

# DICOT FLORA OF SWORGADWARI HILL IN PYUTHAN DISTRICT, WESTERN NEPAL



A Dissertation

Submitted for Partial Fulfillment of the Requirement of the Masters' Degree in Botany

**Submitted to**

**Department of Botany**

Amrit Campus

Tribhuvan University

Lainchour, Kathmandu

**Submitted by**

Sadikshya Gautam

Plant Systematics and Biodiversity Unit

T.U. Regd. No. 5-2-1156-64-2015

Roll No.: 837

November, 2024

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## DECLARATION

I hereby declare that the work enclosed here is entirely my own, except where states otherwise by reference or acknowledgement, and has not been published or submitted elsewhere, in whole or in part, for the requirement for any other degree or professional qualification. Any literature, data or works done by others and cited within this thesis has been given due acknowledgement and listed in the reference section.

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## **RECOMMENDATION LETTER**

This is to recommend that Ms. Sadikshya Gautam has completed the dissertation work entitled “Dicot Flora of Sworgadwari Hill in Pyuthan District, Western Nepal” as a partial fulfillment of the requirements for Masters' degree in Botany under my supervision. The entire work is based on the original scientific investigations and has not been submitted for any other degree, anywhere else.

I therefore, recommend this thesis work to be accepted for the partial fulfillment of M.Sc. Degree in Botany.

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## LETTER OF APPROVAL

On the recommendation of supervisor “Prof. Dr. Devendra Mananda Bajracharya”, this dissertation submitted by “Ms. Sadikshya Gautam” entitled “Dicot Flora of Sworgadwari Hill in Pyuthan District, Western Nepal” has been accepted for the examination and submitted to the Amrit Science Campus, Tribhuvan University for partial fulfillment of the requirements for Master’s degree in Botany.

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## **CERTIFICATE OF ACCEPTANCE**

This thesis work submitted by “Ms. Sadikshya Gautam” entitled “Dicot Flora of Sworgadwari Hill in Pyuthan District, Western Nepal” submitted to Department of Botany, Amrit Campus, Tribhuvan University by “Ms. Sadikshya Gautam”, “T.U. Regd. No.5-2-1156-64-2015” has been accepted for partial fulfillment of the requirements of Masters’ degree in Botany.

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.....

Sadikshya Gautam

## ABSTRACT

A flora is a systematic enumeration of the plant species occurring in a given region which gives a method in the form of artificial key to enable the user to identify an unknown plants. Knowledge of flora of any region is essential for the study of biodiversity and environment so that the scopes regarding the management and conservation can be made easily and effectively. Sworgadwari lying in the mid-hill of Western Nepal, is one of the biodiversity rich area of Pyuthan district. Pyuthan is one the less explored area of Western Nepal. The present study was carried out with an aim of comprehensive enumeration, collection, identification and provide the detail taxonomic treatment of dicot flora from Sworgadwari. The study area covers Sworgadwari and its adjoining areas within the elevation range of 650m (Bhingri) to 2261m (Sworgadwari). Five field visits were made covering three seasons from September 2022 to May 2023. During exploration, only dicot plant specimens were enumerated and recorded with photographs and noted their diagnostic characters as well as illustration of some selected species.

Altogether 147 species (including 2 unidentified species) of dicotyledonous plants were systematically collected and identified belonging to 132 genera and 55 families. The study area was found to be dominated by Asteraceae (20 spp.) followed by Lamiaceae (19 spp.), Fabaceae (13 spp.), Acanthaceae and Rosaceae (7 spp. each), etc. The study revealed that the largest genera was *Scutellaria* with 3 species and *Justicia*, *Clematis*, *Euphorbia*, *Oxalis*, *Flemingia*, *Anaphalis*, *Swertia*, *Solanum*, *Leucas*, *Jasminum* (2 species each) and other genera were monospecific. Of the total plant species 77 species were herbs, 39 were shrubs, 21 were trees and 10 were climbers. Among the above species, *Swertia angustifolia* is enlisted under endangered species and *Shorea robusta*, *Bombax ceiba* under protected plants of Nepal.

**Key words:** *Sworgadwari Hill, elevation gradient, species richness, dominant families, endangered species*

## शोध सार

फ्लोरास भनेको दिइएको क्षेत्रमा हुने विरुवा प्रजातिको एक व्यवस्थित समूह हो । यसले प्रायः प्रयोगकर्तालाई पहिचान नभएका विरुवाहरू पहिचान गर्न सक्षम पार्न कृत्रिमकुञ्जीको रूपमा एक विधि पनि दिन्छ । जैविक विविधता र वातावरणको अध्ययनको लागि कुनै पनि क्षेत्रको वनस्पतिको ज्ञान आवश्यक हुन्छ जसले गर्दा व्यवस्थापन र संरक्षणलाई सजिलो र प्रभावकारी बनाउन सकिन्छ । स्वर्गद्वारी प्यूठान जिल्लाको जैविक विविधताले भरिपूर्ण भएको क्षेत्र हो जुन पश्चिम नेपालको मध्य पहाडी क्षेत्रमा अवस्थित रहेको छ । पश्चिम नेपालका क्षेत्रहरू मध्ये प्यूठान एक कम मात्रामा अन्वेषण भएको क्षेत्र हो । हालको यस अध्ययनले व्यापक गणना, सङ्कलन, पहिचान र स्वर्गद्वारीबाट दुईदलीय विरुवाको विस्तृत वर्गीकरण प्रदान गर्ने उद्देश्यका साथ गरिएको थियो । यस अध्ययनले ६५० मिटर ( भिङ्ग्री) देखि २२६१ मिटर (स्वर्गद्वारी) को उचाइको भूगोलभित्र स्वर्गद्वारी र त्यसको छेउछाउको क्षेत्रहरूलाई समेटेछ । सेप्टेम्बर २०२२ देखि मे २०२३ सम्म तीन सिजनहरू कभर गरी पाँचपटक अन्वेषण गरियो। अन्वेषणको क्रममा केवल दुईदलीय विरुवाहरूको तथ्याङ्क सङ्कलन र तस्वीरहरू सहित रेकर्ड गरियो र तिनहरूको मुख्य गुणहरू (विशेषताहरू) नोट गर्नुका साथै केही विरुवाका चित्रण पनि गरियो।

कुल १४७ प्रजातिहरू (२ पहिचान गर्न नसकेका प्रजातिहरू सहित) दुईदलीय विरुवाहरू व्यवस्थित रूपमा सङ्कलन गरी १३२ जेनेरा र ५५ परिवारहरूसँग सम्बन्धित छन् । अध्ययन क्षेत्रमा Asteraceae (20 spp.) पछि Lamiaceae (19 spp.), Fabaceae (13 spp.), Acanthaceae र Rosaceae (7 Spp.), आदिको प्रभुत्व रहेको पाइयो । अध्ययनले पत्ता लगाए अनुसार सबैभन्दा ठूलो जेनेरा *Scutellaria* जुनको ३ प्रजातिहरू थिए र *Justicia*, *Clematis*, *Euphorbia*, *Oxalis*, *Flemingia*, *Anaphalis*, *Swertia*, *Solanum*, *Leucas*, *Jasminum* (प्रत्येकका २ प्रजातिहरू) र अन्य जेनेराका एक-एक प्रजाति थिए । कुल वनस्पति प्रजातिहरू मध्ये ७७ प्रजाति जडिबुटी, ३९ भाडी, २१ रुख र १० लहरे विरुवा थिए । माथिका प्रजातिहरू मध्ये *Swertia angustifolia* लोपोन्मुख प्रजातिहरू अन्तर्गत र *Shorea robusta*, *Bombax ceiba* प्रजातिहरू संरक्षित वनस्पतिहरू अन्तर्गत नेपालमा सूचीबद्ध छन् ।

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## ABBREVIATIONS AND ACRONYMS

%	Percentage
&	And
°C	Centigrade/ degree Celcius
Anno. Check. Fl. Pl. Nepal	Annotated Checklist of Flowering Plants Nepal
APG	Angiosperm Phylogeny Group
Apr.	April
asl	Above sea level
Aug.	August
BM Museum	Natural History Museum, London, UK/ British
ca.	Circa; about (approximate)
cm	Centimeter
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
E	Royal Botanic Garden, Edinburgh, UK
Ed	Edition
e.g	<i>exempli grata</i> or, for example.
Enum. Fl. Pl. Nep.	Enumeration of the Flowering Plants of Nepal
et al	et alia or “ and others”
Fig.	Figure
Fl. Bhutan	Flora of Bhutan
Fl. Brit. Ind.	Flora of British India
Fl. China	Flora of China
Herb. Linn.	Linnean Herbarium
i.e	That is
IUCN	International Union for Conservation of Nature
Jan.	Janauary
Jul.	July
K	Royal Botanic Garden, Kew, UK

KATH	National Herbarium and Plantarium laboratories
km	Kilometer
L.	Linnaeus
m	meter
MFSC Conservation	Ministry of Forest and Soil
mm	millimeter
Mar.	March
Max.	Maximum
Min.	Minimum
No.	Number
Nov.	November
Oct.	October
p, pp.	Page, pages
Roxb. ex DC.	Roxburgh ex de Candolle
Sept.	September
S.N	Serial number
Sq. Km.	Square kilometer
Spp., sps.	Species, as a species
TUCH Herbarium	Tribhuvan University of Central
µm	micrometer
Vol	Volume
W. N	Western Nepal

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Nepal lies on the central Himalayas and occupies a total area of 147, 516 sq. km. between the latitudes 26°22' to 30°27' N and the longitudes 80°40' and 88°12' E, is extremely rich in terms of floral diversity in proportion to its size. The country is divided into 7 physiographical regions (Hagen, 1998). Due to the great geographic diversity along with climatic variation, Nepal is endowed with the tropical to alpine vegetation (Chaudhary, 1998). Nepal has a total of 118 types of ecosystems, 75 types of vegetation and 35 types of forests. Dobremez (1972) identified 11 bioclimatic zones from lower tropical (below 1000m) to sub-Nival (above 5000m) along the slope of the Nepal Himalaya. Climatic variation also exists horizontally from east to west.

Nepal serves as a transitional region between the eastern and western Himalayas (Shani 1981; Shrestha and Joshi 1996). With extreme altitudinal variations (70 m to the top of Everest's 8848m) and topographical differences, Nepal's hills and mountains make up more than 78% of the country's total land area. As a result, the country contains nearly all of the world's climatic zones, leading to a highly diverse composition of vegetation (Hagen 1960). According to the current status of Nepal's flowering plant diversity, there are 5309 species of flowering plants classified into 1515 genera and 193 families, including 312 endemic species (Rajbhandari *et al.* 2017). In the global scenario Nepal occupies about 0.1 percent of global land area, but harbours 3.2 percent and 1.1 percent of the world's known flora and fauna, respectively (Government of Nepal, 2014). Among the 3.2 percent known flora it includes the flowering and non-flowering plant. This has made the country ranks the 31st richest country in the world and 10th in Asia in terms of biodiversity (Ministry of Agricultural Development, 2017). Regarding the flowering plants, Rajbhandari *et al.* (2017) reported 5309 species under 1515 genera and 193 families and recently Shrestha *et al.* (2022) reported 5,606 species and 214 infra-species under 1541 genera and 200 families. However, there are approximately 374,000 plants in the world out of which 308,312 are vascular,

295,383 angiosperms, 74,273 monocots and 210,008 eudicots (Christenhusz & Byng, 2016).

The term "flora" refers to both published descriptions of plants and the plants that naturally appear in a certain area. It provides a detail account of information which is collected over time from the field, herbarium and literature by organizing them in a scientific manner. A Flora often includes a scientific name and author citation, as well as synonymy, a thorough description, habitat information, geographic distribution, images, notes, and more (Chaudhary 1998). The description of the taxa should be based on the examination of fresh plants or herbarium specimens. The dichotomous keys to taxa are prepared to assist in easy identification of unsure plants and their nomenclature (Harvard University, 2023).

Flora means the plants characteristic of a region, period, or special environment (Rajbhandari, 2023). Flora is the fundamental requirement of all the researchers of contemporary taxonomy, since the accurate identification of species is absolutely essential (Simpson 2006). A flora summarizes the biodiversity of a particular region. The conservation priorities are decided on generalized measures of biodiversity

An understanding of the vegetation of any region is crucial for the study of biodiversity and the environment. The diverse research and development efforts of the entire country can benefit greatly from scientifically prepared flora from any region of the country. There has been very less study of flora of Nepal and finding more species is still a chance (Press *et al.*, 2000).

### **1.1.1 Vegetation of Nepal**

Numerous researchers have investigated Nepal's vegetation, and they have divided it into different phytogeographical groups. According to their climatic differences, Stainton (1972) categorised Nepal into six geographical groups: (a) the Terai, Bhabur, and Dun valleys and outer foothills; (b) the Midland lands; (c) the Humla-Jumla areas in the north-west; (d) the drier river valleys; (e) the inner valleys; and (f) the Trans-Himalayan dry zone. Chaudhary (1998) identified the five vegetative zones listed below.

Tropical zone (up to 1000m): *Shorea robusta* is the predominant plant species there. While *Acacia-Dalbergia* relationship is evident in the riverine belts, *Shorea-Terminalia* association is frequently observed.

Sub-tropical zone (1000-2000m): The predominant plant is *Pinus roxburghii*, although other well-representative species include *Alnus nepalensis*, *Pyrus pashia*, *Berberis aristata*, *Zanthoxylum armatum*, and *Woodfordia fruticosa*.

Temperate zone (2000-3000m): Coniferous forest is a part of the temperate zone. The principal species found here include *Pinus wallichiana*, *Picea smithiana*, *Abies spectabilis*, *Abies pindrow*, *Tsuga dumosa*, *Cupressus torulosa*, and *Cedrus deodara*. *Juglans*, *Acer*, and *Aesculus* trees make up broad-leaved evergreen forests.

Sub-alpine zone (3000-4000m): *Abies pindrow*, *Quercus semecarpifolia*, *Betula utilis*, *Rhododendron campanulatum*, and *Tsuga dumosa* are plants that are found in the sub-alpine zone. The majority of the *Betula utilis* and *Rhododendron campanulatum* thickets in the upper zone are small and twisted.

Alpine and Nival zone (above 4000m): This region is characterised by steppe vegetation. Here, we can find examples of *Lonicera*, *Ephedra*, *Salix*, *Rhododendron*, etc.

## **1.2 Justification/Rationale:**

Although various specimens have been made from other parts of Nepal, the floristic study of the Pyuthan district is not extensively investigated. This study may reveal the true potentials of the mid-western region of Nepal because Siwakoti *et al.* (1999) and Shrestha (2003) have only investigated the western and eastern regions of the country. The Pyuthan, particularly Sworgadwari and its surrounding area, remained mostly undiscovered in terms of its floral diversity. As a result, this study will try to provide a thorough overview of flora.

Only a few studies have been conducted in western Nepal's south west (Dinerstein, 1979; Pokhrel, 1993; Shrestha *et al.*, 1997). Because the study area is yet undiscovered, the possibilities of a new species occurrence are higher. The objective of the current study is to enumerate, identify and provide detail taxonomic treatment of the dicot flora and vegetation of Sworgadwari Hill in Pyuthan District, Western Nepal. The recording and inventory of the region's plant

resources, along with details on their habitat and distribution range, will provide trustworthy data for management effort planning.

### **1.3 Research Objectives:**

The main objective of the present study is to systematically document and taxonomic study the dicot flora of Sworgadwari Hill, Pyuthan District in Western Nepal. The specific objectives were:

- To explore, enumerate, collect and document the dicot flora of Sworgadwari Hill
- To accurately identify the collected species and provide the detail taxonomic treatment including discription and keys.
- To illustrate the selected species to support research and conservation.

### **1.4 Limitation of the study**

Sworgadwari lies in Pyuthan district which is one of the famous religious place in Nepal. The present study is strictly limited to Pyuthan district especially focusing on the Sworgadwari Hill and its adjacent areas. This work could be regarded as an important contribution to supplement floristic study Pyuthan district. Geographically this region is far from Kathmandu and due to time constraints, poor transportation facilities, all seasons were not covered.

Many plants that were in their vegetative states, without fruits or blooms, were not collected during the research due to the inconvenience of the geographical location and the time constraints. Because they were inaccessible at the appropriate time, several plants with short flowering periods that were collected during field excursions may not have been included.

Few species are still unidentified as a result of the low representation of herbarium specimens in TUCH, the deposition of herbarium specimens, and the details of all listed specimens are not included. Next, unfavorable weather was a limiting issue. The forest fire at the pick flowering seasons is the main problems of the field visit. Due to all these constraints, it was not possible to collect sufficient specimens as expected.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Enumeration of Plants in Nepal

In Nepal, the botanical explorations, first of all was commenced by a British Naturalist Sir Francis Buchanan-Hamilton (1802-1803) and N. Wallich (1820-21) in the central region of country (Rajbhandari, 2016). Wallich collected 1834 plants specimens from Kathmandu valley and recorded these in "Tentament Florae Nepalensis (1826)". "Prodromus Florae Nepalensis", the first book with the record information of Nepalese plants: 93 families, 337 genera and 738 species, was published in 1825 by British botanist D. Don based on a collection made by Hamilton and Wallich (1920–1921) (Rajbhandari *et al.* 2017). Botanists from different countries including British, Japan, Switzerland, France, India and so on were interested in the investigation and study of plants of Nepal during eighteenth century and published findings and informations in different books, journals and bulletins. Similarly, the exploration of Eastern Nepal was initiated by J.D Hooker in 1848 (Rajbhandari, 2016).

Hooker (1848) published the book named "*Flora of British India*" Volume I-VIII (1972-1997) and collected plants from eastern Nepal. Two amateur Nepali collectors Captain Lal Dhwoj and Khadanada Sharma (KN Sharma) explored Central and Western Nepal during 1928-1934, primarily for the British naturalists. With 417 species of flowering plants documented, M. L. Banerji published his dissertation on the *Flora of East Nepal* in 1965 under the title *Contribution to the Flora of East Nepal* (Rajbhandari 2002; Rajbhandari *et al.*, 2020).

Several important works on Nepalese flowering plants were published between 1949 and 1982 especially three volumes of '*An Enumeration of Flowering Plants of Nepal*' in 1978-1982 by Hara *et al.* (Rajbhandari *et al.* 2017). The Flora of Eastern Himalaya, assembled by Hara (1966) from several samples from eastern Nepal. Hara *et al.* (1978, 1979 and 1982) published the first comprehensive account of flora of Nepal. He enumerated 5150 species of flowering plants belonging to 1475 genera and 257 families of which 4000 dicots species and 1150 monocots species.

The British Museum (Natural History), in 1952, organized an exploration to west Nepal (Jumla-Humla) with a group of O. Polunin, W.R. Sykes and L.H.J. Williams.

Similarly, in 1954, another trip to central Nepal (Dhaulagiri and Annapurna areas) was led by J.D.A. Stainton, W.R. Sykes and L.H.J. Williams. The contribution of Stainton is noteworthy and it came in the form of a book '*Forests of Nepal*' in 1972. Botanists from different universities explored different parts of Nepal from east to west and succeeded to add many new species (Lamichhane, 2020).

In 1961, the Government of Nepal established the Department of Plant Resources to contribute on flora of Nepal by carrying out botanical explorations in different parts of the country. The University of Tokyo in collaboration with the Department of Plant Resources has contributed in the publications of *The Himalayan Plants* Vol. I (1988), Vol.II (1991), besides their earlier contributions such as *Flora of Eastern Himalaya I* report (1966), second report (1971) and the third report (1975).

Similarly, Natural History Museum, London in collaboration with Central Department of Botany Published *Annotated Checklist of the Flowering Plants of Nepal* (Press *et al.* 2000) which enlisted 5345 species, 163 subspecies and 51 forma of angiosperms and gymnosperms belonging to 1534 genera and 216 families. Under the same collaboration Catalogue of Type specimens from Nepal (Shrestha and press, 2000) was also published. The most latest and remarkable publication is *Flora of Nepal Vol.3* (Magnoliaceae to Rosaceae; Watson *et al.* 2011), which enumerates 21 families, with 123 genera, 600 species, 19 subspecies, 31 varieties and 4 forma.

## **2.2 Study of flora by DPR, Nepal**

The systematic study on flora of Nepal has been carried since the establishment of Department of Plant Resources (DPR), Nepal and National Herbarium and Plant Laboratories (KATH), in 1960. In 1967, DPR published a booklet "Key to the Dicot genera of Nepal, Part I" which represents the Polypetalae group and is the first publication of the series of the keys to the identification of Nepalese plants.

Since 1967, flora of different areas has been published in the form of Bulletins. Flora of (Gokarna Forest) Rajnikunj (1967), Bull. No. 1 reported 2 species of Gymnosperms, 34 species of monocots and 194 species of dicots. Flora of Phulchoki and Godawari (1969) Bull. No. 2 reported 525 species of angiosperms and 2 species of gymnosperms. Flora of Nagarjun (1973) Bull. No. 4 enumerated 350 species of angiosperms and 3 species of gymnosperms. Supplement to the Flora of Phulchoki

and Godawari (1974) Bull No. 5, reported 44 species within 27 families. Flora of Langtang and Cross Section Vegetation Survey (1976), Bull. No. 6 reported 76 species of Pteridophytes, 10 species of gymnosperms, 125 species of monocots and 700 species of dicots. Flora of Kathmandu Valley (1968), Bull. No. 11 comprises 1312 vascular species, of which 169 are pteridophytes, 7 are gymnosperms and 1136 are angiosperms (DPR, 1986). Furthermore, the Endemic flowering plants of Nepal Part I (2009) Bull. Sp. Publication No. 1, Endemic flowering plants of Nepal Part II (2010) Bull. Sp. Publication No. 2, Endemic flowering plants of Nepal Part III (2011) Bull. Sp. Publication No. 3, The Catalogue of Nepalese flowering Plants Part I (Rajbhandari *et al.*, 2010), The Catalogue of Nepalese flowering Plants Part II (Rajbhandari *et al.*, 2011), The Catalogue of Nepalese flowering Plants Part III (Rajbhandari *et al.*, 2011), Plant Resources of Kailali, West Nepal (2016), Plant Diversity of Salhesh Phulbari, Siraha (2016) etc. has been published.

Likewise, Bhattarai (2016) recorded 152 dicots, 45 monocots, 30 pteridophytes, and 3 bryophytes in his article titled "Documentation of Flora of Maipokhari Ramsar site, Ilam, Nepal". Altogether, 276 species of flowering plants belonging to 78 families and 200 genera of which 63 families belong to dicotyledons and 15 families belong to monocotyledons were recorded from Manaslu Conservation Area, Central Nepal (Sapkota *et al.* 2017).

However, National Herbarium and Plant Laboratories (KATH) comprises nearly two third species reported from Nepal which shows the need of further exploration in under explored remote sectors of Nepal. Though the concept of Flora of Nepal project was initiated in early 1990s, only a single volume, Vol. III has been published yet.

### **2.3 Status of flora in west Nepal**

Plant collection in Nepal extensively started from 1949. However, botanical explorations in the Western Nepal is less as compared to the eastern and central Nepal (Banerjii, 1965; Hara, 1966, 1971; Ohasi, 1975; Siwakoti and Varma, 1999). Few studies in the southwest Nepal have been conducted regarding the vegetation and flora (Dinerstein, 1979; Pokharel, 1993; HMG, 1994; Shrestha *et al.*, 1997). A book entitled '*Enumeration of Vascular plants of West Nepal*' was published by Department of Plant Resources under the edition of Rajbhandari *et al.* (1994) which

includes 1741 species of angiosperms, 14 species of gymnosperms and 139 species of ferns.

Since 1880, the following botanical discoveries have been made in western Nepal: A British expedition team led by three botanists, Williams, Polunin, and Sykes explored the Karnali to Kali Gandaki of west Nepal in Jumla, Humla, Jajarkot, and Salyan in 1952. Although a few botanists have done their work in upraising the flora of west Nepal, the region is still unexplored yet in comparison to the central and eastern Nepal. Western Nepal's floristic study has received little attention (Shrestha *et al.*, 2006). Due to its remoteness and somewhat dry, hot environment, the flora of far-western Terai has even less research done on it (Sah *et al.*, 2003). Only a few number of studies have been done in the past that are restricted to the documenting and enumeration of blooming plants (Joshi & Singh 2010; Pant & Yadav 2013). Recently, with the explorations and concentrations at the regional level, documentation of plant resources has been started, as a result, 'Plant resources of Kailali, West Nepal' has been published by Department of Plant Resources in 2016.

Budha-Magar (2016) recorded 452 species of plants belonging to 89 families and 284 genera from Jaljala Mountain and its adjoining areas of Rolpa District. Among 89 families, 87 families belongs to Angiosperms with 278 genera and 446 species.

Similarly, Chalise *et al.* (2020) identified 136 vascular plant species, including 121 angiosperms (98 dicots and 23 monocots), 4 gymnosperms, and 11 ferns and fern allies from Daman and its adjoining areas of Makawanpur district. Pandey and Ghimire (2020) harbors 148 plant species from Janahit Mahakali community forest in Kanchanpur district belonging to 123 genera under 59 families. Among them 117 dicots and 23 monocots.

Magar *et al.*, (2020) identified 560 flowering plant species from Jaljala Mountain and surrounding areas of Rolpa District, divided into 329 genera and 98 families. Among them, 138 species were discovered for the first time in western Nepal. Nine of the total species were endemic to Nepal, 86 were Himalayan endemic, 206 were Eastern Asiatic and 204 were widespread.

Altogether 145 species belonging to 111 genera and 41 families were recorded from Shaktikhor V.D.C. Chitwan (K.C., 2020). Lamichhane (2020) recorded 125 species

of dicotyledons plants belonging to the 111 genera under 50 families from Murkuti Hills, Northeast part of Dang district, Western Nepal.

Pandey *et al.*, (2020) collected 625 species during the first Sino-Nepal collaborative Botanical expedition to West Nepal's Bajhang district. But a total of 503 species were represented in this collection.

# CHAPTER III

## MATERIALS AND METHODS

### 3.1 Materials

#### 3.1.1 Site Description:

The Study was conducted in the area of Sworgadwari Nagarpalika which lies in the north of Pyuthan District in Mid-Western Development Region of Lumbini Province, covering an area of 223.96 sq. km ranging from 650m at Bhingri to 2324m at Sworgadwari Temple. It lies at latitude between 28° 5' N to 28° 10' N and longitude between 82° 37' E to 82° 45' E. Sworgadwari Nagarpalika is surrounded by Dang to South, Rolpa to North and west and Pyuthan Municipality to east. It takes 3-4 hours to reach Sworgadwari Municipality from Bhalubhang by bus and approximately same time from Ghorahi Dang. Sworgadwari Municipality is also famous for its religious site known as Sworgadwari Temple, located 13.5 km north of Bhingri Pyuthan.

The present study was carried out around the Sworgadwari Hill lying at an altitude of 2261m and with the latitudes and longitudes being 28° 7' N and 82° 40' E (Fig:1). Similarly, the collections were carried out on its adjoining areas like dadakharka, Dharampani, Sidenikhola, Chelepata, Rabhang, etc. While collecting the plants, the altitudinal variation of 650m to 2261m was found.

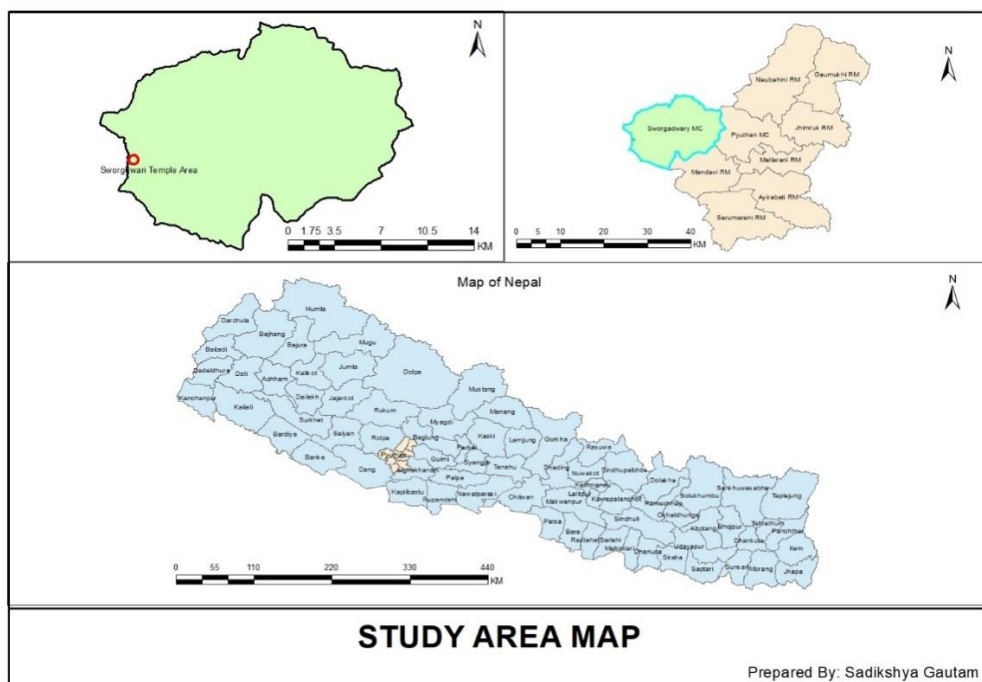
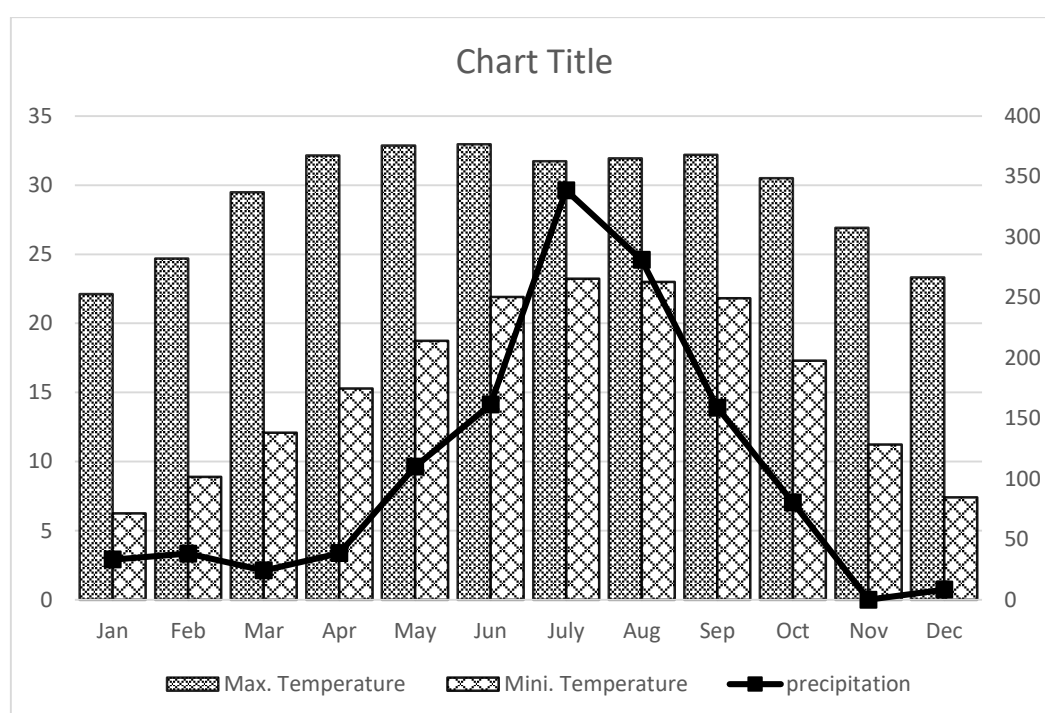


Fig 3.1: Study area map

### 3.1.2 Climate

Since the study area is located at a height of 2261m above sea level with many hills around it, cool wind usually blows throughout the year. The climate is tropical at lower altitude and moist temperate at higher altitude. There is no meteorological station in the Sworgadwari area. So, the meteorological data of Department of Hydrology and Meteorology of Government of Nepal (GoN) for the last 10 years (2013-2022) of nearest meteorologically stations (Bijuwar Tar, Pyuthan district; altitude: 835 m asl for temperature and precipitation) was used. The mean annual precipitation (Prepn) recorded in the station for the last 10 years was 106.0365 mm (range: 82.3 mm in 2014 to 152.6533 mm in 2021). Highest amount of precipitation (338.631 mm in average) was recorded during the monsoon period (June to September; Fig. 2). The mean annual Maximum temperature (Max. Temp) varies from 22.1081 to 32.9613°C and minimum temperature (Mini. Temp) varies from 6.2525 to 23.2282°C (Fig. 2)



**Fig 3.2:** Ten years (2013-2022) average temperature and precipitation recorded at Bijuwar Tar, Pyuthan district (altitude: 835 m asl). (Source: Department of Hydrology and Meteorology, GoN, Kathmandu).

### 3.1.3 Vegetation

The study area consists of tropical, sub-tropical as well as temperate type of vegetation. The forest is mixed forest (*Pinus-Shorea robusta*) but mostly dominated by *Pinus* trees. From 700-900m, mixed forest was found which included *Shorea robusta* along with *Diploknema butyraceae* (Chiuri), *Bombax ceiba*, *Pinus roxburghii*, *Acacia catechu*, *Bauhinia* sp., *Terminalia chebula*, *Phyllanthus emblica*, etc. The common shrubs species were *Calotropis* spp., *Berberis aristate*, etc.

*Pinus roxburghii* is dominant species and other associated tree species such as *Rhododendron arboreum*, *Citrus sinensis*, *Pyrus pashia*, etc. in the elevation range 900-2000m. The common shrubs species were *Berberis aristate*, *Rubus ellipticus*, *Osbeckia nepalensis*, etc. and herbs were *Swertia* sp., *Rubia manjitho*, *Galium* sp. etc.

## 3.2 Methods

### 3.2.1 Methods of plant collection and herbarium preparation:

During field visit materials like GPS, knife, scissors, paper tags, polythene bags, newspaper, tissue papers, needle, threads, notebook, pen, hand lens, Microscope, brushes, forceps, plastic jars, labelling tags, herbarium press and digger are used.

The plant specimens were gathered from the end of September 2022 to May 2023 within the altitudinal range of 650- 2261m covering all the habitat types wherever possible. The five field visits included three seasons. During exploration, only dicot plant specimens were enumerated and recorded with photographs and noted their diagnostic characters. The plant specimens were properly tagged in the field during collection with field notes. The collection route followed was mainly the walking trail, river side, inner trails of forest etc. Morphological characters along with vegetative parts (stem, leaves, and inflorescence) and reproductive parts (calyx, corolla, stamens, carpels, fruits, etc.) were observed.

The plant collection, herbarium preparation and their preservation was based on the herbarium technique following Forman & Bridson (1989). Using a 21×14-inch herbarium press on the collecting site, the gathered plant specimens were pressed, and their drying condition was regularly checked. Following the confirmation of

the specimens at the species level, the well-dried specimens were mounted on herbarium sheets and systematically labeled. An additional set of the plant species was gathered throughout the plant collection process for taxonomic treatments in the lab. The collected plant specimens were deposited in ASCOL.

The collected flora were categories either native or government protected under CITES or under IUCN category. The collected data about plants and different categorical variable values was presented quantitatively. The local names were given which were noted in the field if not from secondary literature ([www.efloras.org](http://www.efloras.org)).

### **3.2.2 Taxonomic description:**

Taxonomic treatment including species description, identification keys and illustration are generated for each species. The collected data of plants arranged and written on the basis of modern classification system (APG IV system). The description of morphological characters and reproductive characters of the collected specimens was mainly based on the fundamental guidelines of Flora of Nepal. Based on the detailed characteristics that have been noticed in the field as well as the other relevant literatures Dichotomous keys have been made to families, genera and species. The keys of families, Genera and species are prepared by making data matrix.

### **3.2.3. Species Identification**

The plant specimens were identified by using relevant literatures (Hooker 1872-1897; Watson *et al.* 2012; Davis and Cullen, 1988 etc.) and further compared them with the standard herbarium stored at National herbarium and Plant Laboratories, Godawari, Lalitpur (KATH). Expert advice was used to identify species that were confusing. Finally, species were validated by comparing digital photographs of herbarium specimens deposited at KATH, TUCH, TI (Herbarium of the University of Tokyo, Japan), K (Royal Botanic Garden, Kew, UK), E (Royal Botanic Garden, Edinburgh, UK) and BM (British Museum). To complete and accept the genus names, online databases such as the International Plant Name Index and the Plant Name Record of the World were consulted and other online databases such as the Tropicos, An annotated checklist of Flowering plants, Kew Herbarium Catalogue, the Chinese Virtual Herbarium Catalogue, the Global Biodiversity Index Faculty,

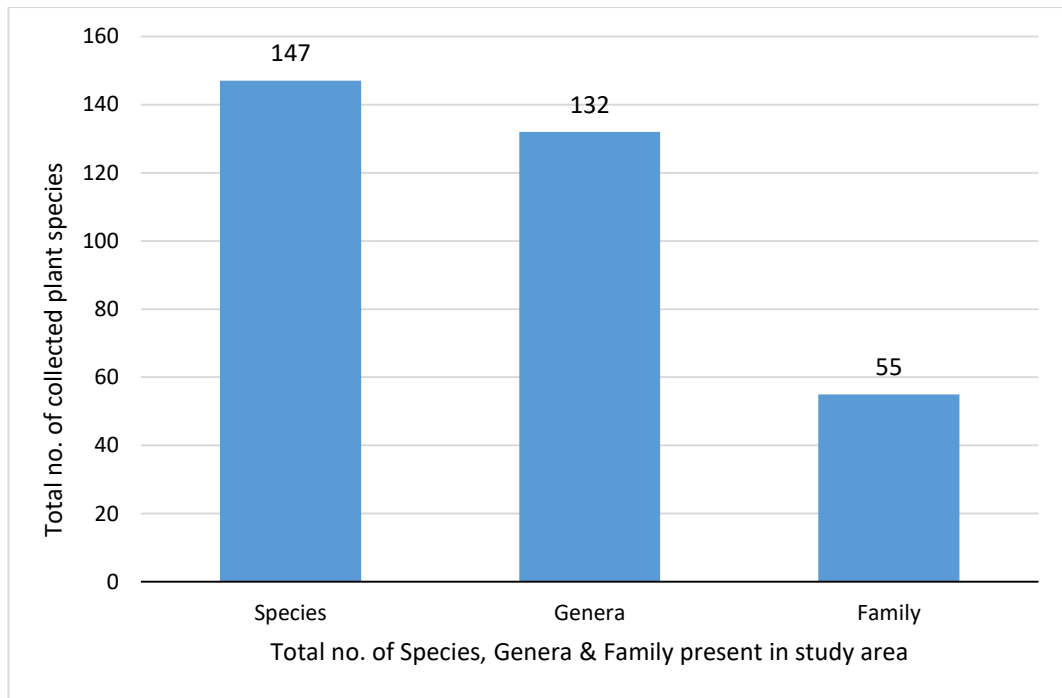
and the Flora of Himalaya Database. Similarly, Plant of the World online (POWO;[www.powo.science.kew.org](http://www.powo.science.kew.org)) is used for the distribution of the species and to know the name of accepted species. The process of species confirmation was done by studying plant parts with their taxonomic characteristics and referring to the accessible flora books; Flora of Bhutan, Flora of British India, Flora of Kathmandu valley, Plants of Nepal and the taxonomic treatments on the Flora of China website.

## CHAPTER IV

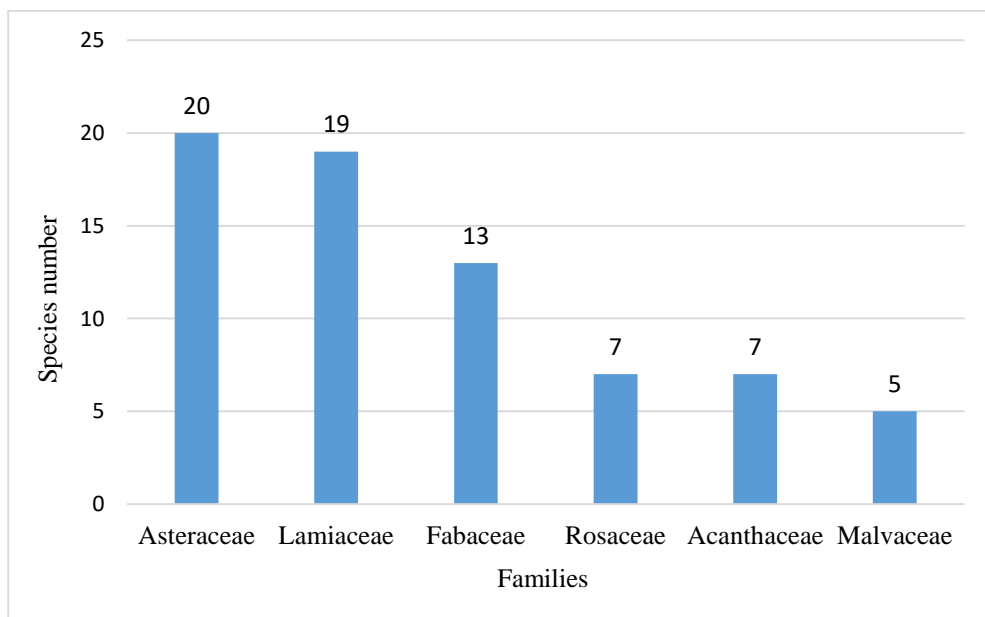
### RESULTS

According to the current investigation on the floral composition of dicots plants in the north western region of Pyuthan District (Sworgadwari Hill, research site), a total of 147 species were identified, belonging to 132 distinct genera and 55 distinct families (Fig. 4.1). Every species that was gathered has a species-level identification but 2 species are still unidentified. The majority of the species were found in the 700–1200 m altitude range near the roadside and in forested areas. With 20 species and 19 genera, the Asteraceae family was the largest among them, followed by the Lamiaceae family with 19 species and 16 genera. The next main families were similarly Fabaceae with 13, Acanthaceae and Rosaceae with 7 each, and Malvaceae with 5 species (Fig. 4.2 & 4.3). Comparably, there were 30 monospecific families, 13 families with two species, and 6 families with three species (Appendix I). The APG IV (2016) system of flowering plant classification was used to arrange the families that were encountered in this investigation.

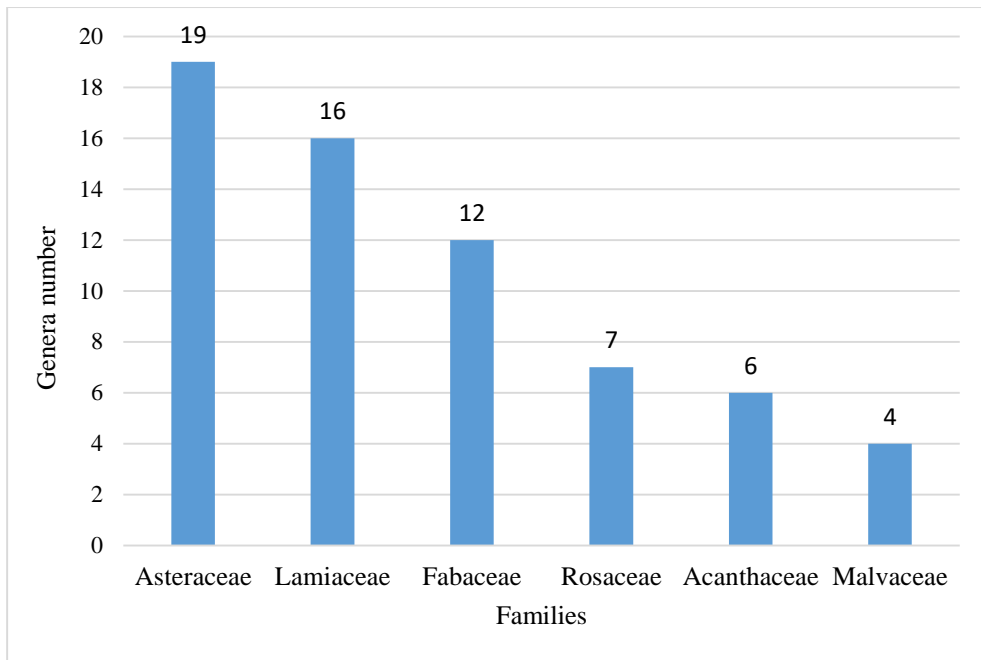
The largest genera among all the species collected in the study area were *Scutellaria* with 3 species and *Justicia*, *Clematis*, *Euphorbia*, *Oxalis*, *Flemingia*, *Grewia*, *Swertia*, *Solanum*, *Leucas*, *Jasminum* and *Anaphalis* with 2 species and other genera were found to be monospecific. Approximately 52% (77 species) of the 145 species were represented by herbs, 27% (39 species) by shrubs, 14% (21 species) by trees, and 7% (10 species) by climbers which is shown in figure 4.4 (Appendix II).



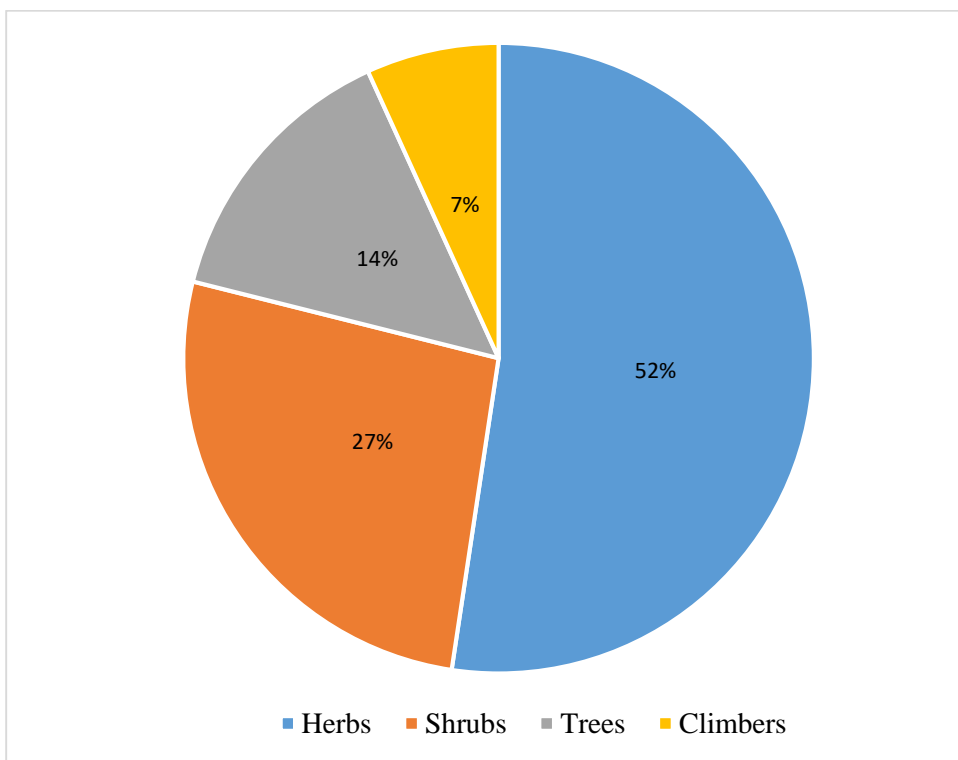
**Fig. 4.1:** Bar diagram displaying the species, genus, and family composition



**Fig. 4.2:** Six families are displayed in a bar graph according to the total number of species.



**Fig. 4.3:** Six families are displayed in a bar graph according to the total number of genera



**Fig 4.4:** Pie chart displaying the different plant species' life stages in the study areas

#### 4.1 Taxonomic Treatment

### ORDER: RANUNCULALES

#### Keys to Family:

- 1a.** Leaves alternate, spiny or toothed margin.....2
- 1b.** Leaves opposite, entire margin.....**Ranunculaceae**
- 2a.** Sepals 6-9 in 2 or 3 whorls, stamens 6, 1 carpellate, berry fruit.....**Berberidaceae**
- 2b.** Sepals 2 or 3, uniseriate, stamens numerous, carpel 2 or many, fruit capsule..... **Papaveraceae**

### FAMILY 1: BERBERIDACEAE

Perennial, evergreen, shrubs or trees; often spiny. Leaves alternate, simple, petiolate, exstipulate or stipulate, pinnate venation, margin spinose. Inflorescence terminal raceme, flower bisexual, actinomorphic, pedicellate or sessile. Perianth 2 or 3 merous, usually 6 each in whorls of 3, usually yellow or greenish, sepals 6--9 in 2 or 3 whorls; petals 6 in 2 whorls. Stamens 6, slightly adnate to base of petals, opposite to petals, anther 2-celled. Ovary superior, 1- carpellate, ovules numerous, short style. Fruit a berry, seeds 1 to numerous.

#### 1. **Berberis** L.

Evergreen spiny shrubs. Stems branched, glabrous, spinose, usually with 3-5-fid spines. Leaves simple, alternate, petiolate, clustered on short-shoots in axils of spines. Terminal raceme flower, yellowish, tri-merous, pedicellate. Sepals 6-10 in 2-3 whorls. Petals 6 in 2 whorls, Stamens 6, ovules 1-10. Berries ellipsoid, juicy.

**Berberis asiatica** Roxb. ex DC., *Syst. Nat.* 2: 13. 1821.

*Berberis hypoleuca* Lindl.

चुत्रो

Evergreen spiny shrubs up to 3m high. Stems branches, hairless, spinose, usually bearing spines of 1 cm with 3-5 fid. Leaves simple, ovate, alternate, petiolate (3mm long); leaf blade 2-3.5×1-3 cm, dark green dorsal surface and light green on

ventral surface, leaflets arranged in tufts of 5-8; base attenuate; margin with spinose teeth; apex acute. Inflorescence terminal racemes elongating in fruit to 3 cm, pedicel 1 cm. Flowers yellowish, 3-merous, Sepals 6, broadly ovate, yellow, in 2-whorls; petals 6, obovate, 1-7×3-6 mm, yellow, in 2 whorls; Stamens 6, opposite petals; ovary club shaped, style 1mm, ovules 2-4. Berries ca. 10×7mm, black when ripe, juicy; seeds 1 to few.

**Distribution:** Himalaya (Garhwal to Bhutan), Assam, China (Yunnan).

**Nepal:** West, Central and East

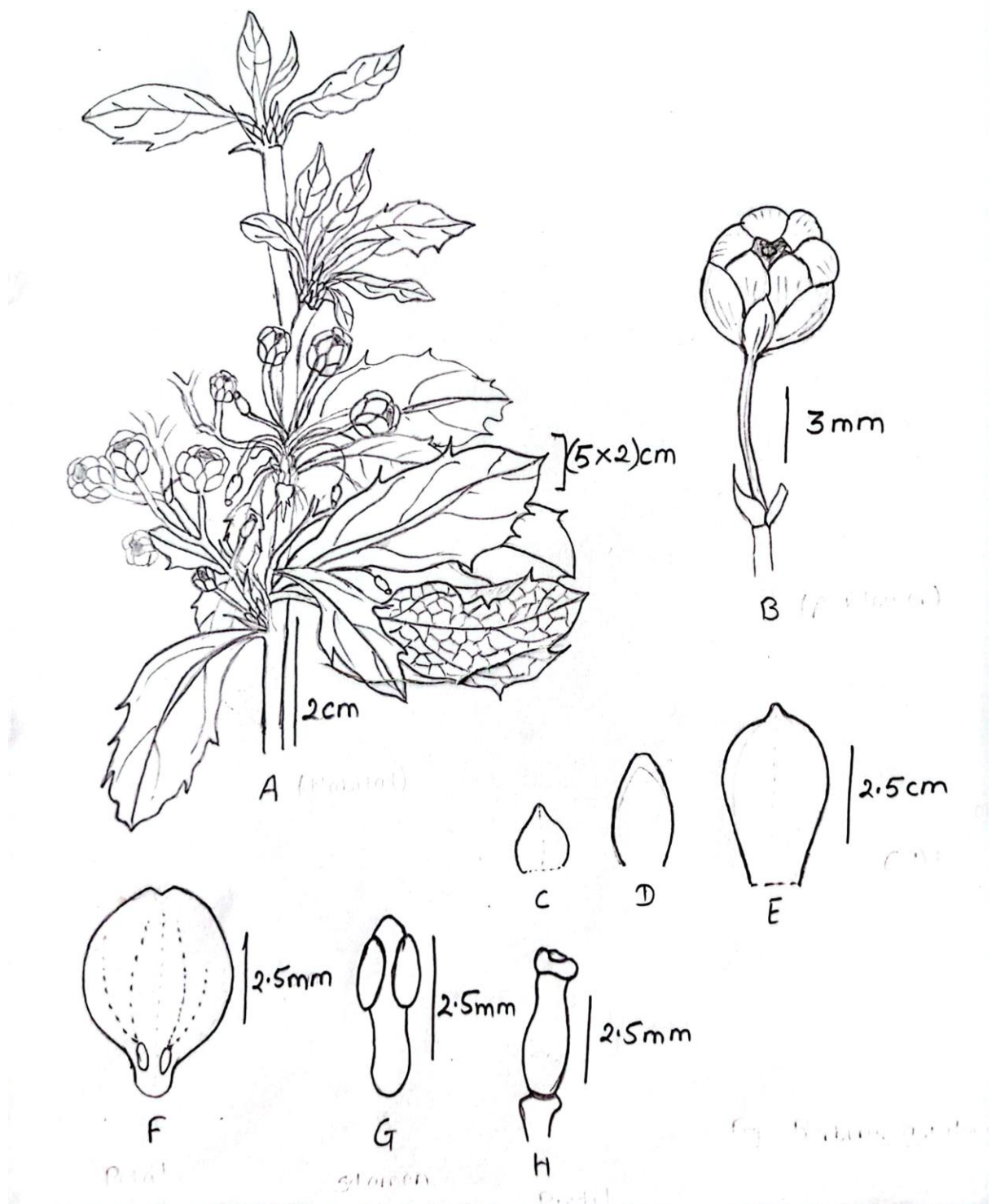
**Altitudinal range:** 1200- 2500m.

**Fl.:** March-May.

**Fr.:** April-June

**Ecology:** Open area, roadsides.

**Representative collection:** *Pyuthan*, Sworgadwari, 2200m, 15 Jan. 2023, S. Gautam, SG4167, ASCOL Herbarium.



**Fig 4.5.** *Berberis asiatica* Roxb. ex DC. A: Flowering and Fruiting branch, B: Flower, C: Outer sepal, D: Median sepals, E: Inner sepals, F: Petals, G: Stamens, H: Pistil

## FAMILY 2: PAPAVERACEAE

Annual or perennial herbs or shrubs with erect, branched stem; produce yellow or milky latex. Leaves simple, alternate or spirally arranged, exstipulate, lamina lobed. Inflorescence solitary, terminal cyme or racemose. Flower complete, pedicellate, trimerous. Sepals 2 or 3, uniseriate, deciduous, polysepalous. Petals 4-6, biseriate, rolled, polypetalous. Stamens numerous or 4 in two whorls, polyandrous, anther ditheous. Carpels 2 or many, syncarpous, ovary superior, ovules numerous. Fruit capsule.

### 1. *Argemone* L.

Annual to perennial herbs with branched spiny and lactiferous stem; Leaves pinnate, hairless, spiny margin, stipule absent; terminal 3-merous flowers, 2 or 3 spiny sepals; 6 petals arranged in 2 whorls, yellow, white, orange; Many free stamens in 2 whorls; 3 or 4-5 carpellate, fused, ovules many; Fruit capsule, seeds many.

*Argemone mexicana* L.; *Sp. Pl.* 508 (1753)

Prickly Poppy

थाकल (Thakal)

Annual herbs c.a 50 cm tall. Erect, cylindrical, green stem with few scattered spines. Leaves alternate, sessile, serrate, lobed oblong, irregular spiny margin with white veins, glabrous, pinnate. Flower yellow. Sepals 2, thorny or spiny. Petals 6, biserate, 4×3 cm, yellow, obovate. Stamens numerous, spirally arranged in 2 whorls. Carpels 5, fused, ovules numerous, ovary superior, styles short or absent. Fruit spiny capsule, oblong, covered by hard spines, numerous seeds each capsule, seeds globose.

**Distribution:** Native to Central and Tropical America, introduced in China

**Nepal:** West, Central and East

**Altitudinal range:** 150-1400m

**Fl.:** Apr.-June.

**Fr.:** May-.Aug.

**Ecology:** Roadsides

**Representative collection:** *Pyuthan*, Bhringri, 745m, 25 May 2023, S. Gautam, SG4212, ASCOL Herbarium.

### FAMILY 3: RANUNCULACEAE

Annual or perennial herbs or woody climbers. Leaves opposite or alternate, exstipulate, pinnate venation. Flowers occurs in terminal or axillary cymose, solitary or in clustered, bracteates, peduncle present. Sepals 5-8, showy, petaloid, rarely spurred at base. Petals 1- many or absent, free, nectariferous. Stamens numerous. Numerous carpels, Ovary superior, 1-celled. Fruit an etaerio of follicles or etaerio of achenes or a berry or capsule.

#### 1. *Clematis* L.

Vines woody or herbaceous and perennial, rarely erect shrubs or herbs. Leaves opposite, rarely alternate, simple or compound; leaf or leaflet blades palmately veined. Inflorescences cymose, sometimes solitary, usually pedunculate, 2-bracteate. Flowers bisexual or unisexual. Sepals 4 to 8, petaloid, spreading, ascending, or erect. Petals absent. Stamens numerous, linear or petaloid staminodes; anthers introrse. Carpels numerous, usually pubescent or villous; ovaries 1-ovuled; ovule pendulous, solitary. Style elongated after anthesis, rarely slightly or not elongated. Achenes usually  $\pm$  bilaterally compressed; persistent style usually strongly elongated, plumose.

#### Key to Sepecies

- 1a. Cordate leaves with heart shaped base and dentate margin..... **C. connata**
- 1b. Lanceolate leaves with round base and entire margin..... **C. gouriana**

***Clematis connata*** DC. *Prodr.* 1: 4. 1824.

Bhainsee laharaa (भैसेलहरे)

Perennial woody climbers, branches puberulous; leaves compound, pinnate, 5-leaflets, puberulous, petiole 4-6 cm, leaflet 4-9 $\times$ 3-6cm, ovate, base heart shaped, apex acute, margin dentate; Inflorescence auxillary cymes, flower arises from leaf axils, companulate creamy white flower, peduncle 2-10cm; Sepals 4, campalulate, oblong, 1-2 $\times$ 0.5 cm; stamens hairy, many, 1-1.5 cm, filaments pubescent, anther glabrous, style short, 0.8- 1.2 cm, achene ovate.

**Distribution:** Himalaya (Bhutan), India, Myanmar, New Guinea, Philippines, Sikkim, China.

**Nepal:** West, Central and East

**Altitudinal range:** 2000-3300m

**Fl.:** Aug.-Sept.      **Fr.:** Sept- Nov.

**Ecology:** Mixed forests

**Representative collection:** *Pyuthan*, Sworgadwari, 2123m, 17 November 2022, S. Gautam, SG442, ASCOL Herbarium.

**Clematis gouriana** Roxb. ex DC., *Syst. Nat.* 1: 138. 1817

*C. vitalba* subsp. *gouriana* (Roxb. ex DC) Kuntze;

Junge lahara (जुँगेलहरा)

Climbing shrubs, stem brown, branches puberulous. Leaves opposite, pinnate, trifoliate or petafoliate, petiole 1-5cm, leaflets 3-8×1.5-5 cm, ovate or lanceolate, acuminate apex, rounded base, entire margin, both surfaces glabrous, reticulate venation, shining upper surface. Small flowers in many branched panicles, cymes axillary or terminal, peduncle 1.2-5cm, bracts simple, triangular to ovate, 4-8mm, Flowers white, 1-1.5 cm diameter, pedicel 5-10 mm, Petals absent, 4-greenish white sepals, 6x4mm, oblong-ovate, apex obtuse, pubescent; stamens many, free, 3-7.5mm, filament 2-7 mm long, glabrous; anthers narrowly oblong 1.1-1.5mm. Carpel 10-15, pubescent; Achenes lanceolate, 3x1mm, ovoid, hairy, style persistent, 30mm long.

**Distribution:** Himalaya (Bhutan), India, Myanmar, New Guinea, Philippines, Sikkim, China.

**Nepal:** West, Cental and East

**Altitudinal range:** 550-1600m

**Fl. & Fr.:** Sep- Jan.

**Ecology:** Slopes, climbing on trees

**Representative collection:** *Pyuthan*, Bhringrikot, 1247m, 30 Sept. 2022, S. Gautam, SG426, ASCOL Herbarium.

## ORDER: VITALES

### FAMILY 4: VITACEAE

Herbs, shrubs or small trees; branched; Leaves alternate, simple or pinnately compound; petiolate, stipules large, persistent or caducous. Inflorescence corymbose cymes, Flowers bisexual, actinomorphic, 5-merous. Calyx campanulate, lobed. Petals free. Stamens inserted on staminodal tube which is adnate to corolla; filaments alternating with staminodal lobes; anthers coherent, ovary superior, 4-6 celled, ovule 1 per cell, short style, fruit berry, 6 seeded.

#### 1. *Leea* D. Royen

Perennial Erect shrubs or small trees. Leaves alternate, pinnately compound, rarely simple or 3-foliolate. Inflorescences compound dichasial or umbelliform. Flowers 4- or 5-merous, bisexual. Lower part of petals adnate to staminodial tube on disk. Disk deeply cupulate. Ovary discoid, 4-6(-10)-locular; ovule 1 per locule. Berry depressed-subglobose.

*Leea asiatica* (L.) Ridsdale, *Bot. hist. hort. Malab.* 189. 1980

*Leea crispa* Royen ex L.

गलेनी (Galeni)

Perennial erect shrubs up to 2m tall. Stem branched, sparsely pubescent. Leaves 3-foliolate, alternate; petiole 2-4cm; leaflet blade ovate-oblong, 6-17×3-8cm; base rounded; margin serrate, apex acute; glabrous or slightly hairy on veins. Inflorescence dichasial or umbelliform. Flowers greenish white in corymbs cymes of 5-17 cm long, 4 or 5-merous, bisexual; pedicel 1-2mm long; Calyx 5, 2.5mm, cup-shaped, gamosepalous; petals elliptic, 2-3mm long; stamens 5 united, filament 2mm long, anther basifixed. Ovary globose; style short; stigma bilobed. Fruit c.a.1cm in diam., berry, purple black, 6 seeds.

**Distribution:** Himalaya (Kashmir to Bhutan), India, Burma, Thailand, China.

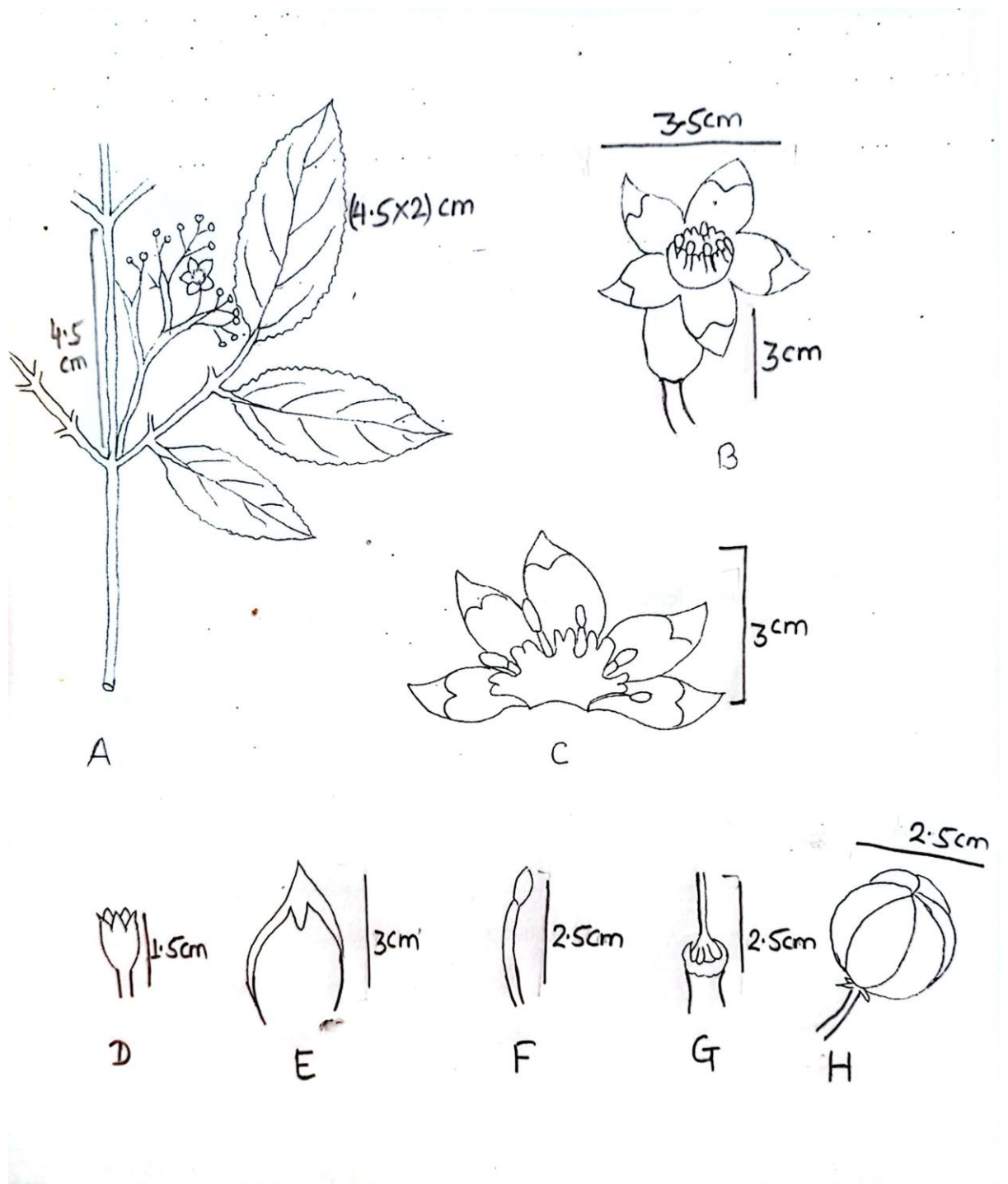
**Nepal:** West, Central & East

**Altitudinal range:** 400-900m.

**Fl. & Fr.:** Apr. - Jul.

**Ecology:** Forest, along road sides.

**Representative collection:** *Pyuthan*, Bhringri, 838m, 24 Sept. 2022, S. Gautam SG406, ASCOL Herbarium.



**Fig. 4.6:** *Leea asiatica* (L.) Ridsdale. A: Flowering branch, B: Flower, C: Dissect Flower, D: Sepals, E: Petals, F: Stamens, G: Pistil, H: Fruit.

## ORDER: FABALES

### Keys to Family

- 1a.** Herbs, shrubs or twining vines with unifoliate or pinnately compound leaves; 1-carpellate; legume or lomentum fruit..... **Fabaceae**
- 1b.** Herbs, shrubs or small tree with simple leaves; 2-8 carpellate; fruit capsule or berry..... **Polygalaceae**

## FAMILY 5: FABACEAE

Herbs, shrubs or trees or twinning vines. Leaves alternate or opposite, pinnately compound, stipulate or exstipulate, petiolate, ovate-elliptic. Inflorescence terminal or axillary raceme. Flowers bisexual, zygomorphic or actinomorphic. Calyx 5, connate, tubular or campanulate. Corolla 4-5, free. Stamens 4- (10) numerous, monadelphous or diadelphous. Ovary 1-carpellate, superior, ovules 1 or more. Styles as many as carpel, simple. Fruit a legume or lomentum or nut. Seeds often pea or bean-like.

### Keys to Genera

- 1a.** Herbs, shrubs, or trees..... 2
- 1b.** Twining or climbing or lianas shrubs..... 8
- 2a.** Simple unifoliate leaves..... **Pleurolobus**
- 2b.** Compound; uni or bipinnate or 3-foliolate leaves..... 3
- 3a.** Inflorescence pseudoraceme or pseudopanicule; 13-27 leaflets..... **Tephrosia**
- 3b.** Inflorescence terminal or axillary raceme or cyme..... 4
- 4a.** Herbs, trifoliolate rarely unifoliate, stamens diadelphous, 1 or 2 ovules..... **Uraria**
- 4b.** Shrubs or trees, stamens monadelphous rarely diadelphous, 2-many ovules..... 5
- 5a.** Erect shrubs, ovary subsessile, ovules 2..... **Flemingia**
- 5b.** Ovary sessile, ovules numerous..... 6
- 6a.** Deciduous trees; stem have prickles; flower red in colour..... **Erythrina**

- 6b. Deciduous shrubs; stem without prickles; flower purple or pale pink.....7
- 7a. Leaves 3- foliate, legume or pod flat..... **Desmodium**
- 7b. Leaves 11-25 foliate, legume linear..... **Indigofera**
- 8a. Lianas or climbers; pinnate or trifoliate compound leaves.....9
- 8b. Tendril climbers; paripinnate, leaflets 2..... **Lathyrus**
- 9a. Large climbers or shrubs, branches with curved thorns..... **Biancaea**
- 9b. Climbers or linans, branches without thorns..... 10
- 10a. Petiole 4-7 cm long, Legumes having 1 or 2 seeds..... **Rhynchosia**
- 10b. Petiole 0.5-1.5 cm long, Legumes having more seeds..... 11
- 11a. Leaves 8-12 pairs; 2-6 seeds per pod or legume, seeds black in lower part and red in upper part..... **Abrus**
- 11b. Leaves trifoliate; 2-7 seeds per legume, dark brown in colour..... **Cajanus**

### 1. **Abrus L.**

Slender shrub. Stem branched, slender. Leaves: pinnate, opposite. Leaflets: numerous, stipulate. Flower: racemose borne on clusters, 2-valved. Calyx: truncate, upper short, clawed. Corolla: purple or pink. Stamens: 9. Ovary: sessile, hairy. Pods: oblong, with 2-6 seeds.

**Abrus precatorius** L., *Syst. Nat.*, ed. 12. 2: 472. 1767

*Glycine abrus* Linn.

रातीगेडी (Ratigedi, Ankhigedi)

Perennial lianas. Stem sparsely white strigose. Leaves paripinnate, leaflets 8-13 paired, opposite, petiole short, blades suboblong, 1-2×0.4-0.8 cm, glabrous adaxially, rounded at base, truncate at apex. Inflorescence axillary raceme, 3-8cm. Flowers small, dense, calyx campanulate, 4-toothed, corolla purple; standard with triangular claw; stamens 9. Ovary hairy, legumes, 2-3×0.5-1cm, leathery, dehiscent, with 2-6 seeds. Seeds black in lower parts and red in upper parts.

**Distribution:** Tropics and subtropics of Africa, Asia, south to Australia, Pacific Isl.

**Nepal:** West and East

**Altitudinal ranges:** 300-1100m

**Fl. & Fr.:** Mar. - Oct.

**Ecology:** Roadside, stream side

**Representative collection:** *Pyuthan*, Bhringri, 750m, 27 Sept. 2022, S. Gautam, SG414, ASCOL Herbarium.

## 2. **Biancaea** Roth.

Perennial climbers or shrubs covered with dense curved thorns or prickles. Pinnately compound leaves with 3-14 pairs of pinnae, 5-12 pairs of leaflets, hairy, acute. Raceme inflorescence with 5-20 flowers in clusters. Sepals 5, petals yellow with reddish purple spot. Stamens 5-10, carpel 1, ovules 6-many, arranged in 1 or 2 lines. Fruits pods, 4-9 seeds in each pods.

**Biancaea decapetala** (Roth) O. Deg. *Fl. Hawaiiensis*: K7 (1936).

*Caesalpinia decapetala* (Roth) Alston in Trimen

*Reichardia decapetala* Roth.

Large climbing shrubs, young branches have curved thorns; Compound leaves with 3-14 pairs of pinnae, each pinnae consists 5-12 pairs of leaflets, leaflets oblong, (1-2×0.5-1)cm, pubescent, acuminate; Inflorescence raceme having 5-18 flowers; Sepals 5, fused at base, 7-10mm; Petals yellow colour with reddish purple spot; Stamens 10, filament hairy; Carpel green, 1 carpellate, 1.5mm, ovary superior, pubescent, 8-numerous ovules in 2 lines, style erect; Fruit pods, flattened, beaked at tip; Seeds 4-9, black.

**Distribution:** Himalaya, India, Ceylon, S.E. Asia, Malaysia, China, Japan, Africa, America

**Nepal:** West, Central and East

**Altitudinal range:** 1000-2200m

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

**Ecology:** On grassland, forest margin, riverbank, on rock walls.

**Representative collection:** *Pyuthan*, Bhringri, 730m, 21 Dec. 2022, S. Gautam, SG4102, ASCOL Herbarium.

### 3. **Cajanus** Adanson

Twining vines or climbing shrubs, leaves pinnately compound or trifoliolate, stipulate small or absent, petiolate. Axillary or terminal raceme, bracteates, pedunculate. Campanulate calyx, 5 lobed, upper 2 connate. Stamens 10, diadelphous, ovules 2-6, legumes or pods, hairy, 2-10 seeds

**Cajanus scarabaeoides** (L.) Thouars, *Dict. Sci. Nat.* 6: 617. 1817.

Annual or Perennial, woody, twining vines up to 2m; Stem branches, hairy, winding; Leaves Pinnate, trifoliolate, pubescent, ovate or elliptic - obovate, 1.5-4×0.5-2.5 cm, petiole 1.5-2.5cm, obtuse apex, pubescent on both surface; Inflorescence axillary raceme, 1.5 cm long, pedicel 1-3mm, flowers 1-5; Calyx campanulate, 5-7mm, upper 2 connate; corolla yellow, 8-10mm, deciduous; Stamens numerous, fused in a tube; 2-6 or several ovules; Legumes or pods oblong, 15-25mm long, densely pubescent, contain 1-7 seeds, seeds dark brown.

**Distribution:** Bhutan, Bangladesh, India, Indonesia, Japan, Africa, Thailand, Srilanka, Malaysia.

**Nepal:** West, Central and East

**Altitudinal range:** 100-1500m

**Fl. & Fr.:** Sept. - Dec.

**Ecology:** On forest margin, roadsides

**Representative collection:** *Pyuthan*, Bhringrikot, 1230m, 30 Sept. 2022, S. Gautam, SG433, ASCOL Herbarium.

### 4. **Desmodium** Desv.

Deciduous herbs, shrubs or trees. Stem branched, pubescent. Leaves: pinnately 1-3 foliate, petiolate, slightly hairy, leafblades variable in shape and size. Inflorescence: axillary racemose. Pea like flower. Calyx: tube short, upper 2 connate, lower lip 3 dentatae. Pods or legume: flat, linear, lower suture crenate, upper suture straight, compressed.

**Desmodium elegans** DC., *Ann. Sci. Nat.* (Paris). 4:100. 1825.

रातोबाख्रेघास (Raato Baakhre Ghaas)

Annual deciduous shrubs, 1-2m tall. Stem branched, cylindrical, hairy. Leaves 3-foliolate, (2-3×0.5-2) cm, ovate-lanceolate or ovate-elliptic; Petiole 2cm long,

slightly pubescent, apex rounded, base obtuse or cuneate, margin entire; Inflorescence: terminal racemes, spike, often 2-3 flowers at each node. Pedicel 5mm; pea like flower. Sepals: 4 mm, 4-lobed, fused, 1-nerved, sepal cup 2-3mm, blunt. Petals: purple, 0.7-2cm, elliptic, cuneate. Stamens 0.9cm, monadelphous, 10 (5 long, 5 short), Carpel: 0.3cm, hairy, stigma capitate, legumes or pods flat, hairy, 4-6 jointed.

**Distribution:** Afghanistan, Himalaya (Kashmir to Bhutan), China,

**Nepal:** West and Central                      **Altitudinal range:** 1200- 3000 m.

**Fl. & Fr.:** Jun- Sep.

**Ecology:** On open grassland, forest margin, roadsides

**Representative collection:** *Pyuthan*, Bhringri, 830m, 30 Sept. 2022, S. Gautam, SG432, ASCOL Herbarium.

## 5. *Erythrina* L.

Deciduous tall tree or shrubs, branches with dense prickles; leaves pinnate, 3-foliolate, petiolate, glabrous or slightly pubescent, acute, entire. Raceme, flowers in clusters, bracteates. Calyx campanulate, hairless. Petals red or orange, stamens diadelphous. Ovary hairy, 2-many ovules. Fruits legume or pods, 1-15 seeds.

***Erythrina stricta*** Roxb.; *Fl. Ind.* ed. 2, 3: 251 (1832).

Nepali name: Phaledo

Deciduous tree, up to 12 m tall, erect; branches has short whitish prickles; Leaves trifoliolate, alternate, petiole 10-15cm long, 7-19×7-24 cm, both surface hairless, base cordate or cuneate, apex acute, margin entire; Inflorescence terminal raceme, 15 cm, flowers arranged in clusters of 4-6; flower bisexual, red, bract ovate, calyx spathaceous, campanulate, glabrous; petals 5, deep red, 3-4.5 cm; Stamens 10, mono- or di-adelphous; ovary hairy, inferior, sessile, styles narrow, 1.5cm, ovary 1- celled, ovules many; fruit a pod, 5-10×0.5-1.5 cm, hairless; Seeds 1-3 or more, light or dark brown, kidney shaped.

**Distribution:** India, E. Tibet, Burma, Indo-china, China.

**Nepal:** West, Central and East                      **Altitudinal range:** 1000-1600m

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

**Ecology:** Forest, road sides.

**Representative collection:** *Pyuthan*, Bhingri, 828m, 15 Apr. 2023, S. Gautam, SG4153, ASCOL Herbarium.

**6. Flemingia** Roxb. ex W. T. Aiton.

Erect branching shrubs. Leaves: simple, 1- or 3-foliate, stipulate, petiole present, glabrous. Inflorescence axillary racemose or cymose. Flower occurs at the leaf axile or at branch end, Bracts deciduous or persistent. Calyx: campanulate, acute. Corolla longer than calyx. Legume or Pods short, not septate, hairy, 2-seeds.

**Keys to Species**

**1a.** Leaves simple..... **F. strobilifera**

**1b.** Leaves compound, trifoliate..... **F. macrophylla**

**Flemingia macrophylla** (Willdenow) Prain, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 66: 440. 1897.

*Crotolaria macrophylla* Willd.

*Flemingia congesta* Roxb.ex W.T. Aiton

Perennial, woody erect shrubs; 2.5m tall; Green, triangular branches; leaves trifoliate, stipule up to 2cm, acute apex, cuneate base, lateral leaflets smaller than terminal, petiole 3-6cm, 7-16×4-8cm, upper surface hairless; Inflorescence raceme, 5-30cm long, numerous flower. Calyx 7-9mm long, campanulate, corolla purple to pink, longer than calyx, ovary elliptic; legume or pod, small, 8-12×5mm, pubescent, 2 shiny black seeds, seeds globular.

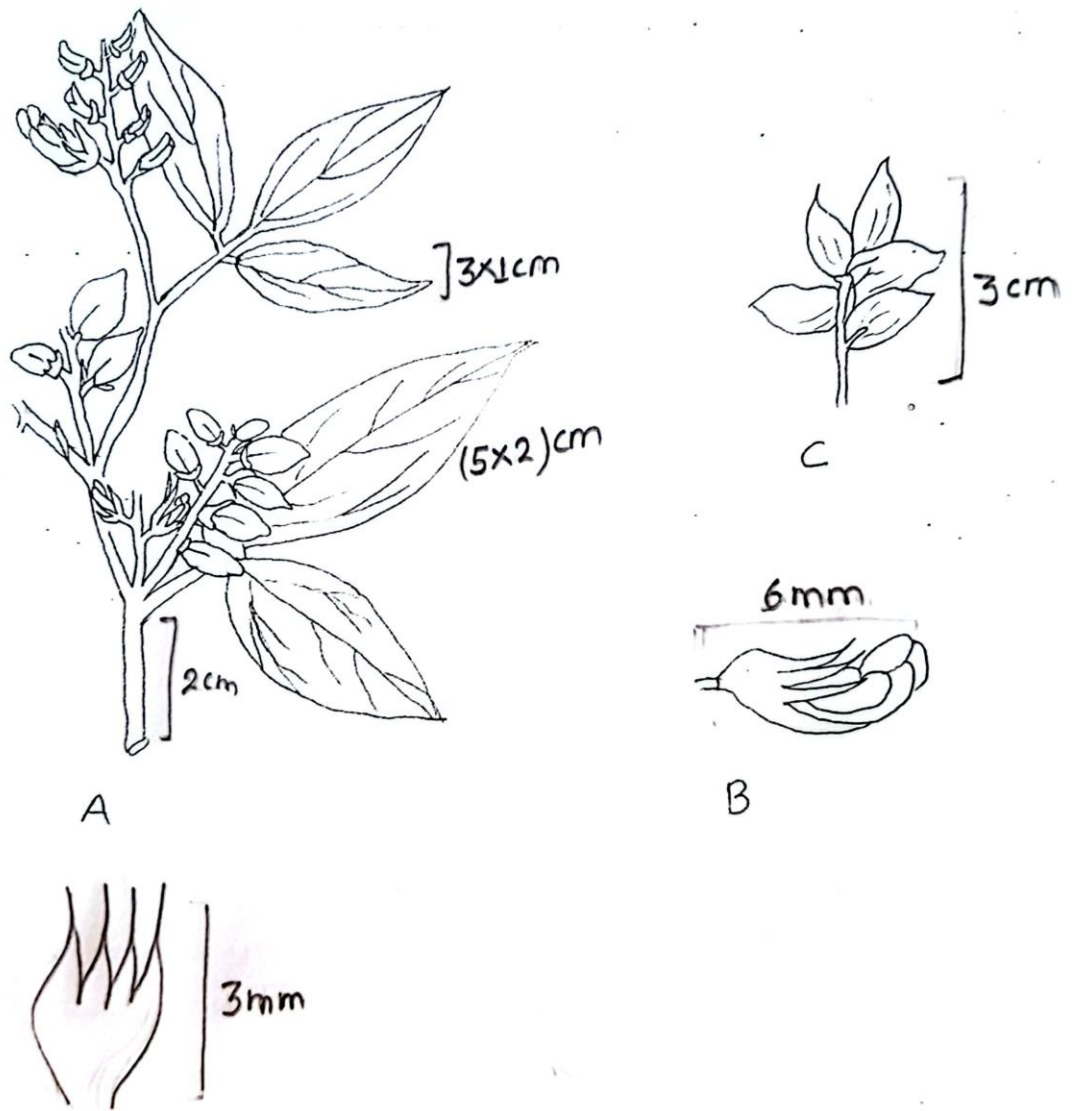
**Distribution:** Himalaya, India, Ceylon, S.E. Asia, Malaysia, Australia, China and Africa.

**Nepal:** West, Central and East      **Altitudinal range:** 700-1700 m,

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

**Ecology:** Forest margin.

**Representative collection:** *Pyuthan*, Bhingri, 731m, Nov. 16, 2022, S. Gautam, SG437, ASCOL Herbarium.



**Fig: 4.7:** *Flemingia macrophylla* (Willdenow) Prain. A: Flowering and Fruiting branch, B: Flower, C: Fruits.

**Flemingia strobilifera** (L.) W. T. Aiton,; H. Kew. ed. 2, 4: 350 (1812).

*Flemingia bracteata* (Roxb.) Wight.

Perennial erect shrub up to 1.5m tall; Branches cylindrical, slightly hairy. Leaves alternate, unifoliate, (7-9.5×2-2.5) cm, Petiole 0.5cm long. Stipule 0.6 cm. Ovate-lanceolate, base rounded, apex acute, margin entire; Glabrous above; Inflorescence axillary & terminal cymose or simple raceme, 8-14cm long, Bract 1.8 cm, hairy; Calyx pubescent. 2mm long; Corolla longer than calyx, white, 6mm long; Legume or Pods, covered by bracts, pubescent, 2 seeded.

**Distribution:** Tropics to subtropics in Asia, America (Jamaica, Trinidad).

**Nepal:** West, Central and East

**Altitudinal range:** 300-2300m

**Fl:** Feb- Aug.

**Ecology:** Slopes, Shorea robusta forest.

**Representative collection:** *Pyuthan*, Sworgadwari, 2070m, 17 Nov. 2022, S. Gautam, SG451, ASCOL Herbarium.

## 7. **Indigofera** L.

Deciduous, herbs or shrubs. Leaves imparipinnate, 11-15 foliolate, petiolate, stipulate. Inflorescence racemes, bracteates minute or absent, Flowers in clusters. Calyx campanulate, 5 toothed, subequal. Corolla shortly clawed, hairy. Stamens diadelphous, anthers ovoid, ovules 8- more. Legumes or pods straight or cylindrical, dehiscent, 6-10 seeds per pod.

**Indigofera heterantha** Wall. Ex. Brandis, For. *Fl. N.W. Ind.* 135 (1874).

*Indigofera gerardiana* Wall. ex. Barker

*Indigofera gerardiana* var. *heterantha* (Wall. Ex. Brandis) Barker

Sakino

Small or large shrubs up to 3m tall; Stem pubescent, grayish brown. Leaves deciduous, pinnately compound, 11-25 foliolate, petiole 5mm, leaflets opposite, elliptic- lanceolate, 4-12mm long, pubescent, base cuneate or rounded, obtuse apex. Inflorescence, raceme, purple or pale pink flower, arranged in spike like clusters, 2.5-5 cm long, pedicel 2mm, hairy, Calyx 3.5mm, campanulate, 5 subequal toothed, corolla purple or pale pink, 5-9mm, hairy; Stamens 7-10 mm,

didelphous, anthers ovoid, hairy; ovary sessile with 10 or numerous ovules; legume linear, straight, hairless, 6-10 seeds per pod.

**Distribution:** India, Afghanistan, Bhutan, Srilanka, Africa, China.

**Nepal:** West, Central and East      **Altitudinal range:** 600-3100 m

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

**Ecology:** Forest margin or slopes.

**Representative collection:** *Pyuthan*, Bhingri, 771m, 11 Feb. 2023, S. Gautam, SG4134, ASCOL Herbarium.

### 8. *Lathyrus* L.

Climbers or herbs, glabrous. Leaves pinnate, compound, 1-many paired leaflets, tendrils present, stipulate, parallel veins. Axillary raceme, pedunculate. Calyx campanulate, corolla blue or white, ovary linear. Fruits legume, 3-many seeded. Seeds smooth.

***Lathyrus sativus* L., *Sp. Pl.* 2: 730. 1753**

Annual herbs or climbers, 60 cm tall; stem suberect, hairless; compound leaves, paripinnate, tendrils at apex, leaflets 2, lanceolate to linear, 15-20×1.5-3 mm, margin entire, parallel veins; Inflorescence axillary raceme; Calyx 6-10mm long, campanulate, corolla blue or white, 12-20 mm long; ovary linear, Fruit legume, 2.5-3 cm long, 3-5 seeded, seeds smooth.

**Distribution:** Tropics to subtropics in Asia, America (Jamaica, Trinidad), Bhutan, Bangladesh, India, Indonesia, Thailand.

**Nepal:** West, Central and East      **Altitudinal range:** 300-2300m

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

**Ecology:** Cultivated land.

**Representative collection:** *Pyuthan*, Bhingri, 731m, 8 Jan. 2023, S. Gautam, SG4116, ASCOL Herbarium.

### 9. *Pleurolobus* L.

Herbs or shrubs. Leaves simple, 1- or 3- foliate, petiolate, stipulate, hairless or hairy, ovate-lance shaped, pointed. Terminal or axillary raceme or panicles,

bracteates, pedicellate. Calyx 4 or 5 lobed in 2 whorls, corolla varies in colour, stamens 10, diadelphous, many ovules. Fruit legume

**Pleurolobus gangeticus** (L.) J. St.-Hil. ex H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 184 (2018).

*Desmodium gangeticum* (L.) DC.

*Hedysarum gangeticum* (L.).

सालिपर्नी (Saliparnee), बन्गहते (Ban gahate)

Perennial shrubs up to 1.5 m tall, branches, pubescent; leaves unifoliate, simple, 4-12 × 3-7cm, ovate-elliptic or lanceolate, rounded or obtuse base, acute apex, glabrous above, petiole 2cm long, stipules 5.5mm long; Inflorescence terminal, and axillary racemes, 15-30 cm long, flowers at the ends of branches or leaf axils, pedicel 4mm long, pubescent; calyx 2mm, long pubescent; Corolla violet or green or white, 5.8 mm long; Stamens diadelphous (9+1), axillary filament free; Ovary hairy; fruit legume slightly curved, 7-8 jointed, hairs present.

**Distribution:** Tropical Africa, Himalaya (Kashmir-Bhutan), India, S.E Asia, China, Malaysia, Australia

**Nepal:** West, Central and East

**Altitudinal range:** 300-1000m

**Fl. & Fr.:** Apr.-Sept.

**Ecology:** Along Roadside, waste land, forest

**Representative collection:** *Pyuthan*, Bhingrikot, 1247m, 30 Sept. 2022, S. Gautam, SG428, ASCOL Herbarium.

#### **10. Rhynchosia** Lour.

Twinning Perennial herbs, leaves pinnately, 3-foliolate, leaflets entire, stipules persistent, Inflorescence axillary, racemes, deciduous bracts. Calyx campanulate, 5-lobed, upper 2 lobes connate. Corolla longer than calyx, circular or ovate, stamens diadelphous, free, anther uniform. Ovary sessile or sub-sessile, ovule 1-2, style curved, stigma terminal. Legume oblong, oblanceolate, dehiscent, inflated 1-2 seeded.

**Rhynchosia viscosa** (Roth) DC., *Prodr.* 2: 387. 1825.

*Glycine viscosa* Roth.

Twining perennial herbs up to 12m long with slightly woody stem having sticky glandular hair. Leaves: trifoliate, terminal leaflet broad, 5-7×3.5-5 cm, rhomboid, lateral leaflet 7.5-6 cm, ovate, pubescent on both sides. Petiole 4-7cm, stalk 3mm, lateral veins 3-5 pairs, base rounded, apex acute. Inflorescence: raceme axillary, solitary, 7-20 cm, pubescent, peduncle 2-3cm. Flowers are reddish yellow. Calyx: campanulate, 8mm, glandular pubescent, calyx tube 3mm, 5 lobes, upper two lobes fused, triangular, hairy. Corolla longer than calyx, yellow, round, velvet hairy. Stamens (9)+1, diadelphous, staminal tube 8mm, free, anthers uniform, ovary 5mm, subsessile, ovules 2, hairy, styles 9mm, curved, stigma oblique. Pods are pointed at tip, legume oblong, pubescent, seeds 2, black.

**Distribution:** India, Indonesia, Malaysia, Sri Lanka, Thailand, Africa.

**Nepal:** West

**Altitudinal range:** 1000-1100m

**Fl. & Fr.:** Aug- Oct

**Ecology:** Along Roadside

**Representative collection:** *Pyuthan*, Bhingrikot, 1050m, 30 Sept. 2022, S. Gautam, SG429, ASCOL Herbarium.

### **11. Tephrosia** Persoon

Annual to Perennial herbs. Leaves pinnately compound, imparipinnate, stipulate, silky brown hairs present, entire. Axillary or Terminal racemes, bracts present, pedicellate, corolla white or orange-red, stamens monadelphous, ovary with many ovules. Legume flat, 5-16 seeds in each legume.

**Tephrosia candida** DC., *Prodr.* 2: 249. 1825.

*Robinia candida* (DC.) Roxb.

Perennial herbs up to 2.5 m tall, stem branches, grayish white, covered with silky brown hair, leaves alternate, compound, 13-27 leaflets, petiolate, leaflets oblong-lanceolate or ovate, sharp or blunt tip, 2.5-7×0.6-1.3 cm, glabrous above, densely silky below, terminal raceme inflorescence up to 25cm long, pea like flower on branches, pedicel 1cm, Flower 2-2.5 cm long, calyx 4.5×5mm, corolla white, ovary with numerous ovules, Legume or Pods 6-10cm×6-9mm, pubescent, 10-15 seeds in each legume, smooth olive-green with dark patches.

**Distribution:** Himalaya (Kumaun to Bhutan), India, Burma, Malaysia

**Nepal:** Central and East

**Altitudinal range:** 300-1300m

**Fl. & Fr.:** Oct. - Dec.

**Ecology:** Slopes, grassland, cultivated land

**Representative collection:** *Pyuthan*, Bhingri, 731m, 16 Nov. 2022, S. Gautam, SG435, ASCOL Herbarium.

## 12. *Uraria* Des.

Shrubs or herbs, leaves unifoliate or tri- or multifoliate, stipules present. Inflorescence axillary or terminal racemes or panicles, small numerous flowers, bracteates, pedicellate, calyx 5 lobed, upper 2 lobes connate and shorter than lower, Stamens 10, diadelphous. Ovary with 2-10 ovules. Fruits legume.

***Uraria lagopodioides* (L.) DC. *Prodr.* 2: 324, 1825**

*Hedysarum lagopodioides* L.

*Doodia lagopodioides* (L.) Roxb.

Herbs, prostrate or spreading up to 60cm tall. Leaves trifoliate, rarely unifoliate, 1-2 cm long stalk (petiole), central leaflet round or elliptic, 2-5×1.5-3 cm, hairy, base cordate, apex rounded. Inflorescence terminal racemes, 3-6 cm long, pedicel 4mm, densely small flowered. Sepal: 5 parted, lower sepal longer than upper, hairy. Petals: pale purple, pea like, 6mm, base flat. Ovary hairless, 1-2 ovules; fruit: legume or Pods, covered by sepal cup, black- brown.

**Distribution:** Himalaya (Punjab to Bhutan), Assam, S.E. Asia, Malaysia, China, Australia.

**Nepal:** West, Central and East

**Altitudinal range:** 150-1400m

**Fl. & Fr.:** Aug- Oct.

**Ecology:** Open waste slopes, thickets

**Representative collection:** *Pyuthan*, Bhingri, 832m, 24 Sept. 2022, S. Gautam, SG402, ASCOL Herbarium.

## FAMILY 6: POLYGALACEAE

Annual or perennial herbs, shrubs or small trees. Leaves alternate, rarely opposite, simple, entire, exstipulate, pinnate veins. Terminal or axillary raceme. Flowers

bisexual, zygomorphic, hypogynous. Perianth biseriate. Sepals 5. Petals 3 or 5, unequal. Stamens 2-10, monoadelphous, filament free, anther basifixed. Ovary 2-8 carpellate, 2 or more locules, ovary superior, 2-celled; ovules 1 per cell. Fruit a 2-seeded loculicidal capsule or berry, seeds glabrous, yellow brown.

**1. Polygala L.**

Annual or perennial herbs, or shrubs or small trees. Leaves simple, alternate, petiolate. Leafblade papery, margin entire. Flowers in racemes, terminal and axillary, bisexual, zygomorphic. Sepals 5, unequal. Petals 3, connate in lower half, keel boat-shaped. Stamens 8, connate at base, adnate with petals. Ovary bilocular, ovule 1 per locule. Style 1, stigmas 1 or 2. Fruit a capsule, compressed.

**Polygala furcata** Royle. III. *Bot. Himal. Mts.* 76. 1834.

*Polygala glaucescens* Wallich ex Royle

Annual herbs up to 20 cm with hairless, angular stem; Leaves simple, alternate, ovate-lanceolate, 1-6×0.5-3.5cm, petiole 0.5cm, base cuneate, margin entire, apex acute, glabrous, stipules absent; Inflorescence terminal raceme, 1-2 cm, flower 4-5mm long, bract 2-3; Sepals 5, unequal, biserate, outer 3 sepals small. Petals 3, united at base, yellow; Stamens 8, monoadelphous, filaments basally united, anther basifixed; Carpel: bicarpellate, glabrous, ovary bilocular, ovules 2; Fruit capsule, flattened; seeds 2, dark coloured, slightly hairy.

**Distribution:** Himalaya (Mussouree to Bhutan), India, Burma, W. China.

**Nepal:** West and Central

**Altitudinal range:** 600-1700m

**Fl. & Fr.:** Aug. - Sept.

**Ecology:** Grassland

**Representative collection:** *Pyuthan*, Bhingrikot, 1230m, 30 Sept. 2022, S. Gautam, SG434, ASCOL Herbarium.

**ORDER: ROSALES**

**Keys to Family:**

**1a.** Trees, herbs or shrubs; hairless or simple hairs with or without prickles..... 2

**1b.** Herbs or shrubs covered with dense stinging hairs..... **Urticaceae**

**2a.** Inflorescence fig or hypanthodium or catkin; Flowers unisexual; plants produce milky latex & glabrous or slightly hairy..... **Moraceae**

**2b.** Inflorescence raceme, cymes, corymbs; flowers bisexual; plants pubescent with or without curved prickles & do not produce latex..... **Rosaceae**

### **FAMILY 7: MORACEAE**

Mostly trees, few herbs or shrubs produce milky latex. Leaves simple, alternate, rarely opposite, entire, deciduous, pinnate or palmate venation, stipulate. Inflorescence: Racemose or spikes, mainly catkins, hypanthodium or fig with numerous minute flowers enclosed within hollow receptacles or involucre. Flowers unisexual, actinomorphic, perianth: united or free. Calyx 4-5 distinct, connate at base. Petals absent. Stamens as many as sepals, 1-4, opposite to perianth lobes, filaments free. Ovary superior, 1 or 2 locules, ovules 1 per locule. Fruit drupe, nut or sorosis, seeds solitary.

#### **Keys to Genera:**

**1a.** Many minute Flowers in figs or hypanthodium, enclosed within hollow receptacle, gall flowers present.....**Ficus**

**1b.** Many Flowers in catkins like or spike like raceme enclosed within a syncarp or fleshy perianth, gall flowers absent .....**Morus**

#### **1. Ficus L.**

Tree or shrubs with milky juice. Leaves alternate rarely opposite, stipulate, petiolate, glabrous. Inflorescence axillary figs on leafy branchlets, enclosed in fleshy globose. Stamens 1-3. Female flower: straight or oblique ovary. Achenes: enclosed in figs.

**Ficus religiosa** L., *Sp. Pl.* 2: 1059. 1753

*Urostigma religiosum* (L.) Gasparrini

Pipal

Evergreen perennial tree up to 25m tall. Stem: branched, glabrous, trunk brown, produce milky latex or juice. Leaves alternate, ovate, (2-6×3-8) cm, petiole up to 10cm, margin entire, base heart-shaped or caudate, apex long pointed, acumen 2-

5cm, surface glabrous. Axillary Figs on leafy branchlets, 1.5 cm in diameter, reddish-purple when mature; Male flower few, sessile, stamens 1, short filaments, Gall flower present, calyx 3 lobed; Ovary globose, style short.

**Distribution:** Widely cultivated in India, SE Asia.

**Nepal:** West, Central and East      **Altitudinal range:** 150-1500m

**Fl:** March-Jun

**Ecology:** Along road side.

**Representative collection:** *Pyuthan*, Bhingri, 736m, 22 May 2023, S. Gautam, SG4198, ASCOL Herbarium.

## 2. *Morus* L.

Deciduous trees. Leaves simple, alternate, serrate, stipulates. Inflorescence axillary catkins, Male catkins small, gall flowers absent, female catkins in short spikes. Fruits berry, multiple-seeded.

***Morus serrata*** Roxb., *Fl. Ind.* 3: 596. 1832.

*Morus alba* var. *serrata* Bureau.

*Morus pabularia* Decne.

किम्बु

Short lived, fast growing, and perennial tree up to 15m tall. Leaves simple, alternate, ovate, 4-8×2.5-5cm; slightly abaxially pubescent, adaxially glabrous; petiole 1-4 cm; stipule 2-3 cm, caducous; base round-cordate; margin serrate; apex pointed. Inflorescence axillary catkins, flowers monoecious. Male catkins small, green, 2.5 cm, hairy; female catkins in short spikes, 1.5 cm long, hairy. Fruits are multiple- seeded berries, blackish purple when mature.

**Distribution:** Himalaya (Kumaun to Nepal).

**Nepal:** West, Central and East      **Altitudinal range:** 1600-2400m

**Fl.:** Apr.-Sept.

**Ecology:** Road sides or cultivated land

**Representative collection:** *Pyuthan*, Bhingri, 735m, 22 May, 2023, S. Gautam, SG4196, ASCOL Herbarium.

## FAMILY 8: ROSACEAE

Herbs, shrubs or trees usually with thorns or prickles. Leaves alternate, simple or compound; venation pinnate; stipulate. Flowers solitary or often in racemes, fascicles, cymes, corymbs or panicles, bisexual, rarely unisexual. Sepals 4-6. Petals 4-6 or more, free. Stamens 4-many. Carpels 1-many, free or united with calyx tube. Ovary superior to inferior. Fruit an achene, follicle, drupe or pome.

### Keys to Genera:

- 1a. Carpel 2-5..... 2
- 1b. Carpel numerous..... 5
- 2a. Leaves entire..... **Cotoneaster**
- 2b. Leaves toothed or serrate..... 3
- 3a. Deciduous shrubs or trees; branches without spines..... 4
- 3b. Evergreen shrubs or small trees; branches with spines..... **Pyracantha**
- 4a. Fruit a pome or pear-shaped; ovary inferior..... **Pyrus**
- 4b. Fruit a drupe; ovary superior..... **Prunus**
- 5a. Perennial herbs without curved prickles..... **Duchesnea**
- 5b. Perennial shrubs or trees with curved prickles..... 6
- 6a. Leaves 5-9 leaflets, glabrous or slightly hairy..... **Rosa**
- 6b. Leaves 3-5 foliate, pubescent with prickles..... **Rubus**

### 1. **Cotoneaster** L.

Shrubs, leaves shiny, elliptic-lanceolate, petiolate, margin enrolled or entire, acute or acuminate, glabrous or softly hairy on both surface. Flowers few to many, in cymes, small, white, solitary, pedicellate.

**Cotoneaster microphyllus** Wall. ex. Lindl. in B. Reg. 13: t. 1114 (1827).

Khareto

Evergreen shrubs up to 1m tall, densey branched, prostrate, rooting stem, branchlets reddish brown, initially yellow, pubescent. Leaves 6-12×4-8mm, elliptic-obovate, shiny, petiole 1-2mm, dark green above, woolly beneath, base cuneate, apex obtuse, margin plane or curl downward. Small white flowers, 6-8mm

diameter, solitary, appear in leaf axils either singly or in groups. Pedicel 2.5mm, sepals densely hairs, petals white, 3mm. Stamens 15, free, anther pink, styles 2, ovary pubescent. Fruit crowded along stems.

**Distribution:** S.W. China, India, Myanmar, Sikkim

**Nepal:** West and East                      **Altitudinal range:** 2000-5400m

**Fl. & Fr.:** Apr.-Aug.

**Ecology:** Rocky area, slopes

**Representative collection:** *Pyuthan*, Sworgadwari, 2061m, 29 April 2023, S. Gautam, SG4168, ASCOL Herbarium.

## 2. *Duchesnea* Sm.

Perennial herbs with spreading stolons. Leaves palmately compound, 3-foliolate, hairs present, petiolate, stipulate, serrate or toothed. Axillary, solitary or 1-3 flowered, sepals 5, epicalyx alternate to sepals, petals 5, stamens many, carpels many, free. Fruit achene.

***Duchesnea indica*** (Andrews) Focke, *Pflfam.* III-3: 33. 1888.

*Fragaria indica* (Andrews) Wolf

भुइँ अइसेलु

Perennial herbs, spreading, stolons 30-80cm long. Leaves trifoliolate, pubescent; petiole spreading, pubescent, 1-5 cm long; stipule 5-7mm; leafblade obovate-oblong, 1-1.5×0.7-1cm, lateral leaflets smaller than terminal ones; base cuneate; margin serrate or dentate; apex rounded. Axillary and Solitary flowers 1.2- 2.5cm in diam., pedicel 0.5-5cm; sepals 5, ovate, pubescent; epicalyx segments obovate, broader than sepals; petals 5, yellow, oblong-obovate; stamens 20-25 (numerous); carpels many, free, style deciduous. Fruit 0.8cm in diam., fleshy, red when ripe, shiny; seeds smooth.

**Distribution:** Afghanistan, Himalaya, India, east to China & Japan, Malaysia.

**Nepal:** West, Central and East                      **Altitudinal range:** 1000-2500m

**Fl. & Fr.:** Jun.-Nov.                                      **Ecology:** Wet places, field margins

**Representative collection:** *Pyuthan*, Bhingri, 731m, 28 Nov. 2022, S. Gautam, SG469, ASCOL Herbarium.

### 3. *Prunus* L.

Deciduous trees or shrubs. Branchlets sometimes spiny. Stipules caducous. Leaves simple, alternate; petiolate or sessile; margin crenate or serrate. Inflorescences axillary, solitary or to 3-flowered in fascicles. Hypanthium campanulate. Sepals 5, imbricate. Petals 5, white, imbricate. Stamens 20–30. Carpel 1. Ovary superior, 1-loculed, ovules 2. Style terminal, elongated. Fruit a drupe.

***Prunus cerasoides*** D. Don, *Prodr. Fl. Nep.* 239. 1825.

*Prunus puddum* (Wall.) Roxb. Ex. Brandis non Miq.

पैयूँ

Deciduous tree up to 30m tall, brownish grey bark. Leaves alternate, glabrous; stipules deciduous; petiole 1.5cm; leaf blade elliptic-ovate, 5-8×3.5-4cm; base rounded; margin finely serrate or toothed; apex acuminate. Flowers are paired or clusters borne at the ends of leafless branches, 1-3 in fascicles, flower bisexual; pedicel 1.8cm; calyx cup tubular, 1cm long, glabrous; lobes 5, ovate; petals 5, obovate, white. Fruit a drupe, 0.8cm in diam., fleshy outside and one stony seeded nut, ellipsoid.

**Distribution:** Himalaya (Punjab to Bhutan), S. Tibet, Assam, Burma, W. China.

**Nepal:** West, Central and East      **Altitudinal range:** 1300-2400m

**Fl. & Fr.:** Oct. - Mar.

**Ecology:** Mixed forest.

**Representative collection:** *Pyuthan*, Sworgadwari, 2073m, 17 Nov. 2022, S. Gautam, SG460, ASCOL Herbarium.

### 4. *Pyracantha* M. Roem.

Evergreen shrubs or small trees with thorny branches. Leaves simple, alternate or fascicled, shortly petiolate or sessile, margin toothed or entire; stipules caducous, minute. Inflorescences compound corymbs. Sepals 5, persistent. Petals 5, spreading, white, shortly clawed at base. Stamens 15–20. Carpels 5; basally adnate to hypanthium. Ovary 5-loculed, semi-inferior. Fruit a pome.

**Pyracantha crenulata** (Roxb. ex D. Don) M. Roem., *Fam. Nat. Syn. Monogr.* 3: 220.1847.

*Crataegus crenulata* (D. Don) Roxb.

*Mespilus crenulata* D. Don

घाँगरु

Perennial shrubs up to 5m tall. Stem highly branched, erect, thorny, glabrous. leaf blade oblong to obovate, 1-4×0.5-1.7cm, both surface glabrous; base cuneate; margin crenate; apex obtuse, Petiole 5-10mm long. Inflorescence compound corymbs about 3-5 cm in diam., 5-10 or many flowered, glabrous; pedicel 8mm, hypanthium campanulate, sepals triangular, 1mm; petals white, obovate, 4-5×3-4mm; stamens 20, 2-3mm long, ovary hairy, style long. Fruit a pome, 3-5mm in diam., orangish red when mature.

**Distribution:** Himalaya (Kashmir to Bhutan), Tibet, Burma, China.

**Nepal:** West, Central and East

**Altitudinal range:** 1200-2500m

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

**Ecology:** Forest of *Rhododendron arborea*, slopes

**Representative collection:** Pyuthan, Sworgadwari, 1980m, 29 April 2023, S. Gautam, SG4179, ASCOL Herbarium.

## 5. *Pyrus* L.

Deciduous trees or shrubs, sometimes armed. Leaves alternate, simple, petiolate, stipulate, margin serrate or entire, rarely lobed. Inflorescences corymbose-racemose. Bracteate, Sepals 5, spreading or reflexed. Petals 5, white, clawed. Stamens 15–30. Ovary inferior, 2–5-loculed, with 2 ovules per locule; styles 2–5, free. Pome with juicy pulp. Seeds black.

***Pyrus pashia*** Buch. Ham. ex D. Don, *Prodr. Fl. Nep.* 236. 1825.

*Pyrus kumaoni* Decne. ex Hook.

*Pyrus nepalensis* Hort. ex. Decne.

मयल (Mayal)

Deciduous tree up to 12m tall, dark brown glabrous branches. Leaves simple, ovate to broadly lanceolate, 4-10×2.5-4cm; stipules 4-7mm, deciduous; petiole 2.5cm; base rounded; margin finely serrate; apex acuminate or acute. Inflorescence umbel like or corymbose with 3-8 or more flowered; pedicels 2.5cm long, glabrous; Sepals 5, triangular, calyx tube 4-6mm, pubescent; petals obovate, 8-10mm, white; Stamens 25-30, 6mm long, Ovary 3-5 loculed, 2 ovules per locule, style 3-5. Fruit yellowish brown with white dots, Pome ellipsoid.

**Distribution:** Himalaya (Kashmir to Bhutan), Assam, Burma, W. China.

**Nepal:** West, Central and East      **Altitudinal range:** 750-2600m

**Fl. & Fr.:** Mar.-Sept.

**Ecology:** Slopes, *Rhododendron* Forest.

**Representative collection:** *Pyuthan*, Sworgadwari, 1952m, 29 April 2023, S. Gautam, SG4180, ASCOL Herbarium.

## 6. *Rosa* L.

A prickly, bushy shrubs or climbers. Stem branches, glabrous. Leaves odd-pinnate, 5-9 leaflets, oblong or ovate or lanceolate, serrate or toothed, stipulate, petiolate, pubescent. Compound corymbs or solitary inflorescence, flowers occurs in dense clusters at the end of branches, pedicellate, bracteates short, sepals 5, petals 5, numerous stamens. Fruits purple-brown or dark red.

***Rosa brunonii*** Lindl.; *Monogr. Rosa* 120, t. 14 (1820).

*Rosa moschata* var. *nepalensis* Lindl

Bhainsi Kande gulaf

Climbing shrubs up to 10m tall with small curved prickles; Stem glabrous, prickles 3-5mm long; Leaves imparipinnate, 5-9 leaflets, 3-5×0.5-1.5 cm, oblong-lanceolate, apex acuminate, glabrous above, slightly hairy beneath, margin serrate, base cuneate, stipules adnate to petiole, petiole 3-7cm, petiole and rachis have hairy. Inflorescence is compound corymbs, Flowers in clusters at the end of branches, 2.5-4 cm diameter, pedicel 2.5-3.5 cm, pubescent, long, bracts narrow; Sepals 5, pubescent, long, narrow apex, deciduous. Petals 5, white; numerous yellow stamens, filament free, pubescent, anther ditheous, style connate; Fruit purple-brown or dark red, ovoid, 1cm in diameter, shiny, smooth.

**Distribution:** Kashmir to Bhutan, Assam, Burma, W. China

**Nepal:** West, Central and East      **Altitudinal range:** 1500-2400m

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

**Ecology:** Forest margin

**Representative collection:** *Pyuthan*, Sworgadwari, 1952m, 29 April 2023, S. Gautam, SG446, ASCOL Herbarium.

## 7. *Rubus* L.

Deciduous shrubs or subshrubs. Stems erect, climbing or prostrate, glabrous or hairy, armed. Leaves alternate, petiolate, simple, palmately or pinnately compound. Flowers in cymose panicles, racemes, or corymbs, or several in clusters or solitary, bisexual, rarely unisexual. Calyx lobes 4-8, persistent. Petals usually 5, rarely more. Stamens numerous. Carpels many, rarely few. Seed pendulous.

***Rubus ellipticus*** Sm., *A. Rees, Cycl. 30: Rubus* no. 16. 1815

*Rubus flavus* Buch.-Ham. ex D. Don

*Rubus gowreephul* Roxb.

अइसेलु

Shrub upto 3m tall; branchlets brownish, pubescent, curved prickled & dense brown bristles. Leaves simple, alternate, 3-foliolate; petiole 2-5cm long; stipules linear, pubescent; leaflet blades elliptic, 4-8×3-6cm, terminal leaflets longer than lateral ones, abaxially densely tomentose, adaxially bristly atveins; base rounded; margin minutely serrate; apex acute. Inflorescence terminal racemes 4cm long; flowers many in leaf axils; pedicel c.a. 5mm, bract 5-9mm, flowers 1.5cm in diam.; Sepals erect, 4-5×2-3 mm, abaxially pubescent; corolla 5, white, longer than petals, densely pubescent; stamens numerous, shorter than petals; ovary pubescent, styles glabrous. Aggregate fruit golden yellow, sub-globose.

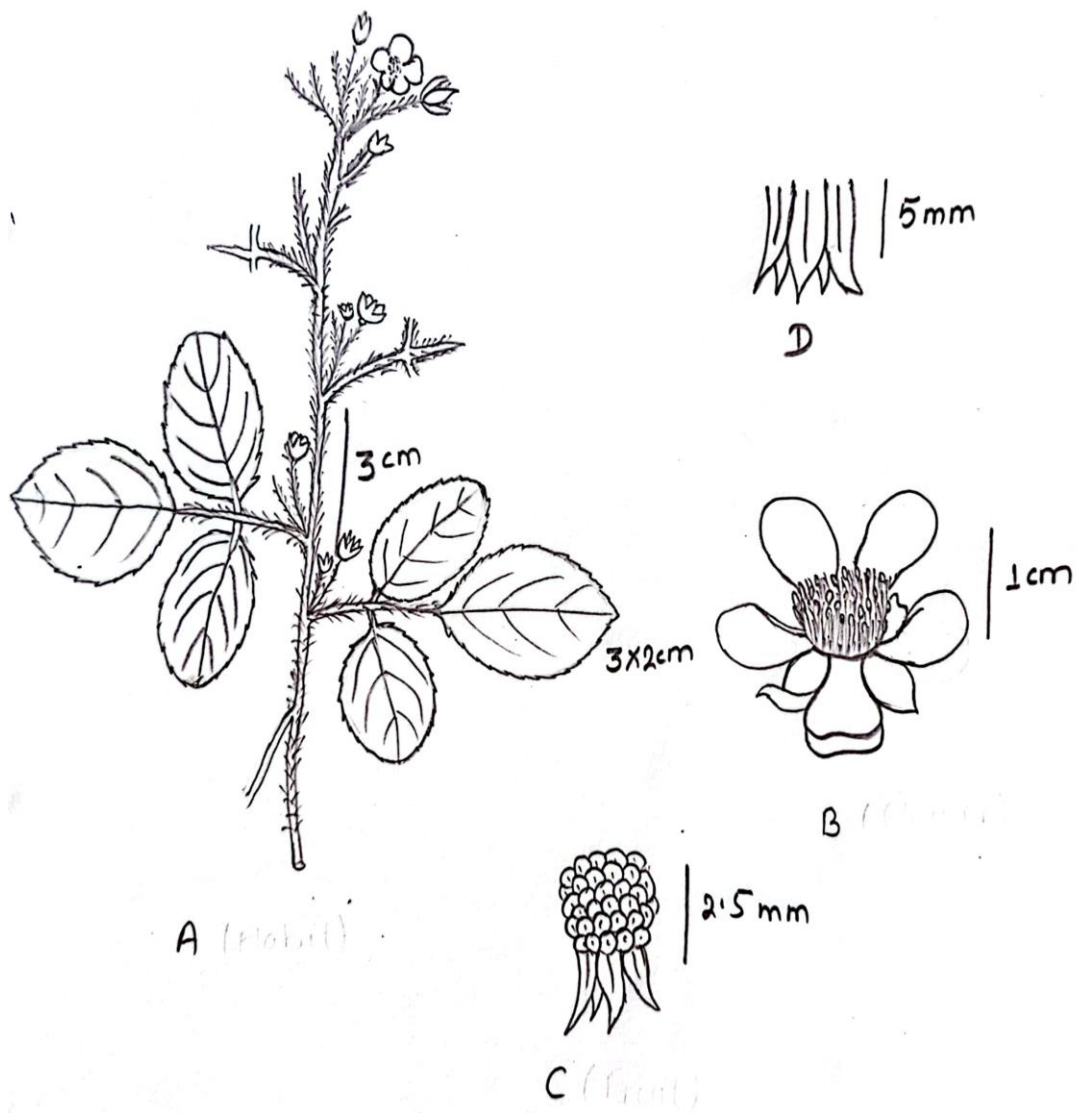
**Distribution:** Himalaya (Swat to Bhutan), Assam, Ceylon, Burma, East to W. China, Philippines.

**Nepal:** West, Central and East      **Altitudinal range:** 1700-2300m

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

**Ecology:** Roadsides, dry slopes.

**Representative collection:** *Pyuthan*, Bhingri, 740m, 18 Feb. 2023, S. Gautam, SG4137, ASCOL Herbarium.



**Fig. 4.8:** *Rubus ellipticus* Sm. A: Flowering and Fruiting branch, B: Flower, C: Fruit, D: Calyx

## FAMILY 9: URTICACEAE

Monoecious or dioecious herb, shrubs or tree, pubescent. Leaves: stipulate, alternate or opposite, petiolate or sessile, simple, acuminate, rounded, serrate. Axillary racemes or cymose inflorescence. Flower: minute, numerous, clustered at heads. Perianth: 2-5 lobed. Stamens: 2-5, opposite to sepals. Ovary: superior, 1celled, style absent or very short. Fruit: drupes.

### 1. *Urtica* L.

Perennial or Annual, Monoecious or dioecious herbs, covered with stinging hairs. Stem: angular. Leaves: petiolate, opposite, 3-costate, serrate, 3-7 veined. Stipulate. Inflorescence: axillary racemes, spikes or panicles. Flowers: green, minute, unisexual. Perianth 4 lobes. Calyx 4, free. Stamens: 4, opposite to sepals, staminodes in female flowers. Ovary: ovoid. style: absent or very short. Stigma capitate. Fruit an achene.

*Urtica ardens* Link, *Enum. H. Berol.* 385 (1822).

*Urtica parviflora* Roxb.

सिस्नो

Annual, Monoecious or dioecious herbs up to 2.5 m tall, branched with dense stinging hairs. Leaves simple, opposite, ovate-lanceolate, 2-10×2-5 cm; petiole c.a. 5cm long; apex acuminate; margin serrate; base sub-cordate or rounded; stipules 2-6 mm long. Paniculate inflorescence of axillary cyme, with stinging hairs, 3-8 cm; flowers green, unisexual, pubescent. Achenes up to 1.5 mm long, minute, ellipsoid, greenish brown.

**Distribution:** Himalaya (Kashmir to Bhutan), Assam, W. China.

**Nepal:** West, Central and East      **Altitudinal range:** 600-3000m

**Fl:** Mar.-Aug.

**Ecology:** Along the roadsides, moist slope.

**Representative collection:** *Pyuthan*, Bhingri, 731m, 28 Nov. 2022, S. Gautam, SG4132, ASCOL Herbarium.

## ORDER: FAGALES

### FAMILY 10: MYRICACEAE

Dioecious evergreen trees. Leaves simple, alternate, exstipulate, petiole present, entire, cuneate, acute. Inflorescence axillary catkin or spikes or heads, pubescent; Flower unisexual; Absence of perianth. Male flowers with 2-20 stamens, anther red; Small numerous female flowers with 1-locular ovary; style short, stigma 2, ovule 1. Fruit a drupe, red to dark when ripe.

#### 1. *Myrica* L.

Evergreen dioecious tree. Leaves simple, alternate, exstipulate, petiolate, entire, acute. Flowers in dense spikes or heads or catkin, axillary, unisexual, perianth absent, bracteates in female flower. Male inflorescence spikelet, stamens 2-8. Drupe ellipsoid.

***Myrica esculenta*** Buch.-Ham. ex D. Don, ; *Prodr. Fl. Nep.* 56. 1825.

*Myrica sapida* Wall.

*Myrica integrifolia* Roxb.

काफल(Kafal)

Medium sized evergreen trees up to 10 m tall; Greyish bark. Leaves lanceolate-obovate, 4-12×1.5-4cm, glabrous; petiole 1cm; base cuneate; margin entire; apex acute. Inflorescence axillary, catkin, 4cm, Male inflorescence compound raceme (spikelets), axillary, branched, pubescent, bracts c.a.1mm, stamens 3-7, anther red; Numerous small female flowers in sub-globose heads or spikes c.a. 1.5-4cm, 2 bracteoles, pubescent, stigma 2, ovary superior. Drupe ellipsoid, oval, red to dark when ripe.

**Distribution:** Himalaya (Kashmir to Bhutan), India, Burma, east to W. & S. China and south to Malaysia.

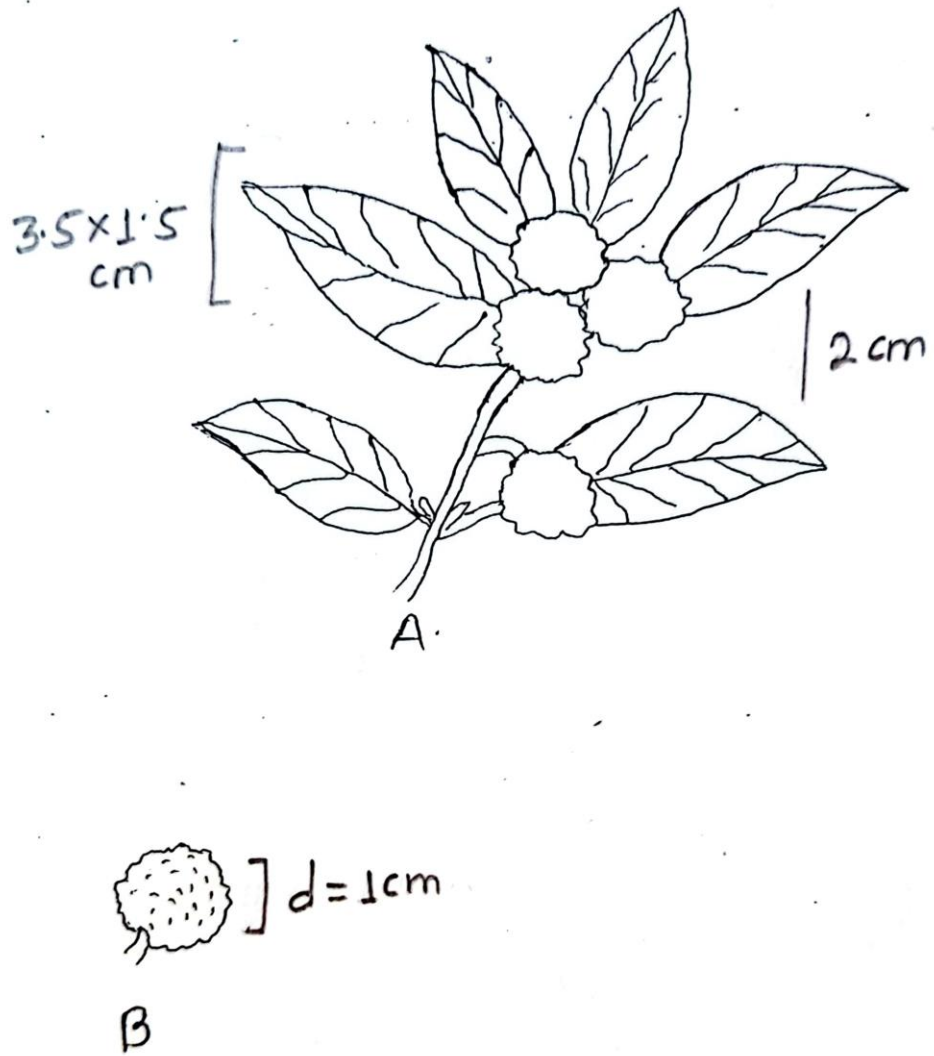
**Nepal:** West, Central and East

**Altitudinal range:** 1200-2300m

**Fr.:** Aug.-May.

**Ecology:** Sub-tropical and temperate forests.

**Representative collection:** *Pyuthan*, Sworgadwari, 2102m, 29 April 2023, S. Gautam, SG4172, ASCOL Herbarium.



**Fig. 4.9:** *Myrica esculenta* Buch.-Ham. ex D. Don. A: Fruiting branch, B: fruit

## ORDER: CUCURBITALES

### Keys to Family:

**1a.** Annual herbs, stemless, petiole large, alternate leaves with cordate base: perianth 2-5 segments, stamens numerous; fruit capsule..... **Begoniaceae**

**1b.** Perennial shrubs, branches stem, petiole short, opposite leaves with rounded base; flowers 5-merous, stamens 10: fruit achene..... **Coriariaceae**

## FAMILY 11: BEGONIACEAE

Herbs, stemless; leaves alternate, simple, pinnately or palmately veined, stipulate, petiolate; Inflorescence axillary cymes, Flower monoecious, unisexual, perianth 2-5 segments, stamens numerous, free; ovary inferior, 2-4 celled, ovules numerous; fruit capsule, unequal 3-winged. Seeds numerous, minute.

### 1. *Begonia* L.

Perennial or annual herbs with erect stem. Leaves simple or compound, ovate, alternate or basal having long petiole, margin entire or serrate, palmate venation, stipulate. Flowers unisexual, 1-4 or several flowers in cymes or in panicles, pedicellate, bracteate. Male flowers: perianth 2 or 4, stamens many, filaments free or united, anther dithecous. Female flowers: perianth 2-5, carpels 2-5, ovary 2-4 locular, inferior. Fruit capsule.

***Begonia megaptera*** A. DC.; *Ann. Sci. Nat. ser.* 4, 11; 134 (1859).

Annual herbs up to 30 cm, glabrous; Leaves simple, large, ovate, 9-13×5-7 cm, apex acuminate, base cordate, margin entire, petiole 2-9 cm, stipules 10mm, bracts 2cm; Flowers unisexual, pink, 2-4 flowers in cymes, pedicel present; perianth oblong, 2-5 perianth in both male and female flowers, stamens numerous, united at base, anther 2-celled; carpels 2-5, 2-4 locules. Fruit capsule inverted, glabrous, seeds many.

**Distribution:** E. Himalaya, N. Burma, W. China.

**Nepal:** Central and East

**Altitudinal range:** 500-1500m

**Fl. & Fr.:** Oct.- Feb.

**Ecology:** On rocks, wet area

**Representative collection:** *Pyuthan*, Rabang, 1034m, 30 Nov. 2022, S. Gautam, SG492, ASCOL Herbarium.

## FAMILY 12: CORIARIACEAE

Shrubs. Leaves opposite, simple, entire, rounded base, palmately veined, exstipulate, petiolate. Flowers actinomorphic, bisexual, in terminal or axillary racemes, 5-merous. Sepals 5, imbricate. Petals 5, shorter than sepals, increasing in size in fruit. Stamens 10, biseiate, opposite to the petals, anther ditheous. Carpels 5 or more, free, 1-celled, style slender. Fruit capsule, red to black.

### 1. *Coriaria* L.

Erect shrubs or herbs. Leaves opposite, palmately veined, exstipulate or minute, entire. Flowers bisexual, in terminal or axillary racemes. Sepals 5, imbricate. Petals 5, distinct, shorter than sepals, increasing in size in fruit. Stamens 10, biseriate, opposite to the petals, anther 2-celled. Carpels 5, ovary superior, ovule 1 per locule. Fruit capsule, red to black when mature.

***Coriaria nepalensis*** Wall. *Pl. Asiat. Rar.* (Wallich). 3: 67. 1832.

*Coriaria sinica* Maxim.

*Morus calva* H. Leveille

मच्छाइनो

Large erect shrub, up to 4m tall. Branches numerous, reddish brown, glabrous. Leaves opposite, sessile, glabrous, ovate-elliptic, 2-6×1.5-4cm; petiole 2mm, base rounded; margin entire; apex acute, reticulate venation. Inflorescence axillary or terminal racemes, 2-5cm long; Flowers many, flowers greenish-yellow, 5-merous, pedicel 4-6mm; sepals ovate; petals 5, oblong, reddish, smaller than sepals; Stamens 10, outer 5 antisealous, free, inner 5 adnate to petals, filament 3mm, anther basifixed, carpel 5, style 1mm, stigma linear; Achenes 5, ovoid, Fruit blue or dark purple, seeds ovate.

**Distribution:** Bhutan, India, Myanmar, Pakistan, China.

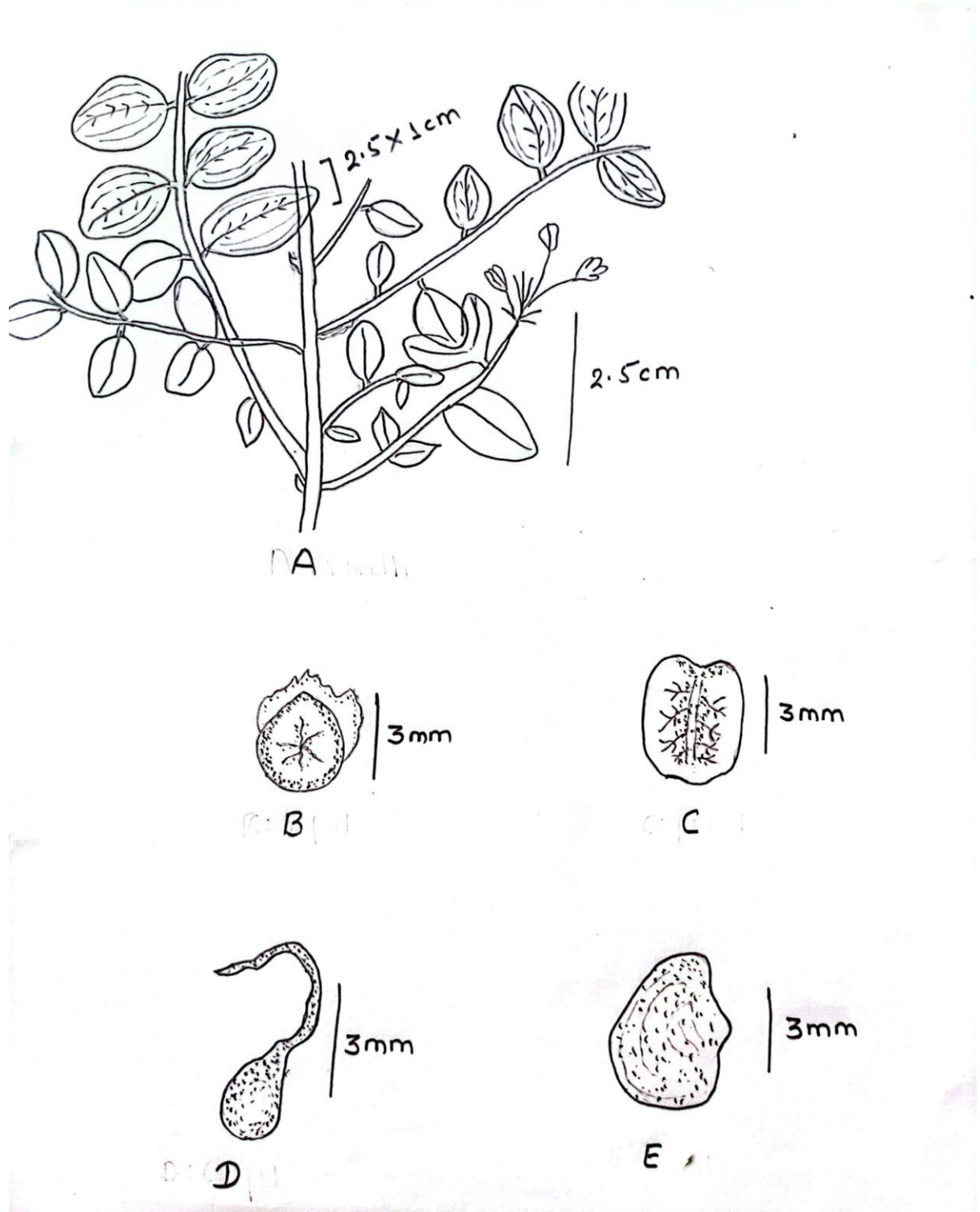
**Nepal:** West, Central and East

**Altitudinal range:** 200-3200m

**Fl. & Fr.:** Feb.-Aug.

**Ecology:** Slopy open areas.

**Representative collection:** *Pyuthan*, Sworgadwari, 2186m, 29 April 2023, S. Gautam, SG4175, ASCOL Herbarium.



**Fig. 4.10:** *Coriaria nepalensis* Wall. A: Flowering branch, B: Sepal, C: Petal, D: Carpel, E: Fruit

## ORDER: CELASTRALES

### FAMILY 13: CELASTRACEAE

Perennial evergreen erect shrubs or trees with spines; leaves alternate or opposite, petiolate, pinnate venation, stipule small or absent, margin serrate; Inflorescence terminal or axillary cyme, flower bisexual; Perianth 3-5 merous, sepals and petals both free, stamens 3-5 present on disk, alternate to petals, anther dithecous, basifixed, carpellate 3-5, ovary superior, 2-5 locular, styles simple, short, stigma simple, lobed, fruit capsule.

#### 1. **Gymnosporia** (Wight & Arnott) Benth. & Hook.

Small trees or shrubs having erect, hairless or pubescent branches with spines or thorns; leaves petiolate, stipules absent, serrate or plane margin, pointed tip; Axillary cymose or solitary, bisexual flowers, pedunculate, bracteates, 4 or 5 merous, disk 4 or 5 angled, 2 or 3 locular ovary with 2 ovules per locule, fruit capsule, seeds 3-6.

#### **Gymnosporia rufa** (Wall.) Hook. F.

*Celastrus rufa* Wall. Fl. Ind.

*Maytenus rufa* (Wall.) H. Hara.

Kande khasru, keshari

Tree with glabrous and slender branches, spines 1-2 cm; leaves simple, elliptic-lanceolate, 6-7×2-3 cm, petiole 5-7mm, base cuneate, margin serrate, apex acute or acuminate, veins 7-9 pairs; Inflorescence cyme, reddish brown bracts at base, peduncle 1-4cm, flower 3-4mm diameter, perianth 5 merous, free, disk 5 angled or lobes; stamens alternate to petals, ovary superior, 3 locular, 2 ovules per locule, style short, stigma lobed, capsule obtriangular, purplish, 3-valved, seeds black.

**Distribution:** Almost cosmopolitan.

**Nepal:** West, Central and East

**Altitudinal range:** 300-2900m

**Fl. & Fr.:** Sept.- Feb.

**Ecology:** Roadsides, Grassland, Forest

**Representative collection:** *Pyuthan*, Bhringri, 878m, 26 Nov. 2022, S. Gautam, SG 467, ASCOL Herbarium.

**ORDER: OXALIDALES**

**FAMILY 14: OXALIDACEAE**

Annual or perennial herbs, shrubs or small trees. Leaves alternate or whorled, pinnate or palmate, often trifoliate, exstipulate, entire margin. Inflorescences cymose- umbel or racemose. Flowers bisexual, pentamerous, usually heteromorphic, heterostylous. Calyx: Aposepalous, 5 imbricate sepals, distinct or basally connate. Corolla; Apopetalous, Petals 5, sometimes basally connate. Stamens biseriate, 10 (5+5), outer whorl usually with shorter filaments, opposite petals; filaments basally connate; anthers 2-celled. Gynoecium syncarpous, Ovary superior; carpels 5, fused; styles 5, axile placentation, ovules anatropous or hemitropus, 2 to several ovules. Fruit a loculicidal capsule or a berry. Seeds; endospermous with basal aril.

**1. Oxalis L.,**

Annual or perennial herbs; creeping, erect stem. Leaves compound, alternate, whorled, exstipulate, heart shaped leaflets, trifoliate, entire margin, notched apex. Inflorescence cyme – umbel. Flower: sepals 5, petals 5, petal colour varies, stamens 5-14, fused at the base, 2 seriate, outer shorter and inner longer, all fertile, carpels 1 to several ovules, styles 5. Capsule glabrous or pubescent, oblong or cylindrical, 1-15 seeds each capsule, seeds ovoid, outer fleshy coat.

**Keys to Species:**

**1a.** Petals 5 with yellow colour, stamens 5 arranged in single seriate..... **O. corniculata**

**1b.** Petals 5 with purple or pink colour, stamens 10-12 arranged in 2 seriate; outer stamens shorter and inner stamens longer..... **O. latifolia**

**Oxalis corniculata** L., *Sp. Pl.* 1: 435. 1753.

*Oxalis pusilla* Roxb.

*Oxalis repens* Thunb.

चरीअमिलो (Chari amilo)

Perennial creeping herbs. Aerial stem, suberect, branched, rooted at nodes, pubescent. Leaves small, slightly rounded, heart-shaped leaflets, alternate or whorl like arrangement, leaf stalk 3-8 cm long, petiole 0.5-1cm, stipules 2-3mm, obovate, base cuneate, hair present. Inflorescence cyme, umbel, flower funnel shaped, 1-5 flowered, 7-11mm wide, peduncle 1-4cm long. Sepal 5, 3-4 mm long. Petals 5, yellow, stamens 5. Ovary superior, bilobed stigma. Fruit capsule, cylindrical, 1-1.5 cm long, 5 sided covered with hairs, each capsule contains 5-14 seeds, seeds ovoid.

**Distribution:** Almost cosmopolitan.

**Nepal:** West, Central and East                    **Altitudinal range:** 300-2900m

**Fl. & Fr.:** Feb- Oct

**Ecology:** Roadsides, Grassland, Forest

**Representative collection:** *Pyuthan*, Bhringri, 756m, 30 Nov. 2022, S. Gautam, SG499, ASCOL Herbarium.

**Oxalis latifolia** Humb.; in Bonpl. & Kunth, *Nov. Gen. Sp.* 5: 184, t. 467 (1821).

चरीअमिलो (Chari amilo)

Annual herbs, no aerial stem. Leaves: basal, leaflets inverted heart-shaped, leaf stalks 2.5cm long, sessile, glabrous, lobes rounded, green. Inflorescence: umbel, flower stem 10-20 cm. Flowers: 5-6 sepals, 5-6mm long, petals 5 or 6, overlapping, 1cm long, purple to pink. Stamens 10-12, joined near the base, ovary 1, 5 or 6 styles. Capsules are cylindrical.

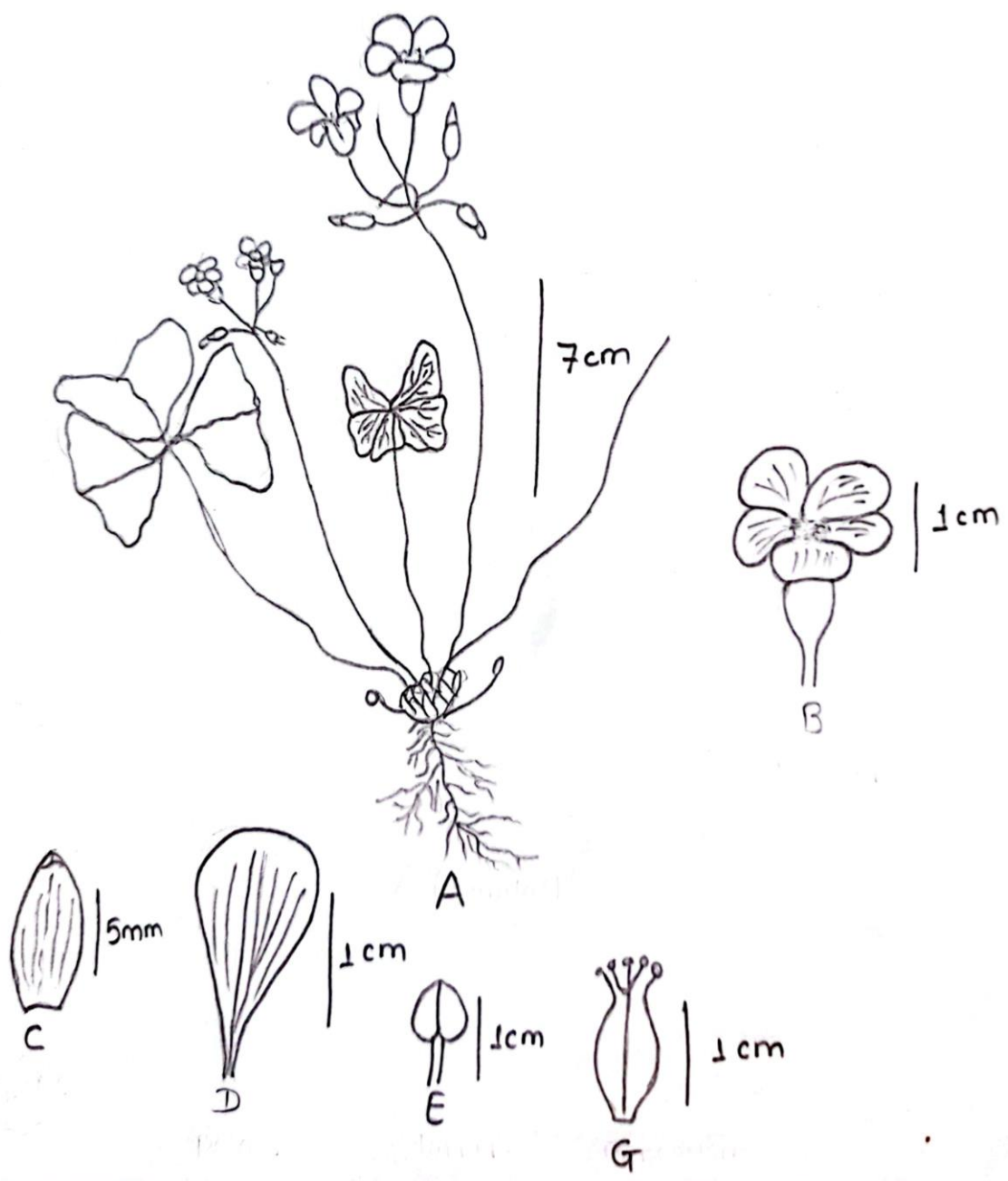
**Distribution:** Europe, C. & S. America, Malaysia, India,

**Nepal:** Central and East                    **Altitudinal range:** 1200-1600m

**Fl. & Fr.:** Jun- Oct

**Ecology:** Rocky Slopes, grasslands.

**Representative collection:** *Pyuthan*, Bhringri, 755m, 15 Jan. 2023, S. Gautam, SG4117, ASCOL Herbarium.



**Fig. 4.11:** *Oxalis latifolia* Humb. A: Flowering Plant, B: Flower, C: Sepal, D: Petal, E: Stamen, F: Pistil

## ORDER: MALPIGHIALES

### Keys to Family:

- 1a. Herbs, shrubs or trees having erect stem..... 2
- 1b. Lianas or Vines or small trees having twisting stem..... **Malpighiaceae**
- 2a. Latex absent, leaves alternate..... 3
- 2b. Milky latex present, leaves alternate, rarely opposite and whorled..... **Euphorbiaceae**
- 3a. Flower unisexual, tepals 6, stamens 2-5..... **Phyllanthaceae**
- 3b. Flower bisexual, 5- merous, stamens 5 with 5 staminodes.....**Linaceae**

## FAMILY 15: EUPHORBIACEAE

Annual-perennial herbs, shrubs, or trees. Stem: glabrous –pubescent. Leaves: alternate, sometimes opposite-whorled. Petiolate. Stipulate. Milky latex present. Flowers: small solitary or in clusters, spikes, unisexual, actinomorphic. Male flower: forming a disc gland, lobes alternate. Stamens: 1-many, anthers 2-celled. Female flower: sepals usually larger. Disc: hypogynous. Staminodes often present. Fruit: capsule, 2-3 segmented.

### Keys to Genera:

- 1a. Annual herbs or shrubs with opposite and whorled leaves..... **Euphorbia**
- 1b. Perennial tree with alternate leaves..... **Mallotus**

### 1. **Euphorbia** L.

Annual succulent herb. Stem: pubescent. Milky latex produce. Leaves: opposite, alternate, pinnately veined, stipulate persistent. Flower: monoecious, cup like involucre, female flower surrounded by male flowers. Flower in cluster, flower-cyathium, Male flower: stamen-1, perianth absent. Female flower: pedicel short, style bilobed. Fruit: trigonous.

### Keys to species

- 1a. Leaves all opposite, flower cluster at leaf node.....**E. hirta**

1b. Leaves opposite and whorled, flower cluster at the top of stem..... **E. heterophylla**

**Euphorbia heterophylla** L.; *Sp. Pl.* 453 (1753).

*Euphorbia geniculata* Ortega ex Boiss.

*Poinsettia geniculata* (Ortega ex Boiss.) Klotzsch & Garcke ex Klotzsch

*Poinsettia heterophylla* (L.) Klotzsch & Garcke ex Klotzsch

दुधी

Annual herbs Ca.50 cm. Stem hollow, rounded. Leaves: 5-10cm×3-4cm, broadleaf, alternate, whorled, lanceolate- elliptic, apex acute, base wedge shaped, margin toothed, petiole 1-2 cm. Inflorescence terminal cymes, cyathium in cluster at top of stem. 3 chambered capsule 3-4× 5-6mm, seed ovoid.

**Distribution:** Native to America, China.

**Nepal:** West, Central and East

**Altitudinal range:** 760-1100m

**Flowering:** Feb.- May/ Aug.

**Ecology:** Pasture, wasteland

**Representative collection:** *Pyuthan*, Bhringri, 740m, 1 Oct. 2022; S. Gautam; SG408. ASCOL Herbarium.

**Euphorbia hirta** L., *Sp. Pl.* 1:145 454 (1753).

*Chamaesyce hirta* (L.) Millsp.

*Euphorbia pilulifera* L.

आँखलेझार (Aankle jhar)

Annual herb, Ca. 15cm. Stem: branched, stipulate, Petiole (1-2.5mm).Leaves (0.7-2.2×0.2-0.8) cm, opposite, hairy, lanceolate, margin dentate, base cuneate, attenuate, apex acute, reticulate, purplish red above and green beneath. Inflorescence lateral cymes. Flower present at the leaf node. Ovary 3- angular, styles free, stigma bilobed. Fruit: Ca.0.2cm, trigonous. Seeds: ovoid, wrinkled seeds.

**Distribution:** Pantropical weed

**Nepal:** West, Central and East

**Altitudinal range:** 150-1500m.

**Fl:** June- Dec.

**Ecology:** Along roadside.

**Representative collection:** *Pyuthan*, Bhringri, 757m, 1 Oct. 2022, S. Gautam, SG407, ASCOL Herbarium.

## 2. *Mallotus* Lour.

Perennial dioecious trees, branches reddish brown, simple hairs; leaves alternate, rarely opposite, stipulate, pinnate or palmate venation, petiolate, hairy beneath and hairless above surface; terminal, solitary paniculate, spikes, many flowers, bracteates, male flowers has several bracts, stamens many, filaments separate, female flowers has 1 or 2 bracts, ovary 2-4 locular, ovules 1 per locule, fruit capsule, seeds ovoid or subglobose.

***Mallotus philipensis*** (Lam.) Mull. Arg.; *Linnaea* 34: 196 (1865).

सिन्दुरे (Sindure)

Tree up to 25 m tall. Branched, reddish brown, stipules 1mm. Leaves alternate, 5-15 cm× 2-7cm, leathery, ovate-lanceolate, cuneate base, 2 glands, apex acute, entire margin, 3- nerved, petiole 1-5 cm long, puberulous lower surface, glabrous upper surface. Inflorescence terminal, solitary paniculate, spikes, 2-12cm; Flower borne at the end of branches or in leaf axils. Stamens numerous, anther bilocular; female flower sessile, 3- celled ovary, ovary superior, ovules 1 in each cell, 3 papillose stigma, styles 3. Fruit trigonous-globose capsule, 3- lobed, orange or reddish, 3- seeded, seeds subglobose and black.

**Distribution:** Himalaya (Kuman to Bhutan), India, Indo-China, China, Malaysia, Australia.

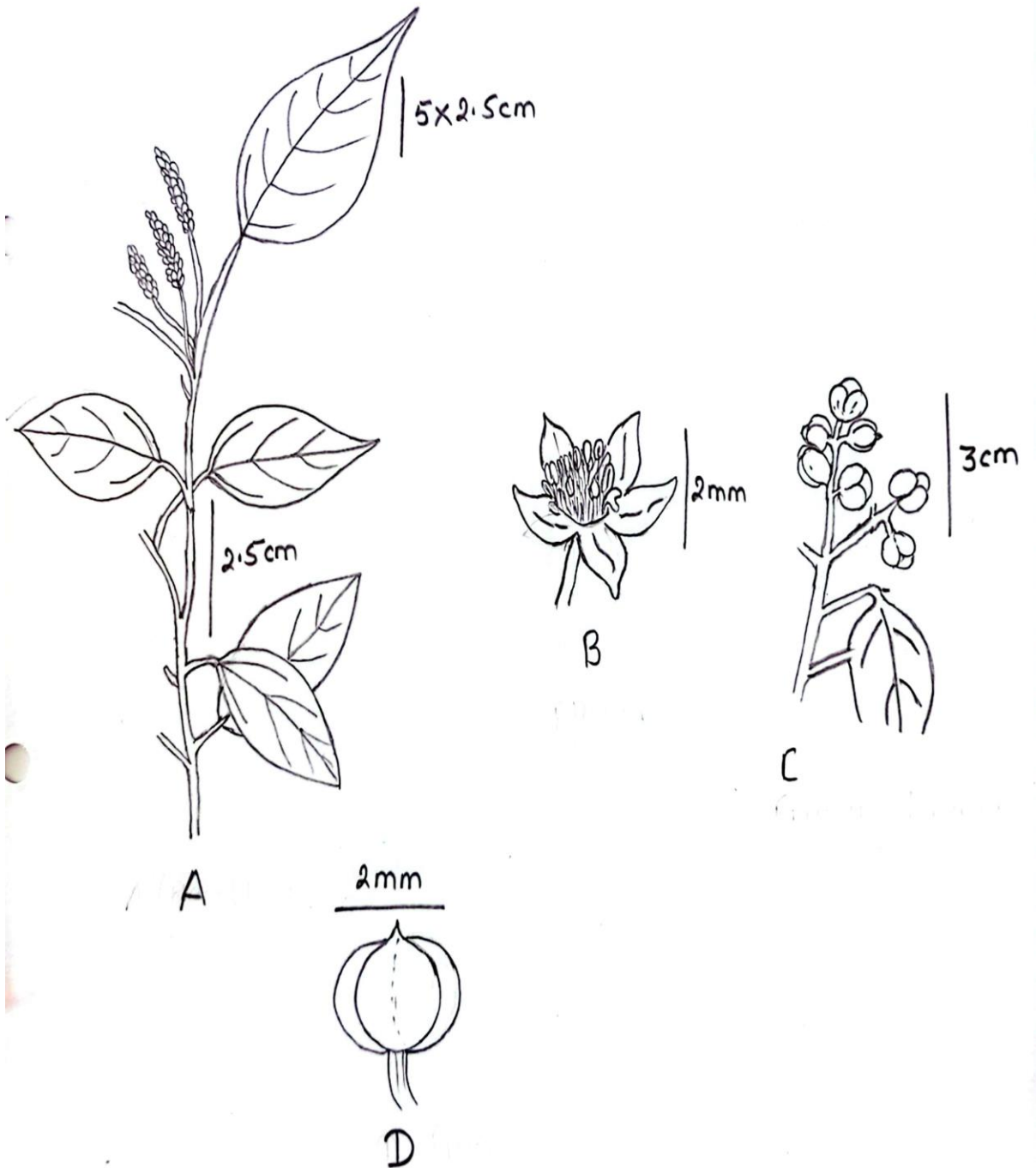
**Nepal:** West, Central and East

**Altitudinal range:** 150-1800m

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

**Ecology:** Open ground, forest

**Representative collection:** *Pyuthan*, Bhringri, 724m, 5 Jan. 2023, S. Gautam; SG4114, ASCOL Herbarium.



**Fig. 4.12:** *Mallotus philipensis* (Lam.) Mull. A: Flowering branch, B: Flower, C: Fruiting branch, D: Fruit.

## FAMILY 16: LINACEAE

Annual or perennial herbs or shrubs. Erect, branched, glabrous, smooth stem. Leaves alternate, spiral, stipulate small or exstipulate, pinnately veined or 3-veined, entire, subsessile. Flowers in racemes or cymes, bisexual, actinomorphic, bracteate, 5-merous, hypogynous. Sepals 5, polysepalous. Petals 5, polypetalous. Stamens 5, alternating with staminodes, connate at base, anther introrse. Carpel 2-5, syncarpous, Ovary superior, ovules 1-2 per cell. Fruit a capsule, seeds flat, shining.

### 1. **Reinwardtia** Dumort.

Shrubs with erect spreading branches. Leaves oblong-elliptic or oval, entire, hairless, stipules present, stipules caducous and minute. Axillary and terminal raceme or cymose inflorescence, flower solitary, bracteates, pedicel present. Corolla 5, golden yellow, funnel shaped. Styles 3-5, free or united at base. Fruit globose capsules, 6-8 seeded.

**Reinwardtia indica** Dumort., *Comm. Bot.* 19. 1822.

*Linum repens* Buch. –Ham. Ex D. Don.

प्याउली (Pyauli)

Evergreen shrubs c.a. 50-150 cm. spreading branches erect. Leaves alternate, petiole c.a. 2cm long; ovate or oval, 2.5-4.5×1-2 cm, base cuneate; margin entire; apex acute and mucronate. Inflorescence solitary and axillary raceme; bracts 1.5 mm; pedicels 1cm, pubescent. Funnel shaped, yellow flowers. Sepals 5, lanceolate, 0.7cm; petals 5, yellow, obovate, 1.5-3cm; stamens 5, styles 3, staminodes 5, Filament connate at base, anther basifixed; ovary superior, ovoid. Capsule globose, 6 -8 seeds, thin.

**Distribution:** Bhutan, N. India, Kashmir, Laos, Myanmar, Pakistan, Thailand, Vietnam.

**Nepal:** West, Central and East      **Altitudinal range:** 300-2300m

**Fl. & Fr.:** Mar.-Jan

**Ecology:** Slopes, along the trails.

**Representative collection:** *Pyuthan*, Bhingri, 800m, 29 Nov. 2022, S. Gautam, SG474, ASCOL Herbarium.

## FAMILY 17: MALPIGHIACEAE

Lianas or shrubs or small trees with twisting branches; leaves alternate or opposite, petiolate, stipulate, pinnate, slightly pubescent; Inflorescence terminal or axillary raceme or cymose, bracteolate, flower 5-merous, calyx 5, polysepalous, corolla 5, polypetalous; Androecium or stamens 10, biseriate, staminodes 1-5, anther introrse, 2-5 carpellate, syncarpous or apocarpous, styles 2-3, ovules 1 per locule, ovary superior; fruit drupe or samara.

### 1. *Hiptage* Gaertner

Large lianas. Stem twisted branches, hairless or hairs present. Leaves simple, opposite, petiolate, pinnate or palmate venation, entire, pointed. Terminal or axillary raceme, flowers occurs in group, white with yellow mark flowers, pedicellate, pentamerous, calyx 5 united, corolla 5, unequal. Stamens 10 arranged in 2 whorls, filaments unequal. Carpels 2-5, fused, ovules 1 per locule. Fruit samara with 1-3 seeds.

***Hiptage benghalensis*** (L.) kurz.; *J. As. S. Beng.* 43, 2: 136 (1874)

Perennial large lianas; twisting, slightly pubescent stem; leaves simple, opposite decussate, ovate-lanceolate, (20×9) cm, petiole 1cm, margin entire, apex acute; Inflorescence terminal or axillary raceme, flower in cluster, white flower with yellow marks, pedicel 14-25 mm long; 5 whitish rounded petals, one slightly larger and yellow at centre; 5 sepals, fused at the base; Stamens 10 arranged in 2 rows, 9 have short filaments about 5mm & other one is longer about 10mm long, style as long as filaments; Fruit samara, golden brown, seeds 1-3.

**Distribution:** Assam, Burma, S. & W. China, Indo-China

**Nepal:** West, Central and East

**Altitudinal range:** 300-1100m

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

**Ecology:** River banks, road sides

**Representative collection:** *Pyuthan*, Bhringri, 750m, 29 March 2023, S. Gautam, SG4149, ASCOL Herbarium.

## FAMILY 18: PHYLLANTHACEAE

Herbs, shrubs or trees. Simple Pinnate leaves, alternate, stipulate, petiolate. Inflorescence axillary raceme like or panicle like. Flower unisexual; Sepals: 4-6. petals: absent; Male flower: Stamens 5 or more, free; Female flower; 3-10 carpellate, Ovary: 3 celled, superior, ovules 2 per locules. Style: free or connate. Fruit: capsule or berry.

### 1. *Phyllanthus* L.

Deciduous trees with small pinnate leaves, subsessile, petiolate short, stipulate, entire. Inflorescence axillary raceme or panicle, flowers borne in leaf axils, pedicellate. Sepals 3-6, biserate or uniseriate, petals absent. Stamens 3 or more, filament free or united, 3-10 carpellate, ovary 3-celled, ovules 2 per locule. Fruit capsule or berry.

***Phyllanthus emblica* L., *Sp. Pl.* 982. 1753.**

*Emblica officinalis* Gaertn.

*Phyllanthus taxifolius* D. Don

अमला

Perennial deciduous tree up to 18m tall. Branches with pinnate leaves, leaves small, (8-15×1-4.5)mm, sub-sessile, alternate, stipulate, oblong, petiole 0.3mm, margin entire, base cordate, apex truncate. Flower in leaf axils, tepals 6, pedicel 1-2mm, stamens 3, ovary 3-celled, superior, ovules 2 per cell, styles 3. Fruit spherical capsule, sub-globose, fleshy, pale greenish-yellow, 4-5 valved, 25mm diameter.

**Distribution:** India, Himalaya (Kumaun to Bhutan), Assam, N. Burma, S. China, Indo-China, Malaysia.

**Nepal:** West, Central and East

**Altitudinal range:** 150-1400m

**Fl. & Fr.:** Mar.-Sept.

**Ecology:** Open sparse forests, open field.

**Representative collection:** *Pyuthan*, Bhingri, 731m, Nov. 26, 2022, S. Gautam, SG468, ASCOL Herbarium.

## ORDER: MYRTALES

### Keys to family:

- 1a.** Perennial or annual herbs; simple raceme; 3-4 merous flowers..... **Onagraceae**
- 1b.** Perennial or annual herbs, shrubs or trees; cymose or panicles or umbellate, 4-6 or 8 merous..... **2**
- 2a.** Stem angled (4 angled), leaves opposite; stamens 4-12 or more, biseriate..... **3**
- 2b.** Stem slender with shining bark, leaves alternate, stamens numerous, connate in 5 bundles.....**Myrtaceae**
- 3a.** Stamens 3-(8)-10, ovary inferior..... **Melastomataceae**
- 3b.** Stamens 4-6 or many, ovary superior..... **Lythraceae**

## FAMILY 19: MELASTOMATACEAE

Perennial or annual herbs, shrub or trees. Stem: angled, hairy. Stipules: absent. Leaves: simple, opposite- decussate, lanceolate. Terminal, rarely solitary inflorescence of cymose, panicles or umbellate. Bracteate. Bisexual flowers in clustered. Calyx: 3-6 lobed. Petals: 4-5, free or adnate at base, equal to sepals. Stamens: (3)-8-10. Ovary: inferior, many ovules. Fruit: capsule.

### 1. *Osbeckia* L.

Herbs or shrubs. Erect Stem: 3-4sided (qandrangular), hairy. Leaves opposite or whorled, petiolate or sessile, pubescent, secondary vein 1-3 on each side of mid vein. Inflorescence: terminal, capitates or paniced. Flower: 4-5 merous, bracts present, purple or white. Sepals: free, pubescent. Petals: 4-5, free. Stamens: double to the perianth segments. Ovary: 4-5 celled, inferior or semi inferior. Seeds: numerous.

***Osbeckia stellata*** Buch.-Ham. ex D. Don, *Bot. Reg.* 8: t. 674. 1822.

रातो चुल्सी

Annual Shrubs up to 2m tall having erect and hairy stem erect. Leaves opposite or 3-whorled, pubescent; petiole 1cm; elliptic, 3-8×2-4cm, secondary veins 2 on each side of mid vein; base cordate; margin entire; apex acuminate. Inflorescence panicles cymose, terminal, Flowers 4-merous, pink colour. Sepals 4, petals 4, both are free & hairy. Stamens 8, anther ditheous. Ovary 4-celled, semi-inferior. Capsule long, many seeds.

**Distribution:** Himalaya (Punjab to NEFA).

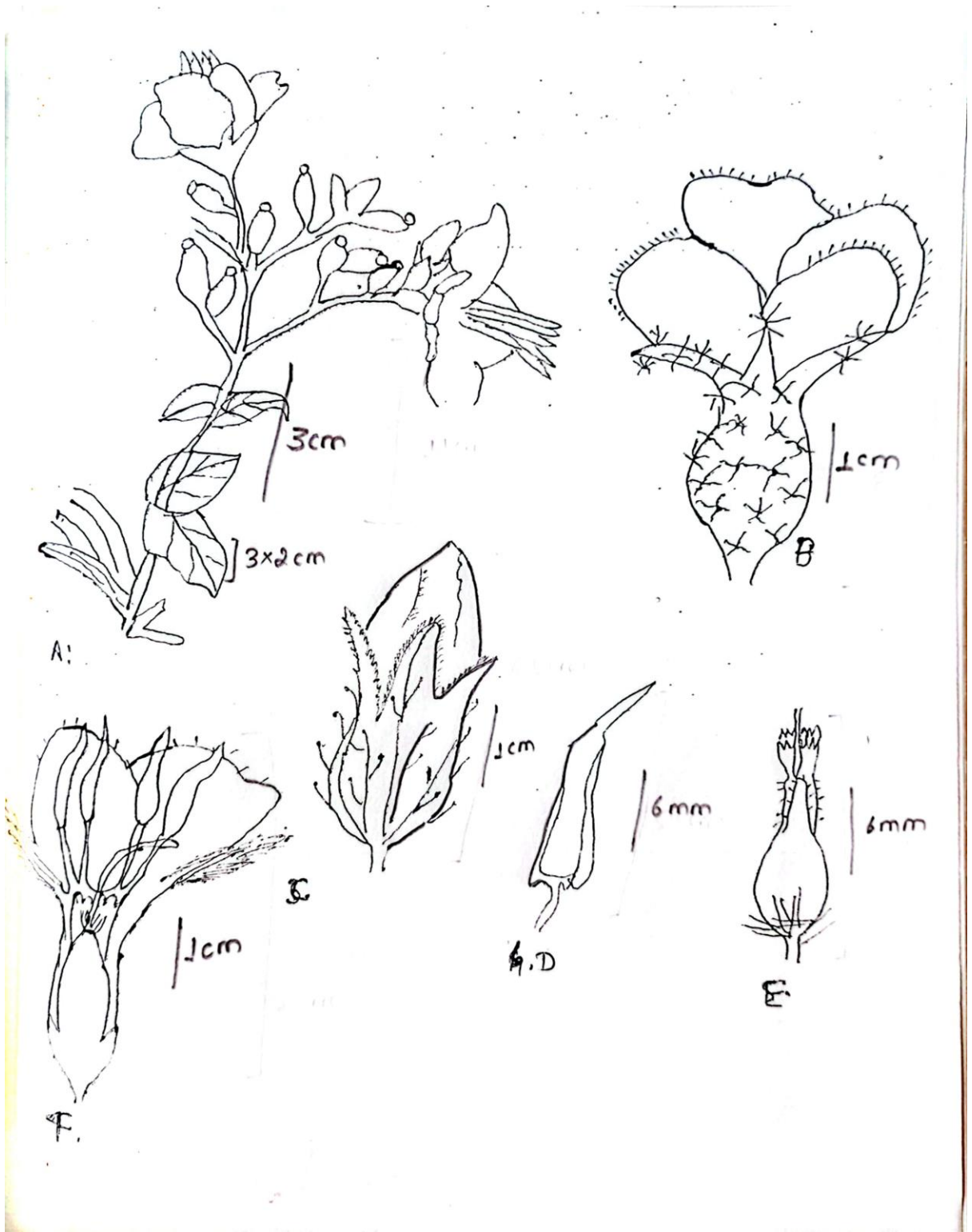
**Nepal:** West, Central and East

**Altitudinal range:** 1300-2600m

**Fl.:** Jul.-Nov.

**Ecology:** Dry pastures on hill slopes.

**Representative collection:** *Pyuthan*, Sworgadwari, 2064m, 17 Nov. 2022, S. Gautam SG453, ASCOL Herbarium.



**Fig: 4.13:** *Osbeckia stellata* Buch.-Ham. ex D. Don. A: Flowering and fruiting branch, B: Flower, C: Sepals, D: Stamen, E: Ovary, F: Section of Flower

## FAMILY 20: MYRTACEAE

Mostly tree or shrubs or shrubs: erect branched shining bark: leaves simple, alternate or opposite, petiolate, exstipulate, entire margin: Inflorescence usually cyme or paniculate, pedicellate, ebracteate or bracteoles, flower complete, bisexual, epigynous, actinomorphic: Sepals 4-5, gamosepalous: Corolla 4-5, free or united, Stamens numerous, filaments connate in 5 bundles, anther 2-celled: carpels 2-5, syncarpous (fused), ovary inferior, fruit berry or drupe or capsule.

### 1. **Eucalyptus** L'Heritier,

Tree or shrubs having smooth bark. Leaves opposite, alternate, petiolate, glabrous or leathery. Inflorescence solitary or grouped into terminal or axillary panicles, umbelliform. Flowers bisexual, sepals forms 2 layered calyptras, petals connate to sepals, Stamens numerous in many whorls, anthers dithecal. Ovary adnate, 2-7 loculed, numerous ovules, seeds numerous, developed seeds ovate.

**Eucalyptus alba** Reinw. Ex. Blume.; Bijdr. 1101 (1827)

Masala

Tree up to 18m tall; Smooth greyish white, shining bark; leaves alternate, lanceolate, (10-15×2-4) cm, thin, petiole 1-3 cm, margin entire, apex long & acute, pointed. Flowers in axillary umbels; cream white, occurs in clusters; pedicellate, ebracteate, usually calyptra: Stamens numerous, 4-5mm, anther dorsifixed: Fruit semiglobose to bowl shaped capsule, 6mm diameter.

**Distribution:** Australia, Indonesia, East Timor

**Nepal:** West and Central

**Altitudinal range:** 700-1700m

**Fl. & Fr.:** Jan-Jun.

**Ecology:** Planted along roadside

**Representative collection:** *Pyuthan*, Bhingri, 740m, 6 Feb 2023, S. Gautam, SG4129, ASCOL Herbarium.

## FAMILY 21: ONAGRACEAE

Perennial or annual herbs: Stem branched: Leaves oblanceolate to elliptic, petiolate, entire, acute: Inflorescence raceme: Flower small, 3-4 merous: Fruit capsule, seeds obovoid.

### 1. *Oenothera* L.

Annual to perennial herbs. Leaves alternate or basal, entire, exstipulate. Inflorescence terminal spikes, racemes, flowers borne in the axils of upper leaves. Sepals 4, green. Petals 4, pink, purple or various colour. Stamens 8. Ovary 4 locules, numerous ovules, stigma 4 linear lobes. Fruits capsule, terete to 4-angled. Seeds numerous, 1-3 row or in clusters in each of 4 locules.

***Oenothera rosea*** L'Heritier ex Aiton, Hort. kew. 2:3 1789.

Perennial or annual herbs; Stem branched up to 40 cm, rosette when young; Leaves cauline, 2-5×1-2 cm, oblanceolate to elliptic, petiole 3-10mm, margin entire or dentate, acute, attenuate, small pinnate: inflorescence simple raceme; flower pink or purple, small, flower tube 4-8mm, sepals 5-8mm, petals 4-10mm, petals 4, style 0.8-1.5cm, stigma surrounded by anther; Fruit capsule, club shaped, seeds obovoid.

**Distribution:** Himalaya, India, Burma

**Nepal:** West and Central                      **Altitudinal range:** 1000-2500m

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

**Ecology:** Cultivated land, weeds places

**Representative collection:** *Pyuthan*, Bhingri, 741m, 26 Mar. 2023, S. Gautam, SG4146, ASCOL Herbarium.

## FAMILY 22: LYTHRACEAE

Herbs, shrubs or trees; branches quadrangular. Leaves opposite, simple, entire, exstipulate. Inflorescence cyme or raceme, Flowers solitary or in clusters in leaf axils, bisexual, 4-6 or 8 merous, actinomorphic or slightly zygomorphic. Sepals 4-6 or 8, polysepalous, Calyx tubular at base. Petals 4-6 or 8, polypetalous, sometimes absent. Stamens 4 - 12 or many, free, biserate, twice the number of petals: anther dorsifixed, dithecous, Carpels 2-6, syncarpous, 2-6 celled, Ovary superior; style 1, slender; stigma capitate: ovules many. Fruit a capsule, seeds numerous.

### 1. **Woodfordia** Salisb.

Perennial shrubs. Branches glabrous. Leaves opposite, simple, sessile, lanceolate, black or orange dotted. Inflorescence axillary cyme. Flowers in leaf axil, bisexual zygomorphic, 6-merous, red, bract absent. Stamens 12, curved, all are unequal. Ovary oblong, bilocular; ovules many, stigma bilobed; Capsule ellipsoid, numerous seeds.

**Woodfordia fruticosa** Kurz., *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 40:56. 1871.

*Grislea tomentosa* Roxb.

*Woodfordia floribunda* Salisb.

धार्दुरो

Perennial shrubs up to 3m tall. Spreading stems and branches, glabrous. Leaves simple, opposite, sessile; lanceolate-ovate, 4-11×2-4cm, adaxially glabrous; base rounded; margin entire; apex acuminate, orange dotted beneath. Inflorescence cymes, 2-16 flowered in leaf axils or axillary shoots; floral tube 1.5 cm, light to deep red: Sepals 6, oblong, 2-3mm; Petals 6, red, lanceolate, 3-4mm long; Stamens 12. Ovary 2-loculed, 2-celled, oblong; ovules many, style 1cm. Fruit: capsule, elliptic or ellipsoid: Seeds numerous, trigonous.

**Distribution:** Africa, W. Asia, Subtropical Himalaya, India, Ceylon, Burma, China.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1800m

**Fl.:** Jan.-May.

**Ecology:** On rocky areas, roadsides.

**Representative collection:** *Pyuthan*, Bhingrikot, 1192m, 29 Mar. 2023, S. Gautam, SG4147, ASCOL Herbarium.

## ORDER: SAPINDALES

### Keys to Family:

**1a.** Tree; Flowers in cyme or panicles; stamens 10 or 5 or only one functional; 3-5 carpel; fruit drupe..... **Anacardiaceae**

**1b.** Herbs, shrubs or tree; corymbs inflorescence; stamens 3-10-numerous; carpel 2-numerous; fruit capsule..... **Rutaceae**

### FAMILY 23: ANACARDIACEAE

Trees or shrubs; erect, woody with resinous bark and cylindrical stem. Leaves alternate or opposite, exstipulate, trifoliolate or imparipinnate. Axillary or Terminal panicles or cymes inflorescence, bracteate small, Flower 3 or 5 merous, small, complete: Sepals 5 (3-7), free or connate at base: petals 5-3, polypetalous; Stamens 10 or 5 or only one functional in 1 or 2 whorls, filaments free, basally connate, anther dithecous: Carpel 3 (or 5), syncarpous, unilocular, ovary superior; Fruit drupe.

#### 1. **Rhus** L.

Shrubs or tree. Leaves pinnately compound, trifoliolate or imparipinnate, petiole present or absent. Flowers in terminal panicles, pentamerous, small flowers. Stamens as many as the number of petals, anther 2-loculed. Unilocular ovary with 1 ovules; styles 3, basally united. Fruit drupe, red when mature.

**Rhus parviflora** Roxb.; *Fl. Ind.* ed. 2, 2: 100 (1832)

*Searsia parviflora* (Roxb.)

*Toxicodendron parviflorum* (Roxb.) Kuntze

Sati bayar

Shrubs or small tree up to 3m height: Stem erect, branched: leaves imparipinnate, leaflets 3, end leaflets larger than other, ovate or obovate, tips rounded, bases tapering, irregularly toothed margins, 3-7×2-4 cm, petiole 2-3 cm, pubescent. Inflorescence terminal panicle, 9-10 cm, flowers tiny, yellowish: Sepals 5, ovate, petals 5, oblong. Ovary unilocular, 1 ovules. Fruit small, round an orange-yellow or red when ripe.

**Distribution:** Himalaya (Kumaun to Bhutan), India

**Nepal:** West, Central and East

**Altitudinal range:** 700-1100m

**Fl. & Fr.:** Mar.-Oct.

**Habitat:** On rocky areas, roadsides, slopy area.

**Representative collection:** *Pyuthan*, Bhingrikot, 1183m, 30 Sept. 2022, S. Gautam, SG427, ASCOL Herbarium.

## FAMILY 24: RUTACEAE

Tree or shrubs having woody, cylindrical, glabrous stem. Some species have thorns on their stem and leaves veins. Leaves opposite or alternate, simple or compound, petiolate, exstipulate or stipule present, entire serrate. Inflorescence axillary, cyme or corymbs, pedicellate, bracteates, 5 or 4 merous. Calyx: 4-5 lobed, free or fused. Corolla: 4-5, free. Stamens: 3-10 or more, free or polyandrous. Carpel 2-numerous, syncarpous. Fruit berry or capsule.

### Keys to Genera:

**1a.** Spines or thorns absent; petals present; bisexual ..... **2**

**1b.** Spines or thorns present on stem as well as leaves; Petals absent; Unisexual..... **Zanthoxylum**

**2a.** Plants herbaceous; flowers 4-merous; Stamens usually 8... **Boenninghausenia**

**2b.** Plants woody; Flowers 5-merous; stamens 2× as many as petals..... **Murraya**

### 1. **Boenninghausenia** Reichenbach ex Maisner

Perennial herbs. Pinnately compound and alternately arranged leaves, petiolate, entire. Flowers in terminal or axillary panicles, bisexual, 4-merous. Sepals 4, fused. Petals 4. Stamens usually 8. Carpels 4, syncarpous, several ovules per locule. Fruit follicles.

**Boenninghausenia albiflora** (Hooker) Reichenbach ex Maisner, *Pl. Vasc. Gen.* 2:44. 1837

*Ruta albiflora* Hook.

*Ruta japonica* Sieb. Ex. Hook.

Perennial herbs up to 1.5 m tall; branched, pubescent; leaves alternate, imparipinnate, 6-15× 5-10mm, elliptic to ovate, margin entire, obtuse, petiolate. Inflorescence terminal cymose, flowers small, white; Sepals 1.5mm long, persistent, petals 4-5, 5mm long; Stamens 6-8, filaments longer than petals; Ovary 3-5 lobed, Capsule 6-8mm in diameter. Seeds 6-8 in each cell.

**Distribution:** Himalaya (Kashmir to Bhutan), India, China, Taiwan, Malaysia.

**Nepal:** West, Central and East

**Altitudinal range:** 600-3300m

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

**Ecology:** Open area, grassy slopes.

**Representative collection:** *Pyuthan*, Bhingri (Kholakharka), 995m, 30 Nov. 2022, S. Gautam, SG490, ASCOL Herbarium.

## 2. *Murraya* J. König ex L.

Shrub or small trees. Branches glabrous or slightly hairy. Leaves pinnately compound, imparipinnate, acute, obtuse, petiole present, exstipulate. Inflorescence: terminal corymbs. Flower pentamerous, bisexual. Calyx: cup-shaped, 5 lobed. Petals 5, free. Stamens: 10 or 2× as many as petals, Free. Ovary superior, 2-5 locules, ovules 1 or 2 per locules. Berry: oblong, black, 1 or 2 seeds.

***Murraya koenigii*** (L.) Spreng.; *Syst. Veg.* 2: 315 (1817).

*Chalcas koenigii* (L.) Kurz.

Mitho neem

Perennial small tree up to 6m. Stem: glabrous. Leaves: alternate, pinnately compound, unipinnate or imparipinnate, leaflets 9-27, ovate-lanceolate, 20-50×11-28mm, base: cuneate or obtuse, apex acute, margin crenulated, petiole 0.5cm, reticulate venation. Inflorescence terminal corymb or cymose bearing many white flowers, flowers 5-merous, bisexual. Calyx up to 1cm, 5 lobed. Petals 5, white, polypetalous. Stamens 10, polyandrous. Ovary 2 locular, 1-2 ovules per locule, ovary superior, style short. Fruit: crimson, black, 1-2 seeded.

**Distribution:** Himalaya (Garhwal to Sikkim), India, Ceylon, Burma, China

**Nepal:** West and East

**Altitudinal range:** 150-1450m,

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

**Ecology:** In open land.

**Representative collection:** *Pyuthan*, Bhingri, 740m, 22 April 2023, S. Gautam, SG 4160, ASCOL Herbarium.

### 3. *Zanthoxylum* L.

Shrubs or trees, often prickly. Leaves opposite or alternate, trifoliolate or imparipinnate, sessile, rachis glabrous or pubescent. Flowers mostly unequal, in axillary cymes or panicles. Perianth in 2 series, tepals 6-8. Calyx 6-8-lobed or absent. Petals absent. Stamens 3-8, rudimentary in the female flowers. Ovary 1-3 locular; style free or united above; stigma capitate. Fruit a schizocarp, sub-globose.

***Zanthoxylum armatum*** DC., *Prodr.* 1: 727. 1824.

*Zanthoxylum hostile* Wall.

*Zanthoxylum violaceum* Wall.

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Evergreen thorny shrub or small tree up to 6m tall. Leaves opposite, 4-20 cm long, imparipinnate, leaflets 5 pairs, glabrous, ovate-lanceolate, prickles at the base, petiole 4mm; 1-3×0.5-1cm; base cuneate, margin entire, apex acute. Axillary or terminal panicles inflorescence; Flowers minute, occurs in dense, green to yellow; Perianth biseriate, 6-8 tepals; Calyx lobes 6-8; petals absent; male flowers: stamens 6-8, glabrous; female flowers: ovary 1-3-locular, 1-3 celled ovary. Fruit Berries, pale red, splitting into 2 when ripe. Seeds round, c.a. 3mm in diam., shinyblack.

**Distribution:** Himalaya (Kashmir to Bhutan), N. India, east to China, Taiwan, Philippines.

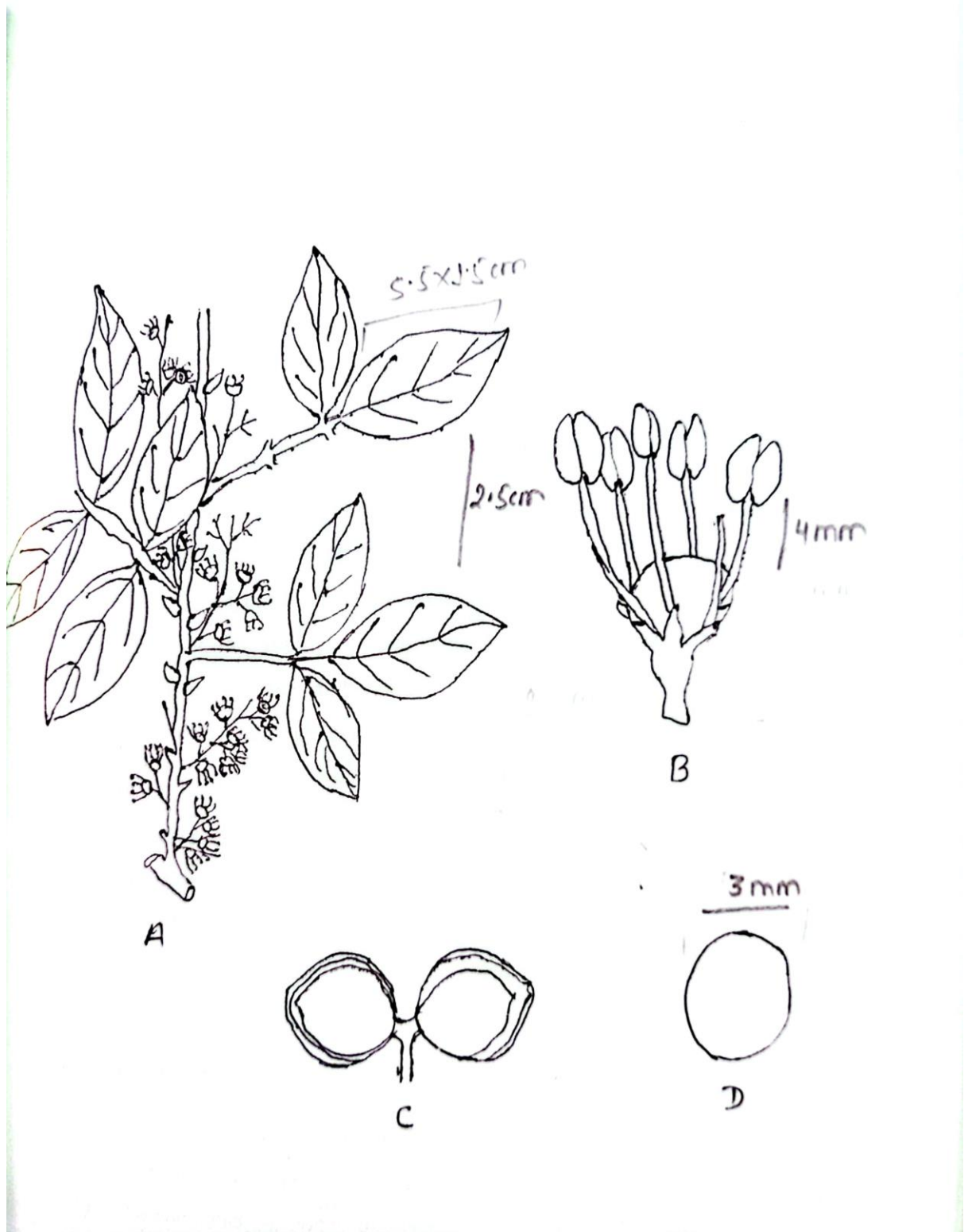
**Nepal:** West, Central and East

**Altitudinal range:** 1100-2500m

**Fl. &Fr.:** Apr.-Sept.

**Ecology:** Open dry slopes.

**Representative collection:** *Pyuthan*, Sworgadwari, 2250m, 29 April 2023, S. Gautam, SG4165, ASCOL Herbarium.



**Fig. 4.14:** *Zanthoxylum armatum* DC. A: Flowering branch, B: Flower, C: Fruit, D: Seed

## ORDER: BRASSICALES

### Keys to family

**1a.** Evergreen shrubs or small trees or climbers; simple or palmately compound leaves; 4-merous flowers; stamens numerous; 1-3 locules..... **Capparaceae**

**1b.** Deciduous tree; pinnately compound leaves; pentamerous flowers; 5 stamens; unilocular..... **Moringaceae**

### FAMILY 25: CAPPARACEAE

Evergreen, perennial herbs, shrubs or climbers. Leaves simple or palmately compound, alternate, entire, acute, pinnate venation. Inflorescence terminal or axillary, racemose or corymbose. Flowers in leaf axils, bisexual or unisexual, tetramerous, bract present or absent, pedicellate. Sepals 4, free, biseriate or uniseriate. Petals 4, free, white or cream yellow, 2-lipped. Stamens numerous, free, anther basifixed, 2-celled. Carpels 2-8, syncarpous, 1 or 3-6 locules, 1-numerous ovules per locule, ovary superior. Fruit silique or berry or drupe.

#### 1. *Capparis* L.

Shrubs or climbers having twining stem, Leaves simple, alternate, ovate-lanceolate, entire, pointed. Inflorescence terminal or axillary racemose or corymbose or panicles, flowers borne in pairs in leaf axils, tetramerous. Sepals 4, free, 2 whorls; Petals 4, polypetalous, creamy yellow, bilabiate. Stamens numerous, alternate with sepals, anther dithecous. Carpels 2-8, fused, superior, ovules 1-many per locules. Fruit berry.

***Capparis olacifolia*** Hook. & Thom. in J.D Hooker, *Fl. Brit. India*. 1: 178 (1872).

Shrubs or small tree up to 5m tall with spreading branches, spines on leaf axils, leaf stalk 5-6mm, leaf blade ovate-lanceolate, 7-13×4-5 cm, glabrous, rounded base, tapering tips, slightly pointed, entire margin, simple, alternate, 5-8 pairs secondary veins. Flowers borne in pairs in leaf axils, flower stalk 0.7-1.5 cm. Sepals biseriate, outer whorls ovate & inner elliptic, 8-10×4-5 cm, Petals white, anterior petals 2mm longer than posterior petals, Stamens 34-38, anther 2mm. Ovary ellipsoid, 2mm style, glabrous, fruit spherical, globose. Seeds 1-3 per fruit.

**Distribution:** Himalaya (Nepal to NEFA), India, N. Burma.

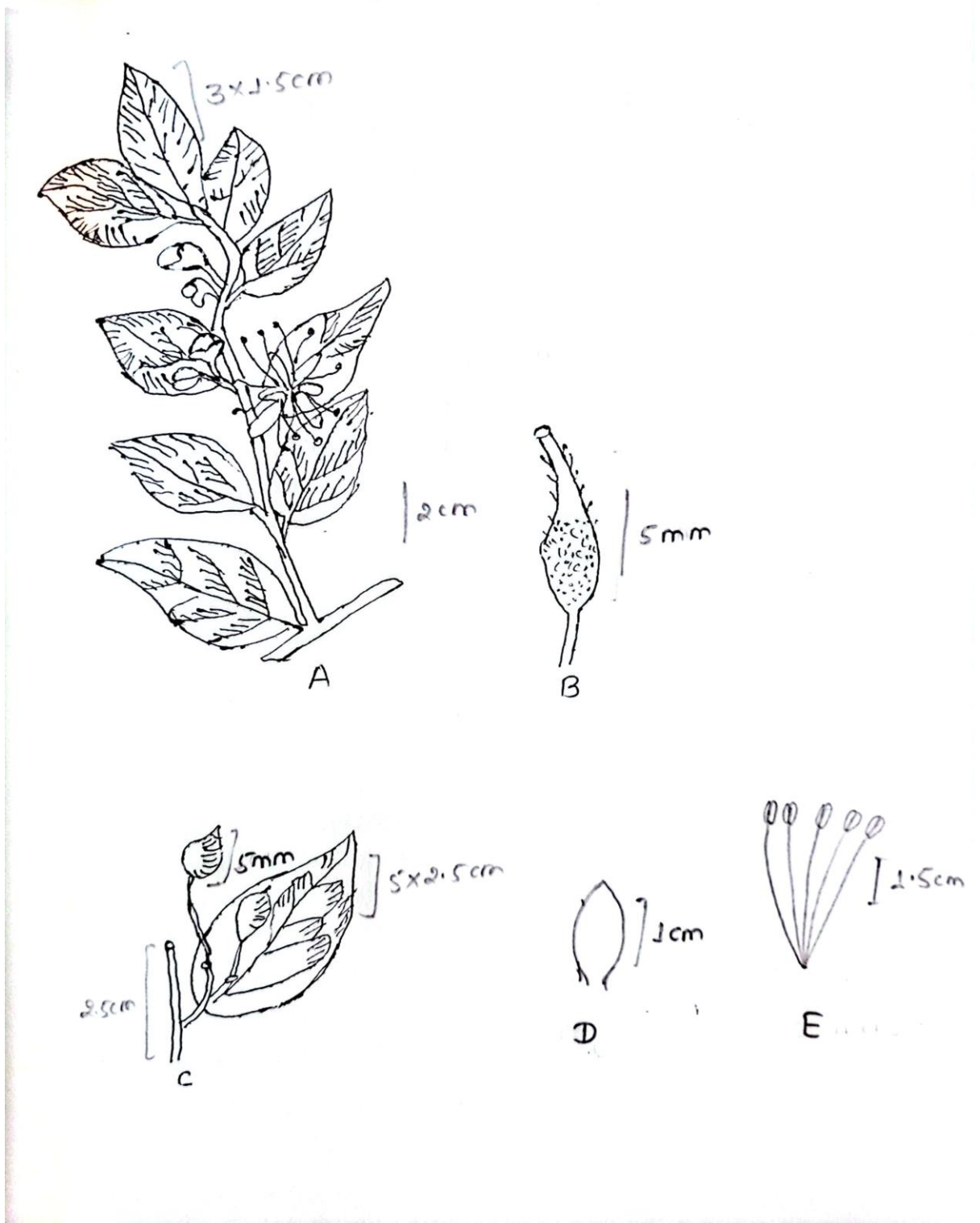
**Nepal:** Central and East

**Altitudinal range:** 200-1500m

**Fl. & Fr.:** Apr.- Jun.

**Ecology:** Along moist slopes forest, road side.

**Representative collection:** *Pyuthan*, Bhingri, 702m, 21 April 2023, S. Gautam, SG4156, ASCOL Herbarium.



**Fig: 4.15:** *Capparis olacifolia* Hook. & Thom. A: Flowering branch, B: Ovary, C: Leaf with fruit, D: Calyx, E: Stamens

## FAMILY 26: MORINGACEAE

Perennial deciduous tree; erect, branched stem. Leaves compound with opposite pinnae imparipinnate, alternate, rounded apex. Each pinnules has 4-6 pairs of leaflets. Inflorescence panicles, flowers bisexual, pentamerous, bracteates, pedicellate. Sepals and petals free, 5 polyandrous stamens, 3-5 alternating staminodes. Carpel 3, united, 1-locule, ovules many, biseriate. Fruit 3-sided pods.

### 1. *Moringa* Adans.

Deciduous tree; leaves compound, alternately arranged imparipinnate leaves with opposite 2-6 pairs of pinnules, each pinnae has 4-6 pairs of ovate leaflets. Inflorescence panicles, flowers bisexual, pentamerous, pedicel present. Sepals 5, polysepalous. Petals 5, polypetalous, white. Stamens 5, polyandrous, 3-5 alternating staminodes. Carpels 3, syncarpous, unilocular, ovules many, 2-whorls. Fruits 3-sided pods, 2-6 seeds per pod.

***Moringa oleifera*** Lam., *Encycl.* 1: 398 (1785)

*Guilandina moringa* L.

*Moringa pterygosperma* Gaertn.

Sitalchini

Tree up to 12m tall with whitish grey bark, spreading branches, leaves compound, pinnate, alternate, 1.2-2×0.6-1 cm, slightly hairy, entire, rounded apex, leaves imparipinnate, 2-6 pairs of pinnules. Each pinnules has 4-6 pairs, ovate-obovate leaflets. Inflorescence panicles, bracteates. Flowers bisexual, surrounded by 5 unequal yellowish white petals. Stamens 5 with 5 smaller sterile stamens. 1-celled ovary, fruits pendulous, 3-sided pods, linear, each pods contains usually 26 seeds.

**Distribution:** Native to India.

**Nepal:** West, Central and East

**Altitudinal range:** 150-1100m

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

**Ecology:** Along road side.

**Representative collection:** *Pyuthan*, Bhingri, 681m, 25 April 2023, S.Gautam, SG4163, ASCOL Herbarium.

## ORDER: MALVALES

### Keys to Family:

**1a.** Trees; Stamens 5-15 or many, 1 to several whorls; Anther 2-celled; Carpels 3, ovules 2 per locule..... **Dipterocarpaceae**

**1b.** Herbs, Shrubs or Trees; Stamens numerous, monoadelphous; Anther 1-celled; Carpels 3-10 or more, 5 or multilocular, 1 to many ovules..... **Malvaceae**

### FAMILY 27: DIPTEROCARPACEAE

Annual or Perennial, Evergreen or Deciduous herbs, Shrubs or Trees. Leaves alternate, oblong, simple, palmately veined, entire, stipulate or exstipulate. Inflorescence axillary, raceme or panicle, bracteates. Flower bisexual, solitary or clustered. Epicalyx present. Sepals 5, ovate, free or fused. Petals 5, free. Stamens numerous, free or fused, anther dithecous. Ovary superior, 3 locules, 3-celled, 2-many ovules per locule. Fruit capsule or nut like.

#### 1. **Shorea** Roxb.

Large deciduous or evergreen tree. Leaves simple, entire, alternate, glabrous or pubescent, shiny. Inflorescence axillary or terminal cymose panicles. Bracteates present or absent. Calyx: 5, all are unequal. Petals elongate, yellow or pink, slightly hairy. Stamens: numerous, anther ovoid. Ovary ovoid or conical, densely hairy. Fruit contains 1 seed closed by calyx segments, developed into large veined wings.

**Shorea robusta** C. F. Gaertn., *Suppl. Carp.* 48 (t. 186, f.1) (1805).

Saal

Perennial large deciduous tree attain a height of 18-45m. Stem Branched, glabrous. Bark: dark reddish brown. Leaves simple, glabrous, alternate, (7-25×5-15) cm, oblong to oval, 10-12 pairs of lateral veins, shiny, Petiole 1.5cm, base cordate or oval, apex acuminate or tapering into a long point, margin entire. Inflorescence raceme like panicles in leaf axils, terminal or axillary, pubescent. Flowers are cream-yellow carried in clusters. Bract 0.2cm, minute, caducous. Sepals 5, unequal, 3 longer & 2 smaller, free, ovate, pubescent. Petals 1.2×0.3cm, 5, creamy

yellow, free, lanceolate. Stamens numerous, 0.2cm, yellowish. Carpel 0.4cm, ovoid, pubescent. Fruit: nut, small, oval, up to 1cm diameter.

**Distribution:** Subtropical Himalaya (Garhwal to Assam), India.

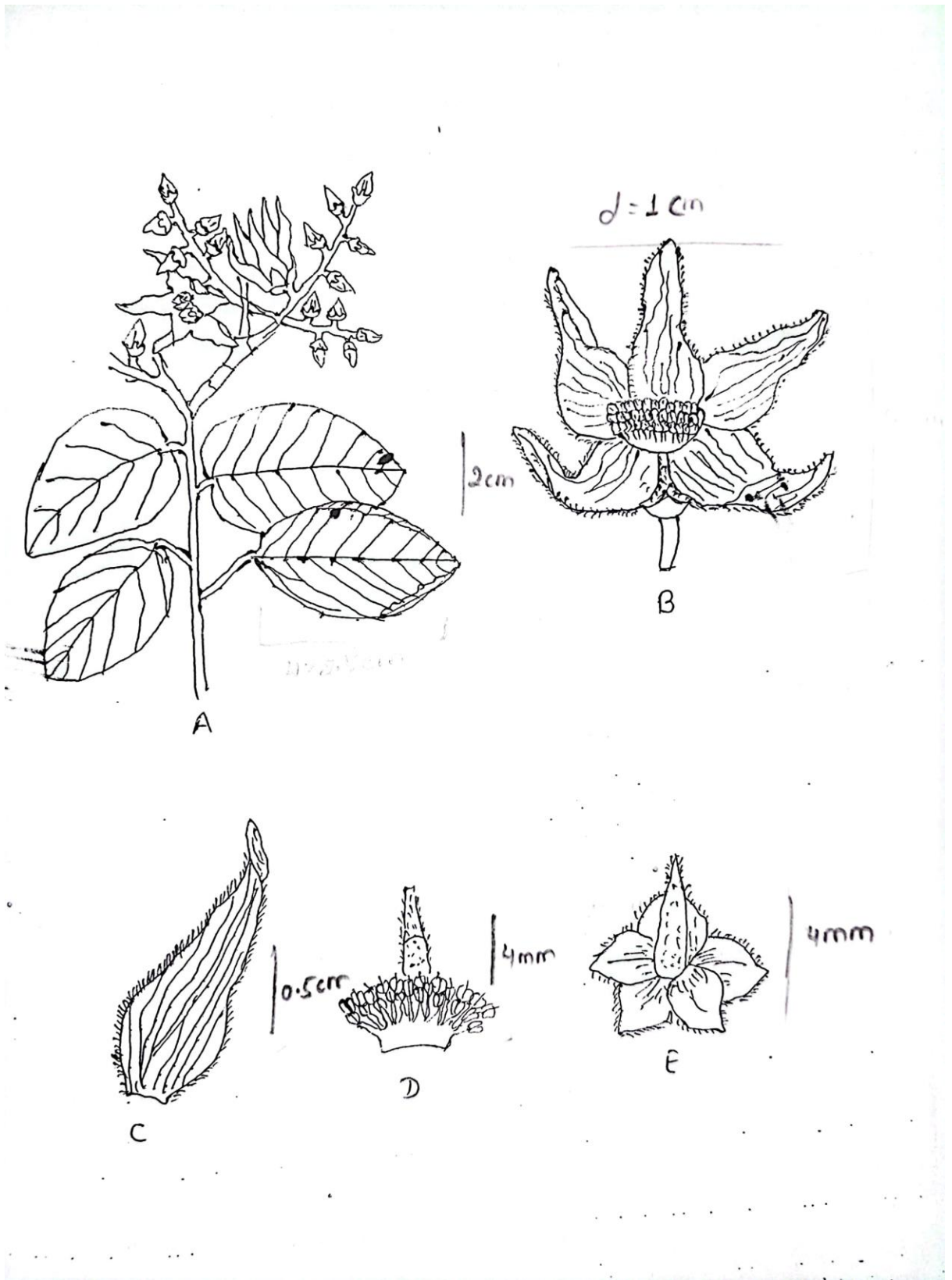
**Nepal:** West, Central and East

**Altitudinal range:** 150-1500m,

**Fl. & Fr.:** Feb.-Jul.

**Ecology:** Forest, Road sides

**Representative collection:** *Pyuthan*, Bhingri, 776m, 22 April 2023, S. Gautam, SG4159 ASCOL Herbarium.



**Fig. 4.16:** *Shorea robusta* C. F. Gaertn. A: Flowering branch, B: Flower, C: Petal, D: Stamens and Pistil, E: Sepals with Pistil

## FAMILY 28: MALVACEAE

Annual to perennial herbs, shrubs or small trees. Stem branches, erect or spreading, pubescent with star-shaped hairs. Leaves alternate, petiolate, palmately lobed & palmately veined (reticulate venation), stipulate, pubescent, serrate or entire, acute. Inflorescence solitary, axillary or terminal, raceme or cyme. Flower bisexual, actinomorphic, pentamerous with epicalyx, pedicellate, bracteate. Calyx (Sepals) 5, separate or basally connate. Corolla (petals) 5, free. Stamens numerous, fused, monadelphous, filaments united in a tube & joined to corolla, anther basifixed, monothealous, unilocular. Gynoecium: 5 or multicarpellary, united, 4 – many locules, 1 or many ovules per locule: ovary superior, hypogynous: Fruit capsule or schizocarp.

### Keys to Genera:

- 1a. Herbs, shrubs or small trees without spines .....2  
1b. Large trees with spines..... **Bombax**  
2a. Sepals 5, free .....3  
2b. Sepals 5, connate to middle..... **Sida**  
3a. Ovary 2-4-celled, fruit a drupe..... **Grewia**  
3b. Ovary 2-5-celled, fruit a capsule with hooked spines..... **Triumfetta**

### 1. **Bombax** L.

Deciduous trees having small prickles. Leaves digitate, deciduous, compound, alternate, stipulate, petiolate, acute, entire. Peduncles: axillary or clustered, 1-flowered. Flowers large. Bracteole absent. Calyx: 5-7 lobed, cup-shaped. Petals: obovate. Stamens: 5 bundles, numerous, opposite to petals, connate. Ovary 5-celled, ovules many. Fruit capsule. Seeds many, black in white cotton.

**Bombax ceiba** L.; *Sp. Pl.* 511 (1753).

*Bombax malabaricum* DC.

*Salmalia malabarica* (DC.) Schott & Endl.

Simal

Deciduous tall tree up to 30m. Grey with hard small prickles bark. Stipules minute, Petiole 10-20cm. Leaves compounds, alternate, 5-7 leaflets, (5-15×2-4) cm, oblong-lanceolate, glabrous, base attenuate, acuminate apex, entire margin. Inflorescence terminal or axillary of 1-4 flowers near the end of branches. Flowers large, red. Calyx 3-5 lobes, cup-shaped or campanulate, smooth outside, inside silky. Corolla crimson red, slightly pubescent, recurved. Stamens numerous, filament flat, connate at the base, staminal tube short, anther reniform. Carpel conical, green, ovary 5-celled, ovules many, stigma light red. Fruit Capsule, seeds numerous, smooth, black or grey, packed in white cotton.

**Distribution:** Himalaya (Kashmir to Bhutan), India, S. China, S.E. Asia,

**Nepal:** West, Central and East                      **Altitudinal range:** 200-1200m.

**Fl:** March- April

**Ecology:** Found in Sal forest.

**Representative collection:** *Pyuthan*, Bhingri, 750m, 11 Feb. 2023, S. Gautam, SG4136, ASCOL Herbarium.

## 2. *Grewia* L.

Small trees or shrubs. Leaves alternate, petiolate, entire or serrate, stipulate. Inflorescences solitary or clustered cymes. Flowers bisexual, pedicellate, 5-merous, bracteate. Sepals 5, free, mostly coloured. Petals 5, free, mostly shorter than the sepals. Stamens numerous, free. Carpels 2-4, syncarpous. Ovary superior, 2-4-loculed. Fruit a drupe.

### **Keys to Genera:**

**1a.** Dark brown bark; opposite leaves; white flowers..... **G. optiva**

**1b.** Greyish rough bark; alternate leaves; yellow flowers..... **G. asiatica**

***Grewia optiva*** J. R. Drumm. ex Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 9: 692. 1926.

*Grewia oppositifolia* Buch.-Ham. ex D. Don

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Medium sized tree up to 12m; Branches smooth, spreading, bark dark brown. Leaves opposite, broadly ovate, 3-9×1-5cm, rough and hairy above, base rounded, margin crenate or toothed, apex acute to acuminate or pointed, stipules 0.5cm long, petiole 0.5-1cm long. Inflorescence cymes, Flowers borne in leaf axils, 2-8 flowered together, peduncle 2.5cm, pedicel 2-3cm, Pubescent. Sepals 1-1.5 cm, linear oblong. Petals white, shorter than sepals, elliptic-oblong. Stamens numerous, free, 6-10mm long, anther dorsifixed. Ovary ovoid, ovary 2-4 loculed, 2-4 ovules per locule, pubescent; style 1cm long, simple; stigma papillose. Fruit drupe, globose, purple.

**Distribution:** Himalaya (Kashmir to Nepal).

**Nepal:** West, Central and East

**Altitudinal range:** 150-1800m

**Fl. & Fr.:** Apr.-Sep.

**Ecology:** Slopy dry and open areas.

**Representative collection:** *Pyuthan*, Bhingri, 750m, 29 Sept. 2022, S. Gautam, SG418, ASCOL Herbarium.

***Grewia asiatica* L.; *Fl. Br. Ind.* 1: 387 (1874)**

Deciduous small tree up to 4.5m tall, greyish rough bark; Branches, young branches with hairs; leaves alternate, simple, broadly cordate to ovate, 20×16cm, acute, toothed margin, hairy above, petiole 1.5cm long. Inflorescence in 3-5 flowered axillary cymes, flowers borne in clusters of 2-8, pedicels 1-1.5 cm long; sepals 5, oblong. Petals 5, yellow, style equal to stamens, stamens numerous, free. Ovary 4-lobed. Fruits drupe, globose, red or purple, seeds 1-2.

**Distribution:** Himalaya (Kashmir to Nepal).

**Nepal:** West, Central and East

**Altitudinal range:** 150-1800m

**Fl. & Fr.:** Sept.- Jan.

**Ecology:** Slopy and dry open area.

**Representative collection:** *Pyuthan*, Bhingri, 743m, 5 Jan. 2023, S. Gautam, SG4113, ASCOL Herbarium.

### 3. *Sida* L.

Herbs or shrubs. Leaves: simple, alternate, ovate or elongated, star-shaped hairs or hairless, toothed margin, acute apex. Stipulate, petiolate. Flowers at end of branches or at the leaf axils, flowers occurs singly or in clusters, pentamerous. Sepals 5, united at the base. Petals: 5, yellow. Stamens numerous, divided into many filaments. Ovary: 5-10 celled. Fruit: schizocarp, globose.

***Sida acuta*** Burma. F.; *Fl. Ind.* 147 (1768).

*Sida carpinifolia* Linnaeus f.

*Sida lanceolata* Retzius

बलुझार (Balu Jhaar)

Perennial erect herbs or small Shrub, up to 2m height. Stem: branched, cylindrical, star-shaped hairs or glabrous. Leaves simple and alternately arranged along the stem, hairy, Stipules 3-6mm: Petiole (3-6) mm, shorter than stipules, (12-95×3-40) mm, ovate or linear-lanceolate, obtuse base, acute or acuminate apex (pointed tips), toothed or dentate margin. Inflorescence axillary, racemose. Pedicel 3.5-10 mm, pubescent. Flowers singly or in paired, produced at the leaf axils. Sepals: 5, (3-7) mm, fused, ovate or cup shaped, hairless (glabrous), pointed tips. Petals: 5, (7-9) mm, yellow, obovate. Stamens numerous, 0.6 cm, filament tube glabrous or slightly hairy. Fruit schizocarp, green to dark brown when mature. Seeds trigonous, glabrous, dark in colour.

**Distribution:** Bhutan, Cambodia, India, Laos, Thailand, China, Vietnam. A Pantropical weed.

**Nepal:** West, Central and East

**Altitudinal range:** 250-2700m

**Fl:** Jul- Feb.

**Ecology:** In open & wasteland, roadsides.

**Representative collection:** *Pyuthan*, Bhingri, 743m, 30 Oct. 2023, S. Gautam, SG4200, ASCOL Herbarium.

#### 4. **Triumfetta** L.

Shrubs or herbs. Leaves pubescent, unlobed or 3-7-lobed. Flowers in axillary cymes, 5-merous. Sepals 5, free. Petals 5. Stamens many. Ovary 2 – 5-celled, ovules 2 per cell; style slender. Fruit a capsule with hooked spines.

**Triumfetta rhomboidea** Jacq., *Enum. Syst. Pl.* 22. 1760.

*Triumfetta bartramia* L.

*Bartramia indica* L.

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Erect herbs or shrubs, 75-120cm in height. Stem glabrous, grooved. Leaves simple, alternate, pubescent with stellate hairs; petiole 1.5cm; leaf blade ovate-rhomboid with 3-5 lobes, 2-10cm long, palmately veined; base rounded; margin serrate or toothed; apex acute-acuminate. Flowers small, clustered on leaf axils; petals 5, yellow, obovate, 5mm long; stamens 10-15. Fruit sub-globose, 4mm in diam. covered with hooked spines.

**Distribution:** Africa, Himalaya, India, east to China, Malaysia.

**Nepal:** West, Central and East      **Altitudinal range:** 600-1400m

**Fl.:** Aug.-Nov.

**Ecology:** Open areas, forest margins.

**Representative collection:** *Pyuthan*, Bhingri, 750m, 27 Sept. 2022, S. Gautam, SG417, ASCOL Herbarium.

### ORDER: SANTALALES

#### FAMILY 29: SANTALACEAE

Evergreen or deciduous herbs or trees, monoecious or dioecious. Branches glabrous, slender or angled. Leaves opposite rarely alternate or whorled, simple, ovate – lanceolate, petiole present, margin entire, pinnate venation. Inflorescence axillary or terminal, raceme or cymes, paniculate, flower solitary, bisexual or unisexual, occurs in clusters. Sepals absent, petals 3-4 or 5, post-staminal hair

present. Stamens 3-4 or 5, opposite petals, free, pistil 1, 1-3 carpellate, Ovary inferior, ovules 2-4 per ovary, fruit pseudodrupes, small.

### Keys to Genera

**1a.** Tree up to 20m tall with thin, ovate-elliptic leaves and crimson red petals..... **Santalum**

**1b.** Shrubs or small trees up to 5m with thick, lanceolate leaves and yellowish green petals..... **Osyris**

### 1. *Osyris* L.

Evergreen shrubs or small trees with angled branches. Leaves simple, alternate, lanceolate-elliptic. Inflorescence cymose, bracteates, 1-4 or flowered in clusters. Flowers unisexual or bisexual. Bisexual flowers has fused perianth to ovary. Stamens 3 or 4, short filaments, anther ovoid. Ovary inferior, unilocular, 2-4 ovules. Fruit drupe, small, fleshy. Seeds globose.

***Osyris quadripartite*** Salzm.ex Decne.; *Ann. Sci. Nat., Bot., Ser.* 2. 6: 65, t. 6(1836).

*Osyris lanceolata* Hochstetter & Steudel ex A. Candolle

*Osyris arborea* Wallich ex A. Candolle

Jhuri, Nundhiki

Large evergreen perennial hardy shrubs or small tree up to 5m tall. Smooth, darkbrown, 3-angled branches. Leaves thick, alternate, lance-shaped, (1.2-6×0.6-2) cm, tip pointed, base obtuse, margin entire. Male Inflorescence: 2-13 flowered on peduncle up to 1.1 cm. Female inflorescence has 1-4 flowered in cluster, solitary, pedicel 2.5 cm. Flower small, yellowish green, produced in axillary clusters on flower stalks. Minute bracts, 2 in number. In male flowers petals 3, yellowish green, pedicel 4-8mm, stamens 3, filaments short. Bisexual flowers similar to the female flower with stamens. Stigma 3. Drupe fruits, pear-shaped, small, yellow to bright red to purplish dark when ripe.

**Distribution:** Bhutan, India, Myanmar, Sirlanka, Thailand, Africa, S. Europe, Indo-China, China, Burma.

**Nepal:** West and Central

**Altitudinal range:** 900-2200m

**Fl. & Fr.:** Apr.-Sept.

**Ecology:** Margin of Forests, roadsides

**Representative collection:** *Pyuthan*, Rabang, 1015m, 30 Nov 2022, S. Gautam, SG497, ASCOL Herbarium.

## 2. *Santalum* L.

Evergreen trees with slender, glabrous stem. Leaves, thin, alternate or opposite, ovate- elliptic, glabrous, reticulate venation, petiole well developed. Inflorescence axillary and terminal, cymose or raceme. Pedicellate. Flowers bisexual, 4 fused Tepals. Petals 4, lobes distally, stamens 4, hairs at filament base, ovary inferior, ovules 2-4, fruits Pseudodrupes.

***Santalum album* L., *Sp. Pl.* 2: 349. 1753**

Chandana

Perennial evergreen tree up to 20m tall, upright, slender branchlets. Bark dark brown or reddish, smooth in young trees. Leaves thin, opposite, ovate, 3.2-8.5 x 2-4cm, glabrous and shining above, tip pointed, reticulate intercostae venation, petiole 12-16mm long. Inflorescences paniculate cymes, peduncles 4-10mm, pedicels up to 2mm, Flowers terminal or axillary, 4-6mm, bisexual. Petals rose to crimson red or maroon through maturation, triangular. Tapels 4, basally fused, anterior free, 2-3mm, lobes ovate, thin, reddish minutely ciliate, its lobes alternate with tepals. Stamens 4, filaments 1mm, filament longer than anther. Anthers less than 1 mm, ovoid, 2-celled (ditheous), style 1.5-2 mm, stigma 3-lobes, ovary superior, globose 1mm, 1-celled. Fruit drupe, 8-12mm, globose, blackish-purple, seed one, smooth.

**Distribution:** Introduced elsewhere in Asia, Australia.

**Nepal:** West, Central and East.

**Altitudinal range:** 700-1200m

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

**Ecology:** Deciduous forests, grown in homesteads

**Representative collection:** *Pyuthan*, Bhingri, 764m, 30 Nov. 2022, S. Gautam, SG412, ASCOL Herbarium.

## ORDER: CARYOPHYLLALES

### Keys to Family:

- 1a. Perianth present..... 2
- 1b. Perianth absent..... 4
- 2a. Monocarpellary..... 3
- 2b. Bi or tri-carpellary..... **Polygonaceae**
- 3a. Flowers covered by 2 spiny bracts..... **Amaranthaceae**
- 3b. Flowers surrounded by 1-3 involucre bracts..... **Nyctaginaceae**
- 4a. Opposite leaves; 4-5 merous flowers without sticky calyx..... **Caryophyllaceae**
- 4b. Alternate or spiral leaves; pentamerous flowers in which calyx produce sticky substance..... **Plumbaginaceae**

## FAMILY 30: AMARANTHACEAE

Annual or Perennial herbs or shrubs. Leaves simple, alternate or opposite, entire, absence of stipules. Inflorescence racemes, spikes or panicles, basally cymose. Flowers bisexual or unisexual; bracts hard; bracteoles: 2. Perianth uniseriate, Tepals 3-5, free or connate, Stamens as many as tepals, opposite to petals, filaments separate or fused at base, anther dorsifixed. Ovary: superior, 1-celled, 1 to many ovules, style short or long. Fruit: capsule rarely berry, seeds lenticular or ovoid, sub-globose.

### 1. **Achyranthes** L.

Annual herb, Stem: cylindrical, pubescent, woody. Leaves: opposite, ovate lanceolate. Inflorescence: racemose, axillary spikelet, dense. Bracteole: spiny, perianth green or reddish. Stamens: 5

**Achyranthes aspera** L.; *Sp. Pl.* 204 (1753).

*Achyranthes aspra* Wall.,

*Achyranthes aspera* J. Jacq.,

*Achyranthes aspera* Duss.

Perennial herbs up to 110cm tall. Stem 4-angled, branches opposite, hairy. Petiole (0.5-1.5) cm. Leaves simple, opposite, ovate or elliptic-obovate, (1.2-4.7×0.6-2.9) cm, pubescent on both surface, tip acute or obtuse, margin entire, base cuneate, reticulate venation. Inflorescence terminal racemose or spike, pubescent. Bracts 2, spiny, lanceolate, 0.5cm. Flowers small on stem. Tepals 5, white or green, 3-4mm. Stamens 5, 2-3mm, white filament. Ovary 1-seeded. Capsule ovoid, seed brown, spiny.

**Distribution:** Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Africa, SW Asia, Europe.

**Nepal:** West, Central and East

**Altitudinal range:** 100-2900m.

**Fl:** Jun- Oct.

**Ecology:** Along trail, open place.

**Representative collection:** *Pyuthan*, Bhingri, 735m, 31 Dec. 2022, S. Gautam, SG4111, ASCOL Herbarium.

### **FAMILY 31: CARYOPHYLLACEAE**

Annual or perennial herbs or shrubs. Stem erect, branched, angled, swollen nodes, glabrous or slightly hairy. Leaves simple, opposite, lanceolate-ovate-cordate, entire, stipule absent. Inflorescence axillary cymose (dichasial) or racemes. Flowers solitary, bisexual or unisexual, tetra or penta-merous, bracteates, Sepals: 4-5, free or united. Petals 4-5, sub-equal to sepals. Stamens 10 or reduced to 8-1 or 2 pentamerous whorls of stamens, free, carpels 3-5, syncarpous, ovules many. Fruit capsule, seeds small, many.

#### **Keys to Genera**

**1a.** Sepals free, 3-5 carpels..... **Stellaria**

**1b.** Sepals united, 3 carpels..... **Silene**

#### **1. Stellaria Kuntze.**

Annual herb. Leaves simple, opposite, ovate-oblongate, petiolate or absent. Inflorescence solitary, cymose, terminal or axillary, pedicellate, bracteates. Sepals:

free, 4-5. Petals: 4-5, 2 petals arising from single base. Stamens: 2-5 or 10, polyandrous. Style: 3-5, carpels 3-5, fused. Fruit capsule, seeds numerous.

**Stellaria media** (L.) Villars.; *Hist. Pl. Dauphine*. 3: 615 (1789).

*Stellaria monogyna* D. Don.

Annual herbs up to 30cm. Stem prostrate, angled or cylindrical, glabrous. Leaves simple, Ca. (0.5-4×0.6-2) cm, opposite, ovate, Petiole length: Ca.0.11.2 cm, cordate base, acuminate apex, entire margin, shiny white surface, smooth, reticulate venation. Inflorescence axillary or terminal cyme, flowers minute, pedicel 0.5-1.5 cm, 2 bracteoles, pentamerous. Sepals 5, 0.4cm, free, fimbriate outersurface. Petals 5, polypetalous, shorter than sepals, white. Stamens: 5, polyandrous, filaments long, anther ditheous, basifixed. Carpels 3-5, syncarpous, ovary superior, unilocular, Style: 3. Fruits unilocular capsule, seeds numerous, red-brown.

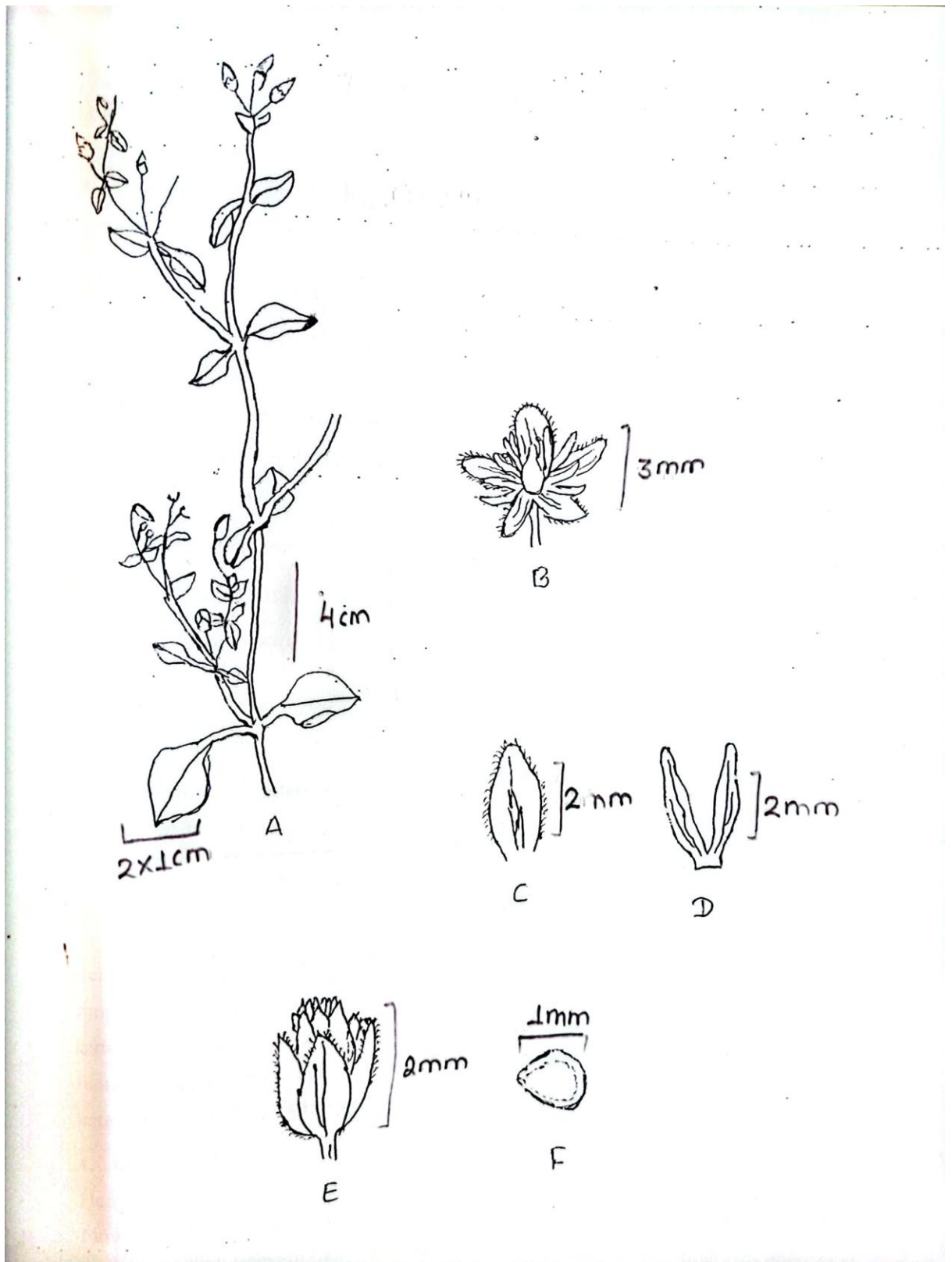
**Distribution:** Afghanistan, Bhutan, India, Japan, Pakistan, Russia, Sikkim, Europe.

**Nepal:** West and Central                      **Altitudinal range:** 1800-2700m.

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

**Ecology:** Along roadside, on cultivated land.

**Representative collection:** *Pyuthan*, Bhingri, 745m, 3 Dec. 2022, S. Gautam, SG4100, ASCOL Herbarium.



**Fig: 4.17:** *Stellaria media* (L.) Villars. A: Flowering branch, B: Flower, C: Sepals, D: Petals, E: Fruit with calyx, F: seeds

## 2. *Silene* L.

Annual prostrate herbs, pubescent, leaves simple, pubescent, petiole absent, ciliate. Inflorescence terminal and axillary cymes, bracteates, pedicellate. Sepals united, conical, 15-30 nerved. Carpels 3, fused. Fruits capsule, minute several seeds.

***Silene conoidea* L., *Sp. Pl.* 1: 418. 1753**

Annual herbs up to 40 cm tall. Stem erect, branched, pubescent. Leaves linear-lanceolate, (5-12×5-10) cm, pubescent, acute, sessile, obtuse, ciliate margin. Inflorescence dichasial cymes, several flowered, bracts similar to leaves, pedicel present. Flowers: calyx green, conical, 25-30 nerved. Petals pink, 5, filaments short, pubescent, style 3, carpels 3. Fruit capsule, seeds dark brown.

**Distribution:** S. Europe, N. Africa, temperate Asia, Himalaya, N. India.

**Nepal:** West and Central      **Altitudinal range:** 700-1500m

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

**Ecology:** Along roadside, on cultivated land.

**Representative collection:** *Pyuthan*, Bhingri, 745m, 24 Jan. 2023, S. Gautam, SG4104, ASCOL Herbarium.

## FAMILY 32: NYCTAGINACEAE

Herb or climbing herbs, shrubs. Stem herbaceous or woody. Leaves: opposite or alternate, simple, stipulate, petiolate, entire. Inflorescence cymes, umbel, terminal or axillary. Flowers surrounded by 1-3 involucre bracts. Perianth: Tepals 4-5, gamophyllous, connate in a funnel shaped or tubular, 5 petals fused. Stamens: 1-10, free or connate, filaments of unequal length. Carpel 1, Ovary superior, 1celled. Fruit: 1 seeded, seeds small.

### 1. *Boerhavia* L.

Herbs or shrubs, sticky glands present. Leaves opposite, petiole present, entire, acute, hairy. Flowers axillary dense, cymose or panicles. Bracteate. Perianth: Campanulate or bell-shaped, 5-lobed, filaments and styles shortly exerted. Stamens: 1-5, filaments connate at base. Carpel 1, locule 1, Ovary superior, style slender, stigma capitate. Fruit: obovoid.

**Boerhavia diffusa** L., *Sp. PL.*; 3(1753)

Annual Herbs up to 1m. Stem branched, hairless. Leaves simple, opposite, ovate, (0.5-2.5× 0.3-1.4) cm, rounded base, acute apex, entire margin, pubescent, Petiole 0.1-0.5cm. Inflorescence terminal or axillary, cymose, panicles, capitate. Flowers bisexual, small, bract 0.2cm, pubescent. Perianth. 1.7mm, campanulate, purple. Stamens: 3, filaments connate at base. Monocarpellary, unilocular, ovary superior, oblique. Fruit Anthocarp, glandular, obovoid.

**Distribution:** Tropical and sub-tropical regions of world,

**Nepal:** West, Central and East

**Altitudinal range:** 300-1200m

**Fl:** Mar.- Sept.

**Ecology:** On agricultural field.

**Representative collection:** *Pyuthan*, Bhingri, 750m, 25 May 2023, S. Gautam, SG4208, ASCOL Herbarium.

### FAMILY 33: PLUMBAGINACEAE

Annual- perennial, herbs, shrubs or lianas. Stem cylindrical or angular, glabrous. Leaves simple, alternate or spiral, ovate- lanceolate, pinnate venation, petiole short, entire, stipule absent. Inflorescence spike, racemose or head, terminal or axillary. Flowers bisexual, 5-merous, pedicellate or sessile. Calyx 5, synsepalous, funnel-shaped or tubular, usually ribbed, 5-lobed, produce sticky substance. Petals: 5, free or connate at base. Stamens: 5, free. Carpel 1-5, syncarpous, Ovary superior, 1-celled, single ovule per carpel. Fruit: capsule or achene with single seeds.

#### 1. **Plumbago** L.

Annual erect herb or sub shrubs. Leaves simple, alternate, lanceolate, petiolate or sessile, pinnate venation, exstipulte, entire or merely toothed. Inflorescence terminal or axillary raceme or panicles or spike. Flowers bisexual, pedicellate short, bract 2. Calyx 5 ribs, tubular, covered with glands producing sticky substance. Corolla tubular, tube longer than calyx, lobes 5 spreading, white. Stamens 5, free. Ovary superior, unilocular, 1 ovules per carpel. Fruit capsule with single seed.

**Plumbago zeylanica** L.; *Sp. Pl.* 151 (1753).

*Plumbago rosea* L.

Evergreen perennial herbs or shrubs up to 80cm with several long branches, cylindrical or angular. Leaves simple, opposite or alternate, ovate-lanceolate, (4-10×3-6) cm, surface smooth and shiny, attenuate, pointed end, entire, reticulate venation, petiole (0-5)mm. Inflorescence terminal, long spike like racemose. Flowers bisexual, pentamerous, persistent bracts 0.5 mm. Sepals 5, 1.2 cm, tubular, glandular hairs secreting sticky mucilage, 5 toothed. Petals 5, fused at base and tips free, white, tubular. Stamens 5, free, 5 elongated stigma lobes. Ovary superior, single celled. Fruits capsule, dark brown when ripe with one seeds.

**Distribution:** Tropical Africa, Tropical Asia,

**Nepal:** West, Central and East

**Altitudinal range:** 100-1300m

**Fl. & Fr.:** Mar.- Dec.

**Ecology:** Along road side.

**Representative collection:** *Pyuthan*, Bhingri, 735m, 15 Jan. 2023, S. Gautam, SG4112, ASCOL Herbarium.

#### **FAMILY 34: POLYGONACEAE**

Annual or perennial herb or shrubs with swollen nodes. Leaves simple, alternate, entire, Stipules: sheathing the stem. Inflorescence racemose or also in spike or panicles, clustered. Flowers bisexual, 2- or 3- merous, polyphyllous in 2 whorls. Perianth: 3-6 segments in 2 or 3 whorls, connate below. Stamens: 1-9, biseriate, filaments free or adantate to perianth. Bi or tri- carpellary, syncarpous, unilocular, Ovary superior, ovule 1, Styles 1. Fruit dry nut with single seed.

##### **1. Rumex** L.

Annual or perennial herbs, erect. Leaves ovate, lanceolate or hastate; ochrea tubular, deciduous. Flowers bisexual or unisexual, in axillary clusters or in whorls, forming simple or paniced racemes; perianth segments 6, the outer 3 smaller and the inner 3 larger. Stamens 6, styles 3. Achenes angular.

**Rumex hastatus** D. Don, *Prodr. Fl. Nep.* 74. 1825.

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Bushy shrub upto 90 cm tall with several ascending branches, woody, glabrous. Leaves simple, narrow and arrow shaped, triangular, petiole 1-3 cm, 1-5×1-2 mm; base truncate; apex acute. Flowers in terminal panicles, slender clusters of distant whorls of tiny greenish pink or pinkish green flowers, flowers small, polygamous, pedicel slender. Achenes brown, ovoid, trigonous, 2 mm.

**Distribution:** Afghanistan, Himalaya (Kashmir to Bhutan), W. China.

**Nepal:** West and Central

**Altitudinal range:** 1100-2600m

**Fl. & Fr.:** Apr.-Jun.

**Ecology:** Dry slopes and stony walls.

**Representative collection:** *Pyuthan*, Sworgadwari Dharamshala, 1720m, 17 Nov. 2022, S. Gautam, SG438, ASCOL Herbarium.

## ORDER: ERICALES

### Keys to Family

- 1a. Evergreen shrubs or tree..... 2
- 1b. Annual herbs..... **Primulaceae**
- 2a. Tree with milky sap; Stamens numerous in 2 or 3 whorls..... **Sapotaceae**
- 2b. Small tree without milky sap; Stamens 10-many in 2 whorls..... **Ericaceae**

## FAMILY 35: ERICACEAE

Perennial, dioecious, evergreen trees, shrubs. Leaves simple, opposite or whorled or spiral, exstipulate, entire or toothed, pinnate venation. Inflorescence racemose, clustered or solitary. Flowers bisexual, 4 or 5 merous, pedicellate, bracteate 2, perianth biseriate or uniseriate. Calyx usually 5, free or adnate to ovary. Corolla lobes 5-20, sympetalous, campanulate. Stamens 10-many, 2 whorls, epipetalous. Carpel 5 (2-10), syncarpous, 5 (2-10) locules. Ovary superior. Fruit a capsule. Seeds numerous.

## Key to Genera

1a. Shrubs, flowers small, white..... **Lyonia**

1b. Shrubs or trees, flowers comparatively large and showy..... **Rhododendron**

### 1. **Lyonia** Nutt.

Deciduous or evergreen trees or shrubs. Leaves alternate or spirally arranged, petiolate, entire or serrulate. Small flowers in axillary racemes, paniculate or umbellate or sometimes solitary, white, bracteates, 4-8 merous. Calyx 4-5-lobed, valvate, persistent. Corolla 4-5-lobed, sympetalous, tubular, globular or urceolate, pubescent. Stamens 8-10, filaments flattened. Ovary 4-5-locular, superior, many ovules per locule, stigma truncate. Capsule 4-5-locular, subglobose. Seeds oblong-ovoid, minute.

**Lyonia ovalifolia** (Wallich) Drude in Engler & Pranth. *Nat. Pflfam.* 4(1): 44. 1889.

*Andromeda lanceolata* Wall.

*Pieris ovalifolia* (Wall.) D. Don

अंगेरी

Evergreen or deciduous trees up to 5m tall with glabrous twig. Petiole c.a. 0.7 cm. Leaf blade ovate-elliptic, 3–15 × 2–10 cm; apex acute, margin entire, base obtuse, petiole 0.7 cm. Small flowers borne in dense axillary or terminal racemes in leaf axils, flask-shaped. Calyx lobes 5, ovate, slightly pubescent; corolla tubular, flask shaped, pubescent, white; stamens 10, filaments thread like; style twice as long as ovary, ovary glabrous. Capsule globose, seeds minute.

**Distribution:** Himalaya (Punjab to Bhutan), Tibet, Assam, Burma, east to China, MalayPen.

**Nepal:** West, Central and East

**Altitudinal range:** 1300-3300m

**Fl.:** May.-Jun.

**Ecology:** Open dry slopes, thickets.

**Representative collection:** *Pyuthan*, Sworgadwari, 2120m, 29 April 2023, S. Gautam, SG4182, ASCOL Herbarium.

## 2. **Rhododendron L.**

Evergreen or deciduous shrubs or trees with woody stem. Leaves alternate, entire, thick, coriaceous. Petiole short. Flowers in terminal racemes or corymb, few to many flowered, petiolate short. Calyx 5-8 lobed, persistent. Corolla funnel-shaped, tubular, lobes 5-10, sympetalous, spreading. Stamens 5-10 (-27), inserted at the base of the corolla. Ovary 5-(18) locular, style straight. Fruit a capsule, cylindrical or ovoid, seeds numerous, minute.

**Rhododendron arboreum** Sm., *Exot. B.* 1: 9, t. 6. 1805.

*Rhododendron puniceum* Roxb.

लालिगुराँस

Evergreen perennial trees up to 20 or 25 m tall, much branched, reddish brown, soft or rough bark. Leaves oblong-elliptic-oblongate, 7-20 x 3-6 cm, apex acute; base cuneate, revolute margin; abaxially densely tomentose. Flowers in cymose or raceme, 10-20 flowered, bright red in dense globose cyme, pedicel 0.5 cm. Calyx 5, small, triangular, bell-shaped. Corolla tube funnel shaped or tubular, campanulate. Stamens 10, unequal filaments glabrous, anther ovate, ovary conoid, 5-15 locular. Capsule slightly recurved, seeds minute, dark-brown.

**Distribution:** Himalaya, China, Myanmar, India, Sri Lanka, Thailand.

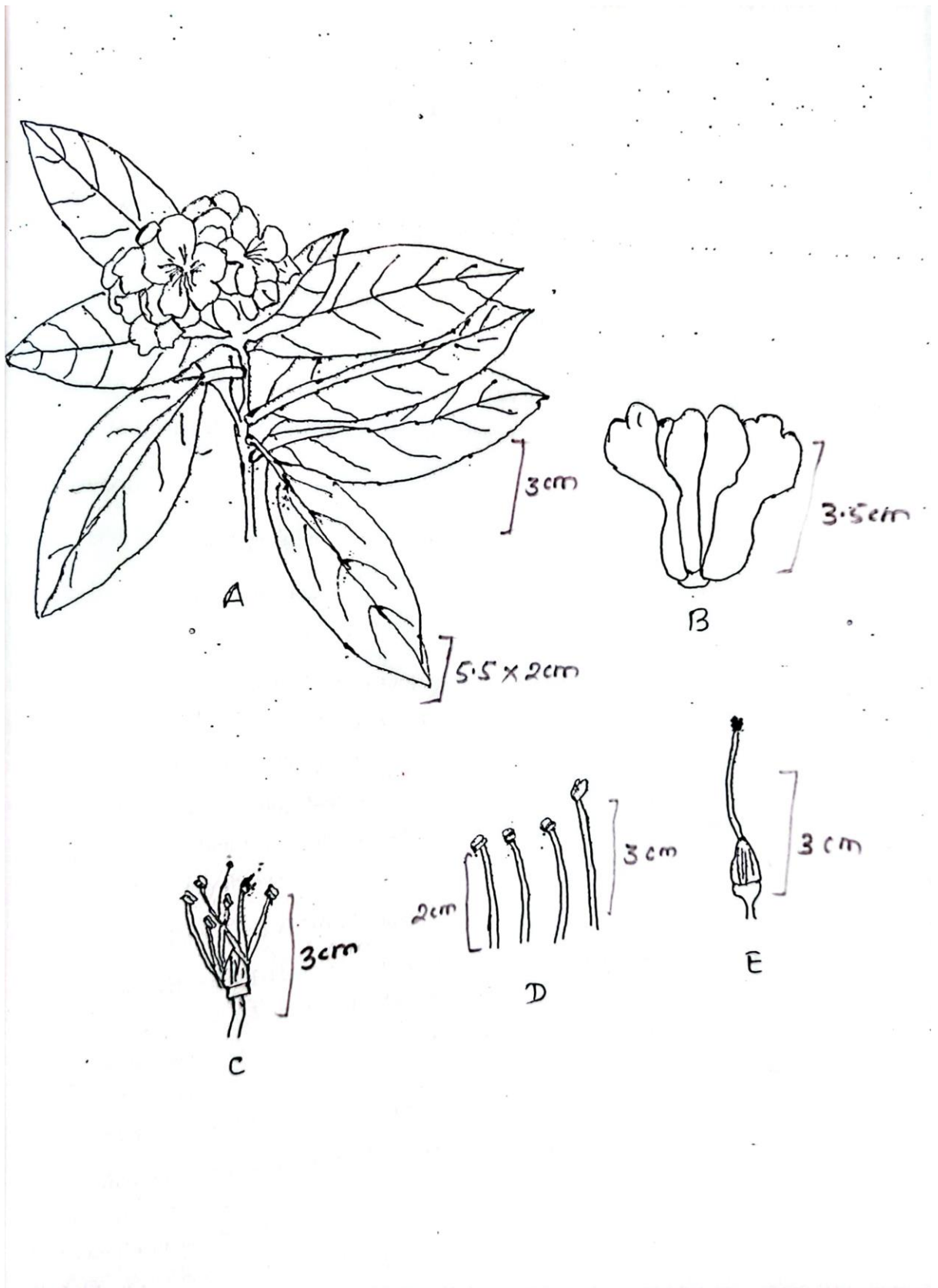
**Nepal:** West, Central and East

**Altitudinal range:** 1500-3300m

**Fl. & Fr.:** Apr.-Aug.

**Ecology:** Hilly slopes, forests.

**Representative collection:** *Pyuthan*, Sworgadwari, 2200m, 29 April 2023, S. Gautam, SG4183, ASCOL Herbarium.



**Fig. 4.18:** *Rhododendron arboreum* Sm. A: Flowering branch, B: Flower, C: Stamens with carpel, D: Stamens, E: Carpel

## FAMILY 36: PRIMULACEAE

Annual or perennial herbs. Leaves alternate, opposite or whorled, simple, exstipulate, petiolate or absent, entire, pubescent or glabrous. Inflorescence terminal, umbellate, racemous, or solitary flower, bracteates, flowers bisexual, pentamerous. Sepals 4-5, connate into tube, persistent. Petals 4-5, connate, gamopetalous, campanulate to tubular. Stamens 5, inserted in corolla tube, connate or distinct, single whorls of stamens opposite the corolla tubes, filaments short, free, anther ditheous. Carpels 5, syncarpous, ovary superior, unilocular, style 1, stigma 1. Fruit capsule, seeds numerous, black or brown.

### Keys to Genera:

**1a.** Leaves basally rosettes, petioles present, lanceolate..... **Androsace**

**1b.** Leaves on stem, sessile, ovate..... **Anagallis**

### 1. **Androsace** L.

Annual, biennial or perennial herbs with simple ascending stems. Leaves simple, single or basal rosettes, petiole present or absent, cuneate or attenuate, entire, acute. Inflorescence umbel, raceme or spikes, solitary, bracts present, 5-merous. Calyx 5, campanulate to subglobose, glabrous or slightly hairy. Corolla 5, white, pink or varies colour, tube shorter than calyx or equal, lobes imbricate. Filaments indistinct, free, shorts. Capsule globose, valvular. Seeds 3-many, brown.

**Androsace umbellate** (Lour.) Merr.; Philipp. *J. Sci.* 15: 237 (1919).

Perennial or annual herbs, 5-11 cm tall. Leaves at the base, lanceolate, round-kidney shaped, 0.5-2.1×0.6-2 cm, stalk 1-3 cm long, toothed or dentate, apex obtuse. Inflorescence umbel of 3-9 flowered with 2-3 mm long bracts, bracts hairy, ovate-lanceolate, pedicel 1-3 cm long, hairy. Sepal tube bell shaped, elliptic-ovate, 3-nerved, hairy. Petals oblong to obovate, white, corolla lobes imbricated in buds. Capsule globose, seeds 12-50.

**Distribution:** Pakistan, Himalaya (Kashmir to Sikkim), India, China, Japan.

**Nepal:** West and Central

**Altitudinal range:** 270-1500m

**Fl. & Fr.:** Feb. - Jun.

**Ecology:** Damp shady place

**Representative Collection:** *Pyuthan*, Bhingri, 745m, 3 Feb. 2023, S. Gautam, SG4123, ASCOL Herbarium.

## 2. *Anagallis* L.

Annual, biennial or perennial herbs; erect, glabrous or pubescent. Leaves alternate, opposite or whorled, entire, leafy stem, petiole short or sessile. Flowers solitary in leaf axils or axillary & terminal panicles or racemes with bracts, 5-merous. Calyx 5 (6-9), Corolla 5 (6-9), white, blue, pink, lobes contorted in bud, corolla tube very short. Stamens attached at the base of corolla, filaments free or fused, pubescent, anther basifixed, dorsifixed, ovary superior. Capsule globose, operculate, seeds many.

***Anagallis arvensis* L. *Sp. Pl.* ed. 1. 148.**

Annual herbaceous plants with stem up to 50 cm long, hairless. Leaves small, oppositely arranged along its four angled stem, 4-25×3-15mm, sessile, ovate or narrowly ovate with entire margins, rounded or pointed tips. Inflorescence solitary, axillary. Flowers small, bright blue, bracteates, bisexual, flowers opens early morning, pentamerous, pedicellate 2-3 cm. Sepals 5, gamosepalous. Petals 5, fused at the base. Stamens 5, epipetalous, filaments connate, anther bsifixed. Carpels 5, syncarpous, superior, unilocular, many ovules. Capsule operculate, small rounded, seeds 12-45, trigonal.

**Distribution:** Pakistan, Himalaya (Kashmir to Sikkim), India, China, Japan.

**Nepal:** West and Central

**Altitudinal range:** 270-1500m

**Fl. & Fr.:** All seasons

**Ecology:** Damp shady place

**Representative Collection:** *Pyuthan*, Bhingri, 731m, 28 Nov. 2022, S. Gautam, SG471, ASCOL Herbarium.

## FAMILY 37: SAPOTACEAE

Trees or shrubs with milky sap. Leaves coriaceous, simple, alternate, opposite or spiral, crowded at apex of branchlets, petiolate, stipulate, obovate, entire, pubescent, leathery. Inflorescence cymose clusters in leaf axils or solitary. Flowers

bisexual, sessile, actinomorphic, bracteate. Sepals 5 or 4-8, uniseriate or biseriate, usually united, rarely free. Petals 4-8, gamopetalous in one or more whorls, usually equal or double to number of sepals, united petals in semi-funnel shape. Stamens numerous, in 2 or 3 whorls, epipetalous, inserted in corolla, staminodes alternate to stamens, anther ditheous. Ovary superior, 4 or 5 locular, ovules 1 per cell, style 1, multi-carpellary, syncarpous, carpels double to the number of stamens. Fruit a berry, 1 to many seeded.

**1. Diploknema** Pierre.

Trees with leaves crowded towards branch apex. Leaves broad, spirally arranged, stipulate. Lateral veins prominent beneath. Flowers in fascicles in axils of leaves, crowded below existing leaves, pedicel present. Sepals 5, outer 2 larger. Corolla lobes 8-10. Stamens ca. 40 or numerous inserted at the base of corolla lobes, staminodes absent. Ovary superior, multilocular. Fruit fleshy, 1 large seed.

**Diploknema butyracea** (Roxb.) H.J. Lam., *Bull. Jard. Bot. Buitenzorg sér. 3*, 7:186. 1925.

*Aesandra butyracea* (Roxb.) Baehni.

*Bassia butyracea* Roxb.

चिउरी (Chiuri)

Trees up to 30 m tall with thick, round branchlets, young shoots pubescent. Leaves broad, spirally arranged, crowded at apices, obovate or elliptic-oblong, 6-20×3-7 cm, petiole 2.5 cm, pubescent. Stipules 4mm, triangular or lance-shaped, falling off early, apex obtuse; base cuneate or wedge shaped; margin entire or wavy. Inflorescence axillary, clustered in leaf axils, 1-6 per axil; pedicel 2-4 cm. Sepals 4-6, ovate, 6-9 mm, hairy. Petals 8-10 lobes, white, 6-8 mm. Stamens several (10-20), in 1 or 2 whorls. Ovary conical, 7-12 locular, style glabrous, Fruit ovoid-ellipsoid, fleshy, 1 large seeds, seeds brown, shiny, hard.

**Distribution:** Subtropical Himalaya.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1500m

**Fl. &Fr.:** May – June.

**Ecology:** Forest of *Shorea robusta*, slopy areas.

**Representative collection:** *Pyuthan*, Bhingri, 750m, 25 April 2023, S. Gautam, SG4164, ASCOL Herbarium.

## ORDER: GENTIANALES

### Keys to Family:

- 1a. Herbs, shrubs, trees or climbers without white latex..... 2
- 1b. Herbs, shrubs, small trees or twining with milky latex..... **Apocynaceae**
- 2a. Stipules absent; 4-5 merous flowers; ovary superior..... **Gentianaceae**
- 2b. Stipules present; 5-merous flowers; ovary inferior..... **Rubiaceae**

## FAMILY 38: APOCYNACEAE

Herbs, shrubs or trees, twining with white latex, erect, branched stem. Leaves simple, opposite or whorled, exstipulate, entire margin with latex, petiolate, reticulate venation. Inflorescence terminal or axillary cyme or umbellate cyme. Flowers bisexual, bracteates or ebracteate, pedicellate, tetra- or penta- merous, flowers in cluster. Sepals 4 or 5, gamo or polysepalous, tubular. Petals 4-5, gamopetalous forming corolla tube, funnel form. Stamens 4-5, epipetalous, alternipetalous, filament short, free, dithecous anther, connate to stigma. Bicarpellary, syncarpous, ovaries free below but united by style, unilocular or bilocular, ovary superior, 1 or 2-numerous ovules per locule. Fruit drupe, berry, follicle.

### Keys to Genera:

- 1a. Shrubs or Trees having alternate leaves..... **Plumeria**
- 1b. Climbers having opposite leaves..... **Vallaris**

### 1. **Plumeria** L.

Shrubs or trees produce latex, without spines, erect stem, glabrous. Leaves alternate, deciduous, leaves clustered at the tip of branches. Inflorescence terminal or axillary cyme, peduncle present, bracteates large. Flowers large and waxy. Calyx 5 lobed, equal or unequal, small. Corolla white, yellow, pink, funnel form,

pubescent, corolla lobes overlapping. Stamens 5, attached near the base of corolla. Ovary superior, ovules many, multiseriate, short style. Fruit follicles, seeds many.

**Plumeria rubra** L., *Sp. Pl.* 209. 1753.

गोलचीनी (Golchini), Champa

Soft-wooded erect tree with 5-8m high producing milky latex. Leaves simple, alternate, large, obovate-oblong or lanceolate, acute, glabrous, 15-30×5-10 cm, pinnate venation, entire, 20-30 pairs of veins, leaves clustered at the end of branches. Inflorescence terminal, many flowered cymes, appear at the end of the branches, peduncle 12 cm, white pale yellow or reddish with yellow centre flower, calyx hairy outside, small. Corolla tube 2 cm, pubescent inside, glabrous outside, petals 5, fused. Fruit follicles in pairs, seeds large, flat.

**Distribution:** Almost cosmopolitan. Native to Mexico and Central America, China.

**Nepal:** West, Central and East

**Altitudinal range:** 600-1200m.

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

**Ecology:** On roadsides, open fields

**Representative collection:** *Pyuthan*, Bhingri, 750m, 19 Jan. 2023, S. Gautam, SG4189, ASCOL Herbarium.

## 2. **Vallaris** N. Burman

Perennial twining or climbers producing white latex, plants without spines, leaves opposite, oblong to lanceolate, acute. Inflorescence axillary or terminal cyme, umbellate. Sepals free, puberulent, lobes ovate-oblong. Corolla funnel form to campanulate, lobes overlapping. Stamens exerted or inserted at the tip of corolla tube, filaments short. Carpel 2, fused, ovules many, style hairy. Fruits follicles, in pairs, seeds many.

**Vallaris solanacea** (Roth) Kuntze, *Revis. Gen. Pl.* 2: 417. 1891.

*Vallaris dichotoma* Wall. ex. G. Don

*Vallaris heynei* Spreng

Dudhe Lahara (दुधे लहरा)

Annual to perennial climbing or twining shrubs up to 10m with milky latex produce stem, hairy. Leaves opposite, elliptic oblong-lanceolate, (5-15×0.5-5) cm, acute or pointed tip, cuneate base, entire margin, glabrous or hairy, petiole 1-2 cm. Inflorescence axillary, dichasial or trichasial cymes, hairy, pedicel up to 1cm, flowers in leaf axils. Sepals 5, free. Petals 5, funnel shaped or campanulate, white, lobes overlapping. Stamens inserted at the tip of corolla tube, anther united, short filaments. Carpels 2, ovules many. Fruits follicles, seeds many, biseriate.

**Distribution:** Himalaya (Kumaun to Bhutan), S. China, Burma, Indo-China.

**Nepal:** West, Central and East

**Altitudinal range:** 150-1000m

**Fl. & Fr.:** Mar.-Jul.

**Ecology:** On roadsides, open fields, slopes

**Representative collection:** *Pyuthan*, Bhingri, 765m, 15 Apr. 2023, S. Gautam, SG4154, ASCOL Herbarium.

### FAMILY 39: GENTIANACEAE

Annual herbs, glabrous, erect, branched herbaceous stem. Leaves simple, opposite, entire margin, exstipulate, sessile. Inflorescence cymose. Flowers bisexual, 4-5 merous, varies in colour, perianth biseriate, sepals 4 or 5, synsepalous, tubular, persistent, petals 4 or 5, sympetalous, bell-shaped, tubular or funnel shaped, corolla lobes overlapping. Stamens 4-5, epipetalous, inserted in near the base of corolla, anther dorsifixed or basifixed, 2-celled. Bicarpellary, syncarpous, ovary superior, ovules many, 1-2-celled ovary, style simple and short, stigma bilobed. Fruit capsule, seeds many, small.

#### 1. *Swertia* L.

Annual or perennial herbs having cylindrical, 4-angled, erect, branched stem. Leaves opposite or alternate, entire, lanceolate, acute, sessile or petiole present. Inflorescence axillary and terminal cluster, cymose, paniculate, 4 or 5 merous flowers, bisexual, complete, pedicellate, bracteates. Calyx 4-5, free or fused at base. Corolla 4-5, tubular, tube very short, varies in colour, hairless. Both calyx and corolla rotate, 1 or 2 nectaries per corolla lobes. Stamens epipetalous, inserted near the base of corolla tube, free rarely united, filaments longer, anther opening

by longitudinal slits. Ovary bicarpellary, unilocular, fused. Fruit capsule, enclosed by calyx and corolla. Few to many seeded, seeds small.

### Keys to species

**1a.** Flowers tetramerous..... **S. angustifolia**

**1b.** Flowers pentamerous..... **S. paniculata**

**Swertia angustifolia** Buch.-Ham. ex D. Don. *Prodr. Fl. Nepal.* 127. 1825.

*Ophelia angustifolia* (Buch.-Ham. ex D. Don) G. Don

Chiraito (चिराईतो)

Annual, erect, branched herbs up to 1.5m high. Stem cylindrical and four angled. Leaves lanceolate, opposite, sessile, acute at tip, 5 or (1-3) nerved, 2-6cm×3-10mm, margin entire, attenuate base. Inflorescence paniculate cyme, branched, many flowered, flowers 4-merous, pedicel 3-6mm. Calyx lobes free, shorter or equal to corolla. Corolla bluish white with light purple dots, nectaries 1 per corolla lobes. Filaments 5-6.5mm long, anther ellipsoid, style short. Capsule ovoid. Seeds minute.

**Distribution:** Himalaya (Kashmir to Bhutan), Myanmar, India, Sikkim, Myanmar, Vietnam.

**Nepal:** West, Central and East

**Altitudinal range:** 900-3000m

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

**Ecology:** On roadsides, mixed forest,

**Representative collection:** *Pyuthan*, Kolakharka (Bhingri), 1069m, 30 Nov. 2022, S. Gautam, SG479, ASCOL Herbarium.

**Swertia paniculata** Wallich, *Pl. Asiat. Rat.* 3: t. 205. 1832.

*Ophelia paniculata* (Wallich) D. Don.

*Ophelia wallichii* G. Don.

चिराईतो (Chiraito)

Annual herbs up to 110cm tall with erect, slender, 4-angled branched stem. Leaves basal as well as cauline, opposite, petiolate or absent, ovate-oblong to lance-

shaped, 2-5cm×4-13mm, margin ciliolate with hairs, acute or acuminate, 1-3 veins. Inflorescence terminal and axillary, panicles of cyme, many flowered, pedicel 0.5-1 cm, petiole 0.5-1.5 cm, pentamerous, pale yellow-green with blackish purple spots. Sepals 5, free, longer than corolla. Petals 5, ovate, pale yellow, nectaries 1 per corolla lobe, horse-shoe-shaped. Stamens 5, 4-5mm long, purple anthers, filaments free, flattened. Capsule ovoid, seeds pale yellow.

**Distribution:** Himalaya (Kashmir to Bhutan), Myanmar, India, China.

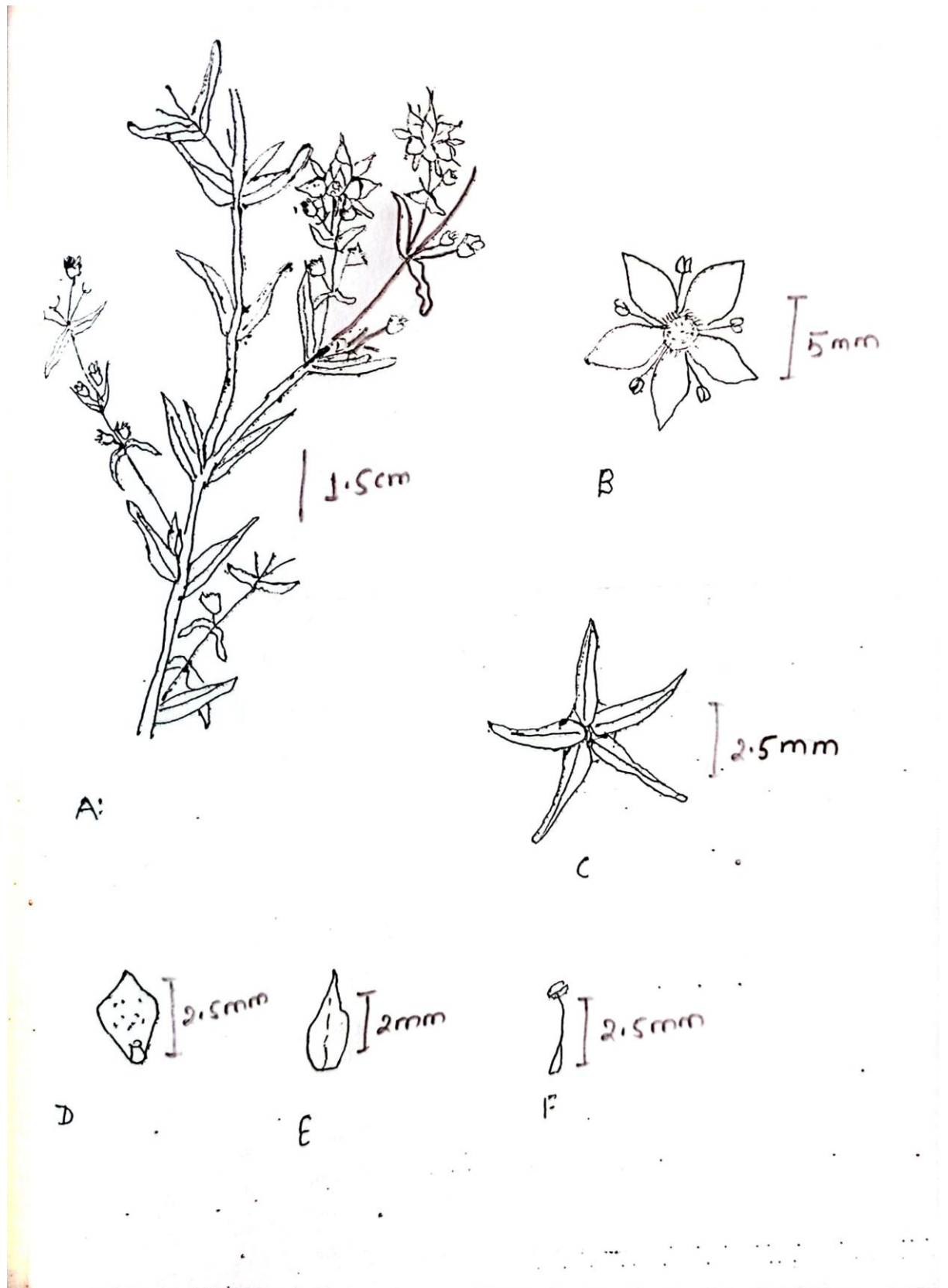
**Nepal:** West and Central

**Altitudinal range:** 1500-3000m

**Fl. & Fr.:** Aug.-Sept.

**Ecology:** Mixed Forests

**Representative collection:** *Pyuthan*, Sworgadwari, 2073m, 17 Nov. 2022, S. Gautam, SG457, ASCOL Herbarium.



**Fig. 4.19:** *Swertia paniculata* Wallich. A: Flowering and Fruiting branch, B: Corolla, C: Calyx, D: Petal, E: Carpel, F: Stamen

## FAMILY 40: RUBIACEAE

Annual or Perennial herbs, shrubs, trees or climbers with herbaceous, cylindrical or quadrangular stem. Leaves simple, opposite decussate or whorled, stipulate, stipules leafy like, entire, hairless or hairy. Flowers bisexual, clustered in heads, 4-5 merous, pedicel present or absent, bract present or absent. Sepals 4-5, tubular, adnate to ovary or free. Corolla tubular, campanulate, gamopetalous, 3-5 lobed, fused with filaments. Stamens 3-5, epipetalous, alternate to the corolla lobes, anthers dorsifixed or basifixed, bilocular. Ovary inferior, 2- (-7) loculars, ovules numerous or solitary, bicarpellary, syncarpous, stigma 2-lobed. Fruit capsule, drupe, berry.

### Keys to Genera:

- 1a. Stamens 4 or 5, ovary 1 or 2 celled..... 2  
1b. Stamens 5, ovary 5-celled..... **Spermadictyon**  
2a. Leaves crowded at the end of branches, leaves glabrous..... **Himalrandia**  
2b. Leaves occurs in whorls of 4, leaves rough..... **Rubia**

### 1. **Himalrandia** T. Yamazaki

Shrubs, densely branched, branches usually spinescent. Leaves present at the end of the branches, entire, acute, hairless, stipules small, interpetiolar, triangular. Flowers solitary, axillary. Calyx campanulate, 5-lobed. Corolla 5-lobed. Stamens 4 or 5. Anthers almost sessile. Ovary glabrous, 2-loculed. Fruit berry, sub-globose with 2-4 seeds.

**Himalrandia tetrasperma** (Wall. ex Roxb.) T.Yamaz, *J. Jap. Bot.* 45: 340. 1970.

*Gardenia rigida* Buch.-Ham. ex D. Don

*Aidia tetrasperma* (Roxb.) T. Yamaz

घनालो

Shrubs up to 1.5m tall having rigid branches spinescent, hairless. Leaves ovate-oblongate, crowded at the tip of branchlets, 1 mm long, entire, narrowed base, acute, glabrous, stipule 1.5 mm long. Flower greenish-white, solitary, stalkless. Sepals 5, hairy. Corolla funnel shaped, 5 long pointed petals folded outward.

Stamens 5, stamens and style protrude out, filaments short. Ovary bilocular, glabrous. Fruit round blue berry.

**Distribution:** Himalaya (Kashmir to NEFA), Assam.

**Nepal:** West, Central and East

**Altitudinal range:** 1300-2600m

**Fl.:** May-Jun.

**Ecology:** Open slopes, rocky areas.

**Representative collection:** *Pyuthan*, Sworgadwari, 2065m, 29 April 2023, S. Gautam, SG4169, ASCOL Herbarium.

## 2. **Spermadictyon** Roxb.

Shrubs, erect, branched. Leaves opposite-decussate, oblong, hairless or hairy, petiolate, acute, attenuate, Stipules persistent. Inflorescences terminal, cymose, paniculate, or corymbose, flowers in bunches at the tip of the branches, bracteate. Calyx lobes 5. Corolla campanulate or funnel shaped, lobes 5. Stamens 5, short filaments. Ovary 5-celled, stigma 5-lobed. Fruit drupaceous or capsule, dry, seeds 5.

**Spermadictyon suaveolens** Roxb., *Pl. Corom.* 3: 32, t. 236. 1815.

*Spermadictyon azureum* Wall.

वन चाँप

Erect shrub up to 3m tall. Stem branched, glabrous or slightly pubescent. Oppositely arranged elliptic, oblong or ovate leaves, glabrous or pubescent, petiole 1-2 cm long, 3-14 x 1.5-7cm, apex acute-acuminate, margin entire to wavy, base attenuate, stipules triangle shaped, 10-16 pairs veins. Many flowers arranged in panicles at the end of branches of head-like clusters, flowers in bunches of 5 or more, bluish-purple with long tube, leaf like bracts. Calyx small, 5, persistent, tube narrow. Short oblong petals, 4-5 petals, fused, tube slender, funnel-shaped. Stamens remains inside the flower throat, filament short, straight anthers. Capsule ovoid, black, seeds 5.

**Distribution:** Himalaya (Kashmir to Bhutan), India.

**Nepal:** West, Central and East

**Altitudinal range:** 700-2300m

**Fl.:** Sept.-Dec.

**Ecology:** Thickets, roadsides.

**Representative collection:** *Pyuthan*, Bhringri, 878m, 26 Nov. 2022, S. Gautam SG461, ASCOL Herbarium.

### 3. *Rubia* L.

Shrubs or herbs or climbers having prickles on stems, quadrangular. Oppositely arranged leaves or 2-4 in a whorl, triangle or ovate shaped, exstipulate, main veins 1 or 3-5. Inflorescence axillary or terminal cymes or panicles, few to many flowered. Flowers small, pedicel present or absent. Calyx reduced. Corolla 5, fused at the base, rotate or campanulate. Stamens 5 or 4-6, alternate to the corolla lobes, connate at the base of the corolla, filaments short, anther dorsifixed. Ovary inferior, bilocular or unilocular, styles bifid, 1 ovule per locule. Fruit berry, fleshy, dark red, purple, black. Seeds 2.

***Rubia cordifolia* L., *Syst. Nat.*, ed. 12. 3: 229. 1768**

Manjitho

Perennial climber herbs up to 1.5 m tall with long, rough, quadrangular stems. Branches has numerous tiny hooks or prickles or smooth. Leaves rough, oval-heart shaped, (5-10×2-3)cm, 3-5 nerved, leaves occurs in whorls of 4, petiolate long, entire, pointed, heart-shaped or rounded at base, palmately veined, exstipulate. Flowers small, occurs in terminal or axillary cymes, bract ovate and leaf like, few to numerous flowered, pedicel 3-4.5 mm, flowers bisexual. Calyx tubular. Corolla 5 lobed, tubular, glabrous, fused at base. Stamens 5 anther oblong, basifixed, style 2, united. Fruits fleshy drupe, berry, shining, purple black with grey black seeds.

**Distribution:** Himalaya (Simla to Bhutan).

**Nepal:** West, Central and East  
2100m

**Altitudinal range:** 1200-

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

**Ecology:** Forest margin, grasslands

**Representative collection:** *Pyuthan*, Sworgadwari, 2070m, 17 Nov. 2022, S. Gautam SG456, ASCOL Herbarium.

## ORDER: BORAGINALES

### FAMILY 41: BORAGINACEAE

Annual herbs usually covered with dense hairs. Leaves simple, alternate or opposite, pubescent, pointed, exstipulate, entire or serrate. Inflorescence terminal, singly in the leaf axils or helicoid cyme or many flowered raceme, bract present and absent, pedicellate or sessile, flowers pentamerous, bisexual. Calyx 5-lobed, campanulate or tubular, enlarging in fruit. Corolla 5-lobed, gamopetalous, campanulate, infundibuliform. Stamens 5, epipetalous, alternating with the corolla lobes, filaments short, ditheous anther. Carpels 2, fused, Ovary superior, 2-4 locular, 2 ovules per locule, styles simple. Fruit drupe, ellipsoid, 4 nutlets.

#### Keys to Genera:

- 1a. Tip of anthers obtuse and not spirally twisted..... **Cynoglossum**  
1b. Tips of anthers elongated and spirally twisted..... **Trichodesma**

#### 1. **Cynoglossum** L.

Biennial or perennial herbs. Basal and cauline leaves, entire, petiolate. Inflorescence terminal or axillary cymes, pubescent or setulose, bract present or absent, pedicellate. Calyx 5-lobed to base. Corolla 5-lobed, campanulate to tubular, scales like appendages 5 at throat. Stamens included, inserted at middle or above in corolla tube, anther tip obtuse and not spirally twisted. Ovary 4-lobed. Style included, filiform, gynobase narrow. Nutlets 4, ovoid to sub-globose.

**Cynoglossum zeylanicum** (Vahl ex Hornem.) Thunb. ex Lehm., *Neue Schriften Naturf.*

*Ges. Halle* 3(2): 20. 1817.

*Anchusa zeylanica* Vahl ex Hornem.

Erect biennial herbs up to 1m tall with strigose hairs. Cauline leaves narrowly oblong or broadly lanceolate, 3-18 x 1-4 cm, alternate, apex acute, margin entire, cuneate or wedge-shaped, petiole 1cm long, upper stem leaves sessile or short

stalked, upper leaves reduced in size, pubescent. Inflorescence terminal and axillary, branched or furcated raceme. Flowers blue, bract absent, pedicel 4mm. Calyx 5-lobed, oblong, sepals enlarged in fruit. Petals campanulate, scales like 5 appendages at throat. Stamens 5, inserted on corolla tube, filaments short, anther bicelled. Ovary 4-celled, style gynobasic. Nutlets 4, bristly, round to ovate.

**Distribution:** Himalaya, East China to Japan, Malaysia.

**Nepal:** West, Central and East      **Altitudinal range:** 1200-4100m

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

**Ecology:** Meadows and roadsides, Forest margin.

**Representative collection:** *Pyuthan*, Bhingrikot, 1237m, 30 Sept. 2022, S. Gautam, SG424, ASCOL Herbarium.

## 2. *Trichodesma* L.

Annual or perennial herbs, erect, densely pubescent branches. Leaves opposite, oblanceolate, pubescent, entire, acute, sessile. Inflorescence terminal cymes, raceme like or paniculate, flowers occurs singly in the axils of leaves, 5-merous, bracteates, pedicellate. Calyx 5 lobed, hairy. Corolla 5 lobed, tubular, infundibuliform, hairy. Stamens 5, alternate to the corolla, inserted on the lower part of corolla tube, anther pubescent, tip elongated and spirally twisted. Ovary 4 lobed, ovules 4, superior, style linear, exserted, gynobasic. Fruits nutlets 4, ellipsoid, covered by sepals.

***Trichodesma indicum* (L.) R. Br., *Prodr. Fl. Nov. Holland*, 1: 496, 1810**

*Borago indica* (L.)

Kanike kuro

Erect, annual herbs about 50cm, densely hairy branches. Leaves opposite, oblanceolate, 3.5-8×0.5-2 cm, hairy on both sides, pointed at the tip, base heart shaped. Inflorescence: terminal, flower occurs singly in the axils of leaves. Bracts leafy, pedicel 10-25mm. Flower mauve colour. Calyx: 5, hairy, 10-12mm, sepal tube green, hairy, Corolla: hair on outside, infundibuliform. Anthers hairy. Fruit ellipsoid, enclosed by sepal. Nutlets ovoid, smooth.

**Distribution:** Subtropical Himalaya (Kashmir to Nepal), India, Burma, Philippines.

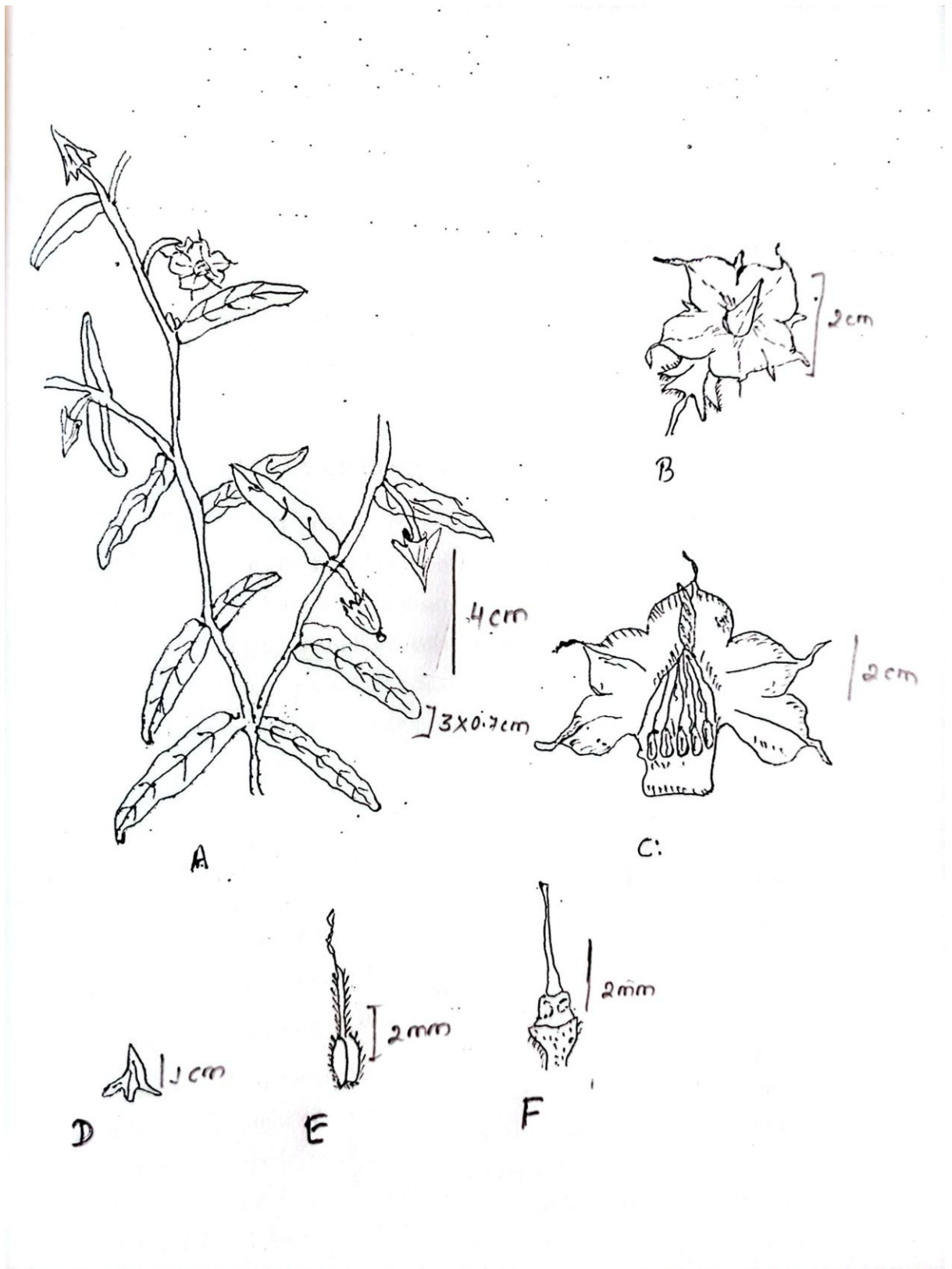
**Nepal:** West and Central

**Altitudinal range:** 200-900m,

**Fl. & Fr.:** Mostly throughout the year

**Ecology:** stony dry lands, roadsides

**Representative collection:** *Pyuthan*, Bhingri, 838m, 24 Sept. 2022, S. Gautam, SG405, ASCOL Herbarium.



**Fig. 4.20:** *Trichodesma indicum* (L.) R. Br. A: Flowering Branch, B: Flower, C: Corolla cut open to show anthers, D: Calyx, E: Stamens, F: Pistil

## ORDER: SOLANALES

### Keys to Family:

**1a.** Twining and erect herbs with winding stem, alternate leaves....**Convolvulaceae**

**1b.** Herbs, shrubs or small trees having woody and herbaceous stem, spiral to opposite leaves..... **Solanaceae**

### FAMILY 42: CONVOLVULACEAE

Twining and erect herbs, stem produce latex. Leaves simple or compound, alternate, exstipulate, vary between ovate to lanceolate to oblong, obtuse, acute. Axillary either simple or compound cymes. Flowers bisexual, pentamerous, regular with involucral bracts. Sepals 5 free, petals 5, united in funnel shaped or tubular, white to yellow, 5 epipetalous stamens (stamens fused to the petals), Carpels 2 or 3-5, syncarpous, superior, mostly 2 locular but may be 4-6 locular, 2 ovules per locule, style 1 or 2, stigma 1-2. Fruit: a capsule or a fleshy berry.

#### 1. *Evolvulus* L.

Twining herbs with winding stem. Leaves simple, alternate, elliptic, entire, hairy, petiolate or sessile. Inflorescence cymes 1-few flowered. Axillary flowers. Corolla blue, rotate. Stamens included and adnate to the base of the corolla. Ovary glabrous or slightly hairy, styles simple. Capsule rounded, 4 seeded.

*Evolvulus alsinoides* L., *Sp. Pl.* ed. 2: 392 (1762).

A small, prostrate or ascending herbs up to 30 cm, leaves are simple, alternate-distichous, 3-12×1-3 mm, leaf blade elliptic or oblong-lanceolate, apex obtusely apiculate, base acute, margin entire, pubescent, petiolate or subsessile. Inflorescence cymes, solitary to few flowered. Flowers axillary, solitary, pale blue. Corolla rotate. Stamens included, connate to the base of corolla tube. Ovary hairless. Fruit capsule, rounded or conical or depressed-globose, usually 4-seeds, glabrous.

**Distribution:** Subtropical Himalaya.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1500m

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

**Ecology:** Forest of *Pinus*, open areas, lower slopes.

**Representative collection:** *Pyuthan*, Bhingri, 1000m, 30 Sept. 2022, S. Gautam, SG430, ASCOL Herbarium.

### FAMILY 43: SOLANACEAE

Annual herbs or shrubs, climbers. Leaves simple, spiral to opposite, alternate, ovate to ovate-lanceolate, simple or compound, exstipulate, entire or lobed. Inflorescence terminal or axillary umbellate cyme, racemose, paniculate. Flowers 4-8 or many, bisexual, 5-merous, rarely 4-9, singly or in clusters. Calyx 4-6 lobed, tubular. Petals united, 5 lobed, tubular. Stamens 5 or as many as corolla and alternate. Ovary superior, 2-5 locular, ovules numerous, styles 1. Fruit globose berry or capsule, seeds numerous.

#### Keys to Genera:

**1a.** Plants covered with simple hairs or prickles: leaves deeply lobed: corolla tube shorter than lobes: Fruits berry..... **Solanum**

**1b.** Plants covered with sticky hairs; large leaves, entire: Corolla tube longer than lobes: Fruits capsule..... **Nicotiana**

#### 1. **Solanum** L.

Annual to perennial herbs, shrubs or small trees with simple, pubescent, branched stem. Some species has prickles on their stem as well as on leaves veins. Leaves simple or compound, ovate to oblong-ovate, hairs present on both surface, entire or lobed or wavy margins, petioles present. Inflorescence terminal or axillary racemose, umbellate with 4-20 flowered, pedicellate, flowers bisexual, 5-merous; Calyx campanulate, cup-shaped, 5-lobed. Corolla 5-lobed, rotate. Stamens inserted in corolla tube. Ovary 2-5 locular, ovules many, stigma small. Berries small pea-sized, orange red to dull black, seeds many per berry.

#### Keys to Species:

**1a.** Undershrubs, plants with stellate hairs, deeply lobed leaves, prickles on stem as well as leaves nerves, berry yellow when ripe..... **S. anguivi**

**1b.** Herbs, Plants glabrous or slightly simple hairs, entire or wavy margin, prickles mostly absent, berry purple black when ripe..... **S. nigrum**

**Solanum anguivi** Lam.; *Tabl. Encycl. Meth. B.* 2: 23 (1794).

Thoolo bihin (ठूलो बिही)

Fast growing prickly herbs or shrubs up to 4m tall, pubescent, branched, stem. Prickles curved. Large leaves 4-15×3.5-9 cm, ovate to oblong, acute, wavy or lobed margin, cuneate or rounded base, both surface hairy, thorns or prickles on the nerves, petiole 2.5cm long. Inflorescence terminal or lateral with 4-15 flowers in leaf axils cyme or racemes, pubescent, pedicel 0.5-1 cm, flowers 5-merous. Calyx lobes 5, bell shaped, hairy with prickles. Petals 5, fused, blue. Stamens: 5, filaments equal, filaments glabrous. Ovary glabrous, styles pubescent. Fruits berry, spherical, 10-20 seeds per berry, dull yellow to orange brown.

**Distribution:** India, Malaya, Indo-China, Philippines, Taiwan.

**Nepal:** West, Central and East

**Altitudinal range:** 250-2300m

**Fl. & Fr.:** Mostly throughout the year

**Ecology:** On roadsides

**Representative collection:** *Pyuthan*, Bhingri, 769m, 27 Sept. 2022, S. Gautam, SG415, ASCOL Herbarium.

**Solanum nigrum** L. *Sp. Pl.* 1: 186. 1753.

Perennial or annual herbs or shrubs up to 110cm height, hairy and angular stem, prickles absent. Leaves alternate, ovate to heart shaped, (4-7× 2-5) cm, entire or wavy margin, both surface hairless, petiole 1-3cm, acute or acuminate, cuneate base. Inflorescence axillary umbels, 4-12 flowered, pedicel 10mm long, 5-merous. Calyx 5-lobed, cup-shaped, pubescent. Corolla 5-lobed, white, hairy. Yellow anthers, filaments equal. Fruit berry, dull black or purple black, seeds discoid.

**Distribution:** Almost cosmopolitan.

**Nepal:** West, Central and East

**Altitudinal range:** 900-2900m.

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

**Ecology:** On roadsides, open fields

**Representative collection:** *Pyuthan*, Bhingri, 769m, 19 Jan. 2023, S. Gautam, SG4213, ASCOL Herbarium.

## 2. *Nicotiana* L.

Annual to perennial herbs or shrubs, pubescent with sticky hairs. Leaves ovate-elliptical, petiole present or absent, entire. Inflorescence paniculate, racemose, axillary and terminal, bracteates, flowers 4-5 merous, bisexual, pedicellate. Calyx and corolla both are tubular-campanulate, funnel-shaped. Stamens inserted in the corolla tube, anther dorsifixed, filaments slender, ovary 2 locules, stigma bilobed. Fruit dry capsule, seeds minute, many.

***Nicotiana tabaccum* L., *Sp. Pl.* 1: 180. 1753.**

Surti, Lampate surti

Annual or perennial shrubs up to 3m high with densely covered by sticky hairs. Leaves large, (15-30×10-22) cm, elliptical-ovate to oblong, pubescent, narrowed base, acute or pointed apex, margin entire. Inflorescence terminal panicle, many flowered, pedicel 0.5-1 cm. Calyx tubular-campanulate, 5 triangular sepals, synsepalous. Corolla funnel-shaped, lobes triangular, 5 white-pinkish petals, gamopetalous. Stamens 5, inserted at the base of corolla, filaments inserted at the base of the tube, upper 4 longer than 5<sup>th</sup>, anther dorsifixed. Ovary superior, style single, stigma bilobed. Fruits Capsule, ellipsoid-ovoid, seeds minute, brown.

**Distribution:** Almost cosmopolitan.

**Nepal:** West, Central and East

**Altitudinal range:** 900-2900m.

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

**Ecology:** On roadsides, open fields

**Representative collection:** *Pyuthan*, Sworgadwari, 1990m, 19 Jan. 2023, S. Gautam, SG4189, ASCOL Herbarium.

## ORDER: LAMIALES

### Keys to Family:

1a. Leaves green, expanded, free-living plants..... 2

1b. Leaves never green, scale-like, root-parasites..... **Orobanchaceae**

2a. Inflorescence terminal or axillary cyme, raceme, spike, corymbs or umbel or panicles.....	3
2b. Inflorescence verticellasters of various arrangement.....	<b>Lamiaceae</b>
3a. Stamens usually 4: rarely 2.....	4
3b. Stamens 2.....	<b>Oleaceae</b>
4a. Carpels 2, ovary usually 2 celled.....	5
4b. Carpels 3 or 4, ovary 3-9 celled.....	<b>Verbenaceae</b>
5a. Leaves basal, rosette, alternate or opposite .....	6
5b. Leaves simple cauline, opposite decussate.....	7
6a. Capsule with 1 or more seeds per cell.....	<b>Plantaginaceae</b>
6b. Capsule with 20-40 seeds.....	<b>Mazaceae</b>
7a. Ovule many in each locule.....	<b>Scrophulariaceae</b>
7b. Ovules 2-12 per locule.....	<b>Acanthaceae</b>

#### **FAMILY 44: ACANTHACEAE**

Herbs or shrubs rarely climbers with cylindrical or quadrangular. Leaves opposite decussate, simple, margin entire, petiolate, exstipulate, acute, hairy. Inflorescence axillary or terminal, solitary or in spike, cyme or racemes, bracts, bracteoles 2. Flowers bisexual, 4 or 5 merous. Calyx 4-5 lobed, fused at base, bilabiate. Corolla tubular, 2-lipped, 2-5 lobed, fused, funnel shaped. Stamens didynamous, epipetalous, polyandrous, 2 or 4 inserted in corolla tube, filament free or fused; anther 2-locular, dehiscing by longitudinal slits, dorsifixed. Bicarpellate, syncarpous, Ovary superior, 2 celled, 2-12 ovules per locules, style 1, Stigma bifid. Fruits capsule, seeds 2-many.

#### **Keys to Genera**

1a. Leaf margin entire.....	2
1b. Leaf margin serrate.....	<b>Strobilanthes</b>
2a. Staminodes absent.....	3

- 2b.** Staminodes present..... **4**
- 3a.** Flowers in cyme; covered by 2 or more pairs of bracteoles: upper lip of corolla has 3 lobes and lower lip has 2 lobes..... **Dicliptera**
- 3b.** Flowers in spikes; covered by single pairs of bracteoles; upper lip 2 lobes and lower lip 3 lobes..... **Justicia**
- 4a.** Bract absent; Calyx 4 lobed; Upper lip of corolla 4 lobed and lower lip 1 lobed; Stamens 2..... **Barleria**
- 4b.** Bracts present: Calyx 4 or 5 lobed; Upper lip of corolla 2 lobes and lower lip 3 lobes; Stamens 4 or 2..... **5**
- 5a.** Corolla small up to 1.5 cm; Stamens 4..... **Lepidagathis**
- 5b.** Corolla large up to 4 cm; Stamens 2..... **Eranthemum**

### **1. Barleria L.**

Shrubs with erect, branched stem. Simple opposite decussate leaves, petiolate, stipulate, elliptical-lanceolate, entire, acute, cuneate, unicostate reticulate. Inflorescence axillary or terminal spike, dichasial cyme, bract present, 2 bracteoles, pentamerous, bisexual. Sepals 4, 2 whorls, outer 2 bigger and inner 2 lobes smaller. Petals 5, gamopetalous, 2-lipped, upper lip with 4 lobes and lower lip with 1 lobes. Two fertile stamens and 2 staminodes, didynamous, polyandrous, epipetalous, filaments long, anther 2 celled. Bicarpellary, syncarpous, ovary superior, bilocular, 1 or 2 ovules in each locule, bilobed stigma. Capsule ovoid, 2-4 seeded, seeds flattened.

**Barleria cristata** L., *Sp. Pl.* 1: 636 (1753)

*Barleria nepalensis* Nees

*Barleria dichotoma* Roxb.

Perennial herbs or shrubs up to 50 cm with branched, hairy, armed, terete stem. Leaves simple, opposite, ovate-oblongate, 3-15×1-3 cm, petiole 0.5-1 cm, acute, cuneate, entire, hairy, dark green on upper surface. Flowers in dense clusters of spikes, 1-5 funnel shaped flowered, bracteoles spiny. Sepals 4 lobes, outer 2 lobes larger than inner 2 lobes, spiny margin. Corolla pinkish-purple, blue, lobes 5,

funnel shaped. Stamens 4, didynamous, only 2 fertile, filaments hairy, anther oblong. Ovary bi-celled, 4 ovuled, hairless. Capsule glabrous, 4-seeded.

**Distribution:** Himalaya, India, Burma, Indo-China, S. China, Philippines

**Nepal:** West, Central and East                      **Altitudinal range:** 200-2000m

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

**Ecology:** Along roadside, slopes,

**Representative collection:** *Pyuthan*, Bhingrikot, 1235m, 30 Sept. 2022, S. Gautam, SG423, ASCOL Herbarium.

## 2. **Dicliptera** Jussieu

Herbs or undershrubs with 6-angled stem. Leaves ovate or elliptic, acute, entire, petiolate. Inflorescence small cyme or panicle in leaf axils, axillary or terminal, enclosed with a pairs of bracts. Calyx 5 lobes, equal. Corolla pink, 2-lipped, 5 lobes, lip in lower portion with 2 lobes and lip in upper portion with 3 lobes. Stamens 2, free, anther ditheous, staminodes absent. Ovary bilocular, 2 ovules per locule, stigma bilobed. Capsule, 2-4 seeded, seeds flat, glabrous.

**Dicliptera bupleuroides** Nees.; in Wallich., *Pl. As. Rar.* 3: 111 (1832).

Perennial herbs or shrubs with erect, angled stem up to 2m. Leaves elliptic, ovate, 2-15×1-8 cm, acuminate short, entire, petiole 5-7mm, base wedge shaped. Flowers axillary and terminal clusters cymes, many flowered in leaf axils; bract linear, hairy, 2 or more pairs of bracteoles oblong. Calyx 5-lobes, Corolla pink, bilipped, lower lip with 3 lobes and upper lip with 2 lobes; Stamens 2, free, staminodes absent. Ovules 2. Fruit Capsule, 4 seeds per capsule, seeds ovate.

**Distribution:** Himalaya (Kashmir to Bhutan), India, Thailand, Indo-China, W. China.

**Nepal:** West, Central and East                      **Altitudinal range:** 500-2000m,

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

**Ecology:** Along roadside

**Representative collection:** *Pyuthan*, Bhringri, 735m, 16 Nov. 2022, S. Gautam, SG421, ASCOL Herbarium.

### 3. *Eranthemum* L.

Shrubs or perennial erect herbs, leaves petiolate, leaf blade margin entire, leaves opposite, Inflorescences terminal or rarely axillary, spikes, bracts sometimes colored, bracteoles small, calyx 5-lobed, lobes narrow, corolla tube basally cylinder, long, slender, limb 5-lobed, lobes obovate, subequal, stamens 2, inserted below throat, anther ditheous, thecae parallel, staminodes 2, filiform, ovary with 2 ovules per locule; style filiform glabrous or pubescent, stigma 2-lobed, capsule with a solid stalk at base, clavate, 4-seeded, seeds discoid, compressed,

***Eranthemum purpurascens*** Nees,; in Wall., *Pl. As. Rar.* 3: 106 (1832); in DC., *Prodr.* 11: 447 (1847).

*Justicia pulchella* Roxb.

Perennial herbs to undershrub, upto 2-2.5 ft. tall, stem 4-angled, shortly velvet-hairy leaves simple, opposite, ovate, 4-8 x 2.5-7 cm, base rounded and then decurrent, margin rounded-toothed, tip tapering, lateral nerves upto 8 pairs, prominent leaf stalk is decurrent, leaf stalk 2.5-3cm, upper leaves much smaller than lower ones, heart-shaped rounded base, stalkless. Flowers are borne in spikes at branch-ends and in leaf axils, 5-7 cm long, flower cluster stalk up to 8cm. Flowers are blue, purple, purplish-white, 4cm long, tube long and slender, petals obovate corolla tube 3.5cm twisted to the left in bud, stamen 2, staminodes 2, style long and slender, anther ditheous, thecae parallel and equal, style sparsely hairy, bracts are green, ovate-lanceolate, 2.5cm long, prominently nerved, net veined, margin fringed with hairs. Capsule 1-1.2cm long, dub-shaped hairless.

**Distribution:** Tropical Himalaya, India.

**Nepal:** West

**Altitudinal range:** 300-1700m

**Flowering:** - November-February

**Ecology:** Along roadside

**Representative collection:** *Pyuthan*, Bhringri, 972m, September 30, 2022, S. Gautam, SG421, ASCOL Herbarium.

#### 4. **Justicia** L.

Herbs or shrubs having quadrangular stem, sparsely pubescent. Leaves simple, opposite, pubescent, entire, exstipulate. Flowers bisexual, axillary spikes, raceme, panicles. Bracteate. Bracteoles 2 or absent. Calyx 4 or 5-lobed, subequal. Corolla tubular, straight or curved, 2-lipped, lower lip 3 lobed, tube short, white, pink or purple. Stamens 2, anther ditheous. Ovary superior, bicarpellate, 2-celled. Capsule, 2-4 seeded, seeds glabrous.

#### **Keys to Species:**

**1a.** Evergreen shrubs..... **J. adhatoda**

**1b.** Herbs..... **J. diffusa**

**Justicia adhatoda** L., *Sp. Pl.* 1:15. 1753.

*Adhatoda vasica* Nees

असुरो (Asuro)

Perennial evergreen shrub upto 4m tall having erect, branched with swollen nodes, quadrangular stem. Leaves simple, opposite decussate, lanceolate-ovate, 5-18×3-7cm; petiole 0.5-2.5cm, pubescent; exstipulate; pubescent on nerves abaxially; base cuneate; margin entire; apex acuminate, reticulate venation, 8-10 pairs of lateral veins. Inflorescence terminal and axillary, racemose, spikes, 10cm long; Flowers bisexual, pentamerous, peduncle 2-8cm, bracts 1-2 cm, foliaceous; bracteoles 2, elliptic-oblong-lanceolate; calyx 5, fused, lobes linear-lanceolate; petals 5, gamopetalous, bilipped, upper lip with 2 lobed and lower lip with 3 lobes, pale white, tubular; stamens 2, polyandrous, epipetalous, filaments 1.5cm long, anther basifixed, ditheous. Bicarpellary, syncarpous, superior, bilocular, one ovule in each loculus, style 2.5cm long, stigma bifid. Capsule obovoid, seeds circular.

**Distribution:** Subtropical Himalaya, India, Indo-China, Malaya, sometimes cultivated.

**Nepal:** West, Central and East

**Altitudinal range:** 500-1600m

**Fl. & Fr.:** Jan.-Jul.

**Ecology:** Along the trails, thickets.

**Representative collection:** *Pyuthan*, Bhingri, 740m, 3 Feb. 2023, S. Gautam, SG4121, ASCOL Herbarium.

**Justicia diffusa** Willdenow, *Sp. Pl.* 1: 87. 1797.

उल्टा चिरा

Perennial herbs up to 50cm tall with quadrangular, branched, hairy stem. Leaves lance shaped-elliptic, 1.5-3×0.5-2cm; petiole 2-4mm, base attenuate or cuneate; margin entire; apex pointed; 2-4 pairs of veins. Flowers in spikes like clusters at the branch end or in leaf axils, terminal or axillary; Flowers small, bracts ovate; calyx 4 lobed, sparsely pubescent; corolla purplish red or pink, bilipped, upper lip with 2 lobed and lower lip with 3 lobes. Stamens 2, filaments 2mm. Ovary glabrous, style pubescent. Capsule oblong, sparsely pubescent, 4 seeded per capsule, seeds ovate.

**Distribution:** Himalaya, India, Ceylon, Burma, Thailand.

**Nepal:** West and East

**Altitudinal range:** 1000-2300m

**Fl.:** Apr.-Aug.

**Ecology:** Roadside, Meadows, sparse thickets.

**Representative collection:** *Pyuthan*, Sworgadwari, 2023m, 17 Nov. 2022, S. Gautam, SG441, ASCOL Herbarium.

## 5. **Lepidagathis** Willd.

Herbs or shrubs. Leaves entire or toothed, petiolate. Flowers in dense, sessile, bracteates, 1-sided heads or spikes. Calyx 4-5 lobed, lobes unequal. Corolla small, 2 lipped. Stamens 4, anther ditheous. Capsule: 2-4seeded. Seeds flattened, hairy.

**Lepidagathis incurva** Buch.-Ham. ex D. Don, ; *Prodr. Fl. Nep.* 119 (1825).

Seto Phuli

Perennial herb up to 50cm with erect, quadrangular, branched, cylindrical, glabrous. Leaves opposite, elliptic, ovate-lanceolate, (1.5-10×1-5) cm, sessile, base rounded or wedge shaped, acute, entire, reticulate venation, 4-8 veins on each side of midveins. Inflorescence spike. Flowers in dense, 1-sided, mostly in terminal cluster or in leaf axils. Bract 0.9cm, oblong-lanceolate, pubescent. Bracteolate

similar to bract, 5mm. Calyx 5-lobed, free, unequal, linear-lanceolate. Petals white, light purple, fused, 2 lipped, upper lip erect, lower lip longer with 3-lobed. Stamens 4, unequal. Carpel: 0.5mm, hairy, stigma bilobed, ovary oblong. Capsule oblong, glabrous, 4-seeded, seeds hairy.

**Distribution:** Subtropical Himalaya (Punjab to Bhutan), India, east to S. China, Malaysia,

**Nepal:** West, Central and East

**Altitudinal range:** 200-1400m.

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

**Ecology:** Along roadside, grassland.

**Representative collection:** *Pyuthan*, Bhingri, 740m, 31 Dec. 2022, S. Gautam, SG4109, ASCOL Herbarium.

## 6. *Strobilanthes* Blume; Bijdr.

Annual herb or shrubs. Stem quadrangular, branched, hairy. Leaves simple, opposite, petiolate or sessile, oblanceolate, serrate-dentate, acute. Inflorescence axillary or terminal spikes, head, solitary or paired, bracteates. Flower whitish, purplish-blue. Bracts: solitary, persistent caducous, bracteoles 2. Calyx 5 lobed, unequal. Corolla campanulate, tubular, base curved, 5 lobed. Stamens 4, free, didynamous. Ovary 2-celled, glabrous, oblong, style hairless. Capsule oblong, 4-8 seeded, seeds ovate, pubescent.

***Strobilanthes atropurpurea*** Nees.; in Wallich, *Pl. As. Rar.* 3; 86 (1832).

*Strobilanthes wallichii* Nees.

Annual to perennial erect herbs up to 90 cm tall. Stem much branched, 4-angled, slender, white hairy. Leaves simple, ovate, elliptic, 1-5(15)×0.5-4 cm, petiole present at base but sessile at apical, petiole 0-1.5 cm, 5-6 veins on each side of midvein, base rounded, margin serrate, apex acute, pubescent. Inflorescence axillary spikes, few flowered, solitary or paired in leaf axil on main stem, hairy, bract ovate, leaf like, bracteoles 2. Calyx 5 lobed, unequal, hairy. Corolla 5 lobed, lobes oblong, funnel shaped and bent at the apex, pale purple or bluish purple. Stamens 4, didynamous, inserted in the corolla tube, filament glabrous. Ovary 2-celled, hairless, stigma acute. Fruit capsule, hairless, 4-seeded per capsule, seeds ovate, slightly hairy.

**Distribution:** Nepal, Bhutan, India, Myanmar, Pakistan, Vietnam.

**Nepal:** West **Altitudinal range:** 2071m

**Fl. & Fr.:** Jun.-Oct.

**Ecology:** Along riversides, grassland.

**Representative collection:** *Pyuthan*, Sworgadwari, 2071m, 17 Nov. 2022, S. Gautam, SG450, ASCOL Herbarium.

#### FAMILY 45: LAMIACEAE

Perennial or annual, aromatic, herbs, shrubs, rarely climber or trees with square stems, quadrangular, rarely terete; erect or prostrate, hairy. Leaves simple, opposite-decussate or rarely whorled, exstipulate, rarely pinnatisect, hairy, entire. Inflorescence solitary, verticillasters of various arrangement; spike-like, thyrse, corymbose, paniculate, rarely cymes. Flowers occurs in clusters, bisexual, bracts caducous or persistent, bracteates, pedicellate or sessile, 5-merous, united or bilabiate. Calyx tubular, 5 lobed, fused, 2-lipped. Corolla tubular, gamopetalous, 5 lobed, 2 lobes in upper lips and 3 in lower lip. Stamens 2 or 4, exserted or included, epipetalous didynamous, anther ditheous. Bicarpellary, syncarpous, ovary superior, 2 or 4 locular, ovule 1 per cell. Stigma 2 lobed. Fruit 4 dry nutlets, achene enclosed in persistent calyx.

#### Keys to Genera:

- 1a. Herbs..... 8
- 1b. Shrubs or under shrubs..... 2
- 2a. Leaves simple..... 3
- 2b. Leaves 3-7 foliolate..... **Vitex**
- 3a. Plant aromatic or sweet scented..... 4
- 3b. Plant non-aromatic..... 5
- 4a. Stem terete: Inflorescence terminal spike forming panicles, verticellasters 6-12 flowered; Corolla 4-lobed; upper lip of corolla with 3 lobes..... **Pogostemon**

- 4b.** Stem 4-angled; Inflorescence terminal dense, lateral cyme more than 5-flowered; corolla 5-6 lobes, upper lip with 4 oblong lobes..... **Pseudocaryopteris**
- 5a.** Leaf margin entire..... **6**
- 5b.** Leaf margin serrate or toothed..... **7**
- 6a.** Ovary 4-celled, calyx unlobed..... **Holmskioldia**
- 6b.** Ovary 2-celled, calyx 4-lobed..... **Callicarpa**
- 7a.** Leaves opposite or in whorls of 3; flowers sessile; corolla 5 lobes, upper lip 2 lobes and lower lip with 3-lobes; stamens 4 or 5, exserted..... **Colebrookea**
- 7b.** leaves opposite; flowers pedicellate; corolla 5-6 lobed; upper lip 4 lobed; stamens 4, exserted..... **Plastostoma**
- 8a.** Corolla 1-lipped..... **Teucrium**
- 8b.** Corolla 2-lipped..... **9**
- 9a.** Inflorescence verticillaster or spikes..... **10**
- 9b.** Inflorescence paniculate cymes..... **Isodon**
- 10a.** Calyx 4 or 5 lobed..... **11**
- 10b.** Calyx 8-10 toothed..... **Leucas**
- 11a.** Leaves occurs near the base of stem..... **Scutellaria**
- 11b.** leaves occurs on stem..... **12**
- 12a.** Stamens exserted..... **13**
- 12b.** Stamens included within corolla lip..... **14**
- 13a.** Leaves margin serrate; Flowers deep red; upper lip of corolla folded or curved upward..... **Salvia**
- 13b.** Leaves margin toothed towards tip and more or less entire at base; flowers white to pale pink; upper lip of corolla straight..... **Ajuga**
- 14a.** Calyx irregular..... **Clinopodium**
- 14b.** Calyx regular or slightly irregular..... **15**
- 15a.** Plant aromatic; unbranched stem; upper lip of corolla notched... **Micromeria**

**15b.** Plant non-aromatic; branched stem; upper lip of corolla hooded or convex..... **Lamium**

### **1. Ajuga L.**

Annual to Perennial herbs. Stem erect, or stoloniferous, pubescent. Leaves simple, circular to elliptic or oblong-lanceolate, opposite-decussate, toothed and entire, petiolate or sessile. Inflorescence dense terminal, cyme or verticillaters of 2- many flowers, bracteates, subsessile. Calyx 5 lobed, campanulate to funnelform. Corolla bilipped, upper lip short with 2 lobes and lower lip longer with 3 lobed, tubular, tube straight to curved. Stamens 4, didynamous, exserted, filaments straight, anther ditheous, styles subterminal, stigma lobes equal. Nutlets obovoid.

**Ajuga integrifolia** Buch.-Ham. ex D. Don, *Prodr. Fl. Nepal.* 108. 1825.

*Ajuga bracteosa* Wall. ex. Benth.

Perennial erect herbs up to 40cm, pubescent. Leaves oblanceolate to elliptic, 3-11 × 0.5-4 cm, margin toothed toward the tip and more or less entire toward base, pointed tip or rounded, upper leaves stalkless and lowers leaf short stalk, wedge-shaped, petiole 1cm. Inflorescence verticillaster with 8-15 flowers, bract lance-shaped, pedicels 0.5mm. Flowers white to pale pink, hairy. Calyx campanulate, curving inwards. Corolla bilipped, upper lip straight with 2 small lobes and lower lip with 3 lobes having dark veins. Stamens 4, exserted. Nutlets obovoids.

**Distribution:** Himalaya (Kashmir to Bhutan), India, Burma, S. China, Indo-China.

**Nepal:** West, Central and East

**Altitudinal range:** 700-3000m

**Fl. & Fr.:** Apr.- Jun.

**Ecology:** Open grassland, ricefields.

**Representative collection:** *Pyuthan*, Bhingri, 735m, 22 Mar. 2023, S. Gautam, SG4145, ASCOL Herbarium.

### **2. Callicarpa L.**

Tree or shrubs with erect, star shaped hairs, 4-angled stem. Leaves opposite, oblong-elliptic or ovate to oblong-lanceolate, dentate or serrate. Inflorescence axillary cymes, peduncle absent or present, bract present, many flowered, flowers

small, pedicellate. Calyx campanulate, shallowly 4-lobed. Corolla not bilabiate, campanulate or tubular, lobes 4. Stamens 4, exserted, anther ovate or oblong. Ovary 2 locular, ovules 2 per locule. Style longer than stamens, stigma dilated. Fruit drupe, 4 or 1 seeded pyrenes, seeds small.

**Callicarpa macrophylla** Vahl, *Symb. Bot.* 3: 13. 1794

*Callicarpa incana* Roxb.

Ghunya, Dahichamle

Perennial evergreen shrubs up to 2.5m tall with 4-angled, densely pubescent branches. Leaves opposite, oblong-lanceolate, elliptic, 10-20×5-10 cm, star-shaped hairs, acuminate, base cuneate, serrate; abaxially subglabrous. Petiole 0.5-2.5 cm. Inflorescence axillary cymes in leaf axils, ca. 3-5.7 cm, densely hairy, pedicel 1-2 cm. Calyx 4 lobed, ca. 1mm, campanulate, hairy. Corolla purple, ca. 2.5 mm; 2 lipped with 4 short lobes, tube as long as calyx. Stamens 4, exserted. Ovary 2 celled, ovules 2 per cell, pubescent. Fruit Drupes, ca. 2 mm diameter, globose, 1 seeded pyrenes.

**Distribution:** Himalaya (Kashmir to Bhutan), India, Burma, S. China, Indo-China.

**Nepal:** West, Central and East

**Altitudinal range:** 300-1500m

**Fl. & Fr.:** Apr.-Dec.

**Ecology:** On moist slope along river bank.

**Representative collection:** *Pyuthan*, Bhingri, 899m, 30 Nov. 2022, S. Gautam, SG475, ASCOL Herbarium.

### 3. *Clinopodium* L.

Perennial erect herbs. Stem slender, terete or quadrangular, hairy. Leaves simple, opposite, ovate, petiole short or sessile, serrate. Inflorescence few to many flowered verticillaster borne in axils of leaf, bract linear, pedicel short. Calyx bilabiate, curved, tubular, 5 unequal lobed, upper lip with 3 lobes and lower lip with 2 lobes. Corolla 2-lipped, straight tube, pubescent, upper lip emarginate; lower lip 3-fid. Stamens 4, diynamous, inserted in upper lip of corolla tube, anther 2-celled. Ovary glabrous. Nutlets ovoid or subglobose.

**Clinopodium umbrosum** (M. Bieb.) C. Koch.; *Linnaea* 21: 673 (1848).

*Melissa umbrosa* M. Bieb., Fl. Taur -Caucas. 2:63 (1808)

Bilajor

Perennial herbs up to 30 cm, hairy, straight or erect branches, quadrangular. Leaves opposite, toothed margin, ovate-oblong (1-5.4×0.8-2.5) cm, base rounded, acute, pubescent, petiole 2-8 mm. Inflorescence verticillaster. Flowers borne in axils of leaves of few-many flowered, whorls, bract short, ca. 2mm; pedicel 4mm. Calyx 5mm, 5-lobed, bilabiate, upper lip with 3 lobes and lower with 2 lobes. Corolla bilabiate, 5 lobes, upper lip ca. 1mm; 2 lobes and lower lip ca 1.5mm; 3 lobes. Stamens 4, didynamous, included in the upper lip of corolla. Nutlets ca. 9×7mm, subglobose, glabrous.

**Distribution:** Himalaya (Kashmir to Bhutan), India, Burma, China, Pakistan, Tibet, Malaysia, Taiwan.

**Nepal:** West, Central and East

**Altitudinal range:** 180-3400m

**Fl. & Fr.:** Jun.-Oct.

**Ecology:** On moist slope along river bank.

**Representative collection:** *Pyuthan*, Bhingri, 735m, 3 Feb. 2023, S. Gautam, SG4124, ASCOL Herbarium.

#### 4. **Colebrookea** Sm.

Perennial shrubs with 4 angled, pubescent, erect stem. Leaves large, simple, opposite or in whorls of 3, petiolate, serrate, hairy, ovate-elliptic-lanceolate, acute. Inflorescence paniculate of numerous spikes, axillary, many flowers, sessile, bract fused, white small flowers. Calyx campanulate, 5 lobed, lobes linear, hairy. Corolla 5 lobed, bilabiate, lowers lip larger than others, lower lip 3 lobed. Stamens 4 or 5, exserted, free, anther 1 celled. Style slightly longer than corolla, erect, bifid. Nutlets obovoid.

**Colebrookea oppositifolia** Sm.,; Exot. B. 2: 111, t. 115 (1806)

*Colebrookea ternifolia* Roxb.

धुर्सुलि

Perennial Shrub up to 3m tall. Stem hairy, yellowish-brown bark. Leaves opposite, crowded together at the ends of branches, elliptic, lanceolate, (3.5-12×2-6) cm, Petiole 2cm, cuneate base, pointed tip, crenulate, lower surface whitish pubescent. Inflorescence axillary dense spike, many small white flowers arranged in panicle; verticillasters 10-20 flowered. Calyx ca. 0.7 mm; divided into 5 toothed, lobes ca. 0.4cm, hairy. Corolla ca. 0.8 mm, 5 lobed, upper lip ca. 0.2cm, lower lip ca. 0.7mm, whitish. Stamens: 4, exserted. Anthers 1-celled. Carpel 0.5cm, bifid. Nutlets ca. 0.5mm long, yellowish-brown.

**Distribution:** Punjab, Himalaya (Kashmir to Bhutan), India, Burma, S. W. China (Yunnan), Indo-China.

**Nepal:** West Central and East

**Altitudinal range:** 250-1700m

**Fl:** Jan.-Mar.

**Ecology:** Roadsides.

**Representative collection:** *Pyuthan*, Bhingri, 789m, 18 Mar. 2023, S. Gautam, SG4142, ASCOL Herbarium.

##### **5. Holmskioldia Retz.**

Shrubs. Quadrangular stem, hairy. Leaves simple, opposite, acute to acuminate, hairy, ovate, petiole present. Flower terminal and axillary pedicillate, racemose. Pedunculate Calyx: cup-shaped, fused, showy. Corolla: funnel shaped- tubular, 5-lobed limb, fused, upper lip 2-lobed; lower lip longer, 3-lobed. Stamens: 4, epipetalous, 2 paired, anther oblong, exserted. Ovary: 4-celled. Stigma bilobed. Fruit: drupe, obovoid.

**Holmskioldia sanguinea** Retz.; Obs. B. 6: 31 (1791).

*Hastingia coccinea* Sm.

*Hastingia scandens* Roxb.

Chinese- Hat plant

Jhulephool, Ghanti Phool

An erect or climber evergreen, perennial shrub, Ca. 2-5m tall. Stem woody, cylindrical, quadrangular, hairy, grayish with numerous branches. Leaves opposite, ca. (8.1-12.2×4.4-5.9) cm, ovate to ovate-elliptic, dentate or serrate margin, apex

acuminate to acute, base truncate, cordate, pubescent, upper surface dark green, venation prominent, Petiole length Ca. 0.7-3.4 cm. Inflorescence racemes or panicles, axillary, up to 5 cm long, pedicles 2-7mm long. Flower complete, bisexual, glabrous, orange colour. Calyx saucer shaped, gamosepalous, orange-red colour, pubescent, Ca. 1.7 cm, petaloid. Corolla vivid red, 1.2-1.5 cm, gamopetalous, tubular, 5-lobes, lobes obtuse, 4mm long, corolla tube narrow, pubescent, about 2cm long. Stamens 4, didynamous, filament slender, slightly hairy, about 1.5-2 cm long. Anther oblong, white. Ovary conical, glabrous. Style slender, same coloured as calyx and corolla, stigma bi-lobed. Fruit Drupe ca. 7mm diameter, globose, brown.

**Distribution:** Himalaya (Kumaun to Bhutan), India

**Nepal:** West, Central and East

**Altitudinal range:** 300-1500m

**Fl:** Sept. – Feb.

**Ecology:** On moist slope along river bank.

**Representative collection:** *Pyuthan*, Bhingri, 743m, 27 Sept. 2022 S. Gautam, SG413, ASCOL Herbarium

## 6. *Isodon* (Benth.) Schrad. ex Spach.

Annual to perennial herbs or shrubs with slender, 4-angled, hairy stem. Leaves simple, opposite, ovate, ovate-lanceolate-oblong, serrate, petiolate and upper leaves sessile. Inflorescence terminal or axillary cyme, panicles or in spikes, many flowered, flowers small, pedicellate, pedunculate, usually bracteate, rarely ebracteate. Calyx 5 lobed, bilabiate, upper lip 3-lobed and lower lip 2 lobed, campanulate, glandular, pubescent. Corolla 2-lipped, upper lip 4 curved lobes, lower lip entire, usually concave, lower lip of corolla larger than other. Stamens 4, didynamous, exserted, filaments free, ditheous. Nutlets ovoid or obovoid, yellow or brown.

***Isodons coesta*** (Buch.- Ham. ex D. Don) Kudo. *Mem. Fac. Sci. Taihoku Imp. Univ.* 2(2): 131. (1929).

*Plectranthus coesta* Buch.-Ham. ex D. Don.

Pirre

Annual to perennial herbs or subshrubs, ca. 0.5-2m tall with slender, 4-angled, hairy stem. Leaves opposite, ovate, 1.5-5×0.7-2.5cm, margin serrate, base cuneate, apex acuminate, lateral veins 3-paired, petiolate (ca. 0.3-2.5cm) and upper leaves sessile. Inflorescence terminal or axillary cyme, panicles or in spikes, many small flowers. Lower floral leaves sessile, upper floral leaves bract-like, ovate-lanceolate. Pedicel ca. 1-3mm. Calyx ca. 2.5×1.5 mm, 5 subequal lobed, bilabiate, upper lip 3-lobed and lower lip 2 lobed, lobes 0.8 mm, tubular-campanulate. Corolla ca. 6mm, 2-lipped, upper lip 4 curved lobes, lower lip entire, ovate; lower lip of corolla larger than other, corolla tube exserted, glabrous. Stamens 4, didynamous (2+2), included, filaments free, anther ditheous. Nutlets ovoid, pale brown.

**Distribution:** W. Himalaya, E. Himalaya, Tibetan Plateau, Assam-Burma, S. Asia, E. Asia & SE. Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 600-3400m

**Fl:** Nov.-Dec.

**Fr.:** Dec. – Feb.

**Ecology:** On moist slope, along river bank.

**Representative collection:** *Pyuthan*, Bhingri (Chilepata), 1109m, 30 Nov. 2022 S. Gautam, SG483, ASCOL Herbarium.

## 7. **Lamium** L.

Annual herbs, branched, square, erect stem. Leaves opposite, ovate, lower leaves petiole and upper leaves sessile, crenate-lobed margin. Verticillasters in axils of leaves. Flowers whorled around stem, terminal spikes. Calyx tubular-campanulate, 5 equal lobed. Corolla bilabiate, upper lip convex, lower lip 3 lobed. Stamens 4, didynamous, included, enclosed in hood of upper lobes of corolla. Carpels 2, fused. Styles inseted at the base of the ovary. Nutlets obovoid.

**Lamium amplexicaule** L.: *Sp. Pl.* 579 (1753).

Annual herbs up to 40 cm, hairy. Leaves opposite, ovate, 0.7-3×1-3 cm, apex obtuse or rounded, base truncate to cordate, margin crenate or lobed, lower leaves petiole 1-4cm and upper leaves stalkless. Flowers are whorled around square stem, few flowered terminal spikes. Verticillasters 6-10 flowered. Calyx ca. 5×15 mm, 5 lobes, lobes lanceolate, 1.5-2mm. Corolla pale pink or reddish, bilabiate, upper lip

convex or hooded, lower lip has 3 lobes. Corolla fused into tube which is larger than calyx. Stamens enclosed in hood of upper lobes, 4, 2 long and 2 short, filaments hairless. Carpels 2, syncarpous. Nutlets grayish yellow.

**Distribution:** W. Himalaya, E. Himalaya, Europe, Africa, Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 700-3400m

**Fl:** Mar.- Sept.

**Fr.:** May - Aug.

**Ecology:** Roadsides, forest margin.

**Representative collection:** *Pyuthan*, Bhingri, 731m, 28 Nov. 2022, S. Gautam, SG472, ASCOL Herbarium.

## 8. *Leucas* R.Br.

Annual or perennial herbs or shrubs. Stem erect, angular, pubescent, branched. Leaves simple or dentate, opposite decussate, ovate-lanceolate or lanceolate or ovate, sessile or shortly petiolate, entire or serrate. Inflorescence of many flowers verticillasters, terminal or axillary, crowded or distant in axile of leaves. Bracts ovate-lanceolate to subulate. Calyx tubular, toothed apex not bilabiate, teeth 8-10. Corolla tubular, bilabiate, upper lip entire, densely hirsute, lower lip 3-lobed, longer than upper lip, median lobe larger than lateral lobes, tube included in calyx. Stamens 4, didynamous, included within corolla upper lip, anthers 2-celled. Style bifid. Nutlets oblong, trigonous, scar small.

### Keys to species

**1a.** Annual few branched; Flowers- dense terminal whorls on branches..... **L. cephalotes**

**1b.** Perennial several branched, dense woolly hairs; flowers- axillary whorls in the leaf axils on stem..... **L. lanata**

***Leucas cephalotes*** (Roth) Sprengs.; *Syst. Veg.* 2: 743: (1825)

*Phlomis cephalotes* Roth,

Dhorna pushpi

Annual herb up to 25 cm. Stem erect, few branched, hairy, 4 angled. Leaves ovate-lanceolate or oblanceolate, (1-5×0.5-2) cm, petiole 0.2-0.7 cm, pubescent, base

cuneate, apex acute, margin serrate. Inflorescence: dense terminal verticillaster, many flowered. Bract numerous, overlapping, narrow lanceolate, ca. 1.3 cm. Flower white small, sessile, many flowers in dense whorls on branches. Calyx tubular, 10-short toothed, sepal cub 1-1.5 cm, calyx lobes very short. Corolla bilabiate, lower lip 3 lobes and longer than upper lip, upper lip curved downward, white. Stamens: 4, didynamous, included within the corolla tube, anther dithecos. Fruit: Nutlets, obovoid.

**Distribution:** Afghanistan, Punjab, Himalaya (Simla to Bhutan), India,

**Nepal:** West, Central and East

**Altitudinal range:** 150-2400m

**Fl. & Fr.:** Oct.-Feb.

**Ecology:** Along roadside

**Representative collection:** *Pyuthan*, Bhringri, 644m, 17 January 2023, S. Gautam, SG4115, ASCOL Herbarium.

**Leucas lanata** Benth. *Pl. Asiat. Rar.* 1: 61. 1830.

*Marrubium mollissimum* D. Don

Perennial herbs. Stem erect with several branches having densely woolly hairs, c.a. 25cm with lanate indumentum. Leaves simple, opposite, densely covered with woolly, lanate, 1.5-4×0.6-1.7cm, narrowly ovate-lanceolate or oblong, petiole c.a. 0.6cm apex acute, rounded at base, margin crenate- serrate, veins impressed above, leaves short stalked, upper ones sessile. Verticillasters distant, in leaf axils. Flowers-whorls axillary, many flowered, bracts setaceous, much shorter than calyx. Flowers are 2-lipped, about 1cm across. Upper lip is hooded and very hairy; the lower lip is longer, 3-lobed, with middle lobe rounded and larger than the two blunt side lobes. Calyx tube (sepal cub) is 8mm long with 10 short teeth, alternately short and long, densely hairy, tubular, straight. Corolla tube little exserted, hairy outside, white c.a. 11mm. Nutlets ca. 1.5×1mm, oblong, 3-angular, truncate at apex, tuberculate brown.

**Distribution:** Himalaya (Kashmir to Sikkim), India, China.

**Nepal:** West, Central and East

**Altitudinal range:** 700-1100m

**Fl:** Aug.-Nov.

**Ecology:** Open areas, meadows.

**Representative collection:** *Pyuthan*, Bhingri, 832m, 24 Sept. 2022, S. Gautam, SG401, ASCOL Herbarium.

### 9. *Micromeria* Benth.

Perennial prostrate herbs. Unbranched stem. Leaves opposite decussate, ovate, entire, petiole or sessile, upper leaves bract like. Inflorescence verticillaster axillary, 1 to many flowered, flowers in terminal spikes, bracteates, pedicellate. Calyx tubular, 2-lipped, 5 subequal straight lobes. Corolla 2-lipped, hairy, tube straight, 5 lobes, upper lip straight, flat or convex with 2 lobes, lower lip with 3 lobes. Stamens 4, didynamous, anterior 2 longer, free, included, anther bicelled. Style bifid. Nutlets oblong.

***Micromeria biflora*** (Buch.-Ham. ex D. Don) Benth., *Labiata. Gen. spec.* 378. 1834.

*Thymus biflorus* Buch.-Ham. ex D. Don

*Satureja biflora* (Buch.-Ham. ex D. Don) Briq.

पिनासेझार (Pinaase Jhaar)

Annual to perennial herbs or subshrubs up to 20 cm with erect, unbranched, hairy, red-purple stem. Leaves ovate, 3-6×1-3mm, entire, base rounded, apex acute, petiole short (0.5mm) or sessile. Verticillaster few flowered, bract small (ca. 2mm), pedicel 1-3mm. Sepals tubular, 2-lipped, 5 subequal lobes, upper 3 lobes narrowly triangular and lower 2 lobes subulate. Corolla 2-lipped, upper lip notched, straight with 2 lobes and lower lip longer with 3 lobes. Stamens 4, didynamous, included, anther 2-celled, thecae glabrous, ovary glabrous. Nutlets brown, oblong.

**Distribution:** Bhutan, Afghanistan, India, China, Burma

**Nepal:** West and Central                      **Altitudinal range:** 878-3500m

**Fl. & Fr.:** Jun.-Aug.

**Ecology:** Meadows, grasslands.

**Representative collection:** *Pyuthan*, Bhingri, 878m, 26 Nov. 2022, S. Gautam, SG466, ASCOL Herbarium.

**10. Platostoma** P. Beauv.

Erect Shrubs, velvet-hairy. Quadrangular stem. Leaves opposite, ovate-lance-shaped, acute, toothed, bracteates. Inflorescence spike, verticillaster separate in terminal or axillary raceme or panicles, many flowered, bracteates, sessile or rarely pedicellate. Calyx ovoid, 2-lipped, 5 lobed, upper lip 3, middle lobe larger; lower lip 2-lobed; fruiting calyx 2 toothed. Corolla 2-lipped, campanulate, upper lip with 4 short lobed, lower lip longer. Stamens 4, exserted, anterior stamens longer. Anther 2-celled; Style bifid; Nutlets ovoid.

**Platostoma coloratum** (D. Don) A.J. Paton, *Kew. Bull.* 52: 274. 1997.

*Geniosporum coloratum* (D. Don) Kuntze.

*Geniosporum strobiliferum* Benth.

Ban babari

Erect pubescent herbs with ca. 1 m tall. Leaves ovate-lance-shaped, 5-15×2-3cm, petiole up to 1.5 cm, margin toothed, wedge-shaped, tip tapering or acute, bract 1cm. Inflorescence spike, verticillaster separate in terminal or axillary raceme or panicles, many flowered; bracteates, sessile or rarely pedicellate, bract ovate, ca. 4mm. Flowers white with purple spots, flowers in whorls of 12. Calyx bilabiate, 5 lobed, lower lobes 3, lateral 2 triangular, middle lobe flat. Corolla campanulate, bilabiate, 5 lobed; Upper lip of corolla with 4 lobed, lower lip lance shaped. Stamens 4, exserted, didynamous, anterior longer, anther ovoid. Nutlets dark brown, ovoid.

**Distribution:** Himalaya (Garhwal to Bhutan), Bengal, Burma, SW. China, Indo-China.

**Nepal:** West, Central and East

**Altitudinal range:** 150-1600m

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

**Ecology:** Moist area, riversides.

**Representative collection:** *Pyuthan*, Bhingri, 834m, 24 Sept. 2022, S. Gautam, SG404, ASCOL Herbarium.

### **11. Pogostemon** Desf.

Aromatic herb or shrubs with angular, glabrescent or densely pubescent stem. Leaves opposite, ovate-lanceolate or oblong to ovate-oblong or ovate, petiolate or subsessile, serrate, acute. Inflorescence axillary. Spikes with whorls, verticillaters many flowered Bracteate and bracteoles, bract ovate-lanceolate. Calyx tubular, 5 equal teeth. Corolla tubular, bilabiate, 4-lobed, lobes folded outward, upper lip 3 lobes. Stamens 4, free, base with long hairs, exserted. Carpels bifurcate. Style bifid. Nutlets ovate-trigonous, ovoid.

**Pogostemon benghalensis** (Burm. f.) Kuntze.; *Rev. Gen. Pl.* 529 (1891).

*Pogostemon plectranthoides* Desf.

Perennial shrubs up to 2m, aromatic with angular, terete, pubescent, purplish stem. Leaves opposite, ovate-oblanceolate, 6- 12× 2-9 cm, cuneate, acute, crenulate or serrate, pubescent, Petiole up to 3.9cm. Inflorescence terminal or axillary spikes forming panicles. Many flowers densely packed, verticillaters 6-12 flowered. Ovate Bracts 1.3 cm. Bracteoles present. Calyx 5 equal lobes, tubular, pubescent. Corolla 4 lobes, equal, upper 3 lobed and lowers 1 lobed, pinkish light purple, tubular, lobes folded outwards. Stamens 4, exserted, free, with long purple hairs, anther 1 celled. Carpel bifurcate, ovary glabrous, stigma 2-lobed. Nutlets glabrous, brown.

**Distribution:** W. Himalaya, E. Himalaya, Assam-Burma, S. Asia & SE. Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 150-1300m

**Fl:** Feb.- May.

**Ecology:** Open grassland.

**Representative collection:** *Pyuthan*, Bhingri, 740m, 3 Feb. 2023, S. Gautam, SG4125, ASCOL Herbarium.

### **12. Pseudocaryopteris** P. D. Cantino

Perennial sweet scented shrubs having 4-angled, erect, pubescent stem. Leaves lanceolate-elliptic or ovate-lanceolate, acute, opposite decussate, crenate-serrate, petiole short. Inflorescence dense thyrses, lateral cyme, bracteates. Calyx deeply 5 lobed, pubescent. Corolla 5 or 6 lobed, bilabiate, upper limb 4 oblong lobes, lower larger than upper lip, pubescent. Stamens 4, didynamous, long, exserted. Ovary

pubescent, 4-ovuled, style 2 lobed, slender, curved, exserted. Capsule globose or subglobose.

**Pseudocaryopteris bicolor** (Roxb. ex Hardw) P.D. Cantino, *Syst. Bot.* 23 (3): 381 (1999).

*Caryopteris bicolor* (Roxb. ex Hardw.) Mabb.

Bagh mukhe

Attractive sweet scented shrubs of about 1-3m tall with quadrangular branches. Leaves opposite, lance-shaped to elliptic, acuminate, 1.4-10×1-3 cm, cuneate, acuminate, crenate-serrate or entire, adaxially subglabrous, abaxially hairy, petiole short of about 5-10mm. Inflorescence terminal, lateral cymes of more than 5-flowered, flowers purple, blue, bract lanceolate, ca. 2mm. Calyx deeply 5-lobed, hairy. Corolla bluish purple, 5 or 6 lobed, upper 4 lobes and lower slightly larger, tube ca. 5 mm. Stamens long, 4, exserted. Ovary hairy, 4 ovuled. Fruit Capsule subglobose.

**Distribution:** W. Himalaya, E. Himalaya, Assam-Burma, S. Asia & SE. Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 900-1300m

**Fl:** Feb.- May.

**Ecology:** Open grassland, dry slopes.

**Representative collection:** *Pyuthan*, Bhingri, 910m, 4 Feb. 2023, S. Gautam, SG4126, ASCOL Herbarium.

### **13. Salvia L.**

Annual to perennial herbs or shrubs with erect, quadrangular, pubescent stem; Leaves simple or compound, opposite decussate, triangular-ovate or ovate, petiole present or absent; Inflorescence verticillasters 2-many flowers in raceme, panicles; bract small; calyx tubular-campanulate, bilabiate, upper lip with 2 or 3 entire lobes and lower lip with 2 lobes. Corolla bilabiate, upper lip straight with 2 lobes, lower lip larger, concave with 3 lobed, tube folded or straight. Stamens 2 with short filaments, exserted, staminodes 2 small or absent, style 2-cleft. Nutlets 4, ovoid or oblong, hairless.

**Salvia coccinea** Juss. ex Murr.; *Comment. Gotting.* 1: 86 (1779).

Annual herbs up to 60 cm tall having erect, pubescent, branched stem. Leaves simple, ovate to triangle shape, 2-3×1-1.4 cm, hairy, petiole up to 1.5 cm, base cordate, margin serrate, acute. Inflorescence densely verticillaster 4 to many flowered in terminal raceme, bract ovate, pedicel 2-3mm. Calyx 2-lipped, tubular-campanulate, ca. 9 mm, upper lip ovate or entire with 2 or 3 toothed, lower lip deeply 2 lobed. Corolla 2-lipped, deep red, hairy, upper lip shorter than lower, upper lip folded, corolla tube straight, ca. 2 cm, stamens 2, exserted, filament short; staminodes 2 small or absent. Nutlets 4, ovoid or oblong, hairless.

**Distribution:** Native of Tropical America, widely cultivated in India, Ceylon and Himalaya.

**Nepal:** West, Central and East

**Altitudinal range:** 800-1500m

**Fl.:** April-July

**Ecology:** Roadsides, Grassland

**Representative collection:** Pyuthan, Bhingri, 735m, 30 Oct. 2023, S. Gautam, SG4211, ASCOL Herbarium.

#### **14. Scutellaria L.**

Herbs or subshrubs. Stem erect, quadrangular, pubescent, unbranched. Leaves basally occurs, opposite decussate, ovate rarely elliptic-orbicular, stalk long. Inflorescence terminal or axillary racemes or spikes. Flowers axillary, opposite, bracteate rarely ebracteate, pedicellate. Calyx short tubular, 2-lipped, upper lip with scutellum, fruiting closed by lips. Corolla 2-lipped, upper lip erect and lower lip flat; tube long, sharply recurved above base, pubescent; exserted. Stamens 4, didynamous, epipetalous. Style subulate, bifid. Nutlets globose to ovoid.

#### **Keys to Species:**

**1a.** leaf stalk 0.2-2 cm..... 2

**1b.** Stem leaves has long stalk 0.5-2.2 cm..... **S. discolor**

**2a.** Scrambling herbs: flowers in lateral inflorescence..... **S. repens**

**2b.** Plant not scrambling herbs: flowers in terminal inflorescence..... **S. grossa**

**Scutellaria discolor** Wall. ex. Benth; *Pl. As. Rar.* 1:66. 1830.

*Scutellaria indica* Blume

Nilo butte ghans, Rat pate, dhampate

Perennial herbs or shrubs, ca. 16 cm. Stem erect, densely puberulent, reddish, unbranched; apically leafless. Leaves in 2-4 pairs, petiole 0.5-2.2cm, leaves elliptic-ovate, 1.5-5.5×1-4 cm, pubescent, margins blunt-toothed or entire, long stalked, base cordate, apex rounded to obtuse, veins pubescent, peduncle 2.5-4cm; Inflorescence racemes, flowers alternate to opposite, pedicel purplish, 2.5-3mm, densely pubescent, flowers are blue, tubular 2-lipped, in long leafless spikes, 8-25cm long. The flowers are 1.3-1.8 cm long, with slender, curved, tube, opening into two lips. Upper lips are entire, hooked and lower one is broad with 3-lobes. Calyx bilabiate, pubescent outside, enlarging in fruit and covering the nutlets; corolla purple, glandular pubescent, bilabiate, base bent, pubescent inside, middle lobe of lower lips ovate-orbicular, lateral lobes ovate-oblong, nutlets brown, ovoid-ellipsoid, 1mm in diameter.

**Distribution:** Himalaya (Kumaun to Bhutan), Assam, Burma, S.W. China, Malaysia.

**Nepal:** West, Central and East

**Altitudinal range:** 700-2400m

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

**Ecology:** Roadsides, meadows

**Representative collection:** *Pyuthan*, Bhingri, 834m, 24 Sept. 2022, S. Gautam, SG403, ASCOL Herbarium.

**Scutellaria repens** Buch.-Ham. ex D. Don.; *Prodr. Fl. Nep.* 110 (1825)

*Scutellaria cana* Wall. ex. Benth.

Perennial scrambling herbs up to 1.5m with quadrangular, covered with white simple hairs stem. Leaves oblong-ovate, 0.9-6×0.5-3 cm, pointed tip, densely hairy, toothed or entire, wedge-shaped, leaf stalk 2-10mm on lower leaves, upper leaves 2-5×2-3 mm, entire, cuneate, acute, blunt or pointed, in axils of upper bract-like leaves. Flowers mostly in lateral inflorescence. Inflorescence in leaf axils.

Flowers are arranged only one side of spikes, axillary. Pedicel 2-4mm, erect. Calyx 1.5mm with small scutellum in flowers enlarging in fruits, covered with hairs. Corolla yellow pale-violet with hairs, bilabiate, tube 8-10mm. Nutlets smooth, grey-black, covered with hairs.

**Distribution:** Himalaya (Kashmir-Sikkim), Burma.

**Nepal:** West, Central and East

**Altitudinal range:** 600-2100m

**Fl. & Fr.:** Sept.-Dec.

**Ecology:** Rocky area, roadsides

**Representative collections:** Pyuthan, Bhingri, 731m, 28 Nov. 2022, S. Gautam, SG473, ASCOL Herbarium.

**Scutellaria grossa** Wall. ex Benth. *In Wall., Pl. As. Ran.* 1: 67. 1830.

Perennial herbs with erect, quadrangular, pubescent stem of 20-30cm. Leaves triangular-ovate to oblanceolate, elliptic, 2-20×1-10mm, entire to serrate, acute apex, cuneate-truncate base, lower leaves petiolate up to 30mm, upper leaves sessile. Flowers mostly in terminal. Inflorescence elongated, flowers in the axils of upper leaves like bracts, white or cream flowers. Pedicels 2-4mm, Calyx with scutellum. Corolla blue-creamy, tube 9-13mm with hairs. Nutlets black.

**Distribution:** W. Himalaya & E. Himalaya.

**Nepal:** West, Central and East

**Altitudinal range:** 1500-3500m

**Fl. & Fr.:** Sept.-Dec.

**Ecology:** Rocky area, roadsides

**Representative collections:** Pyuthan, Sworgadwari, 2025m, 17 Nov. 2022, S. Gautam, SG445, ASCOL Herbarium.

### 15. **Teucrium** L.

Perennial herbs or shrubs having 4-angled, branches, hairy, erect stem. Leaves opposite, pinnately lobed, entire or toothed, sessile or petiolate, lance-shaped. Flowers in spike like one-sided terminal raceme, verticillasters of 2-6 flowered, entire, bracteates, pedicellate. Calyx 5 lobed in 2 lipped, tubular to campanulate, upper lip with 3 lobes and lower lip with 2 lobes. Corolla 1 or 2-lipped, 5 lobed,

corolla tube short, white to cream in colour, Stamens 4, didynamous, exserted, anther 2-locular. Ovary 4-lobed, styles inserted near apex of ovary, stigma bi-fid, ovary globose. Nutlets obovoid glabrous.

**Teucrium quadrifarium** Buch.-Ham. ex D. Don, *Prodr. Fl. Nepal.* 108 (1825).

Perennial herbs or shrubs having 4-angled, branches, hairy, erect stem. Leaves opposite, ovate-oblong, (3-7×1-4) cm, hairy, pinnate venation, margin serrate, base subcordate, apex obtuse to acute, sessile or petiolate. Flowers in whorls in the form of spike like one-sided terminal raceme, verticillasters of 2-6 flowered, entire, bract present. Calyx 5 lobed in 2 lipped, campanulate, upper lip with 3 lobes and lower lip with 2 lanceolate lobes, middle teeth (lobe) of upper lip obovate and lateral teeth triangle. Corolla 1 or 2-lipped, 5 lobed, corolla tube short, red in colour, hairy. Stamens 4, didynamous, exserted, anterior 2 stamens slightly longer, anther 2-locular. Ovary 4-lobed, styles sub-terminal, stigma bi-fid, ovary globose. Nutlets obovoid glabrous.

**Distribution:** Himalaya (Kashmir to Sikkim), India, Burma, China, Indo-China, Malaysia.

**Nepal:** West and Central

**Altitudinal range:** 1200-2400m

**Fl.:** Jul.-Sept.

**Ecology:** Slopy area, forest margin

**Representative collections:** *Pyuthan*, Bhingri, 950m, 30 Sept. 2022, S. Gautam, SG431, ASCOL Herbarium.

## 16. *Vitex* L.

Shrubs or small trees, branched, pubescent. Leaves opposite decussate, compound, 1-7 foliate, oblong-lanceolate, entire, acute, petiole present, exstipulate. Inflorescence terminal panicles, dichasial cyme. Flowers bisexual, bract leaf like, calyx campanulate, 5-lobed. Corolla 2-lipped, 5 lobed, upper lip 2 lobed and lower lip 3 lobed. Stamens exserted. Bicarpellate, 2-4 locules, 1 ovule in each locule. Ovary glabrous, stigma bilobed. Fruit black.

***Vitex trifolia*** L. *Sp. Pl.* 2: 638. (1753).

Shrubs or small trees up to 5m tall having erect, branches, pubescent stem. Leaves trifoliolate, lanceolate, 6-13×2-5 cm, opposite decussate, entire, acute, cuneate,

petiole 1-2 cm. Inflorescence terminal panicles, flower bisexual, bract leaf-like. Calyx 5 dentate, campanulate. Corolla 2-lipped, 5-lobed, bluish purple or purplish, upper lip 2 lobed, lower lip 3 lobed. Stamens 4, exserted, didynamous (2+2). Carpels 2, 2-4 celled or locule, 1 ovule in each locule, ovary subglabrous, style glabrous, stigma bilobed. Fruit black.

**Distribution:** Assam-Burma, S. Asia, E. Asia, SE. Asia, SW. Asia, Africa, Australia.

**Nepal:** West, Central and East

**Altitudinal range:** 600-3000m

**Fl. & Fr.:** Apr.-Oct.

**Ecology:** Rocky area, roadsides, open area

**Representative collections:** *Pyuthan*, Bhingri, 700m, 23 May 2023, S. Gautam, SG4162, ASCOL Herbarium.

#### **FAMILY 46: OLEACEAE**

Shrubs or small trees; erect or twinning, branched stem; leaves simple or compound pinnately, opposite, stipules absent, reticulate venation; Inflorescence cymose or compound raceme, panicle; flowers bisexual or unisexual, 4-merous or more; sepals small, 4-10 or more lobes, bell-shaped or tubular; corolla 4-5 (-16) or more, funnel shaped; stamens 2-4, inserted on corolla tube, filaments short, anthers 2-celled; Carpel 2, fused, ovary superior, 2 locules, 2 ovules in each locule, style short, stigma simple or bilobed; fruit capsule, samara, berry or drupe.

#### **Keys to Genera:**

**1a.** Leaves simple; Corolla lobes 4; berry like drupe solitary..... **Ligustrum**

**1b.** Leaves pinnately compound, 3-foliate or simple; Corolla lobes 4-10; berry usually didymous..... **Jasminum**

#### **1. Jasminum L.**

Evergreen, sweet scented shrubs or trees having erect, angular or grooved stem and branches. Leaves opposite or alternate, simple, compound, imparipinnate, entire, petiolate. Inflorescence cymose clusters, axillary or terminal, bracteates, pedicellate, bisexual. Campanulate or bell-shaped calyx with 4-10 lobes, gamosepalous. Corolla 4-10 lobes, gamopetalous, fused into a narrow slender tube.

Stamens 2, inserted about middle of corolla tube, included, epipetalous, filaments short, bithecous, dorsifixed. Bicarpellary, syncarpous, bilocular, ovary superior, 1 or 2 ovules in each locule, stigma linear or 2-lobed. Fruit a berry.

**Keys to Species:**

1a. Leaves pinnately compound, 3-11 foliolate..... **J. grandiflorum**

1b. Leaves usually simple or tri-foliolate..... **J. multiflorum**

**Jasminum multiflorum** (N. L. Burm. F.) Andrews, *Bot. Repos.* 8: t. 496 (1807)

*Jasminum pubescens* (Retzius) Willd.

*Nyctanthes multiflora* N.L. Burm.

Beli puspa

Evergreen branching vines or shrubs up to 3m tall. Branches terete, pubescent. Leaves simple, opposite, ovate, (3-8×1.5-5) cm, acute or acuminate, entire to slightly wavy margin, cordate, petiole 5-10 mm, smooth or pubescent, pinnate venation. Inflorescence terminal or axillary, many flowered, capitate cyme or umbel at the tip of the dwarf lateral branchlets, bract leafy. Flowers tubular, sessile or subsessile, flower stalk 0-2 mm. Calyx is densely softly hairs, 6-9 lobes or teeth, fused, linear. Corolla white, lobes 6-9, fused into a slender tube. Stamens 2, epipetalous, included. Carpels 2, fused, 2-locules, superior. Fruit berry, black when ripe.

**Distribution:** Subtropical Himalaya, India, Ceylon, Burma, China.

**Nepal:** West and Central

**Altitudinal range:** 300-1100m

**Fl.:** Oct.-Apr.

**Ecology:** Roadsides

**Representative collections:** *Pyuthan*, Bhingri, 735m, 31 Dec. 2022, S. Gautam, SG4108, ASCOL Herbarium.

**Jasminum grandiflorum** L., *Sp. Pl. Ed. 2.* 9. (1762)

*Jasminum officinale* var. *grandiflorum* (L.) Stokes.

Chameli, Lahare chameli

Evergreen perennial climbing shrubs up to 5m tall; branches erect, angular. Leaves imparipinnately compound, 3-11 leaflets, opposite, glabrous, petiole 7-10mm, ovate-lanceolate, 1-5×0.5-3 cm, obtuse or cuneate base, entire margin, acute apex. Inflorescence cymose, 3-many flowered in leaf axils, Flowers buds are pinkish in colour, fragrant, pedicel 3-20mm. Flowers tubular, borne in cluster, bisexual flowers, bract linear. Calyx 5, slender, tubular, glabrous. Corolla tubular, lobes 4-6, oblong, white. Stamens 2, attached at the middle of corolla tube. Pistil: 2 locular ovary, style as long as corolla tube, stigma bifid. Fruit 2-lobed berry, black when ripe.

**Distribution:** Subtropical Himalaya (Kashmir to Nepal), often cultivated.

**Nepal:** West and Central

**Altitudinal range:** 1000-1400m

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

**Ecology:** Roadsides, Moist area

**Representative collections:** *Pyuthan*, Bhingri, 836m, 30 Sept. 2022, S. Gautam, SG422, ASCOL Herbarium.

## 2. *Ligustrum* L.

Shrubs or small trees, evergreen or deciduous. Leaves simple, opposite, petiole present, entire margin, hairless. Inflorescence terminal panicles. Flowers white or cream coloured, bisexual, pedicel present or absent. Calyx bell shaped or campanulate, 4-toothed. Corolla lobes 4, funnellform. Stamens 2, attached to the tip of corolla, included or exerted. Ovules 2 in each locule, style shorter than stamens, stigma bilobed. Fruit berry like drupe, seed 1-3 or 4.

***Ligustrum sinense*** Lour., *Fl. Cochinch.* 1: 19. 1790.

*Ligustrum indicum* (Lour.) Merr.

Perennial deciduous shrubs up to 6m tall: branched, terete, slightly hairy stem; Leaves ovate-oblong, elliptic, 2-10×1-5 cm, hairy, petiole 1.5-6mm, acute, cuneate, entire. Inflorescence terminal or axillary panicles, pedicel short, 1-4.5mm. Calyx campanulate, hairless or slightly hairy. Corolla 5, white. Stamens 2, reaches at the apex of corolla lobes. Fruit berry.

**Distribution:** E. Asia, SE. Asia, Himalaya (Garhwal to Sikkim), Indo-China.

**Nepal:** West, Central and East

**Altitudinal range:** 1200-2700m

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

**Ecology:** Mixed forests

**Representative collections:** *Pyuthan*, Bhingrikot, 1191m, 29 Mar. 2023, S. Gautam, SG4148, ASCOL Herbarium.

#### **FAMILY 47: OROBANCHACEAE**

Annual or perennial herbs or shrubs. Branched or unbranched, terete or 4-angled stem. Leaves simple, opposite or alternate, lanceolate-ovate, acute, serrate, reticulate venation, petiolate or sessile, exstipulate. Inflorescence solitary in a leaf axils, racemose or spikes, corymbs, panicles, terminal or axillary. Flowers bisexual, bracteoles, pedicellate or absent. Sepals 4 or 5 lobes, united, irregular, tubular. Petals 5 subequal lobes, bilabiate, upper lip 2 lobes and lower lip 3 lobes. Stamens 4, didynamous, epipetalous, inserted below the middle of corolla, anther bitheous. Carpel 2-3, syncarpous, ovary 1 or 2 locular, superior, ovules numerous, style 1, stigma 2-4 lobed. Loculicidal capsule. Seeds minute.

#### **Keys to Genera:**

**1a.** Leaves opposite or alternate; Flowers golden yellow: bilocular ovary..... **Lindenbergia**

**1b.** Leaves spirally arranged; Flowers blue-purple; Unilocular ovary..... **Orobanche**

#### **1. Lindenbergia** Lehmann

Annual herbs; stem terete, hairy. Leaves simple, basal and cauline, ovate, opposite or alternate, reticulate, petiole short, dentate. Inflorescence solitary racemose or spikes. Flowers bisexual, bract leaf-like or absent, bracteoles absent, pedicellate, 5-merous. Calyx parted into 5 lobes, campanulate, pubescent. Corolla 5, tubular, bilabiate, upper lip straight with 2 lobes, lower 3 lobes. Stamens 4, didynamous, epipetalous, inserted below middle of corolla, filaments hairless, anthers ditheous. Carpels 2, fused, ovary superior, bilocular, many ovules, stigma not lobed. Capsule enclosed by calyx, seeds numerous, small.

**Lindenbergia grandiflora** (Buch.-Ham. ex D. Don) Benth., *Scroph. Ind.* 22. 1835.

Annual herbs or climbers; branched, pubescent, terete. Leaves opposite, ovate, serrate or wavy, acute, reticulate venation, 6-8 lateral veins, petiole 3-7 cm. Flowers borne in the spike, stalk less, golden yellow. Calyx parted into 5 equal lobes, hairy. Corolla 5 lobed arranged in 2 lipped, upper lip with 2-short lobes, lower lip with 3 lobed, corolla tube 2 times as long as calyx. Stamens 4, epipetalous, anther ditheous, filaments hairy. Carpels 2, syncarpous, superior, bilocular. Capsule ovoid, short, covered by calyx, seeds numerous.

**Distribution:** Himalaya (Almora to Bhutan), Assam-Burma, Tibet, W.China.

**Nepal:** West, Central and East

**Altitudinal range:** 700-2400m

**Fl. & Fr.:** Sept.-Dec.

**Ecology:** Rocky or dry slopes, roadsides.

**Representative collections:** *Pyuthan*, Dharamshala, 1721m, 25 Dec. 2022, S. Gautam, SG440, ASCOL Herbarium.

## 2. **Orobanche** L.

Annual or biennial herbs; Leaves spirally arranged, ovate-lanceolate, reduced in size. Inflorescence spicate or raceme, bract, bractlets 2 or absent, pedicel present or absent. Floers many. Calyx campanulate, 4 or 5 toothed. Corolla bilabiate, 5-lobes unequal, curved, upper lip 2 lobes, lower lip with 3 lobes. Stamens included in corolla, 4, didynamous, included. Ovary unilocular, ovules numerous, styles elongated, stigma 2-4 lobed. Capsule oblong, dehiscent by 2 valves, seeds numerous, minute.

**Orobanche aegyptiaca** Persoon.; *Syn. Pl.* 2: 181 (1807).

*Orobanche indica* Buch.-Ham. ex Roxb.

*Phelipaea aegyptiaca* (Pers.) Walp.

*Phelipaea indica* (Buch.-Ham. ex Roxb.) G. Don.

Annual herbs up to 45 cm tall, hairy; Branched. Leaves ovate-lanceolate, 8-10×2-4 mm, scales like along with bracts. Inflorescence spicate lax, bract linear, pedicel

short or absent. Calyx campanulate or bell-shaped, 4-5 toothed. Corolla blue-purple, bilabiate, upper lip erect with 2 lobes, lower lip larger with 3 lobes. Stamens 4, didynamous, filaments hairy, included. Ovary ellipsoid, stigma bilobed. Capsule oblong. Seeds numerous, ovoid.

**Distribution:** Mediterranean, N. Africa, Arabia to Pakistan and Himalaya.

**Nepal:** West and Central

**Altitudinal range:** 150-3100m

**Fl. & Fr.:** Apr.-Aug.

**Ecology:** Cultivated fields.

**Representative collections:** *Pyuthan*, Bhingri, 735m, 17 Nov. 2022, S. Gautam, SG4107, ASCOL Herbarium.

#### **FAMILY48: PLANTAGINACEAE**

Annual to Perennial herbs; leaves simple, basal, spirally, alternate or oppositely arranged, entire and often toothed, exstipulate. Inflorescence raceme or cymose or spike. Flowers small, bisexual, 4 or 5-merous, slender stalk. Sepals 4 or 5, united. Corolla 4 or 5, united, 2-lipped. Stamens 4, didynamous, inserted on corolla tube. Carpels 2, united, ovary superior, single style, numerous ovules, 1 or 2 locules. Capsule with 1 or more seeds per cells. Seeds minute, numerous.

#### **Keys to Genera:**

**1a.** Flowers 5-merous; Calyx and Corolla 5-lobed, corolla 2-lipped; Stamens 4.....**Misopates**

**1b.** Flowers 4-merous; calyx and corolla 4-lobed, corolla 1-lipped; Stamens 2.....**Veronica**

#### **1. Misopates Raf.**

Annual herbs, branched, hairless or hairy. Leaves simple, lanceolate, opposite or alternate above. Flowers in terminal racemes. Calyx 5- unequal lobed, lobes larger than corolla. Corolla tubular, 5-lobed, various colours with darker veins. Stamens 4, didynamous, included. Ovary bilocular, numerous ovules. Capsule brown.

**Misopates orontium** (L.) Raf.; *Autikon B.* 158 (1840)

*Antirrhinum gibbosum* Wall.

Annual herbs having erect and unbranched stem up to 60 cm tall. Leaves linear-lanceolate, 10-20×0.5-3 mm, sessile, entire, slightly hairy, acute or acuminate. Flowers in raceme, axillary, pedicel 1mm, bract leaf like. Calyx 5-lobed, unequal. Corolla 2-lipped, pale or reddish pink with darker veins. Stamens 4, epipetalous, included, anther bitheous. Fruit capsule brown, three opening opercula for seed dispersal.

**Distribution:** N. Africa, Europe, Himalaya, occasionally naturalized in India.

**Nepal:** West

**Altitudinal range:** 1300-2500m

**Fl. & Fr.:** Apr.-Sept.

**Ecology:** Fields

**Representative collection:** *Pyuthan*, Bhingri, 735m, 17 Nov. 2022, S. Gautam, SG4105, ASCOL Herbarium.

## 2. **Veronica** L.

Annual or perennial herbs having erect, creeping stem. Leaves opposite, upper alternate, petiolate, hairy, ovate-lanceolate. Inflorescence terminal racemes, 4 or 5 merous, bisexual, pedicellate, bract present. Calyx 4 lobed, corolla 4-lobed, unequal, upper 3 lobes are in same size and lower 1 lobes narrower. Stamens 2: filament connate at the base of corolla tube, style persistent, stigma capitate. Capsule, 2-50 seeds per capsule, flattened and convex.

**Veronica persica** Poiret, *Encycl.* 8. 542. 1808.

Annual weedy herbs: erect stem, pubescent. Leaves simple, alternate or opposite, suborbicular, ovate to elliptic, 0.5-2cm×3-15mm, apex obtuse or round, base cuneate, petiole 10mm. Inflorescence terminal racemes of stalked flowers, tubular, solitary in axils of leaf, 4 merous, bract leaf like, pedicel 1-3.5 cm; 4 sepals or tepals, fused into a cup or tube; 4 lobes petals, upper 3 all about same size and; lower much narrower; blue. Stamens 2, shorter than corolla. Fruit: 2 lobed capsule, seeds navicular, convex.

**Distribution:** Europe, W. Asia, C. Asia, Himalaya, introduced to E. Asia and America.

**Nepal:** Central

**Altitudinal range:** 1500m

**Fl. & Fr.:** Mar.-Jun.

**Ecology:** Field

**Representative collection:** *Pyuthan*, Bhingri, 735m, 17 Nov. 2022, S. Gautam, SG4106, ASCOL Herbarium.

#### FAMILY 49: SCROPHULARIACEAE

Erect herbs or small shrubs; Leaves simple, alternate or opposite or whorled, exstipulate, entire, reticulate. Inflorescence racemose or spike or cymose, bracteates, pedicellate or sessile. Flowers bisexual, 5-merous. Calyx 5-7, gamosepalous, bilabiate. Corolla 4-5, gamopetalous, bilabiate. Stamens 2-4 or rarely 5, didynamous, epipetalous, anthers basifixed or dorsifixed, anther dithecous, filaments short. Carpels 2, syncarpous, superior, biloculed, ovules many in each locules. Capsule rarely berry. Numerous seeds.

#### Keys to Genera:

**1a.** Small trees; pubescent stem & leaves; petiole 1.5 cm; stipules leafy; corolla whitish pink with orange throat..... **Buddleja**

**1b.** Herbs; glabrous stem & leaves; petiole short (2mm) or absent; exstipulate; corolla yellow with purple lines on upper lip..... **Mecardonia**

#### 1. **Buddleja L.**

Shrubs or trees having 4-angled, tomentose stem. Leaves simple, opposite, stipulate, petiolate, entire or serrate. Inflorescence terminal, Flowers in dense crowded heads in panicles, bisexual, bracts present, tetramerous, actinomorphic. Calyx campanulate, 4 or 5 lobed. Corolla tubular-campanulate, lobes 4 or 5, tube cylindrical. Stamens 4, inserted on corolla tube, alternate with corolla lobes. Ovary bilocular, superior, many ovules per locule, placentation axile. Fruit a capsule with 2 valved. Seeds many.

**Buddleja paniculata** Wall., in Roxb., *Fl. Ind.* 1: 412. 1820.

नारायण पाती

Small tree up to 6m tall having Branches terete or quadrangular, tomentose (pubescent). Leaves narrowly elliptic or ovate, lanceolate, 4-12×2-5cm, covered with hairs, opposite, adaxially glabrescent, base cuneate or decurrent; margin entire, apex acuminate, petiole 1.5cm, and stipules leafy. Inflorescence: flowers in terminal and axillary panicles, in the axils of upper leaves; calyx campanulate, lobes triangle; corolla whitish pink with orange throat, tubular, tube outside hairy. Stamens inserted below corolla mouth, anther oblong; Ovary ovoid, stellate pubescent. Capsules ellipsoid, seeds oblong.

**Distribution:** Himalaya (Nepal to Bhutan), Manipur, Burma, China.

**Nepal:** West, Central and East

**Altitudinal range:** 500-2400m

**Fl.:** Mar.-Jun.

**Ecology:** Forest edges.

**Representative collection:** *Pyuthan*, Bhingri, 789m, 1 Mar. 2023, S. Gautam, SG4139, ASCOL Herbarium.

## 2. **Mecardonia** Ruiz & Pav.

Erect or Prostrate, hairless herbs having quadrangular stem; Ovate leaves with a crenate edge; petiolate, stipules absent. Solitary axillary flowers, pedicellate, basally bibracteolate; 5- unequal lobed calyx, more or less free to the base, the 2 middle lobes longer and overlapping, the 2 abaxial lobes nearly the same size as the adaxial and overlapping the middle lobes; 5-lobed corolla, 7–8 mm long, yellow with purple at the throat; 4 fertile stamens. Ovoid fruit capsule, 5–7 mm long, loculicidal; ovoid, reticulated seeds.

**Mecardonia procumbens** (Miller) Small, *Fl. South. U. S.* 1065 (1903).

*Bacopa procumbens* (Miller) Greenm.

Erect or creeping perennial herbs; branches from base, quadrangular stem, hairless. Leaves opposite decusate, elliptic, ovate, (7-25×3-16) mm, glabrous, petiole short or absent, exstipulate, crenate edge. Inflorescence raceme with paired stalked flowers. Flowers axillary, solitary, glabrous, bract linear, pedicel 4-6mm. Sepals

free, 5 lobed, hairless, 3 outer lobes and 2 inner shorter lobes. Corolla bilabiate, yellow with purple lines on upperlip, longer than calyx, upper lip 2 lobed, lower weakly 3 lobed, stamens 4, didynamous, adnate to tube, anther didynamous basifixed, ovary superior, pistil 1, 2 locules, each chamber with many ovules, capsule, 2 valves, glabrous, seeds numerous, oblong.

**Distribution:** Subtropical America, occasionally naturalized in India.

**Nepal:** Central

**Altitudinal range:** 1300m

**Fl. & Fr.:** Mar.-Jun

**Ecology:** Fields, Moist area

**Representative collection:** *Pyuthan*, Bhingri, 755m, 23 May 2023, S. Gautam, SG4205, ASCOL Herbarium.

#### **FAMILY 50: VERBENACEAE**

Annual or Perennial herbs, shrubs or tree; branched, quadrangular stem, leaves simple or rarely compound, opposite or whorled, exstipulate, entire or serrate, hairy or hairless, petiolate; Inflorescence terminal or axillary, cyme or racemose or umbel, or pedunculate heads, bracts present, flower bisexual, 5 or 4 merous, pedicel short to sessile. Calyx 5 lobed, fused, bell-shaped or tubular. Corolla 4 or 5 lobed, fused, unequal lobes, 2-lipped, tubular. Stamens 4, didynamous, epipetalous, stamens alternate with lobes, filaments elongated, stamens inserted on corolla tube; anther bithecous, dorsifixed. Bi- or tetra-carpellary, ovary superior, ovary entire or 4 grooved, 2-8 locular, 1 or 2 ovules per locule, fused, style terminal, stigma bilobed. Fruit Drupe or Capsule covered with calyx. Seeds 1-4.

#### **Keys to Genera:**

- 1a.** Shrubs with spines or recurved prickles..... **2**
- 1b.** Herbs without spines..... **Phyla**
- 2a.** Leaves opposite decussate, flowers in terminal or axillary racemes.....**Duranta**
- 2b.** Leaves opposite, flowers in terminal or axillary dense umbels..... **Lantana**

## 1. *Duranta* L.

Shrubs, branched with axillary thorns or spines having 4-angled, straight stem, spines opposite. Leaves simple, opposite decussate or whorled, entire or dentate, pinnate venation, petiole long-short. Inflorescence racemes or spike, terminal or axillary. Flowers small, pedicellate, and bracteate. Calyx tubular to sub-campanulate, 5-toothed, persistent. Corolla tube cylindrical, 5 unequal lobes, bilabiate, lower lip 3 lobed and larger, upper lip with 2 lobes. Stamens 4, inserted, didynamous, epipetalous, short filaments, staminodes 1. Fertile 4 carpels, ovary 8-locular, 1 ovule per locule, 2-4 lobed stigma. Fruit a fleshy drupe, enclosed by the persistent calyx.

***Duranta repens* L., *Sp. Pl.* 637.1753.**

*Duranta plumieri* Jacq.

Evergreen erect shrubs or climbing up to 7m tall, spines on mature branches. Leaves simple, opposite, glabrous, leaves obovate-elliptic, 2-6×2-3.3cm; base cuneate; margin serrate; apex acute, reticulate, petiole short up to 1cm. Inflorescence long racemes with many small tubular flowered, flowers blue, fragrant, bisexual, 5-merous, small bract; pedicels 2-3mm; calyx 5, slightly hairy, fused, tubular. Corolla 5 lobed, unequal lobes, fused, tubular, 3 anterior lobes larger and 2 posterior smaller lobes. Stamens 4, didynamous, epipetalous, included, anther basifixed, bithecous. Carpels 4, fused, superior ovary, 4-locular, 2 ovules per locules, ovary hairless, style simple. Drupe enclosed by calyx, orange-yellow.

**Distribution:** Central America, naturalised in India, Himalaya (Nepal), China.

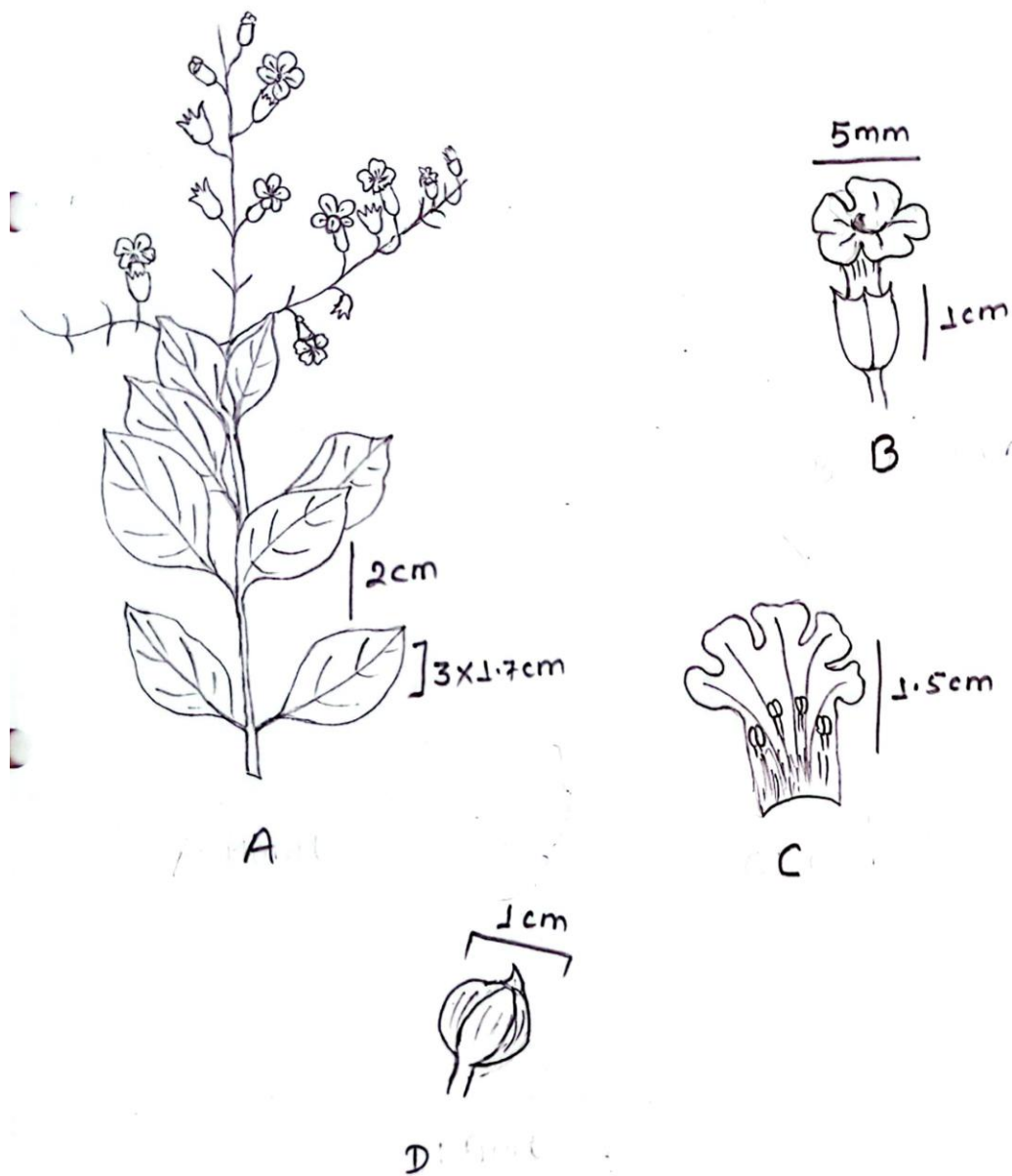
**Nepal:** West, Central and East

**Altitudinal range:** 200-1600m

**Fl.:** Throughout the year.

**Ecology:** Roadsides.

**Representative collection:** *Pyuthan*, Bhingri, 760m, 29 Apr. 2023, S. Gautam, SG4192, ASCOL Herbarium.



**Fig. 4.21:** *Duranta repens* L. A: Flowering branch, B: Flower, C: Corolla cut to show stamens, D: Fruit

## 2. *Lantana* L.

Shrubs with erect to scandent, 4-angled, hairy or hairless stem and branches, sometimes spiny stem. Leaves opposite, simple, petiole present, long to short, pinnate venation, entire or serrate. Inflorescence dense umbels, terminal or axillary, pedunculate. Flowers sessile or sub-sessile, small, bract minute. Calyx small, tubular. Corolla-tube slender, 4 or 5 unequal lobes, sometimes 2-lipped, red or orange. Stamens 4, didynamous, included, staminodes absent. Carpels 1 or 2, ovary bilocular, 1 ovule in each locule, stigma 2-lobed. Fruit a fleshy drupe with 2 or 1-seeded pyrenes.

***Lantana camara* L., *Sp. Pl.* 627. 1753.**

Evergreen perennial shrubs up to 4m tall having branched quadrangular stem with recurved prickles, hairy. Leaves opposite, ovate-oblong, 2-8×1-5 cm, rough surface with stiff hairs, base rounded or cuneate, margin serrate, apex acuminate, Petiole 1-2 cm. Inflorescence terminal Capitula or head, umbellate, bract linear. Flowers varies in colour, unpleasant odour. Calyx hairy, tubular. Corolla 4 lobed, pubescent, tubular. Stamens 4 in 2-whorls, included. Ovary bilocular, glabrous. Fleshy Drupes globose with 1 seeded pyrenes, dark purple.

**Distribution:** India, Burma, China, Indo-China, Malaya. Native of America, India and other parts of Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 400-1300m

**Fl.:** Throughout the year.

**Ecology:** Waste places, roadsides.

**Representative collection:** *Pyuthan*, Bhingri, 828m, 15 Apr. 2023, S. Gautam, SG4203, ASCOL Herbarium.

## 3. *Phyla* Lour.

Herbs, creeping and rooting at nodes. Quadrangular branches, glabrous. Leaves opposite. Inflorescence terminal, flowers very small in compact spicate head, flowers sessile or subsessile, whitish purple flowers, bracteates. Calyx 2-lipped, 4-lobed. Corolla 4 or 5 lobes, sometimes 2-lipped. Stamens 4, didynamous, inserted in corolla tube, staminodes absent. Ovary bilocular, 1 ovules per locule, style short. Fruit capsule, 1-seeded pyrenes.

**Phyla nodiflora** (L.) E.L. Greene. *Pittonia*. 4: 46. (1899).

*Verbena nodiflora* L.

*Lippia nodiflora* (L.) Michaux

Perennial herbs, creeping and rooting at nodes. Quadrangular branches, glabrous. Leaves opposite, oblanceolate-obovate, (1-2.5×0.5-1) cm, hairy, entire or serrate, sessile or petiole short. Inflorescence terminal, flowers very small in compact spicate head, flowers sessile or subsessile, whitish purple flowers, bract 2mm, peduncle present. Calyx 2-lipped, 4-lobed, flattened, hairy. Corolla 5 unequal lobes, glabrous. Stamens 4, didynamous, inserted in corolla tube, staminodes absent. Ovary bilocular, 1 ovules per locule, style short. Fruit capsules separated into 2 when mature, 1-seeded pyrenes.

**Distribution:** Himalaya, Assam-Burma, Asia, Europe, Africa, America, Australia.

**Nepal:** West, Central and East

**Altitudinal range:** 100-2700m

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

**Ecology:** Waste field, moist area

**Representative collection:** *Pyuthan*, Bhingri, 800m, 18 May 2023, S. Gautam, SG4204, ASCOL Herbarium.

#### **FAMILY 51: MAZACEAE**

Annual or perennial herbs, 4-angled stem; Leaves basal rosette and cauline, opposite, margin toothed or entire, crenate, exstipulate, petiole present or absent. Inflorescence terminal raceme; pedicellate; bract small or absent, Flower bisexual. Calyx campanulate, 5. Corolla 2-lipped, posterior lip erect with 2 lobed and anterior lip longer with 3-lobed, tubular. Stamens 4, didynamous, adnate to corolla, staminodes absent. Carpels 2, fused, ovary superior, locule 2, ovules many, style 1, stigma 1, bilobed. Capsule globose, enclosed in calyx. Seeds small, ovoid, yellowish brown, 20-40.

##### **1. Mazus** Lour.

Annual herbs having usually terete or 4-angled stem, rooting from lower nodes. Leaves rosette or opposite, upper leaf alternate, petiolate. Inflorescence racemose,

bract present. Flowers small. Calyx campanulate, 5-lobed. Corolla 2-lipped, lower lip with 3 lobed and upper lip with 2-lobed. Stamens 4 in 2 whorls i.e. didynamous, inserted on corolla tube. Ovary hairy or hairless, styles hairless, stigma bilobed. Capsule compressed with calyx. Seeds small, numerous.

**Mazus pumilus** (Burm. f.) Steenis, *Nova Guinea n.s.* 9: 31. (1958)

*Mazus japonicus* (Thunb.) Kuntze

*Lindernia japonica* Thunb.

Maalati Jhaar, Taapre Jhaar

Annual herbs, hairy, rooting from nodes. Leaves cauline and basal rosette leaves, obovate or ovate-oblongate, opposite or alternate, base cuneate, margin toothed. Inflorescence terminal racemes, pedicel 3-10mm, 3-20 flowered lax. Calyx campanulate, 5-lobed. Corolla bilabiate, white, upper lip with 2 ovate-triangular lobes, lower lip with 3 larger lobes, lateral lobes of lower lip is larger than middle lobe. Stamens 4 (2+2), inserted on corolla. Ovary glabrous. Capsule globose.

**Distribution:** Himalaya (Kashmir to Bhutan), India, East to China, Korea, Japan, Malaysia.

**Nepal:** Central and East

**Altitudinal range:** 200-1600m

**Fl. & Fr.:** Apr.-Oct.

**Ecology:** Wet Grassland, fields

**Representative collection:** *Pyuthan*, Bhingri, 756m, 22 Mar. 2023, S. Gautam, SG143, ASCOL Herbarium.

## ORDER: ASTERALES

### Keys to Family:

**1a.** Inflorescence head or capitulum surrounded by involucre bracts; corolla tubular or ligulate or discoid; Fruit achene with pappus..... **Asteraceae**

**1b.** Inflorescence cymose or raceme-like or flowers solitary in axils of leaf like bracts; corolla campanulate or rotate; Fruit capsule..... **Campanulaceae**

## FAMILY 52: ASTERACEAE

Herbs, shrubs rarely trees. Erect, cylindrical stem. Leaves alternate, opposite, simple or compound, stipules absent, petiolate or sessile, reticulate venation, hairy. Inflorescence head or capitulum, few or many flowers or florets, subtended by involucre bracts: whorled. Flowers: unisexual or bisexual, ray and disc florets, tubular or ligulate, pentamerous. Calyx: absent or reduced to scales or pappus. Corolla fused, 5-lobed, tubular or ligulate, 1-3 petals in ray and 4-5 in disc florets, bilabiate. Stamens: 4-5, connate, epipetalous, opposite to sepals and alternate to petals; filaments free, anther dithecous and united. Carpel absent or if present bicarpellary, fused, Ovary: 1-celled, inferior, basal placentation, ovule 1 in each locule, style slender, stigma bifid. Fruit: achene, surrounded by pappus.

### Keys to Genera:

- 1a. Leaves opposite..... 2
- 1b. Leaves alternate; rosette at base..... 5
- 2a. Leaves sessile..... 3
- 2b. Leaves petiolate..... 4
- 3a. Disc florets 4-lobed; Ray florets 2-seriate; flowers white; pappus present..... **Eclipta**
- 3b. Disc florets 5 lobed; Ray florets uniseriate; florets yellow; pappus absent..... **Guizotia**
- 4a. Capitula with long peduncle (15 cm); 4-8 ray florets; pappus present..... **Tridax**
- 4b. Capitula with short peduncle (1.5 cm); 5 ray florets; pappus absent..... **Galinsoga**
- 5a. Basal leaves rosulate..... 6
- 5b. Basal leaves not rosulate..... 7
- 6a. Phyllaries 5-seriates; flowers in spike or racemed panicles; corolla whitish purple; pappus pale-brown or absent..... **Ainsliaea**
- 6b. Phyllaries 2-seriates; compound head in clustered at the end of branches; 3 leaflike bracts; corolla purple; pappus white..... **Elephantopus**

7a. Capitula ligulate or radiate.....	8
7b. Capitula disciform or discoid.....	12
8a. Capitula ligulate.....	<b>Sonchus</b>
8b. Capitula radiate.....	9
9a. Phyllaries 2-5 seriate; linear-lanceolate.....	<b>Erigeron</b>
9b. Phyllaries 2 or 3 seriate; lanceolate or triangular-ovate.....	10
10a. Phyllaries 2-seriate, lanceolate-ovate; involucre campanulate or hemisphere.....	11
10b. Phyllaries 3-seriate, triangular-ovate to lanceolate; involucre cylindric to narrowly campanulate.....	<b>Melanoseris</b>
11a. Involucre campanulate; Phyllaries persistent.....	<b>Bidens</b>
11b. Involucre hemisphere; Phyllaries deciduous.....	<b>Parthenium</b>
12a. Capitula discoid.....	13
12b. Capitula disciform.....	15
13a. Leaves pubescent, petiolate; Receptacles flat & naked.....	14
13b. Leaves spinulose, sessile; Receptacles spiny.....	<b>Cirsium</b>
14a. Phyllaries 2-3 seriate.....	<b>Ageratum</b>
14b. Phyllaries 4-seriate.....	<b>Vernonia</b>
15a. Pappus present.....	16
15b. Pappus absent.....	17
16a. Pappus of hairs.....	<b>Anaphalis</b>
16b. Pappus of bristles.....	18
17a. Involucre campanulate; capitula terminal corymb; Phyllaries 2 or 3 seriate.....	<b>Cyathacine</b>
17b. Involucre hemispherical; Capitula terminal panicles; Phyllaries 3 or 4 seriate.....	<b>Artemisia</b>
18a. Phyllaries 6 seriate.....	<b>Duhaldea</b>

**18b.** Phyllaries 2 or 3 series..... **Conyza**

**1. Ageratum L.**

Annual to perennial herbs. Leaves opposite or alternate, simple, elliptic, lanceolate-ovate, entire or toothed, petiolate, hairy. Inflorescence cymose or subumbellate, Capitulum clustered around branch end, phyllaries 2-3 seriate, hairy. Florets 20-many. Corolla tubular, campanulate, 5-toothed, white, blue. Achenes linear oblong, 4 or 5 ribbed, pappus 5-6, free, bristled.

**Ageratum houstonianum** Miller, *Gard. Dict.*, ed. 8. Ageratum no.2. (1768)

Annual or biennial herbs up to 1m tall having stem round, green, purplish or reddish and densely covered by soft hairs. Leaves simple, opposite, stalks 0.5-3 cm long, hairy, round shaped or ovate leaves, cordate base, acute to round apex, margin finely serrate, pinnate and palmate venation. Inflorescence terminal, compound umbel, flower head compact, head has numerous tiny tubular flowers surrounded by two or three rows of greenish colored bracts (an involucre). Phyllaries 1-2 seriate. Blue, pinkish or white flowers in dense cluster at the tips. Achenes with five awn-tipped scales (pappus) having whitish in colour, achene brown to black in colour.

**Distribution:** Native to Mexico, India, Myanmar, Thailand, tropical America, Africa, China. Pantropical weeds.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1300m

**Fl.:** Year round

**Ecology:** Along the roadsides

**Representative collection:** *Pyuthan*, Bhingri, 832m, 17 Jan. 2023, S. Gautam, SG4119, ASCOL Herbarium.

**2. Ainsliaea DC.**

Perennial herbs. Leaves basal rosette, alternate, linear, ovate, elliptic, entire, crenate. Inflorescence capitula many in spikes, raceme with involucre, Phyllaries multiseriate; receptacles small. Florets few, bisexual, ray and disk florets. Ray florets: corolla open, 5 unequal linear lobes, usually coiled. Disc florets: corolla if appear closed, tubular; anther bases long tailed, style branches short. Achenes ribbed, terete, pappus uniseriate or absent.

**Ainsliaea latifolia** (D. Don) Sch. Bip., *Jahresher. Pollichia*. 18-19: 190. (1861).

*Liatris latifolia* D. Don

*Ainsliaea heterantha* Handel-Mazzetti

सहदेव-सहदेवी (Sahadeva-sahadevee)

Perennial herbs up to 80 cm tall. Leaves simple, alternate, rosette toward base, linear, ovate-elliptic, 2-11×1.2-5 cm, acute at apex, margin sparsely serrate, sparsely pubescent, petiolate, few smaller elliptic cauline leaves. Inflorescence head or capitula, flowered in a spikes or raceme-panicles with involucre bract; phyllaries 5-multi seriate, linear, ovate-lanceolate. Florets white, bisexual: open florets tubular, deeply 5-lobed, lobes unequal, anther rounded; Closed florets tubular, minutely 5-lobed hidden in pappus. Achenes 8-10 rippled, pappus present or absent, if present uniseriate, pale-brown.

**Distribution:** Himalaya (Kashmir to Bhutan), Assam-Burma, Thailand, Indo-China, C. China, S. China, Taiwan, Philippines.

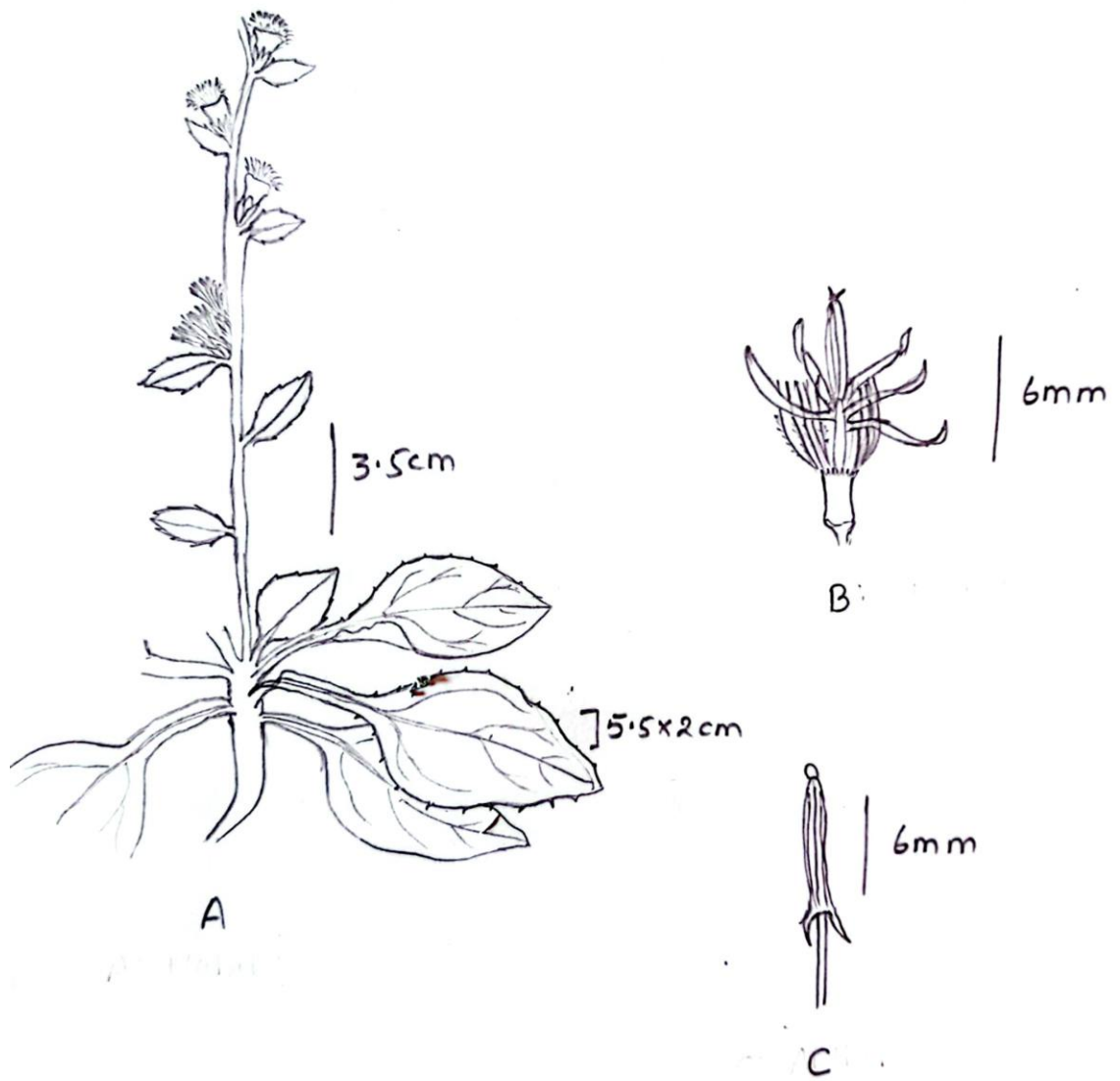
**Nepal:** West, Central and East

**Altitudinal range:** 1700-3500m

**Fl. & Fr.:** Year-round

**Ecology:** Roadsides, dry place

**Representative collection:** *Pyuthan*, Sworgadwari, 2102m, 29 Apr. 2023, S. Gautam, SG4173, ASCOL Herbarium.



**Fig. 4.22:** *Ainsliaea latifolia* (D. Don) Sch. A: Flowering plant, B: Floret, C: Anther

### 3. *Anaphalis* DC.

Perennial herbs or shrubs with erect, densely woolly stem. Leaves simple, alternate, linear-lanceolate, entire, dense white hairs on beneath and slightly hairs on above surface. Capitula small, many florets in terminal corymbs. Flowers unisexual or bisexual covered by bracts or campanulate involucre, phyllaries many seriate. Receptacle convex, naked. Corolla of male and female flowers 3-5 toothed. Achenes oblong, pappus of 1 row of deciduous hairs, simple.

#### Keys to Species:

1a. Leaves 1 veined..... **A. contorta**

1b. Leaves mostly 3-veined..... **A. margaritaceae**

***Anaphalis contorta*** (D. Don) Hook. f., *Fl. Br. Ind.* 3: 284. 1881.

बुकि फूल (Buki Phool)

Annual herbs up to 60cm tall with erect, usually branched stem covered with dense white tomentose. Leaves numerous, overlapping, crowded at base; linear, lanceolate, c.a. 50 x2.5mm, densely woolly on lower surface and less on upper surface, one-veined, cordate base; margin entire, strongly revolute (inrolled); apex pointed. Flowers bisexual in densely crowded corymbs; capitula sub-globose, Florets surrounded by white involucre bract, Phyllaries 5-6 series, shiny white, peduncle up to 2cm. Achene oblong, pappus hairs white.

**Distribution:** Afghanistan, Bhutan, India, Kashmir.

**Nepal:** West, Central and East

**Altitudinal range:** 1200-4400m

**Fl.:** Jun.-Oct.

**Ecology:** Slopy areas and grasslands.

**Representative collection:** *Pyuthan*, Bhingri, 2100m, 17 Nov. 2022, S. Gautam, SG458, ASCOL Herbarium.

***Anaphalis margaritacea*** (L.) Benth., *Gen. Pl.* 2: 303. 1873.

*Anaphalis cinnamomea* C. B. Clarke

Herbs up to 70 cm tall with erect, densely pubescent stem. Leaves simple, alternate, densely hairs on lower surface, linear-lanceolate, 4-7×1-1.5 cm, mostly 3-veined; apex acuminate; margin entire, not revolute, petiole absent on upper

leaves. Numerous Capitula in branched terminal corymbs, covered with campanulate involucre bract, yellowish-white, sparsely pubescent; peduncle 7mm long, densely woolly; phyllaries 5-6-seriate; cypselas dark brown, pappus white.

**Distribution:** N. America, N. W. Pakistan, Himalaya (Kashmir to Bhutan), Indo-China, China, Japan, E. Russia.

**Nepal:** West, Central and East

**Altitudinal range:** 1800-3100m

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

**Ecology:** Roadsides, slopy meadows.

**Representative collection:** *Pyuthan*, Bhingrikot, 1026, 17 Nov. 2023, S. Gautam, SG439, ASCOL Herbarium.

#### 4. *Artemisia* L.

Annual or perennial herbs or subshrubs with strong pleasant aromatic smell. Leaves alternate, pinnate, toothed to deeply lobed, basal leaves large and petiolate, upper leaves subsessile to sessile. Inflorescence racemose, grouped in terminal panicles, capitula many. Involucres hemispherical, globose. Phyllaries: 3 or 4 series. Receptacle convex or flat, glabrous or hairy. Flowers bisexual, central male and marginal female. Ray florets: 1(or 2 or more) series, female; corolla tubular, cup-shaped, apex 2-4 toothed. Disk florets: 2 or more series, male or bisexual; corolla tubular, or funnel-shaped, apex 5-toothed. Anthers with 2 obtuse basal appendages. Achenes obovoid, ovoid, or oblong, small.

***Artemisia dubia*** Wall. ex Besser, ; *Nouv. Mem. S. Imp. Nat. Mosc.* 3: 39 (1834).

*Artemisia vulgaris* Linnaeus, *Sp. Pl.* 2: 848. 1753.

तित्ते पाति

Perennial herb up to 1m having cylindrical, minutely pubescent stem. Leaves alternate, ovate-elliptic, lanceolate, (2-13×1-9) cm, 3-5 lobed, short petiole present at lower leaves, upper leaves sessile, ovate- elliptic, lower leaves pinnatisect, upper leaves 3-fid or untire. Capitula numerous in dense panicles, Involucre oblong, 4 seriate, hemispherical. Phyllaries hairy, 3-4 seriate. Receptacles flat. Female margin ray florets 6-8, 2 toothed. Male central disc florets 2-12 or many, 5 toothed at apex, corolla tube glandular. Achenes: ovoid, smooth, brown.

**Distribution:** Himalaya, China, Korea, Japan.

**Nepal:** West, Central and East

**Altitudinal range:** 1200-3400m

**Fl. & Fr.:** Aug.-Oct. `

**Ecology:** Roadsides and forest margins.

**Representative collection:** *Pyuthan*, Bhingri, 731m, 28 Nov. 2022, S. Gautam, SG470, ASCOL Herbarium.

## 5. *Bidens* L.

Erect herbs. Stem tetrahedral. Leaves alternate or opposite, short petiole. Capitula 1-several, terminal or axillary, radiate. Involucres campanulate, 2-seriate, phyllaries connate at base, lanceolate. Rayflowers neutral, ligulate, corolla white. Disc flowers bisexual, numerous, corolla yellow. Achenes 4-angled or compressed. Pappus 2-5, stiff.

***Bidens pilosa* L., *Sp. Pl.* 2: 832. 1753**

*Bidense Pilosa* var. *minor* (Blume) Sherff.

तिखे कुरो (Tikhekuro)

Annual, erect herb up to 50 cm tall with slender, glabrous or sparsely pubescent in upper parts, 4-angled stems & branches. Leaves opposite-decussate, pinnately 3-5 foliolate, elliptic or ovate-lanceolate, (3-10×2-4) cm, sometimes lower leaves simple, without stipules; leaflets with short petioles (10-30mm): margins finally serrate, terminal leaflet larger than lateral, apex acute or acuminate. Inflorescence an axillary or terminal head, solitary or capitula in corymbs enclosed in campanulate involucral bract, outer involucral bracts 7-10, puberulent; inner phyllaries (7-13), lanceolate: capitula radiate; Ray florets absent or 4-8, ligulate, sterile, corolla white; disk flower (20-50)-80; tubular, bisexual, yellow corolla, stamens with fused anthers, ovary inferior, 1-celled, style bifid. Fruit a linear achene, blackish, pappus absent, 2 or 3 bristles, achenes faces 2-grooved.

**Distribution:** Tropical and sub-tropical regions.

**Nepal:** West, Central and East

**Altitudinal range:** 700-2100m

**Fl. & Fr.:** All year

**Ecology:** Roadsides

**Representative collection:** *Pyuthan*, Bhingri, 738m, 24 Sept. 2022, S. Gautam, SG409, ASCOL Herbarium.

## 6. *Cirsium* Mill.

Perennial herbs, sparsely pubescent with spines, erect stem. Branched or not. Leaves alternate, spinulose, sessile, pinnatisect, large yellowish spiny at margin lobes, sparsely pubescent on upper surface, elliptic-oblong. Capitula solitary to clustered in raceme or subcorymbose having only disc florets, discoid. Flowers bisexual. Involucres narrowly to broadly campanulate, phyllaries 5 to 6 or several seriate, outer phyllaries (involucre bracts) shorter and sessile, apex ending with spine, inner phyllaries longer with dilated tips. Receptacle flat or convex, bearing long spines. Corolla tubular-campanulate, tube 5-lobed or lobes, varies in colour, limb narrow, filaments pubescent. Achene laterally compressed, obovoid-oblong, smooth, with dirty white or brown pappus, pappus 10-13mm long, several seriate, connate at base.

***Cirsium verutum*** (D. Don) Spreng. *Syst. Veg.* 3: 370 (1826).

*Cirsium involucreatum* DC.

सुंगुरे काँडा

Perennial herbs up to 1.5m tall. Stem erect and branched with multicellular hairs. Leaves pinnatifid with more spines (5-12mm), lanceolate-elliptic in outlines, middle leaves sessile, sparsely pubescent abaxially, adaxially rough and spinulose; leaf blade oblanceolate, 11-20×2.5-4cm, margin spiny or with spiny teeth. Capitula in tight raceme, corymbose; disc florets: involucre campanulate, 1-1.5cm in diam., glabrous or sparsely pubescent; phyllaries imbricate, outer acuminate to spines and inner linear-lanceolate; florets bisexual; corolla reddish purple, tube c.a. 1.5cm, 5-lobes. Achenes dark, obovoid, 3.5mm; pappus dirty white.

**Distribution:** Afghanistan, Pakistan, Himalaya (Muree to Bhutan).

**Nepal:** West, Central and East

**Altitudinal range:** 750-2200m

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

**Ecology:** Forest margins, roadsides, grasslands.

**Representative collection:** *Pyuthan*, Bhingri, 776m, 22 April 2023, S. Gautam, SG4158, ASCOL Herbarium.

### 7. *Conyza* Less.

Annual or perennial herbs with erect, branched stem, hairless or hairy. Leaves simple, alternate, numerous, 3-lobed or pinnatifid, petiole present or absent, lanceolate-linear, entire or toothed. Capitula or Head numerous in dense terminal corymbs or paniculiform. Campanulate involucre present around the female, phyllaries 2-3 seriate, narrow. Receptacle flat or convex, naked. Ray florets female: 2-more seriate, many. Disc florets bisexual, Corollas filiform to tubular campanulate, yellowish, lobes 5. Achene obovoid, compressed, pappus 1-seriate.

***Conyza stricta*** Willd. *Sp. Pl.* 3: 1922. 1803.

*Erigeron trilobus* (Decne.) Boiss.

Annual erect herbs up to 70cm. Stem ascending, terete, pubescent. Leaves simple, linear-oblongate, 3-lobed or pinnatisect, 1-7×0.2-1.5cm, pubescent; base attenuate; margin entire to coarsely dentate; apex acute or obtuse. Capitula numerous in dense terminal corymbs; involucre campanulate; phyllaries 2-3-seriate, pubescent, lanceolate; flowers yellowish. Achenes compressed, obovoid, ribbed, pappus caduceus, pappus 2mm long.

**Distribution:** Indo-Malesia, Africa, W. Asia, Himalaya, Burma.

**Nepal:** West, Central and East

**Altitudinal range:** 600-2000m

**Fl. & Fr.:** Sep.-Oct.

**Ecology:** Grassy slopes, dry forests.

**Representative collection:** *Pyuthan*, Sworgadwari, 2015m, 17 Nov. 2022, S. Gautam, SG449, ASCOL Herbarium.

### 8. *Cyathacline* Cassini

Annual herbs. Leaves alternate, pinnatifid, sessile. Capitula small, disciform, in corymbiform-paniculiform or nearly racemiform inflorescences. Receptacles cup-shaped or funnel-shaped peripherally, slightly convex centrally. Involucre campanulate; phyllaries 2- or 3-seriate, subequal, oblong to lanceolate. Marginal florets female, fertile, many seriate, purple, tube filiform, corolla funnelform-

tubular, 2-lobed; disk florets bisexual, usually functionally male, few, limb funnellform, 5-lobed; anther base truncate, appendages triangular; style branch tips linear-lanceolate. Achenes minute, oblong to fusiform, slightly flattened, not ribbed. Pappus absent.

**Cyathacline purpurea** (Buch.-Ham. ex D. Don) Kuntze; *Rev. Gen. Pl.* 333 (1891).

*Tanacetum purpureum* Buch.-Ham. ex D. Don

*Cyathocline lyrata* Cassini

*Artemisia hirsute* Rottb. ex Spreng

Annual aromatic herbs up to 30cm tall having branched erect stem having reddish purple covered with dense hairs. Leaves basal and cauline, ovate, 2.5-10×1-5 cm, pinnatifid, irregular, alternate, sessile. Capitula small in terminal corymb, involucre campanulate, phyllaries 2 or 3 seriate. Marginal Female florets purple, many seriate, 2 lobed, numerous, corolla 2-3 toothed, tubular. Disc florets 7-11, bisexual, purple, corolla tubular-campanulate irregularly 5 toothed, limb funnellform. Achene ellipsoid, minute, not ribbed. Pappus absent.

**Distribution:** W. Himalaya, E. Himalaya, Assam-Burma, S. Asia, E. Asia & SE Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1800m

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

**Ecology:** Grassy slopes, watersides.

**Representative collection:** *Pyuthan*, Bhingri, 700m, 30 Oct. 2023, S. Gautam, SG4209, ASCOL Herbarium.

## 9. **Duhaldea** DC.

Perennial shrubs or herbs. Leaves simple, alternate, pubescent. Capitula solitary or few to many in dense terminal corymbs, racemes or panicles. Capitula radiate, disciform. Phyllaries 6-seriate. Receptacles naked. Ray florets and Disc florets yellowish. Marginal flowers uniseriate, female ligule. Disc flowers bisexual, corolla tubular-campanulate, 5 toothed at apex, style linear. Achenes terete or angular, 4-5 ribbed, hairy, ellipsoid; Pappus bristles, uniseriate.

**Duhaldea cappa** (Buch.-Ham. ex D. Don) Pruski & Anderberg, *Comp. Newsl.* 40:44. 2003.

*Inula cappa* (Buch.-Ham. ex D. Don) DC.

गठि हारे

Shrub up to 2.5m tall with woolly branches and stem. Leaves thick, simple, alternate, elliptic, lanceolate, 8-15×2.5-5 cm, petiole 5cm; sparsely pubescent above surface, densely whitish lanate beneath; base rounded; margin finely serrate; apex acute or shortly acuminate. Numerous small flowers head or capitula radiate in dense corymbs at branch ends, flower heads usually with both yellow ray florets and yellow disc florets; involucre bracts lanceolate in 6 to many rows, tomentose. Marginal female flowers few, corolla tubular and erect with short ligule. Disc flowers bisexual, corolla tubular-campanulate. Achenes 1.5 mm long, angled; Pappus white, hair simple.

**Distribution:** Himalaya (Kumaun to Bhutan), Assam to China, Thailand, Java.

**Nepal:** West, Central and East

**Altitudinal range:** 150-2500m

**Fl. & Fr.:** Jun.-Dec.

**Ecology:** Waste places, thickets, roadsides.

**Representative collection:** *Pyuthan*, Bhingrikot, 1100m, 30 Nov. 2022, S. Gautam, SG483, ASCOL Herbarium.

## 10. *Eclipta* L.

Prostrate herb. Leaves: opposite, sessile, entire or serrulate, acute, hairy. Capitula: small, in upper axil of leaves. Involucres: campanulate. Phyllaries: 2- seriate. Ray florets: many. Disc: bisexual. Corolla: campanulate. Achenes: oblong. Pappus: black.

***Eclipta alba*** (L.) Hassk; *Pl. Jav. Rar.* 528 (1848).

*Eclipta prostrata* (L.) L.

*Eclipta erecta* L.

*Verbesina alba* L.

Erect, prostrate, branched annual herbs up to 40cm tall cylindrical, pubescent, brownish stem. Leaves opposite, oblong-lanceolate, (1.2-3×0.2-0.6) cm, sessile or

sub-sessile, attenuate, acute, entire or serrate, hairs on both surface. Capitula or flowers heads small in upper axils of leaves. Flowers white, solitary or in pairs; involucre bracts are 8 in number, 1cm, campanulate, phyllaries 2-seriate. Peduncles 1.1cm. Ray florets 2-seriate. Many disc flowers tubular, corolla 4-lobed; stamens 5, epipetalous, free filaments, anthers united; Bicarpellary, ovary inferior, unilocular with one ovule. Achenes or cypsela, one seeded, ribbed. Pappus black.

**Distribution:** Native to America, Africa, Asia, Australia, Europe, China. A pantropical weed.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1200m.

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

**Ecology:** On river bank, moist place.

**Representative collection:** *Pyuthan*, Bhingri, 735m, 29 Sept. 2022, S. Gautam, SG420, ASCOL Herbarium.

### 11. *Elephantopus* L.

Perennial herbs. Stem erect and branched. Leaves alternate, petiole present or absent, basal leaves rosulate, cauline leaves smaller, pinnately veined. Synflorescence terminal, capitula clustered in branch ends, discoid, heads surrounded by involucre bracts, bracts foliaceous; Phyllaries 8 in 2 whorls, outer 4 shorter than inner 4. Florets: 4. Corolla: purplish white, 5 lobed. Anthers: acute. Achene: 10-ribbed, oblong-obovoid. Pappus: sparse, bristle many.

***Elephantopus scaber* L., *Sp. Pl.* 2: 814. 1753.**

Sahastra buti (सहस्र बुटि), chhatre (छत्रे)

Perennial, rigid, erect herbs up to 50 cm high. Stem dichotomously branched, pubescent with white stiff hairs. Leaves radical, rosetted at base, oblanceolate, 6-18 X 2-5cm, base attenuate, margin crenate-serrate, apex acute, cauline leaves few and small, sessile or petiole of 0.3cm long. Inflorescence densely aggregated in compound head, surrounded by involucre bracts; Involucre narrow; Phyllaries 2 seriate, oblong. Capitula many. Flowers 2-5, corolla purple, tubular; tube 4-5 mm long, Stamens 5. Achenes oblong-linear, 4-5mm long, angled, pappus white with 5 or 6 basally widened bristled.

**Distribution:** India, Himalaya, Africa, America, China, Asia.

**Nepal:** West, Central and East

**Altitudinal range:** 200-1500m

**Fl. & Fr.:** July – Nov.

**Ecology:** Open slopes, roadsides, forest margin

**Representative collection:** *Pyuthan*, Bhingrikot, 1240m, 30 Sept. 2022, S. Gautam, SG425, ASCOL Herbarium.

## 12. *Erigeron* L.

Herbs, annual or perennial. Leaves simple, alternate, entire or toothed. Capitula solitary or panicled, radiate. Involucres hemisphere or campanulate. Phyllaries in 2-3 series, linear. Ray florets pistillate, receptacle flat. Achenes compressed and flattened, nerved. Pappus slender, often 2-seriate.

***Erigeron bellidioides*** (Buch.-Ham. ex D. Don) Benth. ex C. B. Clarke; *Comp. Ind.* 55 (1876).

*Aster bellidioides* var. *minor* Wall.

*Aster gracilis* Wall.

*Stenactis bellidioides* (Buch.-Ham. ex D. Don) Nees

Annual herb, 20-120 cm tall. Stem erect, branched mostly distally. Leaves simple, alternate, pubescent; leafblade c.a. 3.5cm long, linear-lanceolate; apex acute; margin entire; base attenuate. Flower heads are borne in racemes or panicle-like clusters, peduncles c.a. 4cm; involucre 3.5-5mm, hemisphere or campanulate; phyllaries 2-6mm, whitish when dry, pistillate florets many, 3-4mm, creamy white; disc florets 3.5-4mm, elliptic.

**Distribution:** A pantropical weed of American origin.

**Nepal:** West and Central

**Altitudinal range:** 1400-2800m

**Fl.:** Throughout the year.

**Ecology:** Roadsides, meadows.

**Representative collection:** *Pyuthan*, Sworgadwari, 2100m, 29 Apr. 2023, S. Gautam, SG4150, ASCOL Herbarium.

### 13. *Galinsoga* Ruiz & Pav.

Annual herbs having erect, slender, branched stem. Leaves cauline, oppositely arranged, petiolate, lanceolate-ovate, hairy, entire or serrate. Inflorescence cymose. Capitula radiate, flowers surrounded by involucre bract; Phyllaries 2-3 seriate, outer phyllaries comparatively shorter and less pubescent; Receptacles conic. Ray florets 3-15, whitish, pistillate; disc florets 5-many, yellowish, bisexual, 5 lobed, anther yellow. Achenes, pappus absent or present (white or gray).

***Galinsoga parviflora*** Cav., *Icones. Descr. Pl.* 3:41, t. 281. 1795.

चित्लाङ्गे भारत

Annual herbs up to 70cm tall. Erect, branched, slender, pubescent stem. Leaves simple, opposite, slightly hairy, lanceolate-ovate, 1.5-5×1-4 cm, base broadly cuneate; edge serrate; apex acute. Tiny flowers clusters in head with yellow tubular disc florets in center surrounded by 5 white petals (ray florets); Peduncles 1.5cm; 2 or 3 rows of campanulate involucre; phyllaries persistent; ray florets 5, white, 3-toothed; disc florets 15-20, yellowish grey. Achenes 2mm long with or without pappus.

**Distribution:** Cosmopolitan weeds.

**Nepal:** West, Central and East

**Altitudinal range:** 600-3000m

**Fl.:** Jul.-Oct.

**Ecology:** Sparse thickets, open fields.

**Representative collection:** *Pyuthan*, Bhingri, 735m, 18 Dec. 2022, S. Gautam, SG4101, ASCOL Herbarium.

### 14. *Guizotia* Cassini

Annuals to perennials shrubs or herbs with erect or creeping, branched, pubescent stem. Leaves appears on stem, oppositely arranged, petiole absent, lanceolate or oblanceolate, both surfaces glabrous or puberulent, gland-dotted at least abaxially, margin entire or serrate. Inflorescence corymbiform or solitary capitula. Capitula radiate surrounded by campanulate involucre; phyllaries persistent, 10-13 in 2-seriate; receptacle conical to hemispheric; Ray florets 6-18, female, fertile; corollas yellow. Disk florets numerous, bisexual, fertile; corollas yellow, tubes cylindrical,

hairy, shorter than campanulate throats, 5-lobed. Achenes weakly compressed, 3- or 4-angled, glabrous; pappus absent.

**Guizotia abyssinica** (L. F.) Cassini in F. Cuvier, *Dict. Sci. Nat.* 59: 248. 1829.

*Verbesina sativa* Roxb. ex Sims.

Annual erect herbs up to 2m tall. Stems soft, slightly hairy, branched. Leaves are cauline usually opposite to one another; oblong-ovate to lanceolate, stalkless and clasp to the stem; edges teeth, surface rough, acute. Inflorescence corymb or capitula surrounded by leafy bracts. Phyllaries 2 seriate. Flowers bright yellow. Flower head has tubular disc flowers in center and ray flowers around periphery. Disk flowers bisexual, numerous, 5 lobed; Ray female florets 6-8, 3-lobed lamina. Achenes small. Each flowers produces about 50 seeds. Seeds are black angled structures. Pappus absent.

**Distribution:** A native of tropical Africa, Cultivated in India & Himalaya.

**Nepal:** West, Central and East

**Altitudinal range:** 900-1900m

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

**Ecology:** Field

**Representative Collection:** *Pyuthan*, Bhingri, 741m, 25 Apr. 2023, S. Gautam, SG4161, ASCOL Herbarium.

### **15. Melanoseria** Decaisne in Jacquemont

Perennial herbs, prostrate, glabrous or hairy. Leaves pinnate, petiolate, margin lobed, elliptic- lanceolate, pointed-mucronate; Capitula numerous, campanulate inflorescence. Phyllaries 3-multiseriate, linear-oblong, lanceolate. Receptacles naked. Florets bluish or purple. Achene ellipsoid, compressed, 4-5 ribbed, black. Pappus white, 2-seriate.

**Melanoseria macrorhiza** (Royle) N. Kilian, *Fl. China* 20-21: 224. (2011).

*Lactuca macrorhiza* (Royle) Hook. f.

Perennial herbs with up to 60 cm of branching, erect, glabrous stem. Leaves elliptic to lanceolate, 6-15×1-5 cm, pinnatifid to pinnatisect, distantly lobed, petiole 4-10 cm, lower and middle stem leaves with petiole. The terminal lobe is 1.5-3 x 1.5-2 cm, and lateral lobes 2-4 pairs and the lower leaves slender-winged,

stalked or dilated into a wide round toothed lobe at the base. The leaves are hairy and the endmost lobe is ovate-heart-shaped, pointed-mucronate, sinuate-toothed, 5-15 cm long. Panicle-borne flower heads are produced. Bell-shaped flower heads with 13–15 florets, dense hair and bracteolate flower clusters on stalks. The involucre Phyllaries are 12-15 in 3 seriate and have outer ones are linear-oblong of 2-4 x 1-1.5 mm, the middle ones are lance-shaped of about 5-7 x 1-1.2 mm and inner most are long linear having 11-13x1-1.2mm. Florets are either blue or purple. The seedpod nearly black, elliptic-oblong, 5-ribbed. The pappus is biseriate and measures 6-7 mm long.

**Distribution:** Afghanistan, Bhutan, N India, Kashmir, Myanmar, Nepal, Pakistan, SW Asia.

**Nepal:** West **Altitudinal range:** 2100m

**Fl. & Fr.:** Jul.-Oct.

**Ecology:** Grasslands, forests

**Representative collection:** *Pyuthan*, Sworgadwari, 2025m, 17 Nov. 2022, S. Gautam, SG444, ASCOL Herbarium.

## **16. Parthenium L.**

Annual herbs. Stem erect, branched, pubescent. Leaves alternate, deeply pinnatifid, ovate-lanceolate, lower leaves wider and petiolate, upper leaves narrower and sessile. Inflorescence terminal corymbose. Capitula small, radiate, covered with involucre bract. Phyllaries 10 in 2-seriate. Corolla white. Five tiny seeds or achenes with pappus.

**Parthenium hysterophorus L., Sp. Pl. 988. 1753**

Annual branching erect herbs up to 2m tall. Stem cylindrical covered with white tiny hairs. Leaves simple, alternate, deeply pinnatifid, hairs on both surface, rosette leaves during earliest phase, basal (lower) leaves ovate to elliptic, wider, 4-12x3-8cm, irregularly lobed, petiole long (2cm); upper leaves smaller, narrower, sub-sessile. Numerous tiny flowers heads or capitula in terminal panicles or corymbose, radiate, covered with involucre. Phyllaries 5 or 6 in 2-seriate. Ray florets female 5 or 6. Disc florets 12-50 or more. Achenes 5 tiny, obovoid with black pappus.

**Distribution:** A pantropical weed, native of America.

**Nepal:** West and Central                      **Altitudinal range:** 600-950m

**Fl.:** Apr.-Aug.

**Ecology:** Roadsides.

**Representative collection:** *Pyuthan*, Bhingri, 850m, 18 May 2023, S. Gautam, SG4201, ASCOL Herbarium.

### **17. Sonchus L.**

Annual or perennial herbs with milky latex. Stem erect, hollow, few branched, sparsely hairy, often with gland- tipped bristles. Leaves simple, alternate, cauline or basal, sessile and clasping the stem, spinose dentate to deeply pinnately toothed, pinnatifid; leaves ovate-lanceolate. Inflorescence terminal mostly paniculate, corymb-umbelliform. Head or capitula ligulate, 1 to many, pedunculate; involucre bell-shaped, Phyllaries 2- to several seriate. Receptacle flat, naked. Flowers ca. 100, bisexual; corollas yellow. Achenes flattened, narrowed at both ends with 1-4 ribs on each face, not beaked; pappus of white bristles or of numerous, persistent capillary hair & fewer, thicker, deciduous bristles.

**Sonchus wightianus** DC. *Prodr.* 7: 187. 1838.

Perennial herbs up to 120cm high with hollow, branched, smooth stem. Leaves oblanceolate, 6-20x1-5 cm, alternate, pinnatifid to pinnatisect, obtuse or acute at apex, narrowed to the base, amplexicaule, leaves cauline or basal, minutely spinulose-serrate along the margin. Several heads in terminal paniced cymes or corymbose; peduncles glandular- hairy; bracts (phyllaries) 3-5 series, oblong. Involucre campanulate. Flower yellow, corolla 15mm long, glabrous, limb yellow, 5-lobed; anthers bases shortly tailed, Achenes 3x1 mm, pappus 10mm long.

**Distribution:** A cosmopolitan weed.

**Nepal:** West and Central                      **Altitudinal range:** 1400m

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

**Ecology:** Forest margins, roadsides.

**Representative collection:** *Pyuthan*, Bhingri, 765m, 26 Nov. 2022, S. Gautam SG464, ASCOL Herbarium.

### 18. *Tridax* L.

Annual to Perennial herbs, runner. Leaves: simple, opposite, weakly 3 lobed. Capitula: long peduncule. Involucres: campanulate. Ray flowers: female, corolla white. Disc flower: bisexual, yellow. Achenes: narrow oblong, unequal bristles.

***Tridax procumbens* L., *Sp. Pl.* 900. 1753.**

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Perennial herbs up to 50cm having erect, branched at base, cylindrical, pubescent stem. Leaves simple, opposite decussate, pinnatisect; petiole short 0.8cm; blade ovate or lanceolate, 2.5-5×1-3cm, more or less 3-lobed, pubescent, reticulate; base cuneate; margin serrate or dentate; apex acute or acuminate. Inflorescence Head or Capitula solitary, both ray and disc florets present, involucres subcampanulate, calyx pappus like structure; Ray florets: 4-8, unisexual, gamopetalous. Disc florets: bisexual, yellow, 5 gamopetalous, limb 5-lobed, filaments free, anther united, Bicarpellary, syncarpous, unilocular, inferior. Peduncle 15cm, pubescent. Achenes 0.2cm, brown. Pappus: shiny.

**Distribution:** Native to Tropical America. A Pantropical weed.

**Nepal:** West, Central and East

**Altitudinal range:** 100-1500m

**Fl.:** Nov.-Mar.

**Ecology:** Roadsides, waste places.

**Representative collection:** Pyuthan, Bhingri, 700m, 18 May 2023, S. Gautam, SG4202, ASCOL Herbarium.

### 19. *Vernonia* Schreber

Herbs or shrubs; t-shaped hairs; leaves alternate, petiolate or sessile, entire-dentate, pinnate veined. Inflorescence terminal and axillary, paniculate, cluster to corymbose or solitary capitulum. Involucre campanulate, Phyllaries 4-6 seriate. Receptacles flat, naked. Florets many; corolla pink, purplish, campanulate limb, lobes 5. Achenes cylindrical with 4-10 ribbed. Pappus 2-seriate.

***Vernonia cinerea* (L.) Lessing. *Linnaea.* 4: 291. 1829**

*Cyanthillium cinereum* (L.) H. Robinson

Annual to perennial herbs up to 100 cm tall with erect, branched above, pubescent stem. Lower and middle leaves: petiole 10mm, rhombic-ovate, lanceolate, 3-6×1-3 cm, sparsely pubescent or hairless, alternate; upper leaves shortly petiole or sessile, base cuneate-attenuate, acute. Inflorescence terminal, panicles, capitula many with campanulate involucre, phyllaries 4 seriate, linear-lanceolate. Receptacles flat. Florets many, corolla purple, tubular, lobes linear-lanceolate. Achene cylindrical, white pappus 2-seriate.

**Distribution:** Tropical Africa, Asia and Australia.

**Nepal:** West, Central and East

**Altitudinal range:** 100-2300m

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

**Ecology:** Weeds on open disturbed sites

**Representative Collection:** *Pyuthan*, Bhingri, 750m, 27 Sept. 2022, S. Gautam, SG416, ASCOL Herbarium.

### FAMILY 53: CAMPANULACEAE

Annual or perennial herbs, under shrubs, milky latex present. Leaves simple, exstipulate, alternate or opposite. Inflorescence racemose or cymose, often paniculate or clustered in heads. Flowers bisexual, pentamerous, 2 bracteoles. Calyx lobes 5, corolla funnel-shaped or bell-shaped, regular, 5-lobed, bilabiate. Stamens as many as petals and alternate to them, free or united, anther united. Ovary 2-5 united carpels, inferior or semi-inferior, 2-5 celled, ovules many, style simple. Fruit capsule or berry.

#### 1. *Campanula* L.

Annual herbs or under shrubs, pubescent. Leaves simple, alternate or opposite, petiole short or sessile, acute, entire or toothed. Flowers clustered in panicles or head, pedicellate, 5-merous. Corolla funnel-shaped or campanulate, 2-lipped. Stamens alternate to corolla. 2-5 Carpels, fused, inferior ovary, numerous ovules. Fruit Capsule or berry, seeds minute.

**Campanula dimorphantha** Schweinfurth, *Beitr. Fl. Aethiop.* 140. 1867.

Annual herbs up to 40 cm tall, densely hairy. Stem erect, simple or branched at base. Lower leaves shortly petiolate, lance-shaped to oblong, up to 3 cm long, hairy, base narrowed or cuneate, margin toothed, apex acute. Stem leaves stalkless, up to 7cm long, linear, lance-shaped, hairy, tip acute, attenuate base, margin entire to toothed. Flowers numerous at the top of the stem in clustered panicles, distinctly two forms, pedicel unequal in length. Larger flowers complete and smaller are without petals and stamens. Calyx hairy, triangular. Corolla purple or blue, campanulate. Style included. Capsule rounded, globose. Seeds minute, oblong, yellow-brown.

**Distribution:** Afghanistan, India, Laos, Myanmar, Pakistan, Sri Lanka, Vietnam, Africa,

**Nepal:** West, Central and East

**Altitudinal range:** 300-1100m

**Fl. & Fr.:** Mar.-Apr.

**Ecology:** Roadsides

**Representative collection:** *Pyuthan*, Bhingri, 730m, 16 March 2023, S. Gautam, SG4140, ASCOL Herbarium.

## ORDER: DIPSACALES

### FAMILY 54: ADOXACEAE

Shrubs, rarely herbs or trees. Inflorescences terminal panicles or umbellate. Stamens 5, alternate with corolla lobes, inserted on corolla tube. Anthers 1-celled, peltate, extrorse, longitudinally dehiscent; staminodes 5, in inner whorl, opposite corolla lobes. Ovary semi-inferior to inferior, 1- or 3-5-loculed; styles 5, 4, or 3, connate or free, or absent; stigmas capitate or 2- or 3-fid. Fruit drupes; seeds 1 or 3-5.

#### 1. *Viburnum* L.

Shrubs or small trees, deciduous or sometimes evergreen. Stem branched, young branches pubescent. Leaves simple, opposite decussate, glabrous, coriaceous. Flowers in umbellate corymbs without bracts.

**Viburnum cylindricum** Buch.-Ham. ex D. Don, *Prodr. Fl. Nep.* 142. 1825.

*Viburnum capitellatum* Wight & Arn.

*Viburnum coriaceum* Blume

Evergreen shrub c.a. 2.5m tall. Petiole c.a. 1.5cm; leafblade elliptic, 5-12.5×2-4.5cm; base narrowed; margin entire apex acute. Flowers c.a. 3mm across, bracteolate, bracteoles tomentose, caducous; calyx minute; corolla tubular, lobes short. Drupe c.a. 5mm long, black, slightly compressed.

**Distribution:** Himalaya (Kumaun to NEFA), India, Ceylon, Burma, Thailand, Indo-China, W. China, Malaysia.

**Nepal:** West, Central and East

**Altitudinal range:** 1200-2500m

**Fr.:** Aug-Oct.

**Ecology:** Slopy areas.

**Representative collection:** *Pyuthan*, Sworgadwari, 2055m, 17 Nov. 2022, S. Gautam, SG448, ASCOL Herbarium.

## ORDER: APIALES

### FAMILY 55: APIACEAE

Annual or perennial herbs. Stem often furrowed. Leaves alternate, stalks sheathing. Inflorescence simple or compound umbel. Flowers usually bisexual. Calyx adnate to ovary, 5-lobed. Petals 5, free, apically reflexed. Stamens 5, free. Ovary inferior, 2-celled, placentation axile. Fruit schizocarp.

#### 1. *Centella* L.

Prostrate herbs, rooting at nodes. Leaves simple, petiolated, with sheath. Inflorescence simple umbel. Flowers white, minute, tubular, bisexual, 5-merous, pedunculate. Calyx connate to ovary. Petals 5, free, imbricate. Stamens 5, separate. ovary inferior, bicelled.

***Centella asiatica*** (L.) Urb. *Fl. Bras.* 11: 287, t. 78. 1879.

Perennial herb. Creeping stem with long stolons. Petiole long c.a. 15cm. leaves simple; leaf blade reniform, 1-4×1.5-5cm; base broadly cordate; margin coarsely

toothed. Flowers clustered in axils; peduncles c.a. 1.2cm long; umbels 3-4-flowered; flowers minute, sub-sessile; petals 5, separate, white, ovate; stamens 5, separate. Ovary bicelled, Fruit compressed.

**Distribution:** Tropical and sub-tropical regions throughout the world.

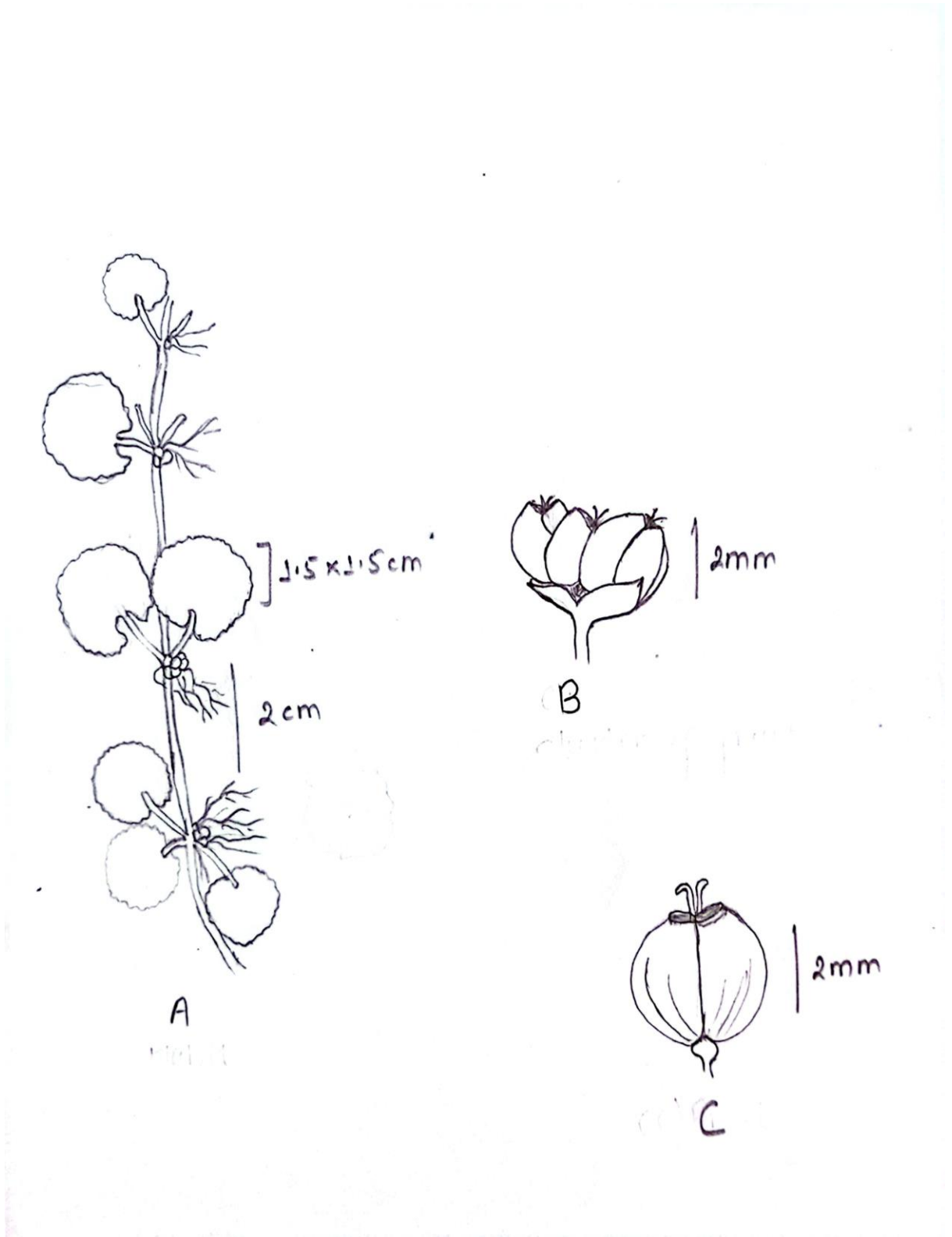
**Nepal:** West, Central and East

**Altitudinal range:** 500-2100m.

**Fl. & Fr.:** Apr-Oct.

**Ecology:** Shady and wet places.

**Representative collection:** *Pyuthan*, Bhingri, 700m, 3 June 2023, S. Gautam, SG4210, ASCOL Herbarium.



**Fig. 4.23:** *Centella asiatica* (L.) Urb. A: Fruiting Branch, B: Clusters of Fruit, C: Fruit

## CHAPTER V

### DISCUSSION

Flora refers to plant occurring within a geographical region as well as publication of description of plants. The primary goal of the current study is to add to Sworgadwari Hill's Dicot Flora, which will benefit the Flora of Nepal. Floristic composition of any area serves as a useful tool to develop strategy for conservation, sustainable management and utilization of biodiversity. Morphological traits, such as vegetative and reproductive traits, are crucial to the systematics of plants. Taxa within the genus were distinguished using vegetative and reproductive characteristics of plant specimens from individual collections. It has been demonstrated that each of these features is helpful for classifying and identifying the various taxa.

#### **Floristic composition:**

A total of 147 species of dicotyledonous plants, organized into 132 genera and 55 families, have been identified in the current study from the Sworgadwari Hill in the northwest Pyuthan district. The biggest percentage of plants, according to a floral analysis, were herbs (52%), followed by shrubs (27%), types of trees (14%), and climbers (7%). Asteraceae (20 species), Lamiaceae (19 species), Fabaceae (13 species), Rosaceae (7 species), Acanthaceae (7 species), and Malvaceae (5 species) were the families with the most species. There were 19 genera in the largest family, Asteraceae. Comparably, 16 genera, 12 genera, 7 genera, 6 genera, and 4 genera were represented by the Lamiaceae, Fabaceae, Rosaceae, Acanthaceae, and Malvaceae families respectively. There were 30 monospecific families, 13 families with two species, and 6 families with three species.

By comparing the finding made from the present study with that of other studies in related area, some of finding have been found to be similar whereas some others have been found to be different with them.

An Enumeration of Flowering Plant of Nepal (Hara *et al.* 1978, 1979 and 1982) and Annotated Checklist of the Flowering Plants of Nepal (Press *et al.* 2000) enumerated the plants found in Nepal in which Asteraceae represents the largest family which is followed by Gramineae, Orchidaceae, Fabaceae, Rosaceae,

Cyperaceae, Scrophulariaceae, Labiatae, Ranunculaceae, Umbelliferae. Most of the top families of present study lie within top ten largest families of Nepal according to Press *et al.* (2000). This may be because of fact that present study was carried out only in the specific area of Pyuthan District which covers subtropical to temperate region and only collected the Dicot Flora.

This result is contrasted with those from Nepal and other relevant regions, which demonstrate findings that are essentially comparable. The Asteraceae family is the largest in the world with 24000 species which is followed by the Fabaceae family with 18,000 species (Shrestha et al. 2018). However, in Sworgadwari, this trend is quite similar with Asteraceae (20 species each), Lamiaceae (19 species) and fabaceae (13 spp.) dominating the area.

Out of the 172 species of dicot plants found in the south-west Darchula district of west Nepal, Mishra (1999) identified 138 taxa and 62 distinct families. The study found that the largest families were Asteraceae (21 species), Fabaceae (17 species), Rosaceae (10 species), Lamiaceae (10 species), Moraceae (9 species), Euphorbiaceae (8 species), Lauraceae (5 species), Acanthaceae (4 species), Fagaceae, Polygonaceae, and Rubiaceae (4 species each). This is comparable to the findings of Sworgadwari hill study, which may be caused by the similarities in altitudinal variation.

Likewise, in the Terai and Siwalik regions of west Nepal, Shakya (2003) identified 249 different plant species belonging to 148 genera and 53 families. 70 species of trees, 65 kinds of herbs, 50 species of shrubs, and 34 species of climbers were among them. In the present work, the largest number of herbaceous plants (52%) were reported from open grasslands, and along walking trails. Herbaceous plants are extremely common due of the open environment, which typically encourages the growth of plant species more than in forested areas (Vetaas, 1997).

Sah *et al.* (2003) identified 401 plant species from the Ghodaghodi Lake region of west Nepal, which are divided into 264 genera and 84 families. There were 132 monocot species and 269 dicot species among them. 36 species of the fabaceae, 32 species of Asteraceae, 17 species of Euphobiaceae, 14 species of Scrophulariaceae, and 12 species of Acanthaceae were found among the dicots. This finding is nearly identical to that of Sworgadwari Hill, although the members differ.

Magar *et al.* (2020) identified 560 species of flowering plants from Jaljala Mountain and surrounding areas, organized into 329 genera and 98 families. Of them, the largest family was Asteraceae, which has 45 species. Other families that were close behind were Rosaceae (41 species), Orchidaceae (38 species), Poaceae (36 species), Lamiaceae (24 species), and Ranunculaceae (24 species). The present study is more or less similar to the above finding because of Rolpa and Pyuthan are adjoining districts with more or less similar climatic condition and physiography.

Similarly, K.C (2020) reported 145 species of both monocot and dicot flowering plants from Shaktikhor V.D.C., Chitwan District, which is organized into 111 genera and 41 families. With 12 genera and 17 species, the fabaceae family was the dominant followed by Poaceae, Acanthaceae, Asteraceae, Cyperaceae and Lamiaceae. This finding is quite similar to the present study due to the altitudinal variations.

Lamichhane (2020) recorded 125 species of dicot plants from Murkuti Hill, Dang District, which belongs to 111 genera and 50 families. With 21 species, the Asteraceae family was the largest followed by Fabaceae (11 species), Lamiaceae (10 species), Malvaceae and Rosaceae (6 species), Acanthaceae (5 species). This finding is almost similar to the study of Sworgadwari Hill due to the similar altitudinal variation and climatic condition. This may be because of Murkuti Hill of Dang district and Sworgadwari Hill of Pyuthan district are the adjoining areas.

DPR (1994) listed 1,741 species of flowering plants from west Nepal, of which 1,427 were dicot species and the other species were monocots. The current study's findings represent 8.76% of all the dicotyledonous plants listed by the DPR.

The three species that have been reported from the site are *Shorea robusta*, *Bombav ceiba* and *Swertia angustifolia* which are classified as endangered or protected in Nepal. *Swertia angustifolia* is classified as an endangered species while the other 2 are as protected plants.

However, within Pyuthan, Sworgadwari resembles to North-Western Part in the floristic distributions. This may be due to the fact that Sworgadwari is closer to the parts of North-Western Nepal like Murkuti, Salyan, Rolpa etc. and the climate and

physiography of this area is almost similar to those of areas in North-Western Nepal.

Due to time and area constraints, the current findings are more preliminary and did not cover all of the adjacent places that are connected to the research area. Thus, there is the greater chance of discovering new species from this area, which will benefits to the flora of both west Nepal and Nepal. As a result, the region requires in-depth research.

## CHAPTER VI

### CONCLUSION AND RECOMMENDATION

The study has been successfully documented and provided taxonomic treatment to the dicot flora of Sworgadwari Hill of Pyuthan District. A total of 147 dicot species are identified and catalogued. Taxonomic treatment including species description, identification keys and illustration are generated for some selected species. Based on the detailed morphological characteristics that have been noticed, artificial keys and a complete flora for the study region have been produced. *Shorea robusta*, *Bombax ceiba* and *Swertia angustifolia* are the 3 species reported from site which are under endangered or protected plants of Nepal. Among the above species, *Swertia angustifolia* is enlisted under endangered species and remaining 2 species under protected plants.

The present study will enhance the scientific knowledge of botanical diversity in Sworgadwari Hill addressing the critical research gap. It is thought that this study would be beneficial to future floristic studies in the present study area as well as other adjoining areas. Furthermore, it will be beneficial to the ecologist, environmentalist, taxonomist, institutions, scholars, Pharmaceutical companies and locals for the identification of various plants.

#### **Recommendation:**

Sworgadwari Municipality is also famous for its religious site known as Sworgadwari Temple. Due to the famous religious site, there is increase in numbers of tourists and human population along with household, the risk of exploitation of plant resources increases. As a result, it is evident that the area is implementing conservation techniques after raising awareness of them.

- Gathering firewood and other materials for household needs from the forest is still done, therefore the local government and people need to know how to use the resources that are available sustainably.
- A few species of protected plants and a few species of terrestrial and epiphytic orchids like *Coelogyne*, *Dendrobium*, *Vanda*, etc. can be found in the study region, thus it's critical to give relevant faculties with attention before those resources are depleted.

- The presence of the temple in this area contributes to its tourist attraction, which will obviously cause needless harm and degradation to the environment. For this reason, both the local community and the temple management committee must enforce strict guidelines during visits.
- Strict regulations should be put in place to stop the illegal trade in valuable medicinal plants and timber, as well as forest fires.
- The government should do an exhaustive investigation before implementing a long-term strategy plan to preserve the area's natural ecosystem and biologically significant species.

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## APPENDICES

### Appendix I

#### List of Families with genera and species numbers

S.N.	Families	Genera	Species
1	Acanthaceae	6	7
2	Adoxaceae	1	1
3	Amaranthaceae	1	1
4	Anacardiaceae	1	1
5	Apiaceae	1	1
6	Apocynaceae	2	2
7	Asteraceae	19	20
8	Begoniaceae	1	1
9	Berberidaceae	1	1
10	Boraginaceae	2	2
11	Campanulaceae	1	1
12	Capparaceae	1	1
13	Caryophyllaceae	2	2
14	Celastraceae	1	1
15	Convolvulaceae	1	1
16	Coriariaceae	1	1
17	Dipterocarpaceae	1	1

18	Ericaceae	2	2
19	Euphorbiaceae	2	3
20	Fabaceae	12	13
21	Gentianaceae	1	2
22	Lamiaceae	16	19
23	Linaceae	1	1
24	Lytharaceae	1	1
25	Malpighiaceae	1	1
26	Malvaceae	4	5
27	Mazaceae	1	1
28	Melastomataceae	1	1
29	Moraceae	2	2
30	Moringaceae	1	1
31	Myricaceae	1	1
32	Myrtaceae	1	1
33	Nyctaginaceae	1	1
34	Oleaceae	2	3
35	Onagraceae	1	1
36	Orobanchaceae	2	2
37	Oxalidaceae	1	2
38	Papaveraceae	1	1

39	Phyllanthaceae	1	1
40	Plantaginaceae	2	2
41	Plumbaginaceae	1	1
42	Polygalaceae	1	1
43	Polygonaceae	1	1
44	Primulaceae	2	2
45	Ranunculaceae	1	2
46	Rosaceae	7	7
47	Rubiaceae	3	3
48	Rutaceae	3	3
49	Santalaceae	2	2
50	Sapotaceae	1	1
51	Scrophulariaceae	2	2
52	Solanaceae	2	3
53	Urticaceae	1	1
54	Verbenaceae	3	3
55	Vitaceae	1	1

## Appendix II

### Checklist of identified plant specimens From Sworgadwari Hill, Pyuthan District, Western Nepal.

S.N	Families	Latin name	Nepali name	Growth form	Altitude (m)	Coll. No.
1	Acanthaceae	<i>Barleria cristata</i> L.	Bhede kuro	S	1235	SG423
2	Acanthaceae	<i>Dicliptera bupleuroides</i> Nees.			735	SG421
3	Acanthaceae	<i>Eranthemum purpurascens</i> Nees.		H	972	SG421
4	Acanthaceae	<i>Justicia adhatoda</i> L.	Asuro	S	740	SG4121
5	Acanthaceae	<i>Justicia diffusa</i> Willd.	Ultachira	H	2023	SG441
6	Acanthaceae	<i>Lepidagathis incurve</i> Buch.-Ham. ex D. Don	Seto phuli	H	740	SG4109
7	Acanthaceae	<i>Strobilanthes atropurpurea</i> Nees.		H	2071	SG450
8	Adoxaceae	<i>Viburnum cylindricum</i> Buch.-Ham. ex D. Don	Ghodekhari	S	2055m	SG448
9	Amaranthaceae	<i>Achyranthes aspera</i> L.		H	735	SG4111
10	Anacardiaceae	<i>Rhus parviflora</i> Roxb.	Sati bayar	S	1183	SG427
11	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	Ghod tapre	H	700	SG4210
12	Apocynaceae	<i>Plumeria rubra</i> L.	Golchini	T	750	SG4189
13	Apocynaceae	<i>Vallaris solanacea</i> (Roth.) Kuntze	Dudhe lahara	C-S	765	SG4154
14	Asteraceae	<i>Ageratum houstonianum</i> Miller	Gane	H	832	SG4119
15	Asteraceae	<i>Ainsliaea latifolia</i> (D. Don)		H	2102	SG4173

		Schultz				
16	Asteraceae	<i>Anaphalis contorta</i> (D. Don) Hook. F.	Buki Phul	H	2100	SG458
17	Asteraceae	<i>Anaphalis margaritaceae</i> (L.) Benth.		H	1026	SG439
18	Asteraceae	<i>Artemisia dubia</i> Wall. ex Besser	Titepati	H	731	SG470
19	Asteraceae	<i>Bidens pilosa</i> L.	Tikhe kuro	H	738	SG409
20	Asteraceae	<i>Cirsium verutum</i> (D. Don) Spreng.	Sungure Kaada	H	776	SG4158
21	Asteraceae	<i>Conyza stricta</i> Willd.		H	2015	SG449
22	Asteraceae	<i>Cyathacline purpurea</i> (Buch.-Ham. ex D. Don) Kuntze		H	700	SG4209
23	Asteraceae	<i>Duhaldea cappa</i> (Buch.-Ham. ex D. Don) Pruski & Anderb.	Gathihare	S	1100	SG483
24	Asteraceae	<i>Eclipta alba</i> (L.) Hassk.		H	735	SG420
25	Asteraceae	<i>Elephantopus scaber</i> L.	Sahasrabuti	H	1240	SG425
26	Asteraceae	<i>Erigeron bellidioides</i> (Buch.-Ham. ex D. Don) Benth.		H	2100	SG4150
27	Asteraceae	<i>Galinsoga parviflora</i> Cav.	Chitlange Jhar	H	735	SG4101
28	Asteraceae	<i>Guizotia abyssinica</i> (L.) Cassini		H	741	SG4161
29	Asteraceae	<i>Melanoseria macrorhiza</i> (Royle) N. Kilian		H	2025	SG444
30	Asteraceae	<i>Parthenium hysterophorus</i>		H	850	SG4201

		L.				
31	Asteraceae	<i>Sonchus wightianus</i> DC.		H	765	SG464
32	Asteracea	<i>Tridax procumbens</i> L.	Hasure jhar	H	700	SG4202
33	Asteraceae	<i>Veronica cinerea</i> (L.) Lessing		H	750	SG416
34	Begoniaceae	<i>Begonia megaptera</i> DC.		H	1034	SG492
35	Berberidaceae	<i>Berberis asiatica</i> Roxb. ex DC.	Chutro	S	2200	SG4167
36	Boraginaceae	<i>Cyanoglossum zeylanicum</i> (Vahl ex Hornem.) Thunb. ex Lehm	Kanike kuro	H	1237	SG424
37	Boraginaceae	<i>Trichodesma indicum</i> (L.) R. Br.		H	838	SG405
38	Campanulaceae	<i>Campanula dimorphantha</i> Schweinfurth		H	730	SG4140
39	Capparaceae	<i>Capparis olacifolia</i> Hook. & Thom.		S	702	SG4156
40	Caryophyllaceae	<i>Stellaria media</i> (L.) Villars		H	745	SG4100
41	Caryophyllaceae	<i>Silene conoidea</i> L.		H	745	SG4104
42	Celastraceae	<i>Gymnosporia rufa</i> (Wall) Hook.	Kande khasru	T	878	SG467
43	Convolvulaceae	<i>Evolvulus alsinoides</i> L.		H	1000	SG430
44	Coriariaceae	<i>Coriaria nepalensis</i> Wall.	Machhaino	S	2186	SG4175
45	Dipterocarpaceae	<i>Shorea robusta</i> Gaertn.	Saal	T	776	SG4159
46	Ericaceae	<i>Lyonia ovalifolia</i> (Wall.) Drude	Angeri	T	1971	SG4182
47	Ericaceae	<i>Rhododendron arboreum</i>	Laliguras	T	2200	SG4183

		Sm.				
48	Euphorbiaceae	<i>Euphorbia heterophylla</i> L.	Dhudhe jhar	H	740	SG408
49	Euphorbiaceae	<i>Euphorbia hirta</i> L.	Aakle jhar	H	757	SG407
50	Euphorbiaceae	<i>Mallotus philipensis</i> (Lam.) Mull.	Sindoor	T	724	SG4114
51	Fabaceae	<i>Abrus precatorius</i> L.	Ratigedi	C	750	SG414
52	Fabaceae	<i>Biancaea decapetala</i> Roth.		S	730	SG4102
53	Fabaceae	<i>Cajanus scarabaeoides</i> (L.) Thouars		C	1230	SG433
54	Fabaceae	<i>Desmodium elegans</i> DC.	Raato Baakhre ghaas	S	830	SG432
55	Fabaceae	<i>Erythrina stricta</i> Roxb.	Phaledo	T	828	SG4153
56	Fabaceae	<i>Flemingia macrophylla</i> (Willd.) Prain		S	731	SG437
57	Fabaceae	<i>Flemingia strobilifera</i> (L.) W. T. Aiton	Bhatwasi	S	2070	SG451
58	Fabaceae	<i>Indigofera heterantha</i> Wall. ex Brandis	Sakino	S	771	SG4134
69	Fabaceae	<i>Lathyrus sativa</i> L.		H	731	SG4116
60	Fabaceae	<i>Pleurolobus gangeticus</i> (L.) DC.	Saliparnee	S	1247	SG428
61	Fabaceae	<i>Rhynchosia viscosa</i> (Roth) DC.		H	1050	SG429
62	Fabaceae	<i>Tephrosia candida</i> DC.		H	731	SG435
63	Fabaceae	<i>Uraria lagopodioides</i> (L.) DC.		H	832	SG402

64	Gentianaceae	<i>Swertia angustifolia</i> Buch.-Ham. ex D. Don	Chiraito	H	1069	SG479
65	Gentianaceae	<i>Swertia paniculata</i> Wallich	Chiraito	H	2073	SG457
66	Lamiaceae	<i>Ajuga integrifolia</i> Buch.-Ham. ex D. Don		H	735	SG4145
67	Lamiaceae	<i>Callicarpa macrophylla</i> Vahl		S	899	SG475
68	Lamiaceae	<i>Clinopodium umbrosum</i> (M. Bieb.) Kuntz	Bilajor	H	735	SG4124
69	Lamiaceae	<i>Colebrookea oppositifolia</i> Sm.	Dhursuli	S	789	SG4142
70	Lamiaceae	<i>Holmskioldia sanguine</i> Retz.	Jhule phool	S	743	SG413
71	Lamiaceae	<i>Isodon coesta</i> (Buch.-Ham. ex D. Don) Kudo	Mire	H	1109	SG483
72	Lamiaceae	<i>Lamium amplexicaule</i> L.		H	731	SG472
73	Lamiaceae	<i>Leucas cephalotes</i> (Roth) Sprengs		H	680	SG4115
74	Lamiaceae	<i>Leucas lanata</i> Benth.		H	832	SG401
75	Lamiaceae	<i>Micromeria biflora</i> (Buch.-Ham. ex D. Don) Benth.		H	878	SG466
76	Lamiaceae	<i>Platostoma coloratum</i> (D. Don) A.J. Paton		H	834	SG404
77	Lamiaceae	<i>Pogostemon benghalensis</i> (Burm. f.) Kuntze		S	740	SG4125
78	Lamiaceae	<i>Pseudocaryopteris bicolor</i> (Roxb. ex Hardw) Cantino		S	910	SG4126

79	Lamiaceae	<i>Salvia coccinea</i> Juss. ex Murr.		H	735	SG4211
80	Lamiaceae	<i>Scutellaria discolor</i> Wall. ex Benth.	Daampate	H	834	SG403
81	Lamiaceae	<i>Scutellaria repens</i> Buch.-Ham. ex D. Don		H	731	SG473
82	Lamiaceae	<i>Scutellaria grossa</i> Wall.		H	2025	SG445
83	Lamiaceae	<i>Teucrium quadrifarium</i> Buch.-Ham. ex D. Don		H	950	SG431
84	Lamiaceae	<i>Vitex trifolia</i> L.		S	700	SG4162
85	Linaceae	<i>Reinwardtia indica</i> Dumort.	Pyauli	S	800	SG474
86	Lytharaceae	<i>Woodfordia fruticosa</i> Kurz.	Dhairo	S	1192	SG4147
87	Malphoghiaceae	<i>Hiptage benghalensis</i> (L.) Kurtze		C	750	SG4149
88	Malvaceae	<i>Bombax ceiba</i> L.	Simal	T	750	SG4136
89	Malvaceae	<i>Grewia asiatica</i> L.		T	743	SG4113
90	Malvaceae	<i>Grewia optiva</i> J.R. Drumm. ex Burret	Bhimal	T	750	SG418
91	Malvaceae	<i>Sida acuta</i> Burma	Balu jhaar	H	743	SG4200
92	Malvaceae	<i>Triumfetta rhomboidea</i> Jacq.	Dale kuro	S	750	SG417
93	Mazaceae	<i>Mazus pumilus</i> (Burm.) Steenis	Maalati jhaar	H	756	SG143
94	Melastomataceae	<i>Osbeckia stellate</i> Buch.-Ham. ex D. Don	Rato chulsi	S	2064	SG453
95	Moraceae	<i>Ficus religiosa</i> L.	Peepal	T	736	SG4198

96	Moraceae	<i>Morus serrate</i> Roxb.	Kimbu	T	735	SG4196
97	Moringaceae	<i>Moringa oleifera</i> Lam.	Sitalchini	T	681	SG4163
98	Myricaceae	<i>Myrica esculenta</i> Buch.-Ham. ex D.Don	Kafal	T	2102	SG4172
99	Myrtaceae	<i>Eucalyptus alba</i> Reinw. Ex. Blume	Masala	T	740	SG4129
100	Nyctaginaceae	<i>Boerhavia diffusa</i> L.		H	750	SG4208
101	Oleaceae	<i>Jasminum grandiflorum</i> L.	Chameli	C	836	SG422
102	Oleaceae	<i>Jasminum multiflorum</i> Andrews	Beli puspa	S	735	SG4108
103	Oleaceae	<i>Ligustrum sinense</i> Lour.		S	1191	SG4148
104	Onagraceae	<i>Oenothera rosea</i> L Heritier ex Aiton		H	741	SG4146
105	Orobanchaceae	<i>Lindenbergia grandiflora</i> (Buch.-Ham. ex D.Don) Benth.		H	1721	SG440
106	Orobanchaceae	<i>Orobanche aegyptiaca</i> Persoon		H	735	SG4107
107	Oxalidaceae	<i>Oxalis corniculata</i> L.	Chari amilo	H	756	SG499
108	Oxalidaceae	<i>Oxalis latifolia</i> Kunth.	Chari amilo	H	755	SG4117
109	Papaveraceae	<i>Argemone Mexicana</i> L.	Thakal	H	745	SG4212
110	Phyllanthaceae	<i>Phyllanthus emblica</i> L.	Amala	T	731	SG468
111	Plantaginaceae	<i>Misopates orontium</i> (L.) Raf.		H	735	SG4105
112	Plantaginaceae	<i>Veronica persica</i> Poiret		H	735	SG4106
113	Plumbaginaceae	<i>Plumbago zeylanica</i> L.		S	735	SG4112

114	Polygalaceae	<i>Polygala furcate</i> Royle		H	1230	SG434
115	Polygonaceae	<i>Rumex hastatus</i> D. Don	Kapu	S	1720	SG438
116	Primulaceae	<i>Androsace umbellate</i> (Lour.) Merr.		H	745	SG4123
117	Primulaceae	<i>Anagallis arvensis</i> L.		H	731	SG471
118	Ranunculaceae	<i>Clematis connate</i> DC.	Bhainsee laharaa	C	2023	SG442
119	Ranunculaceae	<i>Clematis gouriana</i> Roxb. ex DC.	Junge lahara	C	1247	SG426
120	Rosaceae	<i>Cotoneaster microphyllus</i> Wall. ex Lindl.		S	2061	SG4168
121	Rosaceae	<i>Duchesnea indica</i> (Andrews) Focke	Bhuin ainselu	H	731	SG469
122	Rosaceae	<i>Prunus cerasoides</i> D. Don	Painyu	T	2073	SG460
123	Rosaceae	<i>Pyracantha crenulata</i> (Roxb. ex D. Don) M. Roem.	Ghangaru	S	1980	SG4179
124	Rosaceae	<i>Pyrus pashia</i> Buch.- Ham. ex D. Don	Mayal	T	1952	SG4180
125	Rosaceae	<i>Rosa brunonii</i> Lindl.	Bhainsi kande gulaf	C	1952	SG446
126	Rosaceae	<i>Rubus ellipticus</i> Sm.	Ainselu	S	740	SG4137
127	Rubiaceae	<i>Himalrandia tetrasperma</i> (Wall. ex Roxb.) T. Yamaz	Ghanaalo	S	2065	SG4169
128	Rubiaceae	<i>Spermadictyon suaveolens</i> Roxb.	Ban champ	S	878	SG461
129	Rubiaceae	<i>Rubia cordifolia</i> L.	Manjitho	H	2070	SG456
130	Rutaceae	<i>Boenninghausenia</i>		H	995	SG490

		<i>albiflora</i> Hook.				
131	Rutaceae	<i>Murraya koenigii</i> (L.) Spreng.	Mitho neem	S	740	SG4160
132	Rutaceae	<i>Zanthoxylum armatum</i> DC.	Timur	S	2250	SG4165
133	Santalaceae	<i>Osyris quadripartite</i> Salz. ex Decaisne	Jhuri	S	1015	SG497
134	Santalaceae	<i>Santalum album</i> L.	Chandan	T	764	SG412
135	Sapotaceae	<i>Diploknema butyracea</i> H. J. Lam.	Chiuri	T	750	SG4164
136	Scrophulariaceae	<i>Buddleja paniculata</i> Wall.	Narayan pati	S or T	789	SG4139
137	Scrophulariaceae	<i>Mecardonia procumbens</i> (Miller) Small		H	755	SG4205
138	Solanaceae	<i>Solanum anguivi</i> Lam.	Thulo bihin	S	769	SG415
139	Solanaceae	<i>Solanum nigrum</i> L.	Kalo bihin	S	769	SG4213
140	Solanaceae	<i>Nicotiana tabaccum</i> L.	Surti	S	1990	SG4189
141	Urticaceae	<i>Urtica ardens</i> Link	Sisno	H	731	SG4132
142	Verbenaceae	<i>Duranta repens</i> L.	Nil kanda	S	760	SG4192
143	Verbenaceae	<i>Lantana camera</i> L.	Masino kanda	S	828	SG4203
144	Verbenaceae	<i>Phyla nodiflora</i> (L.) E. L. Greene		H	800	SG4204
145	Vitaceae	<i>Leea asiatica</i> (L.) Ridsdale	Galena	S	838	SG406

## Appendix III

### Field Photo plates of selected plant species

#### Photo plates



*Biancaea decapetala* Roth.



*Swertia paniculata* Wallich



*Leucas lanata* Benth.



*Leucas cephalotes* (Roth) Sprengs.



*Reinwardtia indica* Dumort.



*Silene conoidea* L.



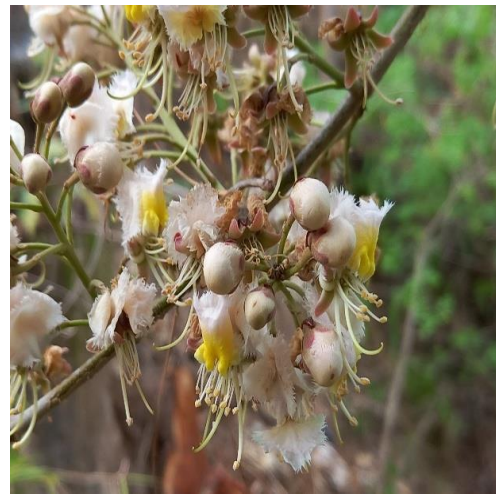
*Lepidagathis incurva* Buch-Ham. ex D. Don



*Pseudocaryopteris bicolor* Roxb.  
ex Hardw



*Anaphalis contorta* (D. Don) Hook.



*Hiptage benghalensis* (L.) Kurz.



*Rumex hastatus* D. Don



*Holmskioldia sanguine* Retz.