves 12–30 × 0.3–0.4 cm, flat, acuminate at apex, greyish-green. Inflorescence panicles spreading, ovoid-oblong. Spikelets 0.2–2 cm long, few to many-flowered, fascicled. Glumes subequal, ovate, acute. Lemmas elliptic-oblong, acute; palea caducous. Caryopsis c. 0.7 mm long, ellipsoid.

Flowering & Fruiting: August–December.

Occasional in marshy places.

Distribution: India (C & N India), tropical and subtropical regions of Africa, Asia.

Specimens examined: Rathuadhab, R. *Manikandan* 124838, 125753 (BSD); Samir Sinha (2001).

2. ***Eragrostis japonica*** (Thunb.) Trin., Mem. Acad. Sci. Petersb., ser. 6, 1: 405. 1830; P.C. Pant, Fl. Corbett Natl. Park: 175. 1986; Stapf in Hook.f., Fl. Brit. India 7: 314. 1896; Bor, Grasses Burma, Ceylon,

India & Pakistan: 506. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 215. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 364. 2007. *Poa japonica* Thunb., Fl. Japon: 51. 1784.

Herb, tufted, annual or short-lived perennial, to 1.5 m high; culms erect, robust. Leaf-blades flat, up to 30×5 cm wide; ligule membranous, truncate, fimbriate. Inflorescence panicle linear, branches ascending or spreading, lanceolate to narrowly ovate, in dense pseudo-whorls; spikelets pedicelled, appressed, spreading. Spikelets 4–14-flowered, ovate-oblong, rhachilla fragile; glumes narrowly ovate to broadly oblong-elliptic, subequal, acute to obtuse; lemmas broadly ovate, obtuse. Caryopsis ellipsoid, to 0.5 mm long.

Flowering & Fruiting: August–December.

Common in open grassy fields.

Distribution: India (almost throughout the country), Africa, Asia, Australia, Pakistan.

Specimens examined: Rathuadhab, R. *Manikandan* 122331 (BSD).

Notes: It is considered to be a good fodder for cattles.

3. ***Eragrostis tenella*** (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 2: 576. 1817; Hook.f., Fl. Brit. India 7: 315. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 513. 1960; P.C. Pant, Fl. Corbett Natl. Park: 175. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 216. 1989; Uniyal & al., Fl. of Uttarakhand Check.: 364. 2007. *Poa tenella* L., Sp. Pl. 1: 69. 1753.

Herb, delicate, tufted, annual, to 50 cm high; culms erect or geniculately ascending. Leaf-blades flat, to 9×0.4 cm, linear. Inflorescence panicle elliptic or pyramidal, open, hairy, branches spreading and bearing oblong yellowish glands. Spikelets 4–8-flowered, oblong-ovate, breaking up from the apex, rhachilla fragile. Glumes ovate to narrowly ovate, subequal, minute, acute; lemmas ovate-oblong, smooth or scaberulous, broadly obtuse; palea-keels ciliate with hairs, normally shorter than width. Caryopsis ellipsoid, to 0.5 mm long.

Flowering & Fruiting: March–September.

Grows in open grassy fields.

Distribution: India (almost throughout the country), Pakistan; throughout the tropics.

Notes: It is eaten by cattle both fresh and dry. The grain is said to be very nutritious and included on the authority of Samir Sinha (2001).

4. ***Eragrostis unioides*** (Retz.) Nees ex Steud., Syn. Pl. Glumac. 1: 264. 1854; Bor, Grasses Burma, Ceylon, India & Pakistan: 515. 1960; P.C. Pant, Fl. Corbett Natl. Park: 175. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 218. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 293, f. 301 a–b. 1996. *Poa unioides* Retz., Observ. Bot. 5: 19. 1789. *Eragrostis amabilis* auct. non Wight & Arn. ex Nees, 1838; Stapf in Hook.f., Fl. Brit. India 7: 317. 1896.

Herb, annuals or perennials, tufted, c. 80 cm high; culms erect or geniculate. Leaves $20\text{--}25 \times 0.1\text{--}0.8$ cm, linear-lanceolate, subcordate at base, ligules thin membranous. Inflorescence of panicles lax, broadly ovate, green or purplish. Spikelets ovate-oblong. Glumes 1-nerved, subequal. Lemmas trinerved. Palea c. 2 mm long, elliptic, keels scabrid. Grains c. 0.75 mm long, obovoid, reddish-brown.

Flowering & Fruiting: August–October.

Common in open grasslands.

Distribution: India (almost throughout the tropical regions of our country), W. Africa, tropical Asia.

Notes: It is quite distinct in having ovate, purplish spikelets and lax terminal panicles; it is included on the authority of Samir Sinha (2001).

22. *Eulalia* Kunth

Eulalia leschenaultiana (Decne.) Ohwi, Bull. Tokyo Sci. Mus. 18: 2. 1947; Bor, Grasses Burma, Ceylon, India & Pakistan: 156. 1960; P.C. Pant, Fl. Corbett Natl. Park: 176. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 221. 1989. *Andropogon leschenaultianus* Decne., Nouv. Ann. Mus. Hist. Nat. 3: 357. 1834. *A. aureofulvus* Steud., Syn. Pl. Glumac. 1: 373. 1854. *Eulalia cumingii* (Nees) A. Camus, Ann. Soc. Linn. Lyon, sér. 2, 68: 203–204. 1921. *Pollinia cumingii* Nees, Hooker's J. Bot. Kew Gard. Misc. 2: 98. 1850.

Herb, perennial, tufted, to 70 cm high; culms very slender, lower nodes bearded, with long trailing stolons; sheaths glabrous, ciliate along margin, bearded at mouth; leaf blades linear-lanceolate, 10 × 0.4 cm, glabrous or thinly hispid with tubercle-based hairs, apex acute. Inflorescence of racemes 1–3, solitary or digitate, hairs golden brown. Sessile spikelet golden brown, callus hairs; lower glume narrowly oblong, leathery, back flat, densely villous except below apex, obscurely 1–2-veined between keels, apex broadly truncate, densely ciliate; lower lemma absent; upper lemma oblanceolate, 2-toothed, awned, column pubescent.

Flowering & Fruiting: November–March.

Rare on grassy fields and open exposed hillsides.

Distribution: India (Himalaya, N. & S. India), China, Indonesia, Malaysia, Philippines, Thailand, Vietnam.

Specimens examined: Rathuadhab, R. *Manikandan* 125737 (BSD).

Notes: It is quite distinct in having golden-yellow to pale brown racemes and unusual in lacking a lower lemma.

23. *Hackelochloa* Kuntze

Hackelochloa granularis (L.) O. Ktze., Rev. Gen. Pl. 2: 776. 1891; Bor, Grasses Burma Ceylon, India, Pakistan: 159. 1960. *Cenchrus granularis* L., Mant. Pl. 2: 575. 1771. *Cenchrus granularis* L., Mant. Pl. 2: 575. 1771. *Manisuris granularis* (L.) L.f., Nov. Gram. Gen.: 37. 1779; Hook.f., Fl. Brit. India 7: 159. 1896; Blatter & McCann, Bombay Grasses: 32. 1935. *Manisuris polystachya* P. Beauv., Fl. Owar & Benin. 1: 24, t. 14. 1805. *Ryttilix granularis* (L.) Skeels, U.S. Dept. Agric., Bur. Pl. Indus. 282: 20. 1913.

Herb, annual, tufted, to 80 cm high; culms erect, branched from base; sheaths loose, slightly inflated, keeled. Leaf blades linear-lanceolate, to 20 × 1 cm, coarsely hispid, subamplexicaul at base, subacute at apex. Inflorescence racemes, rachis internodes. Sessile spikelet usually cream-colored at maturity; lower glume hemispherical, coarsely reticulate-rugose, pits shallow and separated by broad rounded ribs, finely granular; upper glume hyaline below, thickening upward toward the crested apex; lower lemma hyaline; upper lemma hyaline, upper palea as long. Pedicelled spikelet to 2.5 mm long, glumes with prominent green veins and whitish wings.

Flowering & Fruiting: June–September.

Grows in open grassy places and along the roadsides.

Distribution: India (almost throughout the country); throughout the tropics.

Notes: Included on the authority of Samir Sinha (2001).

24. *Heteropogon* Pers.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. ed. 15 bis. 2: 836. 1817; Bor, Grasses Burma, Ceylon, India & Pakistan: 163, f. 6. 1960; P.C. Pant, Fl. Corbett Natl. Park: 176. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 226. 1989. *Andropogon contortus* L., Sp. Pl.: 1045. 1753; Hook.f., Fl. Brit. India 7: 199. 1896.

Herb, perennials, tufted, to 1 m high; culms erect or geniculate. Leaves 2.5–25 × 0.2–0.6 cm, linear-lanceolate, rounded at base, subacute at apex, midrib prominent; sheaths keeled; ligules membranous. Inflorescence racemes 2–6 cm long. Spikelets heterogamous, lower sessile and upper pedicelled. Glumes bulbous based hairy. Lower lemma nerved, upper nerveless. Grains enclosed by lemmas.

Flowering & Fruiting: September–January.

Common in open grasslands.

Distribution: India (almost throughout the country), tropics and subtropics of the world, extending to Mediterranean and other warm-temperate areas.

Specimens examined: Way to Halduparao, R. *Manikandan* 125732 (BSD); Samir Sinha (2001).

25. *Imperata* Cirillo

Imperata cylindrica (L.) Raeuschel., Nomencl. Bot. ed. 3, 10. 1797; Bor, Grasses Burma, Ceylon, India & Pakistan: 169. 1960; P.C. Pant, Fl. Corbett Natl. Park: 178. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 229. 1989. *Lagurus cylindrica* L., Syst. Nat., ed. 10. 2: 878. 1759. *Imperata arundinacea* Cirillo, Pl. Rar. Neapol. 2: 26, t. 11. 1792; Hook.f., Fl. Brit. India 7: 106. 1896. *Saccharum koenigii* Retz., Observ. Bot. 5: 16. 1789. *Imperata koenigii* var. *major* Nees, Fl. Afr. Austral. Ill. 90. 1841. *I. cylindrica* var. *koenigii* (Retz.) T. Durand & Schinz, Consp. Fl. Afric. 5: 694. 1894. *I. cylindrica* var. *major* (Nees) C.E. Hubb. ex C.E. Hubb. & Vaughan, Grass. Maur.: 96. 1940; Bor, *l.c.* 170.

Herb, perennials, tufted, to 1.5 m high; culms rhizomatous, scaly, densely villous at nodes. Leaves 6.5–70 × 0.5–1.8 cm, lanceolate or linear-lanceolate, narrowed at base, glaucous, midrib prominent; sheaths disintegrating into fibres, mouth villous; ligules ovate, membranous. Inflorescence panicles spiciform, cylindrical, white-silky hairy. Spikelets elliptic-lanceolate, awnless. Glumes dissimilar. Lower lemma ciliate, slightly trilobed. Palea obovate, hyaline.

Flowering & Fruiting: July–March.

Common in open grassy fields.

Distribution: India (almost throughout the country), Afghanistan, Africa, SW Asia, Australia, Bhutan, China, S. Europe, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Russia, Sri Lanka, Thailand, Turkmenistan, Uzbekistan, Vietnam.

Specimens examined: Way to Halduparao, R. *Manikandan* 125731 (BSD).

Notes: It can easily be distinguished in having white silky hairy spiciform panicles. It is excellent for thatching.

26. *Isachne* R. Br.

Isachne globosa (Thunb.) Kuntze, Revis. Gen. Pl. 2: 778. 1891. *Milium globosum* Thunb., Syst. Veg. (ed. 14), 109. 1784. *Isachne miliacea* Roth, Syst. Veg. (ed. 15 bis) 2: 476. 1817; Hook.f., Fl. Brit. India 7: 23. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 580. 1960; P.C. Pant, Fl. Corbett Natl. Park: 178. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 230. 1989.

Herb, annuals, to 25 cm high; culms erect or geniculate, nodes glabrous. Leaves 1–4 × 0.5–1.2 cm, ovate-lanceolate or lanceolate, rounded or shallowly cordate at base, acuminate at apex, flat, scabrid; sheaths to 3 cm long, ciliate along the margins; ligule a row of hairs. Inflorescence panicles lax. Spikelets 1.5–2 mm long, obovoid. Lower glume oblong or orbicular; upper glume oblong. First lemma ovate-oblong; lower lemma ovate, coriaceous; stamens 3; anthers cream coloured; stigma violet or pink; palea oblong, delicate.

Flowering & Fruiting: September–January.

Grows in wet places, forming colonies.

Distribution: India (almost throughout the country), Australia, Bangladesh, Bhutan, China, Indonesia, Japan, Korea, Malaysia, Nepal, New Guinea, Pacific Islands, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: Included on the authority of Samir Sinha (2001).

27. *Oplismenus* P. Beauv.

1a. Panicles 6–8.5 cm long, with 2–8 racemes.....1. *O. burmannii*

1b. Panicles 8–12 cm long, in 4–8 racemes.....2. *O. compositus*

1. ***Oplismenus burmannii*** (Retz.) P. Beauv., Ess. Agrost. 54: 168. 1812; Hook.f., Fl. Brit. India 7: 68. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 317. 1960; P.C. Pant, Fl. Corbett Natl. Park: 179. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 240. 1989. *Panicum burmannii* Retz., Observ. Bot. 3: 10. 1783.

[Plate-21e]

Herb, annual, to 60 cm high; culms slender, prostrate or trailing, rooting at nodes, sparsely bearded at nodes. Leaves 0.8–8 × 0.3–1.3 cm, elliptic-lanceolate, acute to acuminate at apex, oblique at base; sheaths and ligules hairy. Inflorescence panicles 6–8.5 cm long, with 2–8 racemes, densely bristly. Spikelets elliptic-lanceolate. Glumes pale yellow. Lemmas ovate-elliptic; palea subcoriaceous, 2-nerved.

Flowering & Fruiting: December–March.

Occasional along roadsides and grassy fields.

Distribution: India (almost throughout the country), Pantropical.

Specimens examined: Way to Adnala, R. *Manikandan* 122366 (BSD); Vatanvasa, T.S. Rana & Party–220160 (BSD).

2. ***Oplismenus compositus*** (L.) P. Beauv., Ess. Agrostogr. 54: 168, 169. 1812; Hook.f., Fl. Brit. India 7: 66. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 317. 1960; P.C. Pant, Fl. Corbett Natl. Park: 179. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 240. 1989. *Panicum compositus* L., Sp. Pl.: 57. 1753.

Herb, annuals or perennials, to 1.2 m high; culms rambling or creeping, rooting at nodes, sparsely villous at nodes. Leaves 3–12 × 0.5–2.5 cm, elliptic-lanceolate, oblique at base, subacuminate at apex, hispid; sheaths and ligules hairy. Inflorescence panicles 8–12 cm long, in 4–8 racemes. Spikelets paired, elliptic-lanceolate. Glumes awned. Lower lemma elliptic, subcoriaceous.

Flowering & Fruiting: September–December.

Occasional in marshy places.

Distribution: India (almost throughout the country), E. Africa, tropical Asia, Australia, China, Japan, Pacific Islands, Pakistan, Philippines, Thailand.

Notes: Included on the authority of Samir Sinha (2001).

28. *Panicum* L.

- 1a. Leaf blades lanceolate; spikelets ovate-oblong 2. *P. notatum*
 1b. Leaf blades linear; spikelets elliptic 1. *P. antidotale*

1. ***Panicum antidotale*** Retz., Obs. Bot. 4: 17. 1786; Boiss., Fl. Or. 5: 440. 1884; Duthie, Fodder Grasses: 4. 1888; Hook.f., Fl. Brit. India 7: 52. 1896; Blatter & McCann, Bombay Grasses: 163. 1935; Bor, Grasses Burma, Ceylon, India & Pakistan: 322. 1960; P.C. Pant, Fl. Corbett Natl. Park: 179. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 243. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 305, f. 314 d–e. 1996. *P. miliare* Lam., Tab. Encycl. 1: 173. 1791.

Herb, perennial, erect or ascending, to 1.5 m high; culms woody, usually branched, lower internodes often pruinose, with creeping woody rootstocks. Leaf-blades linear, 6.5–30 × 0.4–1.2 cm, flat, glabrous, sharply pointed. Panicle narrowly pyramidal to broadly oblong or ovate, subverticillate to sparingly branched with condensed spikelets. Spikelets elliptic, glabrous, acute. Glumes lower broadly ovate, membranous with broad hyaline margins, 3–5-nerved, acute; upper glume with broad hyaline margins, 7–9-nerved. Lower lemma 7–9-nerved, its palea almost as long; upper lemma pallid, smooth and shining.

Flowering & Fruiting: August–November.

Fairly common in moist places and along roadsides.

Distribution: India (C & N India), tropical Africa, Arabia, Asia.

Specimens examined: Halduparao FRH, R. *Manikandan* 124888, 122330 (BSD); Samir Sinha (2001).

2. ***Panicum notatum*** Retz., Observ. Bot. 4: 18. 1786; Bor, Grasses Burma, Ceylon, India & Pakistan: 701. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 243. 1989. *P. montanum* Roxb., Fl. Ind. (Eds. Carey & Wall.) 1: 315. 1820; Hook.f., Fl. Brit. India 7: 53. 1896.

Herb, perennials, to 1.5 m high; culms erect, wiry. Leaves 5.5–20 × 1–3.5 cm, lanceolate, flat, cordate at base, tubercled-base hairs along margins, acuminate at apex, rigid, midrib prominent; sheaths ciliate; ligules membranous. Inflorescence panicles lax, spreading. Spikelets ovate-oblong, greenish-purple. Glumes subequal, 5-nerved. Lower lemma ovate, subcoriaceous, shining. Grains $\approx$ 1.5 mm long, ovate.

Flowering & Fruiting: September–December.

Occasional in open grass lands and along roadsides.

Distribution: India (almost throughout the country), Bhutan, Borneo, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam.

Specimens examined: Halduparao FRH, R. *Manikandan* 124885 (BSD); Samir Sinha (2001).

Notes: It can easily be distinguished in having trailing habit, lanceolate leaves and lax panicles.

29. **Paspalum** L.

Paspalum scrobiculatum L., Mant. Pl. 1: 29. 1767; Hook.f., Fl. Brit. India 7: 10. 1896; Rang. & Tadul., Handb. S. Ind. Grass.: 49, f. 69 & 70. 1921; Bor, Grasses Burma, Ceylon, India & Pakistan: 340. 1960; P.C. Pant, Fl. Corbett Natl. Park: 180. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 244. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 309, f. 316 d–f. 1996. *P. orbiculare* G. Forst., Fl. Ins. Austr.: 7. 1786; Bor, *l.c.* *P. commersonii* Lam., Tabl. Encycl. 1: 175, t. 43, f. 1. 1791; Bor, *l.c.* 335. *P. cartilagineum* J. Presl & C. Presl, Reliq. Haenk. 1: 216. 1830; Bor, *l.c.*

Herb, annuals or perennials, tufted, to 1 m high; culms erect or creeping, rooting at nodes. Leaves 4–40 × 0.2–1.2 cm, linear-lanceolate, rounded at base, acute to acuminate at apex, midrib prominent; sheaths keeled; ligules membranous. Inflorescence racemes 2 or 3. Spikelets ovate; lower glume absent; lower lemma ovate, crustaceous; palea orbicular, inflexed.

Flowering & Fruiting: September–November.

Occasional in forest cleanings and wet places.

Distribution: India (almost throughout the country), tropics and subtropics of the Old World; introduced in America.

Specimens examined: Morghatty, R. *Manikandan* 122389 (BSD).

30. **Phragmites** Adans.

Phragmites karka (Retz.) Trin. ex Steud., Nomencl. Bot., ed. 2. 1: 144. 1840; Hook.f., Fl. Brit. India 7: 304. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 416. 1960; P.C. Pant, Fl. Corbett Natl. Park: 180. 1986. *Arundo karka* Retz, Observ. Bot. 4: 21. 1786. *Arundo roxburghii* Kunth, Rev. Gram. 1: 79. 1829. *Phragmites roxburghii* (Kunth) Steud., Nom. Bot., ed. 2, 2: 324. 1841; Duthie, Fodder Grasses: 60. 1888. *P. nepalensis* Nees ex Steud., Syn. Pl. Glum. 1: 196. 1854. *P. maxima* (Forssk.) Blatter & McCann, Bombay Grasses: 202. 1935, *p.p.* based on *Arundo maxima* Forssk., Fl. Aegypt-Arab.: 24. 1775.

Shrub, robust, perennial, to 6 m high; culms very stout, often woody, with extensive creeping rhizomes; sheaths greenish, glabrous. Leaves erect-ascending, to 80 × 3 cm, abaxial surface scabrous, apex stiff, long acuminate; ligule ciliate. Inflorescence panicle to 50 × 20 cm, branches of lowermost whorl bare of spikelets toward base, glabrous. Spikelets to 1.2 cm long, florets 4–6. Glumes lanceolate-elliptic, obtuse to acuminate, lower glume to half of lowest lemma, upper glume to 5 mm long; lowest lemma narrowly elliptic, floret callus with hairs; bisexual lemmas linear-lanceolate, apex long attenuate.

Flowering & Fruiting: September–December.

Occasional in warm swampy areas and along river banks.

Distribution: India (Himalaya), Africa, N. Australia, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, New Guinea, Pacific Islands, Philippines, Sri Lanka, Thailand, Vietnam.

Notes: It is a very robust species found in warm parts of the Old World. It has stiffer, more scabrous leaf blades and smaller spikelets with shorter callus hairs. The name "*Arundo vallatoria* Linnaeus" (Herb. Amboin.: 15. 1754) belongs here, but was not validly published (see Art. 34 Ex. 2 of the Saint Louis Code), and hence neither was the combination "*Phragmites vallatoria* (L.) Veldkamp" (Blumea 37: 233. 1992) and Included on the authority of Samir Sinha (2001).

31. **Saccharum** L.

Saccharum spontaneum L., Mant. Pl. 2: 183. 1771; Hook.f., Fl. Brit. India 7: 118. 1896; Panje, Indian J. Agri. Sci. 3: 1013. 1933; Blatter & McCann, Bombay Grasses: 45. 1935; Bor, Grasses Burma, Ceylon, India & Pakistan: 214. 1960; P.C. Pant, Fl. Corbett Natl. Park: 181. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 256. 1989; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 273. 2007. *Imperata spontanea* (L.) P. Beauv., Ess. Agrost.: 8. 1812. *Saccharum semidecumbens* Roxb., Fl. Ind. ed. 1820, 1: 241. 1820. *S. canaliculatum* Roxb., l.c. 251. *S. propinquum* Steud., Syn. Pl. Glumac. 1: 406. 1855. Kabi, Kans [Plate-21h]

Herb or shrub, robust, perennial, to 3 m high; culms erect, very stout, often woody, with rhizomatous roots; sheaths greenish, glabrous or hairy, ligules ciliate. Leaves lanceolate, apex stiff, long acuminate; tapered into narrow wings at base, glaucous. Panicles with hairy peduncles. Spikelets all alike, callus bearded with silky white hairs, 2–3 times as long as spikelets; lower lemma ciliate on margins; upper lemma very narrow, very shortly awned.

Flowering & Fruiting: April–July.

Common along the streams and riverbed sides.

Distribution: India (Himalaya), Afghanistan, Pakistan.

Specimens examined: Way to Hathikhund, R. Manikandan 125749 (BSD); Samir Sinha (2001).

Notes: Generally it flowers or fruits at the end of the rains and is therefore capable of colonising areas such as soil and sand left bare by retreating floods. The root system is extremely extensive and acts as an effective sand-binder.

32. **Setaria** P. Beauv., *nom. cons.*

- 1a. Ligules hairy; more than 1 m high 2
- 1b. Ligules membranous; less than 1 m high 5. *S. pumila*

- 2a. Perennial herbs, culm base geniculate 2. *S. geniculata*
- 2b. Annual herbs; culm base not as above 3

- 3a. Sheaths glabrous; panicles contracted, cylindrical 3. *S. glauca*
- 3b. Sheaths usually villous or sparsely hispid; panicles narrow, pyramidal or linear-oblong 4

- 4a. Spikelets ovate-oblong or elliptic 4. *S. homonyma*
- 4b. Spikelets elliptic-lanceolate 1. *S. barbata*

1. **Setaria barbata** (Lam.) Kunth, Revis. Gramin. 1: 47. 1829; Bor, Grasses Burma, Ceylon, India & Pakistan: 360. 1960; P.C. Pant, Fl. Corbett Natl. Park: 182. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 258. 1989; Sreek. & V.J. Nair, Fl. Kerala-Grass.: 303, t. 60. 1991; Veldkamp, Blumea 39: 373. 1994; Datar & al., Rheedia 15: 134. 2006 (2005). *Panicum barbatum* Lam., Tabl. Encycl. 1: 171. 1791. *P. flavescens sensu* Hook.f., Fl. Brit. India 7: 56. 1896, *non* Sw., 1788.

Herb, annuals, to 60 cm high; culms creeping or decumbent, with rooting at nodes. Leaves 1.5–18 × 0.2–2.5 cm, elliptic or elliptic-lanceolate, acuminate at apex, narrow or rounded at base, plicate towards base, glabrous; sheaths keeled, villous towards mouth; ligules hairy. Inflorescence panicles narrow, lax, with angular scabrid bristles. Spikelets elliptic-lanceolate. Lower glume ovate, trinerved. Lower lemma elliptic, crustaceous, 5–7-nerved; palea elliptic, crustaceous, rugose, 2-keeled.

Flowering & Fruiting: December–April.

Rare along the bands of streams in shady places.

Distribution: India (Andaman & Nicobar Islands, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal), tropics of the world.

Notes: Included on the authority of Samir Sinha (2001).

2. ***Setaria geniculata*** P. Beauv., Ess. Agrostogr.: 51. 1812; Hook.f., Fl. Brit. India 7: 28. 1896. Bor, Grasses Burma, Ceylon, India & Pakistan: 333. 1960; P.C. Pant, Fl. Corbett Natl. Park: 182. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 244. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India: 306, f. 315 a–c. 1996.

Herb, perennials; culm erect, base geniculate, with knotty rhizomes; sheath compressed and keeled; ligule a ring of hairs. Spikelets to 2.5 mm long. Glumes membranaceous; lower glume acute, to 1/3 length of spikelet, 3-veined; upper glume obtuse, to 1/2 as long as spikelet, 5-veined. Lower lemma membranaceous, as long as spikelet, 5-veined; palea flattened, 2-keeled, as long as lemma; upper lemma indurate, rugose, 5-veined, palea flattened abaxially, 2-keeled, nearly as long as lemma and spikelet. Caryopsis clasped by broad margins of palea.

Flowering & Fruiting: July–March.

Common in damp and moist places.

Distribution: India (almost throughout the country), tropical regions of the world.

Notes: It is a polymorphic taxa and can easily be known by having leaves blunt apices and distantly placed spikes and included on the authority of Samir Sinha (2001).

3. ***Setaria glauca*** (L.) P. Beauv., Ess. Agrostogr.: 51. 1812; Hook.f., Fl. Brit. India 7: 79. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 365. 1960; P.C. Pant, Fl. Corbett Natl. Park: 182. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 258. 1989. *Panicum glaucum* L., Sp. Pl.: 56. 1753.

Herb, annuals, to 50 cm high; culm prostrate, mostly compressed. Leaves to 25 × 1 cm, hairy; sheath keeled, glabrous; ligule a ring of hairs. Panicle contracted, cylindrical, not interrupted, mostly 5–10 cm long; bristles 5–20, 2–3 times as long as spikelet. Spikelets broadly ovate, to 3 mm long, obtuse, pale. Glumes lower 1/2 as long as spikelet, 3-veined; upper glume broadly ovate, 5-veined; lower lemma 5-veined, membranaceous; upper floret broadly ovate, as long as lower lemma, strongly and transversely rugose, coriaceous.

Flowering & Fruiting: September–November.

Occasional in open grasslands.

Distribution: India (almost throughout the country), temperate regions of the Old World, introduced into America, Australia and other countries.

Specimens examined: Sonanadi WLS, R. *Manikandan* 122549, 122396, 122428, 125670 (BSD).

Notes: Bor (1960) has given *S. tomentosa* (Roxb.) Kunth as the correct name for this species, based on *Panicum tomentosum* Roxb. The reason being that *S. intermedia* Roem. & Schult. is based on *Panicum intermedium* Roth, Nov. Pl. Sp.: 47. 1821, *non* Vahl ex Hornem 1813. However, as per the provisions of I.C.B.N. the name *S. intemedia* is treated as a new name and hence acceptable.

4. **Setaria homonyma** (Steud.) Chiov., Nuovo Giorn. Bot. Ital., n.s. 26: 78. 1919; Bor, Grasses Burma, Ceylon, India & Pakistan: 363. 1960; P.C. Pant, Fl. Corbett Natl. Park: 182. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 259. 1989. *Panicum homonymum* Steud., Syn. Pl. Glumac. 1: 48. 1853. *P. rhachitricum* Hook.f., Fl. Brit. India 7: 56. 1896.

Herb, annuals, to 70 cm high; culms creeping or decumbent, rarely erect. Leaves elliptic-lanceolate, 2–15 × 0.5–2.5 mm, acuminate, rounded or narrowed at base, slightly plicate towards base; sheaths keeled, sparsely hispid or glabrous; ligules hairy. Panicles pyramidal or linear-oblong, 5–12 cm long, lax; racemes sparsely spiculate; bristles more or less straight, scabrid. Spikelets ovate-oblong or elliptic. Glumes lower ovate, chartaceous, 3–5-nerved; upper glume ovate-oblong or elliptic, 5–7-nerved. Lower lemma similar to upper glume; palea oblong-lanceolate, delicate, 2-keeled, 2-nerved; upper lemma elliptic or elliptic-lanceolate, rugose, faintly 5–7-nerved; palea elliptic, coriaceous, rugose, 2-keeled; stamens 3.

Flowering & Fruiting: September–December.

Occasional in moist places.

Distribution: India (C & N India), throughout the tropics.

Notes: Included on the authority of Samir Sinha (2001).

5. **Setaria pumila** (Poir.) Roem. & Schult., Syst. Veg. ed. 15 bis. 2: 891. 1817; P.C. Pant, Fl. Corbett Natl. Park: 183. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 259. 1989; Veldkamp, Blumea 39: 381. 1994. *Panicum pumilum* Poir. in Lam., Encycl. Suppl. 4: 273. 1816. *Panicum pallidifusum* Schumach., Beskr. Guin. Pl.: 58. 1827. *Setaria pallidifusca* (Schumach.) Stapf & C.E. Hubb., Bull. Misc. Inform: 259. 1930; Bor, Grasses Burma, Ceylon, India & Pakistan: 363. 1960. *S. glauca auct. non* (L.) P. Beauv., 1812; Hook.f., Fl. Brit. India 7: 78. 1896; Bor, *l.c.* 360.

Herb, annuals or perennials, tufted, to 1 m high; culms creeping, decumbent or erect. Leaves 2–10 × 0.1–0.8 cm, subcordate at base; sheaths keeled; ligules membranous. Inflorescence panicles spiciform, cylindric, yellowish, with numerous, scabrid bristles. Glumes unequal, ovate, 3–5-nerved. Lower lemma boat-shaped, beaked, 5-nerved; palea crustaceous, rugose. Grains plano-convex.

Flowering & Fruiting: August–November.

Occasional in open grasslands.

Distribution: India (almost throughout the country), temperate and subtropical Asia, Europe, elsewhere.

Specimens examined: Sonanadi WLS, R. Manikandan 124889 (BSD); Samir Sinha (2001)

33. **Sorghum** Moench., *nom. cons.*

Sorghum halepense (L.) Pers., Syn. Pl. 1: 101. 1805; Bor, Grasses Burma, Ceylon, India & Pakistan: 222. 1960; Cope in Nasir & Ali, Fl. Pak. 143: 295, t. 32. 1982; P.C. Pant, Fl. Corbett Natl. Park: 183. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 261. 1989. *Holcus halepensis* L., Sp. Pl.: 1047. 1753. *Andropogon halepensis* (L.) Brot., Fl. Lusit. 1: 89. 1804; Hook.f., Fl. Brit. India 7: 182. 1896. *A. miliaceus* Roxb., Fl. Ind. (Eds. Carey & Wall.) 1: 276. 1820. *Sorghum miliaceum* (Roxb.) Snowden, J. Linn. Soc., Bot. 55: 207. 1955; Bor, *l.c.* 223. *S. miliaceum* var. *parvispiculum* Snowden, *l.c.* 209; Bor, *l.c.*

Herb, perennials, to 2.5 m high; culms stout, rhizomatous. Leaves 15–60 × 0.5–3.2 cm, linear-lanceolate, subcordate at base, serrulate along margins, acuminate at apex; ligules membranous. Inflorescence panicles pyramidal, lax. Sessile spikelets subelliptic, creamy yellow or purplish-brown, callus hairy. Pedicelled spikelets elliptic-lanceolate, awnless, purplish. Lower glume 7–9-nerved. Lower lemma oblong, obtuse, hyaline; palea ciliate.

Flowering & Fruiting: October–December.

Rare along the bushes and edges of forests area.

Distribution: India (almost throughout the tropical regions of the country), SW Asia, China, S. Europe, Kazakhstan, Kyrgystan, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124839 (BSD); Samir Sinha (2001).

34. **Themeda** Forssk.

1a. Annual herbs 2. *T. quadrivalvis*
1b. Perennial herbs 2

2a. Leaves linear 3. *T. villosa*
2b. Leaves linear-lanceolate 1. *T. arundinacea*

1. **Themeda arundinacea** (Roxb.) A. Camus in Lecomte, Fl. Indo-China 17: 363. 1922; Bor, Grasses Burma, Ceylon, India & Pakistan: 251. 1960; P.C. Pant, Fl. Corbett Natl. Park: 184. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 268. 1989. *Anthistiria arundinacea* Roxb., Fl. Ind. 1: 256. 1820; Hook.f., Fl. Brit. India 7: 215. 1896.

Perennials, tufted; culms to 2 m high, rhizomatous laterally compressed at base. Leaves 20–80 × 0.4–1 cm, linear-lanceolate, acuminate at apex, narrowed into tapering at base; sheaths keeled, villous; ligules membranous. Panicles lax, drooping, densely spiculate with loose clustered spikelets; involucre spikelets 2 pairs, in racemes. Lower glume 7–9-nerved, glabrous. Sessile spikelets solitary. Pedicelled spikelets 2–3 in raceme.

Flowering & Fruiting: November–December.

Rare amidst bushes in partially shady places.

Distribution: India (N India), Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam.

Uses: It is an excellent fodder.

Notes: Included on the authority of Samir Sinha (2001).

2. **Themeda quadrivalvis** (L.) Kuntze, Revis. Gen. Pl. 2: 794. 1891; Bor, Grasses Burma, Ceylon, India & Pakistan: 252. 1960; P.C. Pant, Fl. Corbett Natl. Park: 184. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 268. 1989. *Andropogon quadrivalvis* L., Syst. Nat. ed. 13: 758. 1774. *Anthistiria ciliata* L.f., Suppl. Pl. 113. 1782 (1781); Hook.f., Fl. Brit. India 7: 213. 1896. *Themeda ciliata* (L.f.) Hack. in A. DC. & C. DC., Monogr. Phan. 6: 664. 1889.

Herb, annuals, to 90 cm high; culms simple or sparingly branched, erect or geniculate. Leaves 20–30 × 0.4–0.6 cm, linear; ligules membranous, truncate. Inflorescence of spikes; involucre spikelets whorled.

Glumes unequal, with tubercle-based hairs. Pedicelled spikelets narrow; bisexual spikelets reddish, hairy, callus bearded; glumes subequal. Upper lemma awned. Grains linear, brown.

Flowering & Fruiting: September–January.

Occasional in marshy places and along river banks.

Distribution: India (almost throughout the country), Australia, China, Indonesia, Myanmar, Nepal, Thailand, Vietnam.

Specimens examined: Sonanadi WLS, R. *Manikandan* 124840, 122328 (BSD); Samir Sinha (2001).

3. ***Themeda villosa*** (Poir.) A. Camus in Lecomte, Fl. Indo-China. 7: 364. 1922; Bor, Grasses Burma, Ceylon, India & Pakistan: 254. 1960; P.C. Pant, Fl. Corbett Natl. Park: 184. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 269. 1989. *Anthistiria villosa* Poirlet, Encycl. Suppl. 1: 396. 1812; Hook.f., Fl. Brit. India 7: 214. 1896.

Perennials; culms to 1 m high, erect or ascending from creeping rootstock. Leaves 20–45 × 1–1.4 cm, linear, setaceous, margins scabrid; ligules narrow, membranous. Panicles 20–48 cm long. Involucral spikelets paired. Glumes equal, upper trinerved, lower many nerved. Pedicelled spikelets smaller than involucral spikelets; lower glume lanceolate, winged. Bisexual spikelets 2, sessile, callus bearded with red hairs. Lower lemma epaleate, upper stipitiform, awned.

Flowering & Fruiting: October–January.

Occasional on grassy slopes.

Distribution: India (Sub Himalayan tracks, NE India), Bangladesh, Bhutan, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand.

Notes: Included on the authority of Samir Sinha (2001).

35. ***Thysanolaena*** Nees

Thysanolaena maxima (Roxb.) O. Ktze., Rev. Gen. Pl. 2: 794. 1891; Bor, Fl. Assam 5: 176. 1940; Sultan & Stewart, Grasses W. Pak. 2: 371. 1959; Bor, Grasses Burma, Ceylon, India & Pakistan: 650. 1960; P.C. Pant, Fl. Corbett Natl. Park: 184. 1986. *Agrostis maxima* Roxb., Fl. Ind. 1: 319. 1820. *Melica latifolia* Roxb., l.c. 330. *Panicum acariferum* Trin., Sp. Gram. 1: t. 87. 1828. *nom. Superfl.*, based on *Melica latifolia* Roxb. *Thysanochlaena sikkimensis* Gandog., l.c. *Thysanolaena acarifera* (Trin.) Wight & Arn. ex Nees, Nova Acta Acad. Caesar. Leop. Carol. 19, suppl. 1: 181. 1841. Duthie, Fodder Grasses: 21. 1888. *Thysanolaena agrostis* Nees, Edinb. New Phil. J. 18: 180. 1835. *nom. Superfl.*, based on *Agrostis maxima* Roxb.; Hook.f., Fl. Brit. India 7: 61. 1896. *Thysanolaena agrostis* Nees, Edinb. New Phil. J. 18: 180. 1835. *nom. Superfl.*, based on *Agrostis maxima* Roxb.; Hook.f., Fl. Brit. India 7: 61. 1896. *Thysanolaena assamensis* Gandog., Bull. Soc. Bot. Fr. 66: 303. 1920. (as *Thysanochlaena assamensis*). [Plate-21 f, g]

Shrub, perennial, to 3.5 m high; culms erect, woody. Leaf-blades flat, to 60 × 8 cm, broadly lanceolate, acuminate, sub-amplexicaul, coriaceous. Inflorescence panicle 30–60 cm long, branches mostly straight, erect or suberect. Spikelets lanceolate. Glumes subequal, to 0.8 mm long, ovate, subacute to subrotund; sterile lemma glabrous; fertile lemma ciliate on the margins with hairs, to 0.5 mm long.

Flowering & Fruiting: March–April.

Common throughout the sanctuary.

Distribution: India (almost throughout the country), Pakistan; eastwards to Southeast Asia.

Notes: The inflorescences of this grass are often tied together in bunches to make brooms.

36. *Urochloa* P. Beauv.

Urochloa is distinguished from *Brachiaria* by its abaxial cuspidate spikelets with obtuse, mucronate upper lemmas. But in reality both these characters are found to be inadequate for separating these two genera according to Ashalatha & V.J. Nair (*l.c.*).

Urochloa subquadrifera (Trin.) R.D. Webster, Austr. Panic.: 252. 1987; Ashalatha & V.J. Nair, Bull. Bot. Surv. India 35: 30. 1997. *Panicum subquadrifera* Trin., Gram. Panic.: 145. 1826. *P. miliiforme* J. Presl, Reliq. Haenk. 1: 300. 1830. *Brachiaria miliiformis* (J. Presl) A. Chase, Contr. U.S. Natl. Herb. 22: 35. 1920; Bor, Grasses Burma, Ceylon, India & Pakistan: 286. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 190. 1989. *B. subquadrifera* (Trin.) Hitchc., Lignan. Sc. J. 7: 214. 1931; Bor, *l.c.* 283; Karthik. & al., *l.c.* 191. *Panicum distachyon sensu* Hook.f., Fl. Brit. India 7: 37. 1896, *non* L., 1771. *Brachiaria distachya* (L.) Stapf., Fl. Trop. Afr. 9: 565. 1919; P.C. Pant, Fl. Corbett Natl. Park: 184. 1986.

Herb, annuals or perennials, to 90 cm high; culms creeping, with rooting at basal nodes. Leaves 2–16.5 × 0.3–1.1 cm, linear-lanceolate, rounded to subcordate at base; sheaths ciliate; ligules membranous. Inflorescence racemes 3–8. Spikelets *c.* 4 mm long, elliptic or obovate, apiculate at apex. Lower glume obovate or broadly ovate. Lower lemma elliptic-oblong, rugulose; palea 2-keeled, rugulose.

Flowering & Fruiting: September.

Rare in moist places near tanks.

Distribution: India (almost throughout the country), Myanmar, Pakistan, Sri Lanka, Thailand; introduced in Africa.

Notes: Included on the authority of Samir Sinha (2001).

37. *Vetiveria* Bory

Vetiveria zizanioides (L.) Nash in Small, Fl. Southeast U.S.: 67. 1903; Blatter & McCann, Bombay Grasses: 65. 1935; Bor, Grasses Burma, Ceylon, India & Pakistan: 258. 1960; P.C. Pant, Fl. Corbett Natl. Park: 184. 1986. *Phalaris zizanioides* L., Mant. Pl. 2: 183. 1771. *Sorghum zizanioides* (L.) O. Ktze., Rev. Gen. Pl. 2: 791. 1891. *Chrysopogon zizanioides* (L.) Roberty, Bull. Inst. Franç. Afrique Noire 22: 106. 1960. *Agrostis verticillata* Lam., Encycl. Meth. Bot. 1: 59. 1783, *non* Vill. 1779. *Andropogon muricatus* Retz., Obs. Bot. 3: 43. 1783. *Vetiveria muricata* (Retz.) Griseb., Fl. Brit. West Ind.: 560. 1864. *Vetiveria odoratissima* Lem.-Lisanc., Bull. Soc. philomath. Paris. 1822: 43. 1822. *Andropogon squarrosus* Hook.f., Fl. Brit. India 7: 186. 1896.

Khas Khas [Plate-21d]

Herb, perennials, to 1.5 m high; culms erect, rhizomatous. Leaves chiefly basal, 8–25 × 0.2–0.3 cm, linear, rigid. Inflorescence panicles 10–20 cm long, spiciform, digitate racemes; pedicels with tuft of hairs. Sessile spikelets laterally compressed; lower glume narrowly ensiform, with spinous tip, coriaceous; upper glume cymbiform, awned. Lower lemma absent. Pedicelled spikelets compressed; lower glume awned. Lemmas awnless. Grains oblong.

Flowering & Fruiting: October–December.

Rare in open grasslands.

Distribution: India (almost throughout the country), tropical Africa, Southeast Asia, China, Myanmar, Nepal, Pakistan, Sri Lanka, West Indies.

Uses: Cultivated for its aromatic oils, which used as an hair oil.

Notes: Included on the authority of Samir Sinha (2001).

Cultivated species:

1. **Eleusine coracana** (L.) Gaertn., Fruct. Sem. Pl. 1: 8, t. 1, f. 11. 1789; Hook.f., Fl. Brit. India 7: 294. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 492. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 212. 1989. *Cynosurus coracanus* L., Syst. Nat. ed. 10. 2: 875. 1759.

Herb, perennials, to 90 cm high, robust. Leaves linear-lanceolate, scabrous along margins. Spikes 3–5. Grains brownish-red.

Flowering & Fruiting: September–November.

Cultivated as food grain.

2. **Oryza sativa** L., Sp. Pl.: 333. 1753; Hook.f., Fl. Brit. India 7: 92. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 605. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 241. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 304, f. 313. 1996.

Herb, annuals, to 90 cm high. Leaves linear-lanceolate, glabrous below. Spikelets cuneately oblong, pale green. Caryopsis oblong, red or dirty white.

Flowering & Fruiting: August–November.

Cultivated as food grain.

3. **Pennisetum americanum** (L.) K. Schum., Engl., Pflanzenw. Ost-Afrikas B.: 51. 1895; Karthik. & al., Fl. Ind. Enum. Monocot.: 245. 1989. *Panicum americanum* L., Sp. Pl.: 56. 1753. *Pennisetum typhoideum* L.C. Rich. in Pers., Syn. Pl. 1: 72. 1805; Hook.f., Fl. Brit. India 7: 82. 1896. *P. typhoides* (Burm. f.) Stapf & C.E. Hubb., Bull. Misc. Inform. 1933: 271. 1933; Bor, Grasses Burma, Ceylon, India & Pakistan: 350. 1960.

Herb, annuals to 3 m high; culms erect; nodes bearded. Leaves linear-lanceolate, scabrid. Panicles cylindrical, on pubescent peduncles. Spikelets 2–4-nate, ovoid-ellipsoid. Grains $\approx$ 3 mm long, ovoid, greenish-yellow.

Flowering & Fruiting: September–November.

Cultivated as food grain in adjoining villages of the Sanctuary.

4. **Saccharum officinarum** L., Sp. Pl.: 54. 1753; Hook.f., Fl. Brit. India 7: 118. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 212. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 255. 1989.

Herb, annuals, to 3 m high; culms cylindrical, with many nodes. Leaves linear-lanceolate, rigid. Panicles large, pyramidal. Spikelets with silky white hairs.

Flowering & Fruiting: October–December.

Cultivated for its sweet culms in adjoining villages of the Sanctuary.

5. **Sorghum bicolor** (L.) Moench., Methodus: 207. 1794; Bor, Grasses Burma, Ceylon, India & Pakistan: 228. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 260. 1989. *Holcus bicolor* L., Mant. Pl. 2: 301. 1771. *Andropogon sorghum* Brot., Fl. Lusit. 1: 88. 1804; Hook.f., Fl. Brit. India 7: 183. 1896. *Sorghum vulgare* Pers., Syn. Pl. 1: 101. 1805.

Herb, annuals, stout, to 3 m high. Leaves linear-lanceolate, scabrid. Sessile spikelets broadly obovoid to subglobose. Grains $\approx$ 4 mm across, enclosed or exposed at top.

Flowering & Fruiting: October–December.

Cultivated for food grain and fodder in adjoining villages of the Sanctuary.

6. **Zea mays** L., Sp. Pl.: 971. 1753; Hook.f., Fl. Brit. India 7: 102. 1896; Bor, Grasses Burma, Ceylon, India & Pakistan: 270. 1960; Karthik. & al., Fl. Ind. Enum. Monocot.: 274. 1989.

Herb, annuals, stout, to 3 m high, Leaves lanceolate. Flowers monoecious; male inflorescence terminal, in large panicles; female inflorescence axillary solitary. Grains $\approx$ 5 $\times$ 6 mm, rhomboid.

Flowering & Fruiting: July–October.

Cultivated for food grain and fodder.

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PLUMBAGINACEAE**Plumbago** L.**zeylanica** L.*Poa atrovirens* Desf.*japonica* Thunb.*tenella* L.*unioloides* Retz.**POACEAE (=GRAMINEAE)***Pogonia crispata* Blume**Pogostemon** Desf.**benghalensis** (Burm.f.) Kuntze*parviflorus* Benth.*plectranthoides* Desf.*pubescens* Benth.*Poinciana regia* Bojer ex Hook.*Polanisia icosandra* (L.) Wight & Arn.*Pollinia cumingii* Nees**Polyalthia longifolia** (Sonn.) Thwaites**Polycarpaea** Lam.**corymbosa** (L.) Lam.**Polygala** L.**arvensis** Willd.*chinensis* auct. non L.**crotalarioides** Buch.-Ham. ex DC.**POLYGALACEAE****POLYGONACEAE****Polygonum** L.*alatum* var. *nepalense* (Meisn.) Hook.f.*barbatum* L.subsp. *gracile* Danskvar. *gracile* (Danser) Stewardsubsp. *gracile* Danservar. *gracile* (Danser) Steward*glabrum* Willd.*herniarioides* Spreng.*hydropiper* L.*nepalense* Meisn.**plebejum** R. Br.*serrulatum* Hook.f.*Polytoca barbata* (Roxb.) Stapf**Pongamia** Vent.*glabra* Vent.*macrophylla* Grah.**pinnata** (L.) Pierre*Pontederia plantaginea* Roxb.*vaginalis* Burm. f.**PONTEDERIACEAE****Porana** Burm.f.**paniculata** Roxb.**Portulaca** L.**grandiflora** Hook.**oleracea** L.*pilosa* L. subsp. *grandiflora* (Hook.) R. Geesink**PORTULACACEAE****Potamogeton** L.*indicus sensu* Hook. f.**nodosus** Poir.**POTAMOGETONACEAE***Potentilla indica* (Andrews) Wolf**Pothos** L.**cathcartii** Schott*pertusus* Roxb.**Pouzolzia** Gaudich.*indica* Gaudich.*pentandra* (Roxb.) Bennet & Brown**zeylanica** (L.) Bennett & Brown**Premna** L.

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ABOUT THE BOOK

This is the first comprehensive account on the Flora of Sonanadi Wildlife Sanctuary and forms part of Jim Corbett National Park which is first National Park of India declared in 1936 and became a part of the Corbett Tiger Reserve in 1991 and also a part of Project Elephant which hosts the second largest population of Tiger-Panther Tigris in the world. The Sanctuary is the prime forests of the Shiwalik Terai biotic province. Systematic account of 661 species, 5 subspecies and 12 varieties belonging to 463 genera under 113 families of angiosperms includes a few cultivated species. Besides these, 21 species of Pteridophytes under 16 genera have also been recorded. 2 maps and about 166 colour photographs in 21 photo plates depicting habits, ecology, vegetation, etc. are provided. Updated nomenclature for flowering plants along with synonyms, relevant citations, local names, detailed taxonomic descriptions, phenology, ecological notes and nomenclatural notes are provided. This Flora will be useful to professional botanists, ecologists, environmentalists, foresters, agriculturalists, economists, sociologists, industrialists, teachers and students of biology and the persons interested in vascular plants of Sonanadi Wildlife Sanctuary.



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