

ETHNOBOTANICAL STUDY ON MEDICINAL PLANTS IN PARBAT DISTRICT OF WESTERN NEPAL

**A DISSERTATION
SUBMITTED FOR THE**

**PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL
SCIENCE**



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SEPTEMBER, 2015

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ACRONYMS

AC	:	Acetone
AE	:	Aqueous Extract
BHA	:	Butylated hydroxyl anisole
BSA	:	Bovine Serum Albumin
BSLA	:	Brine Shrimp Lethality Assay
CAMP	:	Conservation Assessments and Management Planning
CBS	:	Central Bureau of Statistics
CFUGS	:	Community Forest Users Groups
CF	:	Community Forest
CITES	:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm.	:	Centimeter
CM	:	Chinese Medicine
CNS	:	Central Nervous System
CR	:	Critically endangered
CVD	:	Cardiovascular diseases
DD	:	Data deficient
DESE	:	Department of Environmental Science and Engineering
DHM	:	Department of Hydrology and Metrology
Distrib.	:	Distribution
DPPH	:	1, 1-diphenyl-2picrylhydrazyl
DPR	:	Department of Plant Resource
DRCs	:	Diabetes related complications
E	:	Ethanolic
ECOS	:	Ecological society
ESON	:	Ethnobotanical society of Nepal
e.g.	:	For example

EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
EN	:	Endangered
ENT	:	Ear, nose, throat
etc.	:	<i>et cetera</i>
ET	:	Electron transfer
FGD	:	Focus group discussions
F _{IC}	:	Informant consensus factor
Fig.	:	Figure
Fl.	:	Flower
FL	:	Fidelity Level
Fls.	:	Flowering
FRAP	:	Ferric ion reducing antioxidant power
Frts.	:	Fruiting
FTC	:	Ferric thiocyanate method
G	:	<i>Gurung</i>
GON	:	Government of Nepal
Ha.	:	Hectare
HAT	:	Hydrogen atom transfer
HPLC	:	High performance liquid chromatography
HPS	:	Hyangsa-Pyeongwi San
HT	:	Hydroxyl Tyrosol
IC	:	Inhibitory Concentration
ICIMOD	:	International Centre for Integrated Mountain Development
i.e	:	that is
Infl.	:	Inflorescence
ITK	:	Indigenous Technical Knowledge
ITPs	:	Indigenous and traditional plants
IUCN	:	World Conservation Union

K	:	Insufficiently, Known
KATH	:	National Herbarium and Plant Laboratory, Nepal
Kcal	:	Kilo calorie
Km	:	Kilometer
Km ²	:	Square kilometer
KU	:	Kathmandu University
LPS	:	Lipopolysaccharide
M	:	<i>Magar</i>
m	:	Meter
μl	:	Microlitre
Ma	:	<i>Majhi</i>
MAPs	:	Medicinal and Aromatic Plants
ME	:	Methanolic Extract
mg	:	Milligram
ml	:	Millilitre
mm	:	Millimeter
N	:	Nepali
NGO	:	Non-Governmental Organization
No.	:	Number
NT	:	Nearly Threatened
NTFPs	:	Non-Timber Forests Products
°C	:	Degree centigrade
OD	:	Optical density
Pd	:	Pediatric
PE	:	Petroleum ether
Per sq. km	:	Per Square kilometer
PMs	:	Medicinal plants
PPE	:	Psychological experience of place
R	:	Rare
Rpm	:	Revolutions per minute
SOD	:	Synthetic antioxidant enzymes

Sp.	:	Species
SN.	:	Serial number
Sq. km	:	Square kilometer
T	:	Threatened
TCA	:	Trichloroacetic acid
TDM	:	Traditional Dai Medicine
TEK	:	Traditional Environmental Knowledge
TMK	:	Traditional Medicinal Plant Knowledge
TK	:	Traditional Knowledge
Temp.	:	Temperature
TMPs	:	Traditional Medicine Persons
TPC	:	Total polyphenol content
µg	:	Microgram
uM	:	Micrometer or micron
UNEP	:	United Nations Environment Programme
V	:	Vulnerable
VDCs	:	Village Development Committees
viz.	:	<i>that is</i>
WEPs	:	Wild/semi-wild edible plant species
WEM	:	Wild Edible Medicinal Plants
WHO	:	World Health Organization
WWF	:	Worldwide Fund for Nature

ABSTRACT

Ethnobotany, the science that explains the relationship between people and their plant environment, documents indigenous knowledge of aborigines on the use of variety of plants and their parts. Systematic inquiries have been carried out to understand the existing and potential use of the plants in different areas. In view of rich floristic composition and diverse ethnic people's existence since long and yet minimum level of study in Parbat district, this research was carried out to a) assess floristic composition, spatial distribution of taxa, plant taxonomy, cross-cultural pattern of uses, and ethno-domestication; b) examine medicinal and other uses of the plant species, and mode of application; and c) analyze phytochemical properties and values, informants consensus factors (F_{IC}), and fidelity level (FL) value of plant species.

A number of field visits, in four different seasons, were carried out from August 2010 to December 2014 using *in situ* inventory method. Information was obtained from three indigenous groups – *Gurung*, *Magar* and *Majhi* – through semi-structured questionnaire, focus group discussions and personal interviews. The data were analyzed by standardized qualitative methods and quantitative spectrophotometric protocols.

In this study, 401 plant species were identified which were categorized into 289 genera under 114 botanical families. Herbs represented the highest proportion of the plants followed by trees, shrubs and climbers respectively. Similarly, dicotyledons were the highest (86 families) and gymnosperms were the lowest (4 families). Likewise, Asteraceae (20 species) was found to be the most dominantly used family followed by Fabaceae (18 species) and Orchidaceae (17 species) respectively. This showed that Parbat is affluent with vast floristic diversity of ethnobotanical plants.

Based on the species' use for different ailments, F_{IC} values were calculated. The results showed that the diseases under cancer category had the highest agreement with F_{IC} of 0.98. Species like *Taxus wallichiana*, *Kalanchoe spathulata*, *Podophyllum hexandrum* and *Bergenia ciliata* were used to cure the disease like cancer. Calculation of FL values showed *Centella asiatica* (100%), *Crateva unilocularis* (100%), *Dactylorhiza hatagirea* (100%) and *Swertia chirayita* (100%) are the most important species used for musculoskeletal and nervous system, cardiovascular disease, urinogenital and venereal ailments, cardiovascular diseases respectively.

In this investigation, the proximate analysis showed that the wild edible plants are good sources of nutritional contents and supplements of various nutrients. The phytochemical screening of 61 herbs/plants revealed the presence of phenol, tannins, terpenoids, saponins, steroids, alkaloids, flavonoids, glycosides. Higher presence of these compounds indicated that they might be useful to cure various diseases such as cardiovascular diseases, metabolic disorder, cancer, antibacterial, musculoskeletal diseases in human. *Piper longum*, *Camellia kissi*, *Benincasa hispida*, *Neolitsea pallens*, *Neopicrorhiza scrophulariiflora*, *Gaultheria fragrantissima* were observed to be promising sources of natural antioxidants and preventative agents. In the scenario where a large number of people are suffering from chronic diseases and the available measures have higher side effects, the use of medicinal plants might be a promising option. Detailed studies on the role of individual phytochemicals involved in the antioxidant activity of specific plants are required for their use as functional foods and in the pharmaceutical industry.

Since traditional knowledge is depleting rapidly due to migration of young people, there is a huge challenge to preserve the knowledge. The data produced in this investigation can be used as baseline information which can be used to conduct more advanced research in the areas of isolation and purification of bioactive components using high-tech instruments. Finding from such study can contribute to the formulations of drugs, and thus make these plants viable for commercial exploitation.

CONTENTS

Certification by the Supervisors	I
Certificate of Approval	II
Certificate of Originality	III
Acknowledgements	IV-V
Abbreviations	VI-IX
Abstract	X-XI
List of Contents	
List of Tables	
List of Figures	
List of Photographs	
List of Appendices	

CHAPTER 1

1. INTRODUCTION	1
1.1 Background	1
1.2 Ethnobotanical study in Nepal	3
1.3 Phytochemical studies	5
1.4 Ethnic communities in Parbat district	6
1.4.1 Gurung	7
1.4.2 Magar	8
1.4.3 Majhi	9
1.5 Intellectual property rights of Ethnic communities	10
1.6 Justification of the study	11
1.7 Objectives	11
1.8 Limitation of the study	12

CHAPTER 2

2. REVIEW OF LITERATURE	13
2.1 Ethnobotanical studies outside Nepal	13
2.2 Phytochemical studies outside Nepal	14
2.2.1 Proximate composition	17
2.2.2 Phytochemical screening	19

2.3 Ethnobotanical studies in Nepal	22
2.4 Phytochemical studies in Nepal	28
2.4.1 Proximate composition	28
2.4.2 Phytochemical screening	29

CHAPTER 3

3. DESCRIPTION OF THE STUDY SITE	31
3.1 STUDY AREA	31
3.2 PHYSIOGRAPHY	33
3.2.1 Soil	33
3.2.2 Rivers	33
3.2.3 Climate	34
3.2.3.1 Temperature	34
3.2.3.2 Precipitation	35
3.2.3.3 Relative Humidity	36
3.3 VEGETATION	37
3.3.1 Tropical Zone (Forest)	37
3.3.2 Sub-tropical vegetation	38
3.3.2.1 Chir Pine Forest	38
3.3.2.2 Chir Pine-Broadleaved Forest	38
3.3.2.3 Schima-Castanopsis Forest	38
3.3.3 Temperate Zone	39
3.3.3.1 Upper Temperate Blue Pine Forest	40
3.3.3.2 Temperate Juniper Forest	40
3.3.3.3 Spruce Forest	40
3.3.3.4 West Himalayan Fir-Hemlock-Oak Forest	41
3.3.3.5 Temperate Mountain Oak	41
3.3.3.6 Rhododendron Forest	41
3.3.3.7 Mountain Oak-Rhododendron Forest	42
3.3.3.8 Mixed Rhododendron-Maple Forest	42

3.3.3.9 Cedar Forest	42
3.3.3.10 Mixed Blue Pine-Oak Forest	42
3.3.3.11 Lower Temperate Oak Forest	42
3.3.3.12 Deciduous Walnut-Maple-Alder Forest	43
3.3.4 Sub-alpine Forest	43
3.3.4.1 Sub-alpine Mountain Oak Forest	43
3.4 DEMOGRAPHY	44
CHAPTER 4	
4. MATERIALS AND METHODS	46
4.1 Demographic characteristics of the informants	46
4.2 Informants selection	47
4.3 Field survey and data collection	47
4.4 Interview with key informants (Healers: Dharni, Jhankri, Lama)	47
4.5 Plant collection, identification and preservation	48
4.6 Statistical Analysis	48
4.7 Informants consensus factor (F_{IC})	48
4.8 Fidelity level (FL) value	49
4.9 Phytochemical (Qualitative and Quantitative) Analysis	49
4.9.1 Collection of plant material	49
4.9.2 Total Protein	49
4.9.3 Carbohydrate	50
4.9.4 Fat	50
4.9.5 Crude Fiber	51
4.9.6 Moisture content	52
4.10 Preparation of plant extracts (Hot water extraction)	52
4.11 DPPH Assay	53
CHAPTER 5	
5. RESULTS	55

5.1 ETHNOBOTANICAL ENUMERATION	55
5.2 ETHNOMUSICOBOTANY	243
5.3 PLANTS IN MAGICO-RELIGIOUS BELIEF	247
5.4 PHYTOCHEMICAL ANALYSIS	253
5.4.1 Proximate Analysis	253
Protein	253
Carbohydrate	254
Starch	254
Fat	255
Crude fiber	255
Moisture	256
5.4.2 Phytochemical screening	258
Alkaloides	258
Phenol	258
Protein and amino acids	258
Carbohydrates	258
Glycosides	258
Saponin	259
Flavonoids	259
Steriod	259
Terpenoids	259
5.4.3 DPPH Assay	265
5.4.4 Reducing power	267

CHAPTER 6

6. DISCUSSION	269
6.1 Taxonomic diversity of local medicinal flora	269
6.2 Indigenous knowledge transfer and practice	273
6.3 Ailment types, number of plant species and treatment methods	276
6.4 Plant parts used for remedy preparation	284
6.5 Modes of remedy preparation and application	285

6.6 Routes of administration	286
6.7 Dosages and antidotes	287
6.8 Ethnodomestication of medicinal plants	288
6.9 Plant species used for different purposes	290
6.10 Quantitative Analysis (Statistical analysis)	290
6.10.1 Informants consensus factor (F_{IC})	290
6.10.2 Fidelity level (FL) value	291
6.11 Cross-cultural pattern	293
6.12 Veterinary medicines and insecticides	299
6.13 Fish stupefying	299
6.14 Wild edible plants	300
6.15 Homegardens	300
6.16 Fodder yielding plants	301
6.17 Fiber yielding plants	301
6.18 Conservation practices/issues	301
6.19 Socio-economic benefit of medicinal plants	302
6.20 Phytochemical Analysis	302
6.21 Identification of new claims	306

CHAPTER 7

7. CONCLUSIONS AND RECOMMENDATIONS	310
7.1 CONCLUSIONS	310
7.2 RECOMMENDATIONS	313
REFERENCES	316

LIST OF TABLES

Table 1 Topographical distribution of Parbat district

Table 2 Average monthly temperature of Parbat (Station: Kusma)

Table 3 Average yearly temperature

Table 4 Average annual and mean rainfall in different location of Parbat district

Table 5 Average yearly rainfall

Table 6 Average monthly Relative humidity of Parbat (Station: Kusma)

Table 7 Average yearly R.H.

Table 8 The general population records of Parbat district

Table 9 Age and gender distribution of ethnic informants

Table 10 Education levels of interviewed ethnic informants

Table 11 Plants use to make musical instruments

Table 12 Magico-religious plants used by ethnic tribes in Parbat district

Table 13 Proximate chemical analysis of some important wild edible plants

Table 14 Phytochemical screening of 61 different medicinal plant species

Table 15 In *vitro* antioxidant activity of methanolic extracts of wild medicinal plants

Table 16 Average absorbance at 700 nm of different plants species and ascorbic acid for determination of reducing power

Table 17 Habits of plants

Table 18 Groups of plant species

Table 19 Taxonomic diversity of medicinal plants in Parbat district

Table 20 Different human diseases treated by the different plant species

Table 21 Plants used for antidotes

Table 22 Marketing value of the plants

Table 23 Informant consensus factor (F_{IC}) by categories of diseases

Table 24 Fidelity level (FL) value of medicinal plants against a given ailment category

Table 25 Cross-cultural patterns in the use of ethnomedicinal plants by the three ethnic communities of Parbat district

Table 26 Comparison of F_{IC} in three ethnic communities (*Gurung*, *Magar* and *Majhi*)

Table 27 Veterinary use of medicinal plants

Table 28 Medicinal plants prioritized for research and development

Table 29 Medicinal plants prioritized for agro-technology development

Table 30 Protected Plants of Nepal

Table 31 Nepalese flora under CITES appendices

Table 32 Threatened medicinal and aromatic plants in Nepal

LIST OF FIGURES

Fig. 1: *Gurung* are dancing, “*Ghatu*” in *Lhosar* festival

Fig. 2: A *Magar* informant with medicinal plant

Fig. 3: A *Majhi* fishing in Kaligandaki River

Fig. 4: Location map of study area

Fig. 5: Temperature Trend of Parbat (2002-2013)

Fig. 6: Rainfall Trend of Parbat district (2002-2013)

Fig. 7: Relative Humidity Trend of Parbat (2002-2013)

Fig. 8: Distribution of Male & Female

Fig. 9: Distribution of different Community

Fig. 10: Aqueous extract of *Justicia adhatoda* showing positive and negative tests of phytochemical compounds

Fig. 11: Aqueous extract of *Potentilla polyphylla* showing positive and negative tests of phytochemical compounds

Fig. 12: Aqueous extract of *Mahonia napaulensis* showing positive and negative tests of phytochemical compounds

Fig. 13: Aqueous extract of *Abies spectabilis* showing positive and negative tests of phytochemical compounds

Fig. 14: Aqueous extract of *Michelia doltsopa* showing positive and negative tests of phytochemical compounds

Fig. 15: Aqueous extract of *Swertia chirayita* showing positive and negative tests of phytochemical compounds

Fig. 16: Aqueous extract of *Glycyrrhiza glabra* showing positive and negative tests of phytochemical compounds

Fig. 17: Aqueous extract of *Taxus wallichiana* showing positive and negative tests of phytochemical compounds

Fig. 18: Aqueous extract of *Bryophyllum pinnatum* showing positive and negative tests of phytochemical compounds

Fig. 19: Aqueous extract of *Lycopodium clavatum* showing positive and negative tests of phytochemical compounds

Fig. 20: Aqueous extract of *Dendrobium moschatum* showing positive and negative tests of phytochemical compounds

Fig. 21: Aqueous extract of Orchid *Pleione humilis* showing positive and negative tests of phytochemical compounds

Fig. 22: Aqueous extract of *Rheum moorcroftianum* showing positive and negative tests of phytochemical compounds

Fig. 23: Aqueous extract of *Mentha spicata* showing positive and negative tests of phytochemical compounds

Fig. 24: Aqueous extract of *Pogostemon glaber* showing positive and negative tests of phytochemical compounds

Fig. 25: Aqueous extract of *Centella asiatica* showing positive and negative tests of phytochemical compounds

Fig. 26: Aqueous extract of *Neopicrorhiza scrophulariiflora* showing positive and negative tests of phytochemical compounds

Fig. 27: Aqueous extract of *Cleistocalyx operculatus* showing positive and negative tests of phytochemical compounds

Fig. 28: Different plant parts used by *Gurung*, *Magar* and *Majhi* community in Parbat district

Fig. 29: Frequency of different formulations used by ethnic communities in Parbat district

Fig. 30: Frequency of different routes of administration

Fig. 31: Different categories of plant usages

LIST OF PHOTOGRAPHS

Photo Plate 1: (A) *Equisetum debile*, (B) *Equisetum diffusum*, (C) *Lycopodium cernuum*, (D) *Lycopodium clavatum*, (E) *Lygodium japonicum*, (F) *Drynaria propinqua*, (G) *Lepisorus thunbergianus*, (H) *Diplazium stoliczkae*, (I) *Nephrolepis auriculata*

Photo Plate 2: (A) *Taxus wallichiana*, (B) Seeds of *Taxus wallichiana*, (C) Researcher measuring the girth of *Taxus wallichiana* tree, (D) *Abies spectabilis*, (E) *Pinus wallichiana*, (F) *Tsuga dumosa*, (G) Aerial view of Kusma valley, Modi river (left) & Kaligandaki river (right).

Photo Plate 3: (A) *Anemone vitifolia*, (B) *Thalictrum reniforme*, (C) *Michelia champaca*, (D) *Michelia doltsopa*, (E) *Cissampelos pareira*, (F) *Tinospora sinensis*, (G) *Berberis asiatica*, (H) *Berberis aristata*, (I) *Mahonia napaulensis*

Photo Plate 4: (A) *Dicentra macrocapnos*, (B) *Cleome viscosa*, (C) *Crateva unilocularis*, (D) *Polygala arillata*, (E) *Drymaria cordata*, (F) *Hypericum uralum*, (G) *Camellia kissi*, (H) *Schima wallichii*, (I) *Shorea robusta*

Photo Plate 5: (A) *Saurauia napaulensis*, (B) *Urena lobata*, (C) *Bombax ceiba*, (D) *Reinwardtia indica*, (E) *Impatiens puberula*, (F) *Zanthoxylum acanthopodium*, (G) *Zanthoxylum armatum*, (H) *Cipadessa baccifera*, (I) *Zizyphus mauritiana*

Photo Plate 6: (A) *Choerospondias axillaris*, (B) *Rhus javanica*, (C) *Rhus succedanea*, (D) *Spondias pinnata*, (E) *Butea minor*, (F) *Dalbergia sissoo*, (G) *Desmodium multiflorum*, (H) *Flemingia marcophylla*, (I) *Glycyrrhiza glabra*

Photo Plate 7: (A) *Mucuna nigricans*, (B) *Mucuna pruriens*, (C) *Bauhinia purpurea*, (D) *Bauhinia vahlii*, (E) *Bauhinia variegata*, (F) *Cassia fistula*, (G) *Cassia occidentalis*, (H) *Acacia catechu*, (I) *Mimosa pudica*

Photo Plate 8: (A) *Fragaria nubicola*, (B) Magar healer preparing paste of *Potentilla polyphylla*, to apply on fresh cuts of researcher, (C) *Prunus cerasoides*, (D) *Pyrus pashia*, (E) *Rubus ellipticus*, (F) Aerial view of Lespar village (Magar community) of Kyang VDC at 2100 m.

Photo Plate 9: (A) *Rubus hoffmeisterianus*, (B) *Rubus nepalensis*, (C) *Astilbe rivularis*, (D) *Bergenia ciliata*, (E) *Bryophyllum pinnatum*, (F) *Terminalia bellirica*, (G) *Cleistocalyx operculatus*, (H) A man grinding the bark of *Cleistocalyx operculatus*

Photo Plate 10: (A) *Osbeckia stellata*, (B) *Oxyspora paniculata*, (C) *Woodfordia fruticosa*, (D) *Duabanga grandiflora*, (E) *Coccinia grandis*, (F) *Herpetospermum pedunculatum*, (G) Magar family collecting seeds of *Herpetospermum pedunculatum*

Photo Plate 11: (A) *Trichosanthes tricuspidata*, (B) *Begonia picta*, (C) *Centella asiatica*, (D) *Eryngium foetidum*, (E) *Sambucus adnata*, (F) *Viburnum erubescens*, (G) *Luculia gratissima*, (H) *Rubia manjith*, (I) *Valeriana jatamansii*

Photo Plate 12: (A) *Ageratum conyzoides*, (B) *Ageratum houstonianum*, (C) *Anaphalis margaritacea*, (D) *Anaphalis contorta*, (E) *Anaphalis triplinervis*, (F) *Artemisia indica*, (G) *Aster diplostephioides*, (H) *Cirsium verutum*, (I) *Eupatorium odoratum*

Photo Plate 13: (A) *Spilanthes paniculata*, (B) *Gaultheria fragrantissima*, (C) *Lyonia ovalifolia*, (D) *Rhododendron arboretum*, (E) *Maesa chisia*, (F) *Diploknema butyracea*, (G) *Diospyros lancifolia*, (H) *Fraxinus floribunda*, (I) *Nyctanthes arbor-tristis*

Photo Plate 14: (A) *Chonemorpha fragrans*, (B) *Rauvolfia serpentina*, (C) *Calotropis gigantea*, (D) *Ceropegia pubescens*, (E) *Swertia chirayita*, (F) *Swertia nervosa*, (G) *Cynoglossum zeylanicum*, (H) *Ipomoea cairica*, (I) *Ipomoea carnea*

Photo Plate 15: (A) *Ipomoea nil*, (B) *Cuscuta reflexa*, (C) *Cestrum nocturnum*, (D) *Datura stramonium*, (E) *Nicandra physalodes*, (F) *Solanum aculeatissimum*, (G) *Oroxylum indicum*, (H) *Justicia adhatoda*, (I) *Callicarpa arborea*

Photo Plate 16: (A) *Callicarpa macrophylla*, (B) *Duranta repens*, (C) *Lantana camara*, (D) *Vitex negundo*, (E) *Colebrookea oppositifolia*, (F) *Elsholtzia blanda*, (G) *Mentha spicata*, (H) *Notochaete hamosa*, (I) *Ocimum basilicum*

Photo Plate 17: (A) *Pogostemon glaber*, (B) *Mirabilis jalapa*, (C) *Amaranthus spinosus*, (D) *Fagopyrum dibotrys*, (E) *Persicaria perfoliata*, (F) *Rheum australe*, (G) *Rumex nepalensis*, (H) *Piper chaba*, (I) *Piper longum*

Photo Plate 18: (A) *Litsea cubeba*, (B) *Litsea monopetala*, (C) *Daphne bholua*, (D) *Bridelia retusa*, (E) *Euphorbia hirta*, (F) *Euphorbia royleana*, (G) *Jatropha curcas*, (H) *Phyllanthus emblica*, (I) *Sapium insigne*

Photo Plate 19: (A) *Daphniphyllum himalense*, (B) *Boehmeria platyphylla*, (C) *Girardinia diversifolia*, (D) *Lecanthus peduncularis*, (E) A woman selling tender leaves of *Urtica dioica*, (F) Gurung women weaving 'Bhangra' made by threads of *Girardinia diversifolia*

Photo Plate 20: (A) *Cannabis sativa*, (B) *Ficus auriculata*, (C) A man carrying fodder of *Ficus lacor*, (D) *Ficus neriifolia*, (E) *Ficus semicordata*, (F) *Morus australis*, (G) *Engelhardia spicata*, (H) *Juglans regia*, (I) *Alnus nepalensis*

Photo Plate 21: (A) *Acampe papillosa*, (B) Researcher carrying *Arundina graminifolia*, (C) *Coelogyne corymbosa*, (D & E) *Dactylorhiza hatagirea*, (F) *Dendrobium*

aphyllum, (G) *Dendrobium moschatum*, (H) *Herminium lanceum*, (I) *Otochilus lancilabius*

Photo Plate 22: (A) *Platanthera latilabris*, (B) *Pleione humilis*, (C) *Pleione praecox*, (D) *Rhynchostylis retusa*, (E) *Satyrium nepalense*, (F) Researcher carrying *Spiranthes sinensis*, (G) *Thunia alba*, (H) Researcher with Magar healer entering to the Forest

Photo Plate 23: (A) *Cautleya spicata*, (B) *Hedychium coccineum*, (C) *Hedychium spicatum*, (D) *Roscoeia capitata*, (E) *Smilax aspera*, (F) *Agave americana*, (G) *Agave sisalana*, (H) *Dioscorea alata*, (I) *Dioscorea bulbifera*

Photo Plate 24: (A) *Dioscorea pentaphylla*, (B) *Asparagus racemosus*, (C) *Chlorophytum nepalense*, (D) *Paris polyphylla*, (E) *Pandanus nepalensis*, (F) *Acorus calamus*, (G) *Arisaema costatum*, (H) *Arisaema flavum*, (I) *Arisaema tortuosum*

Photo Plate 25: (A) *Colocasia esculenta*, (B) *Arundinaria falcata*, (C) *Dendrocalamus hamiltonii*, (D) *Eulaliopsis binata*, (E) *Thysanolaena maxima*, (F) Gurung healer with medicinal plant, (G) A Magar woman (healer), (H) A Majhi fishing in river, (I) Majhi fishing in Kaligandaki river

Photo Plate 26: (A) Magar women with garland to welcome the guest, (B) People celebrating their ritual, (C) Researcher with ‘Gandarva’, (D) Magars performing their cultural dance, (E) Gurungs performing ‘Ghatu’ dance (F) A Magar couple

Photo Plate 27: (A) People performing their rituals, (B) Man playing ‘Damaha’, (C) Magar ladies wearing ethnic dress, (E) Man playing ‘Shehnai’, (D) Magars performing cultural dance (Sorathi song), (F) A lady dancing

Photo Plate 28: (A) Dried herbal medicine for sale in the local market, (B) Art and Artifact made up of bamboo, (C) A man weaving ‘Doko’ by bamboo splints, (E) Raw fiber of *Girardinia diversifolia*, (D) Bamboo fishing net called ‘Dhadiya’, (F) Coarse waist-coat made from ‘Allo’ fibers.

Photo Plate 29: (A) Researcher showing bee hives, (B) Collection of ‘Maize’ in the village, (C) Majhi women carrying leaf litter, (E) Men making charcoal, (D) Magar woman weaving mat of paddy straw, (F) Slipper made by straw

Photo Plate 30: (A) Dr. D.P Gauchan with researcher at Jaljala in Parbat at 3100m asl, (B) Ripen fruits of *Myrica esculenta*, (C) Researcher discussing with Gurung people (E) Fruits of *Phyllanthus emblica*, (D) Researcher discussing with Majhi healer, (F) Fruit nuts of *Castanopsis indica*

Photo Plate 31: (A) A *Majhi* tribe, (B) Nepal's tallest suspension bridge in Parbat district, (C) People playing 'Rote-ping' (swing) in *Dashain* festival, (E) A lady distilling local alcohol, (D) Facing difficulties during field visit, (F) *Majhi* boys fishing in the river

LIST OF APPENDICES

Appendix 1: PROFORMA SHEET: PLANTS USE AMONG THE ETHNIC COMMUNITIES

Appendix 2: Ethnomedicinal plant species used by ethnic tribes *Gurung*, *Magar* and *Majhi*

Appendix 3: Index to the Botanical names

Appendix 4: Research Publications

CHAPTER 1

1. INTRODUCTION

1.1 Background

Ethnobotany assumes an intimate relationship between mankind and plants in their immediate surrounding and vicinity, and documents indigenous knowledge on the utilization of plant resources by the ethnic communities. Etymologically, ‘Ethno’ is a prefix defined as having to do with a group of people with common national or cultural tradition; and ‘Botany’ is the plant life of an area. Therefore, ‘ethnobotany’ means a scientific study of people-plant interaction in the natural environment.

The term ‘ethnobotany’ was coined by Harshberger (1895) to mean the study of plants used by primitive and aboriginal people. Earlier, the term “aboriginal botany” (Power, 1874) was used to mean the study of plants used by aborigines for food, medicine, textiles, fabrics, ornaments, etc. Robbins *et al.* (1916) expanded the sense of ethnobotany beyond mere identification and cataloging of plants used by the primitive people. According to them, ethnobotanical studies should evaluate knowledge of all aspects of plant-life and examine the effect of the vegetal environment upon life, customs, beliefs and history of the people of such societies. Jones (1941) reiterated Robbins *et al.*’s definition when he stated that ethnobotany exclusively concerns inter-relationship of primitive man and plants. Schultes (1962) also emphasized on the relationship between people of primitive societies and their plant environment in his definition. Later, Heiser (1995) defined ethnobotany as the study of not only wild but also cultivated plants in relation to people. It needs to be said Heiser’s sense of the term extended meaning of ethnobotany from wild to domesticated plants. And, Plotkin’s (1995) sense of ethnobotany as the study of tribal people and their utilization of tropical plants focused on locational aspect.

Ethnobotany, an interdisciplinary science, invites study from botany, anthropology, sociology, medicobotany, ecology, pharmacology, palaeobotany etc. Existing studies on ethnobotany have stimulated works on various subdisciplines such as ethnotaxonomy, ethnomedicobotany, ethnomycology, ethnobryology, ethnopteridology, ethnopharmacology and ethnomusicology. **Ethnomedicobotany** concerns medicines made from plants and their use in the treatment of various diseases and ailments based on indigenous pharmacopoeia, folklore handed down to generations. **Ethnopharmacology** is an interdisciplinary field focused on identification,

description, observation and experimental investigations of the ingredients in various medicines utilized by the ethnic people (Holmstedt & Bruhn, 1983). **Ethnotoxicology** deals with the use of various toxic plants as fish-poison, poisons for hunting, etc. **Ethnonarcotics** is the study of using narcotics, snuff, and hallucinogens by ethnic communities. **Ethnoagriculture** is the study of traditional patterns of agriculture prevalent among the ethnic communities, the tools and their use, and indigenous knowledge of domestication of cultivated crops. **Ethnotaxonomy** deals with folk concepts of classification of plants by habit, habitat, usage or some other parameter. **Ethnoecology**, which concerns primitive concepts, relationship and care of environment, studies the impact of worshipping certain trees or mythological associations and taboos related to certain species (Jain, 1995). **Ethnopteridology** examines the issues of origin and antiquity of the human use of ferns and fern allies as food, medicine and many other necessities of life. **Ethnomycology** focuses on the origin and antiquity of the human use of fungi (mushroom, rusts, smuts, truffles, yeast) as food, medicine, etc. **Ethnobryology** peruses the origin and antiquity of the human use of bryophytes as food, medicine, etc. **Ethnoalgology** probes into the origin and antiquity of the human use of algae as food, medicine, etc. **Ethnoarchaeology** identifies plant materials from archaeological sites for studies on migration of human cultures, origin, dispersal and domestication of crops, etc. (Smith, 1965). **Ethnomusicology** inquires into the existing music traditions of the ethnic communities, documents the traditional musical instruments and their role in sustaining the cultural heritage, and studies use of bio-materials to prepare traditional instruments. **Ethnopalaeobotany** is the area of research dealing with documentation of knowledge regarding plant's use from fossil history; it sheds light on the myriad ways of plant's utilization in the past.

Ethnobotany has now become an important discipline of research in natural resource management, biodiversity conservation and socio-economic development. Scholars from different disciplines have been conducting researches to document traditional knowledge of the plant species so as to save for future. Several books published on the subject cover various aspects, among which some are seminal. *An Introduction to Ethnobotany* by Faulks (1958) is frequently referred: it contains various topics pertaining to economic plants in general. The book shows gradually evolving relationship between mankind and plants since its starting to the spread of agriculture. It also argues that even after the advancement in agriculture, people still depend on many wild and semi-wild plants or their parts such as fruits, leaves, roots, seeds, nuts, woods, etc. for daily use. Jain's book *A Manual of Ethnobotany* (1995) classified

man-plant relationship into two broad categories: *Abstract* and *Concrete*. The abstract relationship of plants with man includes faith in good or bad power of plants, taboos, avoidances, notion of sacred plants to worship, and folklore. The concrete relationship includes material use of plants as food, medicine, or for agricultural practice, domestic uses, ornamental and decorative purposes, art and culture, conservation, improvement and sustenance of plants.

Obviously, ethnobotany and its various sub-disciplines have direct application as they avail numerous entities like food, shelter, medicinal care, family welfare, and contribute to the improvement of economic standards and conservation of natural resources. Further, ethnobotany has a direct role to play in the ethnic communities by supplying inexpensive food, wild relatives of crop plants, medicinal herbs, and other domestic utilities. Similarly, cottage industries, handicrafts and woodcraft used by cooperative societies of ethnic communities can bring improvement on economic conditions. The impact of ethnobotany in conservation of natural resources is very direct in the sense that the beliefs and taboos contribute to saving plant species used by the ethnic people.

1.2 Ethnobotanical study in Nepal

Nepal, a country at the heart of the Himalaya, extends from 26° 22' N to 30° 20' N latitudes and 80° 04' E to 88° 12' E longitudes covering a total area of 147,181 square kilometer (CBS, 1998). The country is famous for its floristic diversity, ethnic diversity, cultural richness and spectacular mountain landscape. About 8.4 million indigenous nationals of different groups inhabit various terrains. More than 125 caste/ethnic tribes speaking about 123 languages live in Nepal (CBS, 2011). The nationals possess their own culture, religious rites and rich traditional medicine practices. It may be because of the diversity, the traditional healing practices is different from one ethnic tribe to another, irrespective of the fact that the practices commonly depend on folklore, taboos, culture, rituals, distance, traditional beliefs, religious roots, supernatural power, social and economic costs, fame of special cures, and knowledge on utilization and availability of the resources. Even within the same ethnic tribes, there are different therapeutic systems from place to place due to geographical variation, and other social and religious customs.

Since ancient time, the countries in Indian subcontinent have relied on plants for many purposes. The *Vedas* have records of the oldest repository of human knowledge and utilization

of plants as the medicine. The four *Vedas* namely *Rig-ved*, *Yajur-veda*, *Sama-veda* and *Atharva-veda* carry repository of medicinal knowledge in the human civilization. The *Atharva-veda* known as an *Aryurveda* the ‘science of life’, combines herbal medicine, dietetics, psychology and spirituality to provide itself a therapeutic system (Joshi & Joshi, 2005). In addition, astronomical records show that *Aryurveda* was in practice before 4000 BC. About five hundred medicinal plants have been included in the *Aryurveda* by the Nepalese *Vaidhyas* as early as 879 AD.

Traditional herbal medicine in Nepal has a strong cultural and religious connection. Indigenous and local communities have been using the plants for centuries under local laws, customs and traditions to cure different diseases. Such indigenous knowledge not only identifies but also provides the system of management on natural resources (Koirala & Khaniya, 2009). In Nepali context, however, such an availability and immense potentials has yet not been materialized. According to Rajbhandari (1994) Nepal provides a great opportunity for ethnobotanical studies.

It has been stated that botanical exploration and study in Nepal was started by foreign scientists nearly two century before (Rajbhandari, 2001). Francis Buchanan (1802-1803), a Scottish medical man who first collected 433 plant specimens, was the first one in Nepal. It was followed by Nathaniel Wallich from 1820-1821, who collected plant specimens in and around Kathmandu Valley (Rajbhandari, 1976). Later Don (1825) and Wallich (1824-1826) published record of their collections of plants with ethnobotanical notes. Based on the information collected by Buchman-Hamilton and Wallich, David (1825) published ‘*Prodromus Florae Nepalensis*’ which contained 650 plant species. Since then, several botanical plant species from various parts of the country were collected and recorded Roxburgh ‘*Flora India*’ (1820-1824); ‘*Plantae Asiaticae Rariores*’ (1829-1832) and ‘*Flora of British India*’ (1875-1897).

Systematic study on ethnobotanical uses is believed to have started with a paper published on medicinal and food plants by Banerji (1955). After a gap of few years, Singh (1960) published a paper on wild food plants, which was followed by Pandey (1964), Jest (1972) and Dobremez (1976) respectively. These studies have shown availability of different medicinal plants used by the Nepalese communities. According to Chaudhary (1998), approximately 1000 species of wild plants are used in traditional medicinal practices, majority of which, however, await proper documentation. Manandhar (2002) recorded 1517 plant species of ethnobotanical values

which are used in a myriad of ways. In a study carried in 2006, however, 1792 medicinal plants were identified (Baral & Kurmi, 2006). Department of Plant Resources (DPR, 2007) mentioned that there are about 701 medicinal plant species in Nepal. Rokaya *et al.* (2010) documented 6,653 species of Angiospermic plants; among them 1792 to 2331 were recorded as potential medicinal and aromatic plants.

1.3 Phytochemical studies

Traditionally, the wild plants were used exclusively as edibles in crude forms (Samant & Dhar, 1997). In addition to this rudimentary mode of use, plants were put to extensive use as well (Kheyrodin, 2013). As Okwu (2001) have noted, some plants were used not only as spices and food but also as medicine for pregnant women and nursing mothers. This speaks out that the people of ancient time had also made sense about medicinal properties found in the plants; and since the last three centuries, this wisdom has been very widely acknowledged. It has now been a truism to say that medicinal plants hold phytochemical constituents useful for healing/curing human ailments/diseases, and producing pharmaceutical merchandise. For the last 100 years or so, wild plants have been channelized for commercial use. Today, the merchandise includes products from plants, majority of which are derived from plants.

A vast array of research exists in ethnobotany showing usefulness of the plant species for pharmaceutical purposes and new sources of drugs. There is a vast bibliography on phytochemistry of plants (Gibbs, 1974). The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids, and phenolics compounds (Hill, 1952). For convenience, plant chemicals are often classified as primary and secondary metabolites. Primary metabolites are part of vital metabolic pathways and most of them are of universal occurrence. Secondary metabolites are compounds biosynthetically derived from primary as they are limited in their occurrence in the plant kingdom. Secondary compounds have often an ecological role: they are pollinator attractants and represent chemical adaptation to environmental stress or serve as chemical defenses against microorganisms and insects. They are frequently accumulated by plants in smaller quantities than the primary metabolites; and they have highly complex structure.

A large number of medicinal plants and their purified constituents have shown beneficial therapeutic potentials. Various herbs and spices, including *Ocimum sanctum*, *Piper cubeba*, *Allium sativum*, *Terminalia bellerica*, *Camellia sinensis*, *Zingiber officinale* have been reported

to exhibit antioxidant activity. The potent of plants for antioxidant activity is due to the flavones, isoflavones, flavonoids, anthocyanin, coumarin, lignans, catechins and isocatechins inherent in the plants (Khalaf *et al.*, 2008). Antioxidant-based drug formulations derived from plant species are used for the prevention from and treatment of complex diseases like atherosclerosis, stroke, diabetes, alzheimer disease and cancer (Devasagayam *et al.*, 2004). These findings account to the claim that spices and herbs are the sources of natural antioxidants.

The major chemical substances of interest in ethnomedicinal studies have been the alkaloids, steroidal and saponins. Alkaloids are rich in medicine and constitute most of the valuable drugs. They have physiological effect on animals (Edeoga *et al.*, 2001). Despite an acknowledgement of prevalence of chemical substances in some plants, medicinal compounds in them are described as quite difficult to test, isolate, and elucidate their structure and mechanism because of limited laboratory time and resources, and the high cost of clinical trials of new drug candidate (Chhetri *et al.*, 2008).

In Nepal, wild plants have been utilized traditionally for healing and curing human diseases; and wild edibles are used as important sources of food supplements (Uprety *et al.*, 2012). This trend of indigenous use, however, is declining gradually which has been observed to be true elsewhere (Benz *et al.*, 2000). Now, the practice of using wild food is at risk of disappearing (Abbasi *et al.*, 2013b). Change in land use, deforestation, urbanization, and cultural transformations are found to be important causes to change practice and traditional knowledge of utilization of wild food plants in Nepal (Acharya & Acharya, 2010). Since the loss of indigenous knowledge has negative impact on biodiversity conservation (Keller *et al.*, 2005), it has been urgent to document the traditional indigenous knowledge for preservation of genetic and cultural diversity (Shrestha & Dhillon, 2006; Tremote *et al.*, 2011).

1.4 Ethnic communities in Parbat district

Parbat district is home to a large number of ethnic communities, which can be broadly classified under two categories: Indo-Nepali and Tibeto-Nepali. The former includes *Tolange*, *Bishwakarma*, *Pariyar*, *Puri*, *Syanshi*, *Kumal* and *Majhi* while the later includes *Gurung*, *Magar*, *Newar*, *Rai* and *Tamang*. These communities along with other communities like *Thakali*, *Gharti/Bhujel* have good association with the plants resources.

In the present study, three indigenous tribes – *Gurung*, *Magar* and *Majhi* – are taken into consideration. These ethnic communities have been associated long with the utilization of plant resources in their immediate vicinity and have passed down the valuable information chiefly through oral conversation from generation to generation.

1.4.1 Gurung

Gurung is called Tamu ('Ta'= Horse 'Mu'= man) signifying the traders of horse. About 3.5 million *Gurungs* are staying in Nepal among which 1.1 million speak their own language. In Parbat, 3.69% of the total population is of *Gurung* (Fig. 1).

Gurungs are mongoloid in appearance with slanted eyes, flat nose, black, silky hair having a short, stocky height. Males wear sleeveless jacket, bhangra, dhoti, patuka, cap and turban, whereas women wear bodice, phariya and patuki. Women prefer wearing ornaments including earrings, amulets, nose pendent, colored glasses, silver coin bracelets and necklace of silver or gold coins or colorful beads. They prefer to live in the upper elevation of steep hills and tend to have fields in terraces on the hill or valley floor. Most of the houses are two stories with narrow entrance and wooden windows. All the houses are neatly painted with white and red clay; and doors and windows are painted with black colour. In some villages, they paint the doors and windows in yellow and red which are obtained from the bark of *Berberis aristata* 'Chutro' and *Taxus wallichiana* 'Lothsalla'. They keep open places (yard) in front of the houses for drying grains, keeping various household goods as well as for observing ceremonies.

Religionwise, *Gurungs* are both Hindu and Buddhist. They offer fermented foods and local alcoholic beverages to their deities. Kinema and masuera are two important fermented foods. Sukuti, gunchi, sukako fish, kodo ko roti/dedho, phaper ko roti/dehdo, gundruk and sisno ko tarkari are other traditional foods. Their traditional occupation is based on horse trading and sheep herding. But now agriculture and animal husbandry has become the main source of income. Now a day they are even involved in trade and business.

They practice both arranged and love marriage systems. In the case of arrange marriage, groom and his party go to the bride's house a day before the marriage with typical foods like sel-roti, curd, fried beetles, nuts, and offer to the bride. *Gurungs* have their traditional funeral rites performed by lama. In such procession lamas lead the funerals blowing a musical instrument called conch shell. During the procession, parched rice is sprinkled on the path head. The body

is buried in a short distance from the village.

1.4.2 Magar

Magars are one of the indigenous people having their own distinct language, culture, custom and history (Fig. 2). On the basis of their language, culture and distribution, they are divided into four major groups: Artha Magarth, Bara Magarth, High-mountain Magarath and Chhantvals. Three myths explaining the origin of *Magar* are popular. According to one mythology, *Magars* evolved from two caves namely, Pelma Khar (barley dispersing cave) and Yoma Khar Pu (hornet's cave) scattering in all directions. The other myth narrates story of See *Magar* and Chinto *Magar*. Because of the differences between the two, it is said, Chintoo *Magar* migrated and ruled over Sikkim. See *Magar*, on the other hand, migrated towards Bara Magarath slowly. Yet, another myth presents four brothers living in Kham and Arghamagath. These four brothers once went for camping and distributed works, which in due course developed in four different clans: the eldest represented Bahun *Magar*, the second became Thakuri *Magar*, the third was called Khas *Magar* and the fourth one was known as Kami *Magar*.

The main area that *Magars* inhabit is in the western part of Nepal from Kaski, Syangja, Gulmi, Parbat, Palpa, Argakhachi, Myagdi, Baglung, Pyuthan, Rolpa, Rukum to Dang districts. Besides, the *Magars* spread all along the hills of east Nepal and in a few places in the eastern Terai. They represent third largest ethnic group (CBS, 2011) having 10.96% of total population of Nepal. Among their clans, there are Thapa, Gharti, Rana, Ale, Roka, Pun, Budhathoki, Saru, Budha, Paija, Purja, Kham, etc. The language of *Magar* belongs to the Tibeto-Burman family. According to the census *Magars* are the eighth major mother tongue speaking ethnic group. And Kham, Tarali or Kaike are namely the *Magar* languages.

Physically, *Magars* are short and stocky in built with average height of 5 feet to 5:7 inches. They are fair in complexion having oval, round face with razor cut eyes and black hair. The man wear folk tunic *bhoto* or shirt or the vest with Nepali *topi* while women folk wear *chaubandi cholo*, *lungi* and *patuka*. The common ornaments used by the women are *pote*, *tilahari*, *mundri* and *bulaki*. The special ornaments for wearing on head is made by the beaten gold pieces in elongated and circular shaped called *sirbandhi* and *sirphul*.

Economical activities of *Magars* are mainly agriculture, selling of cash crops and animal husbandry. A large number of the *Magar* population is involved in dry crop farming and

buffalo rearing. They have also earned name and fame by joining in British and Indian Army forces. The typical houses are usually built of two storeys with thatched roof. In western part of Nepal, oval houses are common but not in the eastern hills. Their houses are painted lime red, white washed, ochre depending upon the availability and natural paint in the vicinity. They have stone walls and wooden shingle roofs and are two storied with *verandan* in the front. Timbers used for construction of houses are of locally available trees.

Magars follow both Hinduism and Buddhism. Khas-bhaun *Magar* worship Bahaun priest because of their living with Brahmin for long time. There are differences in rituals and tradition among Bara-Magarath and Aratha-Magarath; and they have their distinct dialects. For entertainment, they sing *Sorathi*, *Kauda*, *Ghatu*, *Jhabre*, *Nachari*, *Chudka bhaka*, *Rodhi*, *Salaijo*, *Dohori* and accompany these songs with dances. *Magars* play the musical instruments like *Madal*, *Sarangi*, *Murali/Bansuri*, *Khajjadi*, *Damphu*, *Majura*, *Panche Baja*. *Magar* worships idol, supernatural power *dhami* and *jhakri*. They relate themselves to nature and worship it. Dead bodies are buried and death is celebrated with singing, dancing and feeding people with the beliefs that they go to heaven and that moment should be cherished.

1.4.3 Majhi

Majhis are one of the indigenous people of Nepal having their own culture and tradition (Fig. 3). And they have a special relation with rivers of Nepal. Traditional occupation of *Majhi* people are making boats, helping people to cross rivers and fishing. Most of their houses are built in vicinity of the water.

Majhi people look dark brown in skin complexion, medium in height but well built. They have mongoloid face, typically of east Asia. Language of *Majhi* is categorized into Indo-European. Religiously, *Majhis* are *Tantrik* and they do not have temples so they establish god and goddess at the base of religious trees near rivers. Their principal god is *Gribhimshen*, *Gorsiddhi*, *Mahadev*, *Satidevi*, *Shikari*, *Jaurekhee*, and their special offerings is flower. The greatest festival of *Majhi* are *Koshi pooja*, *Saune sankaranti* and *Purnima* but unfortunately these festivals are in the verge of extinction. They have their typical traditional dresses: for male and female such as *Kachhad*, *Dhoti*, *Bhoto*, *Istakot*, *Feta* on the head which is the dress code of *Majhi* men; while women put on *Fariya*, *Guynu*, *Patuka*, *Majetro*. Their traditional ornaments *Thokka* (silver band on the rist), *Har of compani rupee*, *Pote* around the neck.



Fig. 1: Gurungs are dancing, "Ghatu" in Losar festival



Fig. 2: A Magar informant with medicinal plant



Fig. 3: A Majhi fishing in Kaligndaki River

Besides boating and fishing, *Majhis* are involved in agricultural farming; women are especially involved in making and selling *Mercha* and *Jhand* (local liquor) in the local market.

Majhi products are considered to be of very good quality. For the settlement, they build simple round houses of stone and clay and construct them very close to each other. While building the houses, they check if the soil is suitable for mixing the four corners of the selected site for preparing *Mercha*. If the soil is suitable, the house is build but if not, place is discarded. *Majhis* have their own mother language which is still spoken in some districts including Parbat.

1.5 Intellectual property rights of Ethnic communities

This intellectual right includes the system of providing benefit or reward to the ethnic communities in the form of incentives. According to prevailing patent system, the products developed from traditional skills after their modification through modern scientific process can be the property of a company or an individual, even though it is based on indigenous knowledge. To protect commercialization without due benefit to indigenous people, the concerned authorities need to be vigilant. At international level, The Convention of Biological

diversity signed at the Earth Summit held in Rio de Janeiro, Brazil (1992) sought to protect the rights of indigenous people by directing the local Governments to enact laws for documenting traditional knowledge and for preventing it from unregulated use.

1.6 Justification of the study

The traditional knowledge of medicinal plants used for food, fiber and fuelwood is based on many years of practice. Indigenous people have been using enormous range of plants for their livelihood. And, their use of forest resources is unique and the skills are passed through oral communication. But due to intrusion of modern civilization in various forms such as construction of roads, markets, hydropower dam, deforestation, resettlement projects, industrialization and changing subsistence economics, the living pattern of tribal people is changing gradually. Even the idea of herbal remedies is being abandoned by new generations. Ethnic communities like *Gurung*, *Magar* and *Majhi* of Parbat, have developed their own ways of living in close association with nature. They have acquired rich knowledge on the use of plants from preceding generations. Because they have been living only among their own people, their rich traditional knowledge has been confined within the community. Considering the facts, it is necessary that traditional knowledge should be assembled and documented, and studied further before they get lost forever. This research aims to document the traditional uses of plants for various purposes with special attention to their medicinal use in healthcare. The discovery of such traditional uses will be helpful to regularize ethnobotanical uses of plants.

1.7 Objectives

The study aimed to explore and document traditional knowledge related to the use of plants among three ethnic communities of Parbat district. The following specific objectives were set:

- To identify and document different plant species reported by the three ethnic communities – *Gurung*, *Magar* and *Majhi*.
- To bring out comprehensive information about the traditional and indigenous herbal medication – use of plant parts for remedy preparation, modes of remedy preparation and application, routes of administration and dosages of herbal medicine.
- To appraise importance of ethnopharmacology among the three ethnic communities and examine cross-cultural use of the medicinal plants.
- To analyze phytochemical and antioxidant properties of the selected plant species mostly used by the three ethnic communities.

1.8 Limitation of the study

- Because the study selected only three ethnic tribes in the studied area, documenting ethnobotany of all the tribes in Parbat district was beyond the scope of this study.
- Information from some of the healers could not be obtained because of their denial to share their indigenous knowledge.
- Detailed study on chemical composition, isolation of active constituents and pharmacological evaluation, though essential, was beyond the purview of this study.

CHAPTER 2

2. REVIEW OF LITERATURE

Ethnobotany, more than a century old independent discipline, has comparatively a shorter history compared to the tradition of using plant species for medicinal and other uses. Over the last hundred years, the ethnobotanical literature in the world has grown rapidly with several journals, magazines, bulletins and books of international repute being exclusively dedicated to covering various aspects on the subject.

An Introduction to Ethnobotany (Faulks, 1958) was the first book on ethnobotany; it contains various topics of economic plants in general. Another highly seminal book, *The Ethnobiology in Human Welfare* (Jain, 1996) contains papers dealing with the social issues of ethnobotany. Another resourceful book on ethnobotanical research, *The Ethnobotany and medicinal plants of Indian Sub-continent* (Maheshwari, 1999), was published with a collection of articles. *Ethnobotany- A methods manual* (Martin, 1995) provides important insights into the methodology used in ethnobotanical explorations. A very notable book on the methodology and ethnobotanical explorations is *A manual of Ethnobotany* (Jain, 1995).

In the context of Nepal, *Ethnobotany of Nepal* (Rajbhandari, 2001) provides important insights into ethnobotanical studies in the past. There are other notable publications: *Natural history and Economic Botany of Nepal* (Bhatt, 1977); *Wild edible plants of Nepal* (Department of Medicinal Plants, Ministry of Forest and Soil Conservation, 1982); *Ethnobotany for conservation and community development* (Shrestha *et al.*, 1997); *Plants and People of Nepal* (Manandhar, 2002); *National Register of Medicinal and Aromatic Plants* (IUCN Nepal, 2004); *Flowers of Mustang* (Chetri *et al.*, 2006); *Medicinal Plants of Nepal* (DPR, 2007); *Medicinal Plants in Nepal: An Anthology of Contemporary Research* (Jha *et al.*, 2008); *Aspects of Traditional Medicines in Nepal* (Gewali, 2008) and *Non-Timber Forest Products of Nepal Himalaya* (WWF Nepal, 2008).

2.1 Ethnobotanical studies outside Nepal

Since Harshberger's (1895) definition of the term, ethnobotany started drawing interest of scholars to examine relationships between human societies and the plants on which they depend. Researchers from developed countries have already spent around hundreds of years studying primary and peripheral aspects of ethnobotany. The availability of journals dedicated to publish ethnobotanical research and prevalence of botanical museums in many universities speak out the intensity and volume of the works. The nature of people's dependency over wild

plants and their potential has also been spotlighted in many researches. According to a prominent scholar, rural people have not only depended on wild plants as sources of food, medicine, fodder and fuel, but also developed methods of resource management, which may be fundamental to the conservation of some of the world's important habitats (Cotton, 1997). As per another study, indigenous knowledge of the local communities includes a system of self-management that governs resources use (Laird & Noejovich, 2002). Studies have also emphasized on the use of traditional medicine and demonstrated that people have produced some of the most useful modern day pharmaceuticals (Joshi & Joshi, 2001). Presented below is the review of research works from outside Nepal.

Ethnobotanical studies worldwide have focused on multiple facets of plant-human relationship. Researchers have documented plant species used by ethnic groups living in any specific area, recorded general use of ethnobotanical plants, studied medicinal use of plant species, and analyzed nutritional values and phytochemical constituents of medicinal plants.

Substantial studies worldwide show a trend of conducting surveys to collect plant species to examine various aspects; some of the significant works are: the ethnomedicobotany of plant species among the four tribes of Meghalaya, India (Chhetri, 1994); cross-cultural use of *Banisteriopsis inebrians* and *Canabis sativa* to treat psychiatric disorder (Halberstein, 2005); medicinal plant species used by *Apatani* tribe of Arunachal Pradesh, India (Kala *et al.*, 2006); threatened edible plant species in South Ethiopia (Balemie & Kebebew, 2006); traditional medicine practice among Yemenite, Iranian and Iraqi Jews (Lev, 2006), anticancer use of *Huanglian* ascribable in traditional Chinese medicine (Tang *et al.*, 2009), use of some plant species in the treatment of sexual dysfunction (Kumar & Arora, 2013), plant species having anti-diabetic agents based on the study of tribal people in Sikkim, India (Chhetri *et al.*, 2014).

Most of the existing studies base on field survey; a few, however, have studied specimens deposited in herbarium (Jain & Dam, 1979). Likewise, researchers have studied wild plants as well as the domesticated ones (Chhetri, 2006), and plants in National parks (Amusa *et al.*, 2010). Almost all the studies deploy a combination of field visits and interview/focus group discussion; some rely only on interview (De Wet *et al.*, 2013), focus group discussions (Hoeven *et al.*, 2013) to generate information from ethnic groups. The studied population largely comprises the practitioners, especially traditional healers (Bhat & Jacobs, 1995).

Review of literature also reveals serious concern about the future of ethnobotanical research (Davidson-Hunt, 2000). It is suggested that the future of research lies in using holistic

approach and relying on cooperative research projects. A comprehensive guidance for ethnobotanical research is provided by Cox (2005); the author points at the need to work towards developing better/new drugs for mankind in future. Some other studies have also recommended for promoting appropriate ethnobotanical research (Khan, 2005), synthesizing medicinal plant knowledge among different cultures (Bletter, 2007) and evaluating outlier interference (Araujo *et al.*, 2012).

A major undercurrent in ethnobotanical results is the elucidation of various uses of plant species. Numerous non-medicinal uses of plant species have been reported; some of them are dye yielding (Punjani & Goel, 2007), alcoholic beverages preparation (Sekar, 2007; Singh *et al.*, 2007) and landscape management (Parra *et al.*, 2012). Medicinal uses of different plants and their parts are reported as the most common (Gill & Nyawuame, 1994; Sen & Batra, 1997; Ramihantaniariyo *et al.*, 2003; Jadhav, 2007; Bano *et al.*, 2014) with no denying of numerous other uses of the plants. Studies carried out in India (Gupta, 1990; Chhetri, 1994; Lalramnghinglova & Jha, 1999; Chandrasekar & Srivastava, 2003; Jamir *et al.*, 2008), in Bangladesh (Anisuzzaman *et al.*, 2007; Nawaz *et al.*, 2009; Hossan *et al.*, 2010), in Pakistan (Qureshi *et al.*, 2007; Khan *et al.*, 2014), in China (Huai *et al.*, 2010; Zhang *et al.*, 2012; Ju *et al.*, 2013), in Korea (Song *et al.*, 2013), in Thailand (Chaveerach *et al.*, 2006), in Iran (Mood, 2008; Sadeghi *et al.*, 2014), in Jordan (Alzweiri *et al.*, 2011), in Egypt (Eissa *et al.*, 2014), in Paraguay (Basualdo *et al.*, 1995), in Peru (Bussmann & Sharon, 2006), in Mexico (Heinrich *et al.*, 1998), in Brazil (Brandao *et al.*, 2012), in Argentina (Martinez & Lujan, 2011), in Mauritius (Mootoosamy & Mahomoodally, 2014), in Canada (Uprety *et al.*, 2012), in America (Latoya *et al.*, 2003), in Cyprus (Della *et al.*, 2006), in Italy (Leporatti & Impieri, 2007), in Switzerland (Abbet *et al.*, 2014), in Serbia (Pieroni *et al.*, 2011; Zlatkovic *et al.*, 2014), in Ethiopia (Teklehaymanot & Giday, 2007; Lulekal *et al.*, 2008; Teklay *et al.*, 2013), in Nigeria (Bhat *et al.*, 1990; Fafioye, 2005), in Malawi (Nyirenda & Maliwichi, 2010), in Mali (Gronhaug *et al.*, 2008), in Namibia (Cheikhyoussouf *et al.*, 2011), in South Africa (Nair & Stalden, 2014) and in Tanzania (Amri & Kisangau, 2012) are the most notable among such studies.

Researches examining more than two or more ethnic groups have analyzed cross-cultural aspects (Heinrich *et al.*, 1998; Halberstein, 2005; Mignone *et al.*, 2007; Pieroni & Torry, 2007; Ceuterick *et al.*, 2008; Eyssartier *et al.*, 2008; Roersch, 2010; Birhan *et al.*, 2011; Navaneethan *et al.*, 2011; Saslis-Lagoudakis *et al.*, 2011 and Mustafa *et al.*, 2012). For instance, Bibi *et al.* (2014) reported highest F_{IC} value (1) for antidote category and 100% FL value for four plant

species, namely, *Achillea welhemsii*, *Caralluma tuberculata*, *Citrullus colocynthis* and *Seripidium quettense*. Similarly, Khan *et al.* (2014) documented the highest F_{IC} values for gastrointestinal and dermatological (0.87 each) and the greatest FL value for *Acacia modesta*, *Caralluma tuberculata* and *Withania somnifera* (100%); Cheikhoussef *et al.* (2011) observed the average F_{IC} value for all ailment categories (0.75); Lulekal *et al.* (2013) on their ethnomedicinal study of plants for human ailments in Ethiopia reported highest F_{IC} value for gastrointestinal and parasitic and dermatological disease categories (0.70 each); Gairola *et al.* (2013) reported 95.83% FL value for *Euphorbia hirta* for the treatment of diarrhoea and dysentery; Mootoosamy and Mahomoodally (2014) found 0.94 and 0.87 average F_{IC} value for all ailments for plants and animal products respectively, and the highest FL value (100%) for *Bryophyllum pinnatum*; Sadeghi *et al.* (2014) noted the highest F_{IC} value for cold/flu/fever (0.71).

Focused inquiries on medicinal uses of ethnobotanical plants have examined prominent use of certain species for certain ailments/diseases (Sarangi & Sahu, 2004; Merlin & Kinsela, 2005, Oyedemi *et al.*, 2009; Lulekal *et al.*, 2013; Megersa *et al.*, 2013; Soladoye *et al.*, 2014). It is argued that traditional methods of treatment still surpass modern medical treatments (Sharma & Sharma, 2010; Hossan *et al.*, 2010). Findings regarding which family species prevails highly seems contested: Asteraceae (Song *et al.*, 2013; Bibi *et al.*, 2014; Bano *et al.*, 2014), Pteridophytes (Kumar *et al.*, 2011) and Fabaceae (Megersa *et al.*, 2013). Significantly reported ailments comprise commonly occurring complaints like day to day maladies (Jamir *et al.*, 2010), teeth blackening (Zumbroich, 2009), malaria (Prakash & Unnikrishnan, 2013), rheumatic disorders and degenerative diseases of musculoskeletal system (Adams *et al.*, 2009), pneumonia and asthma (Mili *et al.*, 2010), skin diseases (Ajibesin, 2012), sexual dysfunction (Kumar & Arora, 2013), gynaecological problems (Shukla *et al.*, 2008; Tiwari & Pandey, 2012; Meena *et al.*, 2013). Very recent studies examining medical value of plants have reported about the use of various plants for contact therapy as well as for the treatment of ailments like diabetes (Ocvirk *et al.*, 2013; Chhetri *et al.*, 2014), cancer (Tang *et al.*, 2009), fungal infections (Mustapha, 2013).

A number of studies have looked into the use of medicinal plants for fish stupefying (Chhetri *et al.*, 1992; Negi & Kanwal, 2009). There are studies which have explicated ethnoveterinary application of plant species (Bandyopadhyay & Mukherjee, 2005; Lans *et al.*, 2006; Mafimisebi *et al.*, 2012; Abbasi *et al.*, 2013a, Giday & Teklehaymanot, 2013) and antidotes (Owuor & Kisangau, 2006; Panghal *et al.*, 2010).

Scholars have examined socio-economic issues and their relationship to ethnobotany. Sher *et al.* (2011), for instance, identified non-timber forest product plants being used from the Miandan valley of Swat district Pakistan and recommended for socio-economic development of the area. Avouhou *et al.* (2012) studied how the socioeconomic status of local people interacted with cultural, botanical and economic features of wild edible plants. Analyzing economic dimension, researchers have emphasized on financial potential of ethnobotanical plants (Shanley & Luz, 2003). It has been suggested that plants can contribute to improving living standards of ethnic people (Rana & Datt, 1997; Andriamparany *et al.*, 2014; Prana & Ahirwar, 2015). One line of scholarship concerned with social dimension has analyzed gender authority issue to spotlight at discrimination over women. It is found that men are prioritized over women to transfer knowledge (Wayland, 2001; Tibuhwa, 2013) and thus interventions from policy makers is required (Wayland, 2001). Another line has inquired on whether and how emigration affects traditional knowledge (Pirker *et al.*, 2012). A study among Chinese and Taiwanese immigrants in Atlanta, USA (Jiang & Quave, 2013) showed statistically significant differences in beliefs concerning their knowledge on traditional medicinal practice.

Researchers have examined reasons for dynamic nature of ethnobotanical knowledge (Stamm *et al.*, 2004; Jain, 2005), surveyed the status of traditional knowledge (Khan *et al.*, 2013) and explicated the modes of transfer (Parabia & Pathak, 2008). Also, they have reported gradual erosion of ethnic knowledge (Voeks & Leony, 2004; Hanazaki *et al.*, 2013; Oliver, 2013) and emphasized on the need to document them (Kumar *et al.*, 1987; Jain & Saklani, 1991; Srithi *et al.*, 2009; Kumar & Yadav, 2010; Bhat *et al.*, 2013; Farooq *et al.*, 2014). Erosion in traditional knowledge is observed not only in the ethnic communities of developing countries but also in developed countries like Italy (Tizio *et al.*, 2012). Scholarly investigations have also revealed exploitation of medicinal plants (Balemie & Kebebew, 2006) and urged different stakeholders for conservation (Aryal & Agrawal, 2006; Choudhary *et al.*, 2008; Sharma & Pegu, 2011).

2. 2 Phytochemical studies outside Nepal

2.2.1 Proximate composition

Plants are very important for human beings from ages as a source of food, medicine, fiber, shelter and many other necessary commodities. Ancient societies obtained their food by hunting and gathering from the Mother Nature. In the course of time, some plant species were cultivated in gardens and wild fields by these societies to cater their various needs. Wild edible plants are important source for nutrient and other necessary supplements in many regions of the world, especially in the developing countries like Nepal. Wild edible plants contain protein,

carbohydrate, starch, fat, vitamin, and mineral required for the local residents to a greater extent (Sundriyal, 1999). Very often they make an important contribution to the diet particularly in the people inhabiting in remote areas. The major nutritional compounds present in wild plants are carbohydrates in the form of starch and sugars. Proteins, crude fiber, lipids in the form of oils, vitamins, minerals etc. also serve as important nutritional supplements. Apart from these, anti-oxidants like ascorbic acid, phenols such as chlorogenic acid and its polymers are available from plants (Aberoumand & Deokule, 2009).

In many tropical countries, rural people traditionally harvest wide range of leafy vegetables, roots, tubers, fruits from wild because of its taste, cultural uses, as food supplements or to tide over food shortage. Many studies have been carried out by researchers all over the world by selecting one or more plants particularly leaves, fruits, roots, stem, bark and food plants to evaluate the nutritional aspects of wild plants as food supplements or to tide over food shortage. Labeled as famine or hunger food, wild plants have been recognized to have potential to meet household food and income security (Kebu & Fassil, 2006).

Protein is the building material for all body parts, as it contributes for development of muscle, brain, blood, skin, hair, nails, bones and body fluids. It is essential for growth, repair of worn-out tissues, replacement of used-up blood and resistance against infections. One gram of protein is known to supply the body with about 4 Kcal (Garrison & Somer, 1995). Non-conventional leafy vegetables are either at par or even superior to many conventional and cultivated leafy vegetables as far as protein content is concerned. Species such as *Diplazium* (Fern), wild Amaranths like *Amaranthus viridis* that occur as garden weed, *Momordica*, and *Moringa* which are of limited occurrence as backyard crop have protein content in the range of 12-27% as against about 23% protein in case of well-known cultivated and conventional leafy vegetables like Spinach (Handique, 2002).

Fats perform life-supporting functions in every human cell, including cell membrane structure, enzyme reactions, blood and tissue structure, in memory and nervous system operations, and in the manufacture and utilization of the sterol hormones and the hormone-like prostaglandins. They are also required for healthy skin, the transport and absorption of the fat-soluble vitamins A, D, E and K, and the regulation of cholesterol metabolism. Although, vegetables naturally have low fat contents in comparison to other nutrients (Garrison & Somer, 1995; Wairagu *et al.*, 2013).

Carbohydrates are the primary source of energy for the body and are often referred to as ‘fuel of life’. Each gram of carbohydrate yields 4 calories in the process of its metabolism. They help to provide energy for muscular work and nutritive processes, maintenance of body temperature, besides their role in oxidation of fats, and as spare protein for growth and repair (WHO & FAO, 1998; Okwu, 2001; Abbasi *et al.*, 2014). Crude fiber plays an important role in decreasing the risks of many disorders such as constipation, colon cancer, cardiovascular diseases (CVD), diverticulosis and obesity (Spiller, 2001). Besides, they inhibit absorption of glucose and cholesterol from the gastrointestinal tract, thus are helpful in diabetes and heart disease control (Ensminger *et al.*, 1993).

In respect to nutritional values, seeds appear to be the most suitable supplementary food of tribes. However, these plants help the tribal as a source of their dietary components up to certain level. Consume wild edible plants on a regular basis and that constitute their routine diet. Although these plants provide some considerable amount of proteins, lipids, carbohydrates and other essential components for the body function, proper supplementation of all necessary vitamins, minerals, and other compounds is urgently required for the better health of the local people (Hussain *et al.*, 2010; Jagtap *et al.*, 2014).

2.2.2 Phytochemical screening

Hill (1952) mentioned numerous medicinal plants, virtually unknown a few years ago, have become important as sources of new drugs, or new applications have been found for their properties. Some 140 additional species are reported and attempt has been made to bring nomenclature up to date. Phytochemicals are chemical compounds formed during the plants normal metabolic processes. These chemicals are often referred to as “secondary metabolites” of which there are several classes including alkaloids, flavonoids, glycosides, steroids, phenols, tannins, terpenes and terpenoids. Phytochemicals are present in a variety of plants in various plant organs such as fruits, seeds, leaves, stem, herbs and vegetables and utilized as important components of both human and animals. These phytochemicals can have strong mechanisms of action in the body and influence the various metabolic activities of the cells and protect the cells against pathogens in humans (Okwu, 2005).

Alkaloid is a plant-derived compound that is toxic or physiologically active. These are a diverse group of low-molecular-weight, nitrogen-containing compounds found in about 20% of plant species. The potent biological activities of some alkaloids have led to their exploitation as

pharmaceuticals, stimulants, narcotics and poisons (Facchini, 2001; Itodo *et al.*, 2010). Alkaloids can be used for curing various human diseases. They can be used as an analgesics, anticancer agents, gout suppressant, muscle relaxant, antiarrhythmic (ajmaline), antibiotics, sedatives (Facchini, 2001; Thenmozhi *et al.*, 2013; Devi & Bhasker, 2014). Some alkaloids have antimicrobial, antifungal, anti-inflammatory, antiproliferative, antidiuretic and anticholinergic activities whereby they act by promoting white blood cells to dispose harmful micro-organisms and cell debris (Roersch, 2010; Bhatnagar *et al.*, 2013; Okach *et al.*, 2013)

Flavonoids are structural derivatives of flavones, containing conjugated aromatic systems, often bound to sugar (s) as glycosides, and they are phenolic and water soluble in nature (Harborne, 1973). They exert their roles as anti-oxidants, and hence protecting against degenerative diseases. Flavonoids such as quercetin, act as chain breaking anti-oxidants, and by preventing oxidation of low-density lipoprotein by macrophages and metal ions like copper. This reduces the oxidative stress (Ngoci, *et al.*, 2011; Ganesh *et al.*, 2013). They also act as anti-allergens, antioxidation, antiaging, antihypoxia, antifatigue, anti-inflammation, anti-hepatic fibrosis, antitumor, analgesia and induce enzymes which destroy mutagens and carcinogens (Edeoga *et al.*, 2005; Zhou *et al.*, 2014).

Saponins are naturally occurring surface-active glycosides mainly produced by plants, lower marine animals and some bacteria. These are service active agents with soap-like properties and can be detected by their ability to cause foaming and to haemolyse blood cells (Harborne, 1973). They have a host of biological roles including boosting respiratory system as expectorant, and hence activity against cough. They also have anti-protozoa activity whereby they act by reacting with cholesterol in the protozoal cell membranes causing cell lysis. They serve as vaccine boosters by acting as adjuvant. They have anti-inflammatory, emetics, antiviral, antifungal, insecticidal, molluscicidal, piscicidal and anti-bacterial activity (Wani *et al.*, 2011; Islam *et al.*, 2012).

Phytosteroids are plant steroids that may or may not act as weak hormones in the body. They share a common basic ring structure with animal steroids though they are not equivalent because of varying chemical groups attached to the main ring in different positions. They are mainly used to treat reproductive complications such as treatment of venereal diseases, used during pregnancy to ensure an easy delivery, as well as to promote fertility in women and

libido in men. They also act as sex hormones derivatives and hence they are potential source of contraceptives (Edeoga *et al.*, 2005).

Terpenoids constitute the largest family of secondary metabolites, with over 30,000 members. They are not only numerous but also extremely variable in structure, exhibiting hundreds of different carbon skeletons and a large assortment of functional groups (Harborne, 1973). They exert their roles as anti-bacterial, anti-fungal, anti-viral, anti-protozoan, anti-allergens, as immune boosters and as antineoplastic (Edeoga *et al.*, 2005; Sharma *et al.*, 2009; Ngoci, *et al.*, 2011; Ravishankar *et al.*, 2012).

Glycosides occurs as a complex mixture together in the same plant and most of them are toxic, however many have pharmacological activity especially to the heart (Harborne, 1973). They are used in treatment of congestive heart failure, whereby they inhibit Na⁺/K⁺-ATPase pump that causes positive inotropic effects and electrophysiological changes. This strengthens heart muscle and the power of systolic concentration against congestive heart failure (Edeoga *et al.*, 2005; Maobe *et al.*, 2013). They are also used in treatment of atrial fibrillation, flutter, and they acts as emetics and as diuretics (Harborne, 1973; Ngoci *et al.*, 2011).

Phenols are astringent, bitter plant polyphenols that either bind and precipitate or shrink proteins. They act as antioxidants through free radical scavenging activity, chelation of transition metals, inhibition of prooxidative enzymes and lipid peroxidation. They also helpful to suppress tumor growth by inducing apoptosis and inhibiting mutagenicity of carcinogens (Edeoga *et al.*, 2005; Okuda, 2005; Ayoola *et al.*, 2008; Ngoci *et al.*, 2011). They are anti-inflammatory, molluscicidal and hence important in the control of schistosomiasis. They also have antidiarrhoeal, anti-septic anti-fungal properties, anti-parasitic, anti-irritant properties and also used in curbing hemorrhage, in wound healing, and improving vascular health by suppressing peptides that harden arteries (Okuda, 2005; Yadav & Agarwal, 2011). Phenol and its derivatives can be used to kill various insects (Sahayaraj & Ravi, 2008).

Antioxidant can act by scavenging reactive oxygen species by inhabiting their formation or by binding transition metal ions and preventing formation of OH or decomposition of lipid hydroperoxides or by repairing damage radicals and so terminating the chain reaction of lipid peroxidation. There are a wide range of naturally available antioxidants in nature which are different in their composition, physical and chemical properties mechanisms and site of action. Many plants serve as a potent antioxidant can be screening which is done by measuring the

antioxidant activities through various *in vitro* models such as DPPH method, Nitric oxide method, DMPD method, ABTS method, ORAG method, TBARS assay (Huang, 2005; Sariri, 2012).

Antioxidants and functioning of various organs and organ systems is highly complex and the discovery of ‘redox signaling’ is a milestone in this crucial relationship. Recent research centers on various strategies to protect crucial tissues and organs against oxidative damage induced by free radicals. Many novel approaches are made and significant findings have come to light in the last few years. The traditional Nepalese diet, spices and medicinal plants are rich sources of natural antioxidants. Newer and future approaches include gene therapy to produce more antioxidants in the body, genetically engineered plant products with higher level of antioxidants, synthetic antioxidant enzymes (SOD mimics), novel biomolecules and the use of functional foods enriched with antioxidants (Devasagayam *et al.*, 2004). Available literature on antioxidant activities and reducing power of medicinal plants has suggested potential use of plants for regenerative biological activities in human.

Rice-Evans *et al.* (1995) studied the relative antioxidant activities, against radicals generated in the aqueous phase, of a range of plant-derived polyphenolic flavonoids, constituents of fruit, vegetables, tea and wine, have been assessed. Many researchers made extensive studies to understand the antioxidant properties on crude extracts of leaves of *Abies spectabilis* (Tote *et al.*, 2009), leaves of *Brucea amarissima*, *Intsia bijuga*, *Laportea meyeniana* and *Pipturus arborescens* (Peteros & Uy, 2010), various fruits, vegetables and grains (Qusti *et al.*, 2010), Leaves and seeds of *Trachyspermum ammi* (Damodar *et al.*, 2011), leaves of *Naravalia zeylanica* (Sutharsingh *et al.*, 2011), whole plant of *Centella asiatica* (Rahman *et al.*, 2012; Haque *et al.*, 2012; Desai *et al.*, 2013), leaves and fruits of *Zanthoxylum armatum* (Negi *et al.*, 2012), leaves of *Ammannia baccifera* (Loganayaki *et al.*, 2012), Leaves of *Benincasa hispida* (Rana & Suttee, 2012), leaf and bark *Litsea* spp. (Choudhury *et al.*, 2013), leaves of *Coelogyne nervosa* (Shibu *et al.*, 2013) and whole plant of *Valeriana hardwickii* (Sajad *et al.*, 2014). In the international level it has been observed that much of the similar study has been undertaken which is evident from scrutiny of above mentioned literature.

2.3 Ethnobotanical studies in Nepal

Ethnobotanical exploration in Nepal is agreed to have begun in the mid-50s of 20th century. Based on the study of medicinal and food plants from east Nepal, Banerji (1955) documented

13 species. Many studies in the 60s and 70s sustained the tradition of identifying and reporting about the plant species found in different locations; enlistment of 217 species having medicinal value (Adhikari & Shakya, 1977) is one of the instances of such study. From the late 70s and thereafter, researchers analyzed plant species used by different ethnic groups: the plants are enlisted with the information related to their taxonomy and discussed in terms of medicinal and other uses. In 2002, a volume was published to provide a thorough treatise on folk wisdom related to 1517 kinds of plants (Manandhar, 2002). Presented below is the review of literature since 1980s:

A substantial body of literature from the 80s onwards brought out information on various facets of plant species used by any specific tribe living in specific geographical areas. Among the tribe focused studies, ethnobotany of *Tamang* in various areas-Kathmandu valley (Shrestha, 1988), Kavrepalanchowk district (Manandhar, 1991), Langtang National Park area (Chhetri & Joshi, 2002), Nuwakot district (Tamang, 2003), Central Nepal (Lohani, 2010) and Makwanpur district (Luitel *et al.*, 2014) has already been documented. Other explorations include ethnobotany of *Sherpa* in Rolwaling region (Sacherer, 1979); of *Gurung* in Kaski, Parbat and Syangja districts (Coburn, 1984); of *Tharu* in Dang district (Manandhar, 1985), and of *Tharu* in Bara, Parsa and Rautahat districts (Chaudhary, 1994); of *Mooshar* in Dhanusa district (Manandhar 1986b); of *Chepan* in Makwanpur district (Manandhar, 1989a); of *Danuwar* in Sindhuli district (Manandhar, 1990); of *Raute* in Dadeldhura district (Manandhar, 1998); of *Satar* in Jhapa and Morang districts (Siwakoti & Siwakoti, 2003); of *Magar* in Dhading district (Poudel & Gautam, 2008), and in Parbat district (Thapa, 2012); of *Chepan* in the mid-hills of Nepal (Rijal, 2008); and of *Pahari* in Lalitpur district (Bhatta & Chhetri, 2009).

Ethnobotanical studies have also yielded comprehensive inventory of plant species in the three geographical regions – Himalayan, Hilly and Terai. In the list of available literature till the turn of 20th century, Narayan P. Manandhar's research appeared the most prominent; Manandhar generated profile of 125 plant species in Jumla district (1986a), 66 species in Lamjung district (1987a), 81 species in Manang valley (1987b), 79 species in Makwanpur district (1995a) and 60 species in Jajarkot district (1995b). Other prominent scholarship include study of 53 leafy and fruity vegetables in the markets of Dharan (Shrestha, 1983); documentation of 83 species in Palpa district (Shrestha, 1985); enumeration of 9 species previously unrecorded in Helambu and adjoining areas (Shrestha, 1989); studied about ethnobotany and conservation of plant diversity in Nepal (Joshi & Joshi, 2005); carried out the study of ethnobotany of Nepal

(Rajbhandari, 2001) and studied about some threatened medicinal and aromatic plants and its status, trade and management practice in Dolpa (Kunwar, 2002).

The available literature has examined ethnobotany of the five development regions – Eastern, Central, Western, Mid-Western and Far-Western. Compared to the number of studies in other regions, ethnobotany of Eastern and Far-Western Development regions are smaller. Other three regions have been studied abundantly. The four consecutive paragraphs below present the literature reviewed for this study:

Ethnobotanical studies of the Eastern and Far-Western regions are sparse. Studies in Eastern region includes documentation of the use of fodder trees in Jhapa and Sunsari districts (Upadhyay, 1992); reporting of 50 plant species used in day-to-day life of ethnic people in Sunsari district (Deokota & Chhetri, 2007) and analysis of 117 species in Sankhuwasabha district (Parajuli, 2000). The studies in Far-Western region comprise enumeration of 22 species in the community forests of Kailali district (Acharya, 2009) and evaluation of ethnomedicinal plants and their uses in Far-west of Nepal (Kunwar *et al.*, 2010). It is concluded that traditional herbal medicine has not only survived but also thrived in the trans-cultural environment.

Studies in Central Development Region abound: Joshi and Edington (1990) examined 66 plant species in two village communities in this region and concluded that 17 species could be expected on pharmacological evidence to produce the therapeutic effects attributed to them; Chhetri (2005) documented the species grown by the farmers of Dhulikhel district; Shrestha and Dhillon (2003) surveyed medicinal plant diversity and their use in Dolakha district; Bhattarai *et al.* (2006a) identified 45 new ethnomedicinal plant species in Manang district; Joshi *et al.* (2011) reported 87 species of medicinal plants in Machhegaun, Kathmandu district.

Studies in Western region are found to be even more: Pohle (1990) reported about 239 species in Manang district; Mahato (1998) studied medicinal plants in Palpa district and found 19 species being used to treat various diseases; Panthi and Chaudhary (2003) transcribed 101 medicinal plants used in Arghakhanchi district to treat gastrointestinal disorders, diarrhoea, cough, cold among others; Mahato and Chaudhary (2005) examined ethnomedicinal uses of 115 wild species in Palpa district and suggested that local forest management needs to be made conversant with sustainable harvesting methods and other pertinent issues; Acharya and Acharya (2007) explored dynamics of furniture and agricultural implements production enterprises from Parbat and Myagdi districts; Bhattarai *et al.* (2009) transcribed the use of 103 plant species used for curing 32 body ailments by *Amchis* of upper Mustang area. In the study

of trans-Himalayan arid zone of Mustang district, Bhattarai *et al.* (2010) recorded the traditional uses of 121 medicinal plant species to treat a total of 116 ailments. Bhattarai *et al.* (2011) found 45 species useful for treating 34 different ailments in Panchase forest of central Nepal.

Literature on ethnobotany of Mid-Western region are also fairly large: Bhattarai (1993) presented information on curative properties of 83 herbal recipes used by people of Rolpa, Salyan and Pyuthan districts; Manandhar (1995b) reported the use of 60 species to treat 25 types of diseases in Jajarkot district; Ghimire *et al.* (2001) studied traditional knowledge of *Amchis* in Dolpa district; Kunwar and Adhikari (2005) accessed 58 plant species used by people in Dolpa district to treat diarrhoea and dysentery, fever, cough and cold, cuts and wounds; Kunwar *et al.* (2006) examined the ethnobotany and traditional use of plants extracts from Dolpa, Humla, Jumla and Mustang districts; Rokaya *et al.* (2010) enumerated 161 plant species in Humla district.

The other type of study includes ethnobotany of multiple tribes living in a specific geographical region. Upadhyay (1992) documented the use of fodder trees among the *Magar*, *Mooshar*, *Rai*, *Tamang* and *Tharu* of Jhapa and Sunsari districts; Deokota and Chhetri (2007) reported 50 plant species used in day-to-day life of *Tharu*, *Satar*, *Sunuwar*, *Mooshar*, *Rai*, *Magar* and *Newar* in Sunsari district; Kunwar and Bussmann (2009) reported 76 plant species used by the ethnic communities in Darchula and Baitadi districts; Malla and Chhetri (2009) enumerated 68 plant species based on the indigenous knowledge of the *Tamang*, *Newar*, *Magar*, *Pariyar*, *Bishwokarma* in Kavrepalanchowk district. Other instances include the study of indigenous knowledge on medicinal non timber forest products used by the *Gurung*, *Magar*, *Kumal* and *Majhi* in Parbat district (Malla & Chhetri, 2012b); an enumeration of 61 plant species utilized by *Gurung*, *Magar* and *Majhi* (Malla *et al.*, 2013) and 132 medicinal plants used by *Magar* and *Majhi* (Malla *et al.*, 2015) in Parbat district respectively.

Quite recent studies examining multiple communities/ethnic groups have also estimated use variability of medicinal plants, which is calculated as F_{IC} and FL value. Kunwar and Bussmann (2009) analyzed 76 medicinal plant species and found *Berberis asiatica* for eye trouble having 1.00 F_{IC} value. Rokaya *et al.* (2010) found that gastrointestinal ailments had the high F_{IC} value of (0.40) and the highest FL (100% each) value for *Mentha spicata* and *Rumex hastatus*. Uprety *et al.* (2010) calculated 0.82 average F_{IC} value for all ailment categories; Singh *et al.* (2012) observed the average value to be 0.94; Kunwar *et al.* (2013) found 37% of

ethnomedicinal plants in Far-western region of the country having 0.86 to 1.00 F_{IC} value. A few studies have examined potential of the indigenous knowledge to contribute for innovations in pharmaceutical industries (Malla *et al.*, 2015).

Recent studies have also examined ethnobotany in various ecosystems of watershed area: Joshi and Joshi (2000) documented the use of 48 species in the Kali Gandaki watershed area; Joshi and Joshi (2006) found 22 species used by the people in Kali Gandaki and Bagmati watershed areas. Similarly, in a multiple issue focused study, (Burlakoti & Kunwar, 2008) found 64 medicinal plants used to prepare 61 medical remedies in Mahakali watershed area. Three major observations were made: first, root of the plants (25 species) was the most frequently used; second, most medicines were prepared in the form of juice; and third, maximum plants (25 species) were used to treat gastro-intestinal problems.

There are studies concerned with a number of other dynamics. Singh *et al.* (1979), who studied plant species used by the people in hilly terrains, observed medicinal plants not only indispensable but also sacred to the people of this region. It is reasoned that the unwillingness of indigenous people to share their knowledge grounds on the belief that such sharing would lessen its strength to cure. The other study (Anguilar, 2004) highlighted the connections between gender, the environment and protected areas. Gender equity is suggested to make differences in protected area management. Another study emphasized on an urgency to initiate organized scientific study and document ethnozoology of the people in the central and eastern Himalaya of Nepal (Lohani *et al.*, 2008). In a review study of indigenous knowledge and the use of plant resources of Nepal Himalayas, Kunwar and Bussmann (2008) analyzed 264 studies between 1979 and 2006 to contrast with empirical research on ethnobotany of seven districts in western Nepal. It was found that up to about 55% of the flora of the study region had medicinal value which in earlier studies had been noted to be 21-28%. Similarly, Poudel *et al.* (2010) found 141 species in Argha VDC of Arghakhanchi district used in different modes, most of them are taken as juice followed by paste, powder and decoction. It was also found that poor and marginal people continued the practice and the knowledge were confined within the family members of herbal healers.

The number of studies with a focus on specific ailment/disease treatment is found to be very less. Bhattarai (1994) enumerated 54 plant species used to prepare 60 widely accepted folk prescriptions to treat gynaecological complaints. Similarly, phytotherapy focused studies are found to be sparsely available. Bhattarai (1992), for example explored phytotherapy of lay

people of Jumla, Mugu, and Kalikot districts.

Study on the edible wild plants is observed to have fascinated some researchers. Uprety *et al.* (2012) documented utility of wild edible plants among the people in Makwanpur, Tanahun, Dang, Bardiya and Kailali and revealed growing threat to the plants' habitat; Aryal and Budathoki (2013) identified and documented nutritional potential of wild edible micro fungi lying within 110m and 165m above sea level in tropical deciduous riverine forest Rupandehi district. The available scholarship has also paid attention to potential threat to ethnobotany. The scholars studying environmental aspects have examined the impacts of climate change on indigenous medicinal plant species and their dependent communities (Kunwar *et al.*, 2014). Others have warned about extinction of plant species because of over exploitation (Saul, 1992).

Researchers have also examined veterinary application of plant species. Bhattarai (1991) observed the use of 58 plant species for 60 different prescriptions; Malla and Chhetri (2012a) observed 21 plant species in Parbat district being used to treat diseases like poisoning, wounds, stomach disorder, and bone fracture among others. Studies have also examined the toxic plant species found in different regions and their use by local people. Bhandary and Shrestha (1982) reported about 15 poisonous plants in Annapurna and Langtang area; Bhandary and Shrestha (1986) presented information on 32 poisonous plants in Manang and Mustang area. Attention has been given to the use of plant species for stupefying fish. Manandhar (1989b) enumerated 50 plant species used in various parts of Nepal; and Joshi and Joshi (2005) documented the plant species used by local people in Bagmati watershed.

Plant family/species focused studies also exist, though not abundantly. For instance, Bhattarai *et al.* (2006b) reported about 3 species of *Juniperus* extensively used by the *Gurungs* in Manang district; Chhetri and Gauchan (2007) studied the indigenous knowledge on fruit pulp processing of *Choerospondias axillaris* (Lapsi) and highlighted its potential for income generation and nutrient supplementation; Chhetri and Gauchan (2008) studied indigenous technical knowledge on the wood processing of *Alnus nepalensis* (Uttis) in Kavrepalanchowk district; Joshi (2008) studied species of *Swertia* L. to understand their usefulness for preparing Ayurveda and allopathic medicines; Phoboo and Jha (2010) reviewed the state of trade and sustainable conservation of *Swertia chirayita*. Deokota and Chhetri (2009) studied about the use of *Girardinia diversifolia* among the ethnic people in Bhedetar, Sunsari district and reported about micro and macro level significance of the plants. Likewise, Koirala *et al.* (2010) transcribed information about the orchids and documented 36 species of *Dendrobium denudans* and *Dendrobium eriiflorum* in Rolpa district. Rajbhandari and Dhungana (2011)

found 283 species of endemic flowering plants in Nepal. Another study focused on *Daphne* species (Lokta plants) and its sustainable availability for Nepali handmade paper (Kharal *et al.*, 2013).

Studies have also examined economic aspect of ethnobotany. It is concluded that some plant species have huge economic potentials. Garbyal *et al.* (2004), for instance, studied the importance of *Cordyceps sinensis* in the economy of people in Dharchula Himalayas and concluded that the local people are improving their living condition. In a macro level study, Bhattarai and Ghimire (2006) found 143 species of medicinal and aromatic plants to be commercially important. Aryal *et al.* (2009) found multiple uses of uncultivated plants and their contribution in the livelihood of *Chepang* in the mid-hills of Nepal. The community is observed to have started in-situ conservation and domestication of important plant species like e.g., *Asparagus racemosus*, *Dioscorea bulbifera* and *Diploknema butyracea*. Later, Pandey *et al.* (2010) analyzed the economic potential of the country's forest resources in terms of forest goods and services. Some studies have recommended about the potential of plant species to contribute in national economy (Magar, 2014). More nuanced studies have focused on genealogy of certain plant species trade. For instance, Subedi *et al.*, 2013 found a long tradition of illegal trade of orchid to China and Hong Kong due to the medical significance of the plant in these countries.

2.4 Phytochemical studies in Nepal

2.4.1 Proximate composition

Plants are the universal resources for food, medicine, fiber and other purpose. Due to unique geographical and climatic characteristics, Nepal is very rich in phyto-diversity. About 90% of Nepalese population is living in rural and remote areas where facilities such as balance diet availability and modern health care are lacking. People are still using wild plants for their food and other purposes. Despite widespread use of wild plants in Nepal, there are very limited studies on nutritional aspects of plants. Wild edible plants contain protein, carbohydrate, starch, fat, fiber, vitamins, and mineral required for the local residents to a greater extent (Sundriyal, 1999).

Studies carried out with the focus on finding nutritional contents in wild edible plants have found some plants are highly valuable for their contents and can be used for commercial purpose in Nepal. Nutritive values of wild edible fruits in terms of total dry matter, sugar,

protein, total ash and sodium, potassium, magnesium and calcium. Wild fruits are comparable to cultivate fruits in nutritive values and therefore, may be considered as suitable for cultivation (Bajracharya, 1980). Wild yams are making a significant contribution to diets of tribal people in Nepal. However, there is insufficient study of their nutritional value of wild yams (*Dioscorea bulbifera*, *D. versicolor*, *D. deltoidea* and *D. triphylla*). Nutritional compositions of wild yams were similar to those reported for most cultivated yams in several parts of the world except for the higher value of crude fiber found in their samples (Bhandari *et al.*, 2003). Estimation of antinutritional factors in wild yam species revealed that the Nepalese wild yams may contain a health-hazard potential, which in turn demands proper processing before consumption to eliminate the effects of the antinutrients (Bhandari & Kawabata, 2004).

Gauchan *et al.* (2008) studied fresh and roasted tubers of *Nephrolepis cordifolia* which were consumed by the local dwellers in Nepal. Different parts of plant had been chemically analyzed for their nutritional contents and further observed that tubers contained high amount of moisture, fat, carbohydrate and calcium while the protein were reported maximum in rhizome part. Valvi *et al.* (2014) carried out phytochemical test for five wild edible fruits (*Ficus Racemosa*, *Elaeagnus conferta*, *Antidesma ghasembilla*, *Grewia tillifolia* and *Scleichera oleosa*) in their mature and ripen stage. All five wild edible fruits were rich in vitamins, proteins and in antioxidant enzymes. The nutritional and phytochemical composition of fruits indicated that, these neglected wild edible fruits can be a valuable source of nutrients under famine conditions and high levels of some vitamins, antioxidants and can be used to prevent diseases.

2.4.2 Phytochemical screening

The richness of Nepal in biodiversity has long been recognized showing its 10th rank in Asia and 31st in the world. Nonetheless, evaluation of the medicinal plants through phytochemical screening using advance technology is very limited. Very limited and inadequate information on phytochemicals of wild medicinal plants of Nepal are available.

Literature on phytochemical screening of medicinal plants in Nepal are very sparse: Karanjit *et al.* (2007) screened bioactive compounds in 171 medicinal plants; Bhattarai *et al.* (2008) evaluated phytochemicals in 31 medicinal plants; Chhetri *et al.* (2008) studied the bioactive chemical constituents and to evaluate the antimicrobial activity of the ethanolic extract of traditionally used eight medicinal plants; Dhakal *et al.* (2009) studied about the phytochemical constituents of the bark of *Vitex negundo* L.; Devkota and Jha (2010) studied about the seed

germination responses of *Centella asiatica*; Adhikary *et al.* (2011) carried out the phytochemical and biological screening of different medicinal plants; Shrestha (2011) studied physicochemical parameters of *Rauvolfia serpentina*; Baral *et al.* (2012) estimated phytochemicals of different species of *Swertia*; Rokaya *et al.* (2012) recorded many secondary metabolites in ethnomedical uses of *Rheum australe*; Aryal *et al.* (2014) reported qualitative phytochemicals in *Termitomyces robustus*; Giri *et al.* (2014) studied phytochemicals in *Justicia adhatoda*, *Artemisia vulgaris*, *Psidium guajava*; Srivastava *et al.* (2014) studied flavonoids and reducing compounds in *Hypericum cordifolium*; Parajuli *et al.* (2012); Chalise *et al.* (2010); Maharjan and Baral (2013) and Kanwal *et al.* (2015) determined the antioxidant activity of some selected medicinal plants.

The survey of available literature revealed that ethnobotanical study in Parbat district is very limited. These studies have focused on one ethnic group found in three districts (Coburn, 1984) or an ethnic group found in one district (Thapa, 2012), selected very small study site (Bhattarai *et al.*, 2011), and analyzed a limited number of indexes (Coburn, 1984; Bhattarai *et al.*, 2011; Thapa, 2012). These studies, in this sense, bring limited account of ethnobotany in Parbat. Very recent studies with an exclusive focus in Parbat district have brought out comparatively more comprehensive account (Malla & Chhetri, 2012a; Malla & Chhetri, 2012b; Malla *et al.*, 2013; Malla *et al.*, 2015). Yet, these studies need to be extended in terms of broader area of Parbat and larger number of ethnic communities. More importantly, the plant species need to be analyzed in terms of indexes which are most frequently used measures everywhere, but not in the cases of ethnobotanical plants in this district. In brief, because of the fact that a detailed investigation of ethnobotanical plants used by the different ethnic tribes has yet not been prepared, this research aims to bring out comprehensive account of ethnobotanical knowledge among the major ethnic communities viz. *Gurung*, *Magar*, and *Majhi* of the district.

CHAPTER 3

3. DESCRIPTION OF THE STUDY SITE

3.1 STUDY AREA

Parbat, a hilly district in western Nepal, lies between 27° 58' N to 28° 39' N latitudes and 83° 34' E to 83° 59' E longitudes. It covers an area of 536.86 sq. km. and altitude varies from 520 m to 3309 m asl. The political boundaries of the district extend in the east to Syanja and Kaski districts; Baglung, Myagdi and Gulmi districts in the west; Myagdi and Kaski districts in the north; and Syanja and Gulmi districts in the south. The head-quarter of the district, Kusma, lies at the altitude of 879 m. Kusma is a long narrow strip going towards the south where two big rivers, Kaligandaki from Northwestern side and Modi from Northeastern side, confluence at dobillha in Shivalaya VDC. These two rivers have high potential for commercial fishing by the local tribes. Other rivulets, streams and streamlets such as Lungdikhola, Panyukhola, Luwakhola etc. where natural breeding of different species of fishes have been taking place, encourage ethnic tribes for fishing.

There are Setibeni and Modibeni, the famous sacred places, which have forests of religious importance. Similarly, Panchase, Dahare, Sirpu and Gorlyang are the famous areas of dense forest. A black topped road passes through the middle of the district called Pokhara-Baglung highway. In terms of political administration, the district is divided into 11 illakas with 2 constituencies and 55 village development committees (VDCs) (Fig. 4). Agriculture is the main occupation and animal husbandry is the second one. Goats, cows, bulls, buffaloes and sheep are the main cattle.

The district contains high diversity of plant species because of sub-tropical, temperate and sub-alpine monsoon type of climate. A substantial number of ethnic communities, who have been basically surviving on plants and plant parts in their surroundings, have knowledge about these plants and their medicinal and other uses. But, the systematic documentation of their knowledge is lagging behind. As per the scrutiny of literature, there are a few studies on ethnobotany in this district. Therefore, it offers a lot of scope for present and future ethnobotanical studies.

The fact speaks out why Parbat district has been selected for the present ethnobotanical study. The present study was carried out to document and record the various ways of plant utilization by three major ethnic communities of the district at *Balakot*, *Banou*, *Behulibans*, *Bhorle*, *Deupurkot*, *Deurali*, *Dhairing*, *Horsangdi*, *Kyang*, *Lekhfant*, *MajhphantMallaj*, *Nagliwang*,

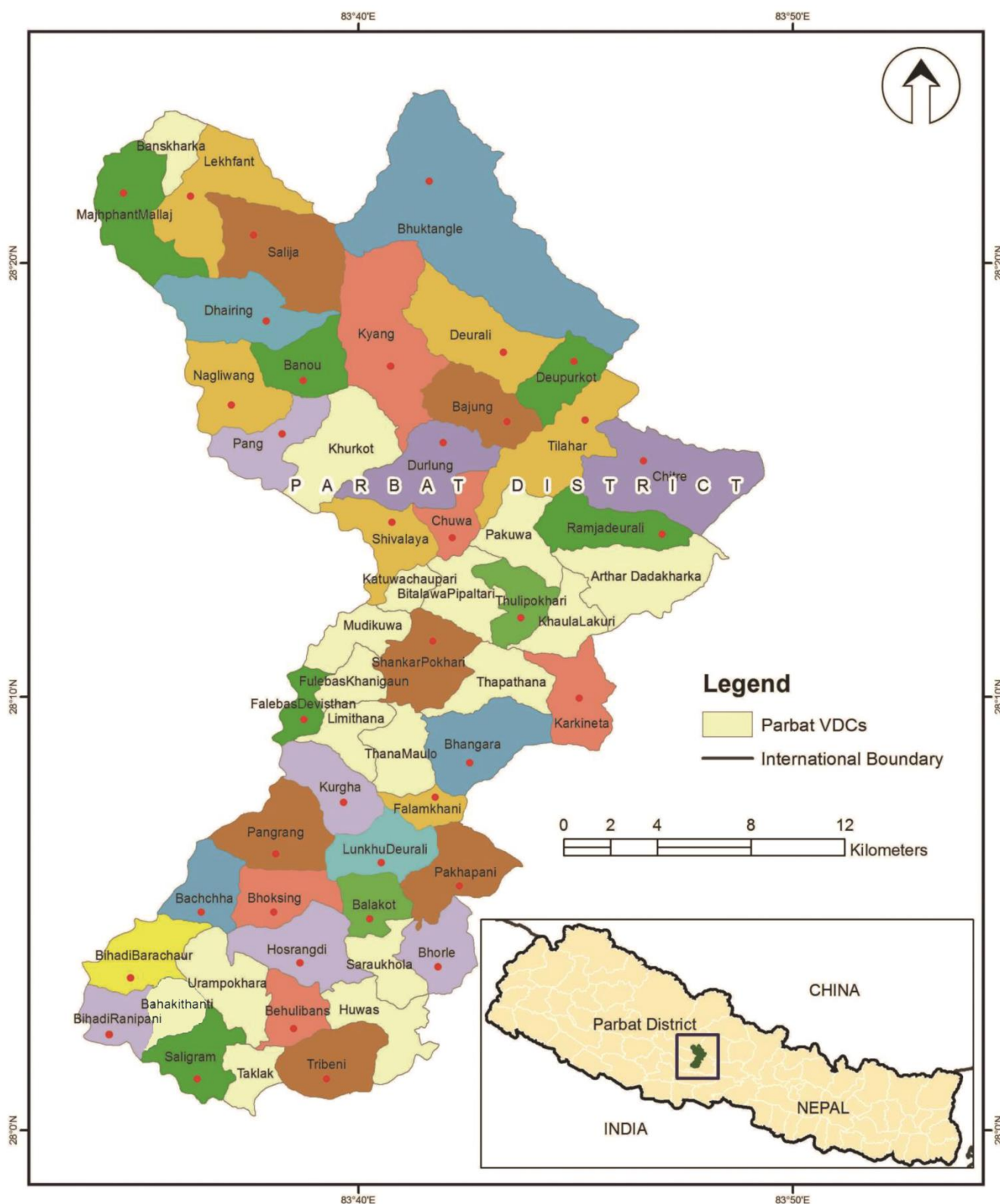


Fig. 4: Location map of study area

Saligram, Salija, Shivalaya, Tilahar, Tribeni, Bachchha, Bhoksing, Bhuktangle, Durlung, Kurgha, Pakhapani, Chitre, Falamkhani, LunkhuDeurali, BihadiRanipani, BihadiBarachaur, FalebasDevasthan, Pang, Pangrang, Bhangara, Karkineta, ShankarPokhari, ThuliPokhari, RamjaDeurali, Chuwa and Bajung VDCs.

3.2 PHYSIOGRAPHY

Parbat district is located in Dhaulagiri zone in the Western Development Region of Nepal. Among the 75 districts, Parbat is 4th smallest district. Its topographical features lies in the inner mid-hills with terraces, mid mountain to high mountain between Mahabharat range and the lesser leading to agro-climate variations in the different pockets of the district. On the basis of physical condition, topographical distribution of land is categorized into high Himalaya, high mountains and mid mountains which includes agriculture (cultivated and noncultivated), pasture, forest and others. The forest land covers about 19,997 ha. from which 5% is managed as Panchase conservation area. The forest is further divided into community forest and national forest for effective conservational management. The Siwalik area of Mahabharat range has been described as geographically sensitive for landslide and erosion (ICIMOD, 1993). The entire forest come under the jurisdiction of Nepal Government following the Private Forest Nationalization Act of 1957 and are under the supervision of the district forest office, Parbat.

Table 1 Topographical distribution of Parbat district

S.N	Land coverage	In percentage (%)	S.N	Physical condition
1	Agriculture	16.8%	1	High himalaya
2	Pasture	28.22%	2	High Mountain
3	Forest	37.25%	3	Low Mountain
4	Others	17.73%		

3.2.1 Soil

Based on the physiographical lay out, different vegetation zones of the district represent distinct varieties of soil composition. Alluvial, colluvial, red, black, sandy loam, loam, clay loam and sandy gravel etc are the soil types found here. The small valleys, plane areas and near river banks have alluvial soil i.e. well stratified and rounded with smooth particle being transported by the river system. The fertile soil viz., loams and sandy loams which are suitable for cultivation are generally found on the banks of the Kaligandaki and Modi rivers. Beside these, other parts of the district have brown loam, black sandy and clay soil. The major categories of soil are as follow:

Siwalik soil: This type of soil, mostly found on the steep sloppy terraces of the southern part of foothills, is mixed with sand stone and gravel. Mountainous type of soil is generally found at the altitude of 1000-1600 m on the inclined terraces.

Rocky soil: Found around the Mahabharat mountain ranges at about 1800 m., this is generally sandy loam type of black soil which is more fertile than the other types of soils. This is the most common type of soil on both sloping land and alluvial terraces (Singh & Singh, 1992).

The majority of the forest soil belongs to the brown forest soil category.

3.2.2 Rivers

The river system that passes through long narrow strip ends towards the south where two big rivers Kali Gandaki from Northwestern side and Modi from Northeastern side confluence at Dobillha in Shivalaya VDC. The Kali Gandaki river acts as a boarder to Baglung and Myagdi districts and Moodi river to Kaski district. These two big rivers which are used in large-scale hydropower and irrigation development have tremendous potential. These are the perennial rivers originating from the high mountain region with substantial amount of water throughout the year; they swell up considerably during the monsoon season. There are many other smaller lakes, rivers and rivulets, streams and streamlets including lamayakhola, lungdikhola, pyanukhola, bhorlekhola, chirdikhola, malangdikhola, bachchhakhola, mardikhola, lastikhola, jaharekhola, ratikhola, luwakhola and lesparkhola.

3.2.3 Climate

The district has monsoon type of climate varying from tropical, sub-tropical to temperate and cold temperate. The climate changes according to the altitude. For instance, it is hot along the bank of river whereas it is sub-tropical in the middle mountain and cool temperate in the high mountain to high Himalayan region.

3.2.3.1 Temperature

The temperature varies from wet summer to dry winter. During summer months (May-July) the maximum temperature recorded between 2002-2013 was 35.7°C. In the same span, the minimum temperature reached to 2.4°C during December –January.

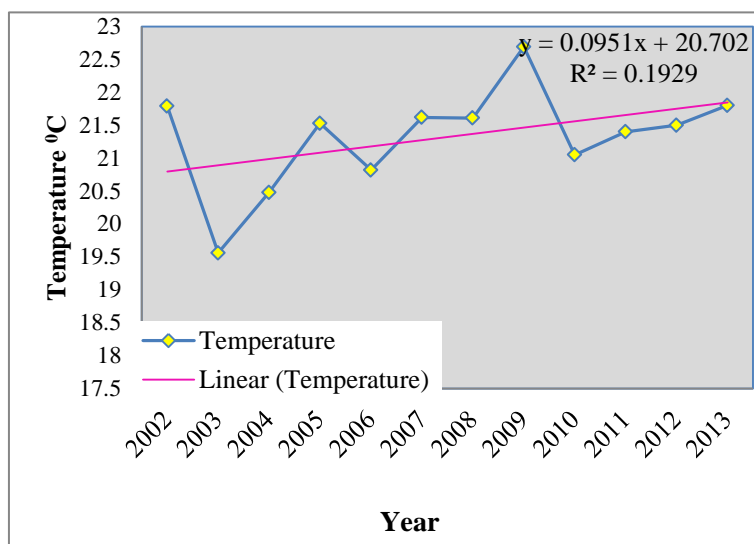
Table 2 Average monthly temperature of Parbat (Station: Kusma)

Year/Month	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
January	13.77	14.07	10.42	10.69	14.90	14.32	13.43	15.91	11.28	11.87	13.35	13.40
February	16.94	15.52	12.13	16.05	19.91	15.37	15.21	18.51	15.95	15.90	15.90	15.90
March	20.38	21.10	15.52	20.79	20.12	19.36	20.73	20.78	20.56	20.56	20.05	21.05
April	23.02	25.00	24.52	23.34	22.91	23.75	23.48	25.54	22.47	22.47	22.75	22.90
May	24.90	26.35	26.48	23.30	25.16	25.57	24.16	25.23	24.47	24.71	24.70	25.10
June	27.16	16.33	26.95	28.13	26.43	26.60	26.03	26.60	22.69	26.03	27.05	25.95
July	26.67	16.36	26.40	26.80	26.25	25.70	26.26	26.32	26.08	26.08	25.95	26.30
August	26.53	16.63	27.45	25.99	25.96	26.09	26.21	27.49	25.88	25.88	26.60	26.85
September	24.96	26.72	26.85	27.50	15.19	25.31	25.71	26.86	26.04	26.04	25.10	26.45
October	22.78	24.58	24.18	21.89	18.05	23.39	22.65	23.70	23.12	23.12	22.40	23.40
November	19.06	20.36	13.20	19.23	18.97	18.81	19.19	18.92	18.81	18.81	18.30	18.70
December	15.39	11.80	11.73	14.67	16.06	15.18	16.34	16.46	15.36	15.36	15.90	15.65

(Source: DHM, 2013)

Table 3 Average yearly temperature

Year	Temperature
2002	21.79
2003	19.56
2004	20.48
2005	21.53
2006	20.82
2007	21.62
2008	21.61
2009	22.69
2010	21.05
2011	21.40
2012	21.50
2013	21.80

**Fig. 5:** Temp. Trend of Parbat (2002-2013)

3.2.3.2 Precipitation

Precipitation, in the form of rainfall, determines the composition of floral and faunal diversity in Nepal. Besides, snow fall, dew, fog, frost and mist occur occasionally. Major precipitation is available in summer monsoon rain coming from the Bay of Bengal and the Arabian Sea around the mid of June to the mid of September. Because of the fact that annual rainfall pattern depends on altitude as well, precipitation increases up to 3000 m. There is seasonal variations in the amount of precipitation depending on the monsoon cycle. There are occasional winter showers during December and January. The average annual mean rainfall from 2002 to 2013 was 2107.36 mm.

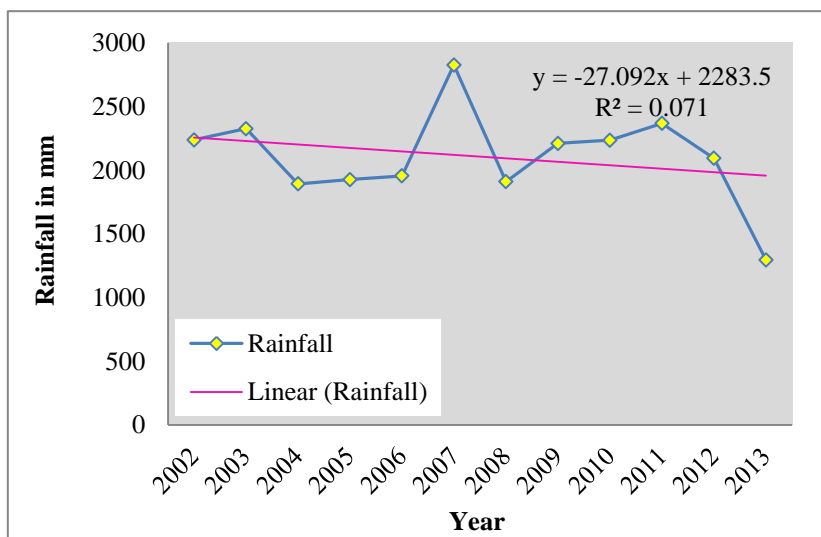
Table 4 Average annual and mean rainfall in different location of Parbat district

Rainfall station/Year	Karkineta	Kusma	Tribeni	Sirkon	Mean Rainfall
2002	2284.7	2637.4	1736.9	2298.0	2239.25
2003	2146.7	2962.5	1653.0	2545.2	2326.85
2004	1366.2	2347.2	1607.9	2250.5	1892.95
2005	1771.5	2434.6	1565.0	1940.1	1927.80
2006	2360.6	2293.1	1624.7	1546.8	1956.30
2007	3222.4	2942.9	2357.0	2787.2	2827.37
2008	2250.8	1626.2	1875.0	1893.1	1911.27
2009	2654.6	2356.2	1827.9	2006.0	2211.17
2010	2532.0	2528.6	1709.1	2177.6	2236.82
2011	2615.7	2457.1	2118.5	2282.1	2368.35
2012	2528.8	2021.3	1741.1	2085.6	2094.20
2013	2799.6	2384.4	00.00	00.00	1296.00

(Source: DHM, 2013)

Table 5 Average yearly rainfall

Year	Rainfall
2002	2239.25
2003	2326.85
2004	1892.95
2005	1927.80
2006	1956.30
2007	2827.37
2008	1911.27
2009	2211.17
2010	2236.82
2011	2368.35
2012	2094.20
2013	1296.00

**Fig. 6:** Rainfall Trend of Parbat district (2002-2013)

3.2.3.3 Relative Humidity

Relative humidity is normally at the peak ranging from 91-96% during rainy season (June-September). The second highest level of humidity is observed from November-January *i.e.* 90-93%; and it is low from March to April *i.e.* 44-59%.

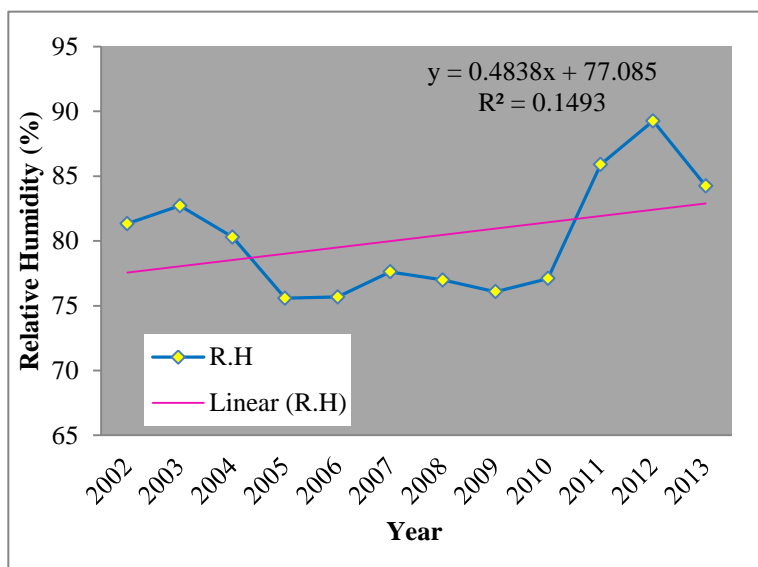
Table 6 Average monthly relative humidity of Parbat (Station: Kusma)

Year/Month	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
January	74.48	81.56	86.00	79.36	73.00	77.36	78.80	78.56	76.09	74.19	83.75	83.55
February	74.32	81.45	74.89	69.27	74.41	76.30	73.57	73.59	76.69	74.09	86.35	86.35
March	71.75	79.70	62.40	67.65	57.71	70.77	67.19	61.25	59.17	78.47	83.60	80.20
April	66.26	75.85	69.91	61.59	64.83	67.52	57.99	54.42	54.75	78.29	89.30	77.25
May	75.26	76.88	76.42	70.35	77.81	64.61	74.16	67.45	81.94	89.89	89.00	81.95
June	83.45	84.82	86.00	81.38	80.00	76.61	83.56	75.09	79.37	89.69	92.10	86.90
July	93.48	88.67	90.65	82.39	86.97	87.01	86.64	87.76	91.30	92.42	96.95	86.05
August	91.45	88.21	84.11	84.85	84.16	86.60	87.82	88.22	85.34	90.95	96.60	87.25
September	88.36	88.39	90.07	81.02	84.63	86.37	80.83	86.19	83.70	93.04	96.25	91.70
October	85.60	82.83	78.26	81.49	78.25	80.58	76.77	79.70	77.32	90.90	90.75	86.95
November	87.23	81.66	86.02	71.60	73.91	79.41	76.43	77.59	77.79	90.08	89.90	76.85
December	84.33	82.63	78.95	75.95	72.42	78.23	80.10	83.20	81.68	88.87	76.65	86.10

(Source: DHM, 2009)

Table 7 Average yearly R.H.

Year	Relative Humidity
2002	81.33
2003	82.72
2004	80.30
2005	75.57
2006	75.67
2007	77.61
2008	76.98
2009	76.08
2010	77.09
2011	85.90
2012	89.26
2013	84.25

**Fig. 7:** Relative Humidity Trend of Parbat (2002-2013)

3.3 VEGETATION

The total area of Parbat district is 53,668 ha, out of which forest land covers about 19,997 ha. (37.25%). Community forest approximately occupies 13,850 ha. (69.26%); agriculture land covers about 16.8%; grazing/pasture land covers about 28.22% and others cover about 17.73%. The topography varies from lowlands to the southern slope of Siwalik and Mahabharat range. Based on the altitude and climate, the vegetation pattern is described under the following vegetation zones.

3.3.1 Tropical Zone (Forest)

Land of Nepal lying between 300 m-1000 m fall into a distinct ecological zone that may be called hill sal forest zone. It corresponds to the upper tropical level (Dobremez, 1976). Bordering hill slopes have characteristically a distinct hill sal zone. The sal zone also penetrates deep into a number of mountainous districts along with valley floors and terraces created by major river (Mahakali, Seti, Karnali, Kali Gandaki, Budhi Gandaki, Marsyangdi, Trisuli, Indravati, Sunkosi, Arun Kosi and Tamur Kosi) and their tributaries. The hill sal (*Shorea robusta*) forest corresponds to upper tropical level (Dobremez, 1972), tropical and subtropical hill sal forest (Stainton, 1972) and north tropical dry deciduous forest (Champion & Seth, 1968). It is characterized by the dominance of sal over other broad leaved trees such as *Terminalia bellirica*, *Terminalia chebula*, *Acacia catechu*, *Lagerstroemia parviflora*, *Erythrina stricta*, *Phyllanthus emblica*, *Syzygium cumini* and *Dalbergia sissoo*. Hill sal forest tends to proliferate quickly through coppice and seed. *Shorea robusta* is an invader as well as a climax species for the upper tropical zone. The hill zone of sal is not rich in species on dry slopes and

flat terraces. However, river gorges and ravines are enriched with a number of trees, shrubs and epiphytes. Orchids are especially abundant in ravine areas. Other common shrubs are *Woodfordia fruticosa*, *Justicia adhota*, *Ricinus communis*, *Combretum roxburghii*, *Jasminum officinale*, *Zanthoxylum armatum*, *Colebrookea oppositifolia*, *Butea minor* and so on.

3.3.2 Sub-tropical vegetation

The sub-tropical zone lies between the altitude of 1000-2000 m. The bio-climate of this zone is warm, sub-humid to humid. The vegetation does not differ distinctly from that of upper and lower zone; so, the sub-division of two zones, *i.e.* upper and lower, is ignored in this division. This sub-tropical zone is characterized by chir pine.

3.3.2.1 Chir Pine Forest

The chir pine (*Pinus roxburghii*) forest corresponds to sub-tropical pine forest (Champion & Seth, 1968), forest (Stainton, 1972) and sub-tropical level xerophytic forest (Dobremez, 1976). It is found along with oaks at its upper limit and with sal at its lower limit. Because of frequently fire the forest does not have climbers and epiphytes, and the ground vegetation is also poor. Chir pine forest observed in its pure form in Parbat attains a height of 20-30 m. The forest floor is generally covered with a brown carpet of dried needles (leaves). At lower altitudes (approximate 1000 m), it is mixed with hill sal on south-facing slopes and with *Engelhardia spicata* and *Toona ciliata* in damp ravines and gullies.

3.3.2.2 Chir Pine-Broadleaved Forest

The chir pine-broadleaved forest occurring between 1000-2000 m corresponds to sub-tropical pine forest (Champion & Seth, 1968) and subtropical level xerophytic forest of *Pinus roxburghii* (Dobremez, 1972). It is generally composed of *Pinus roxburghii*, *Quercus incana*, *Q. lanata*, *Rhododendron arboreum*, *Lyonia ovalifolia*, *Engelhardia spicata*, *Erythrina stricta* and *Schima wallichii*. This type of forest represents the hygrophilic (humid) form of the chir pine forest. It is more profound in western Nepal where associated broadleaved trees are represented by *Quercus incana*, *Quercus lanata* with *Rhododendron arboreum* and *Lyonia ovalifolia*. In eastern and central Nepal, *Schima wallichii* remains the main associated species. In the Siwalik hills, chir pine forest is often mixed with sal trees.

3.3.2.3 Schima-Castanopsis Forest

Parbat district has been known for dominant prevalence of *Schima* or *Schima-Castanopsis* forest. *Schima wallichii* and *Castanopsis* are found from 600 m to 2000 m. The distribution of *Schima* and the three species of *Castanopsis* – *Castanopsis indica*, *Castanopsis tribuloides* and *Castanopsis hystrix* – present an interesting pattern of ecological variation in sub-tropical Nepal. When *Schima* occurs below 1000 m, it is often found along with

Shorea robusta tree ferns and other elements of deciduous hill forest. Over 1000 m, *Schima* is often associated with one or more species of *Castanopsis*.

Schima wallichii, a member of the tea family, has leathery leaves and camellia-like flowers; the tree grows to 20-30 m, has a thick rough bark, woody and hard fruits. *Schima wallichii* is associated with *Castanopsis indica* at lower elevation, i.e., 1000-1500 m, and with *Castanopsis tribuloides* at higher elevation, i.e., 1500-2000 m. However, it is not usual to find both species in the same forest. *Castanopsis indica* is of about 10-15 m height with large oblong leaves; fruits are borne in a small cluster. *Castanopsis tribuloides* is distinguished from *Castanopsis indica* by its long, pointed, lanceolate leaves that are entire and not toothed at all; chestnuts are borne within a spiny fruit cover. Fruits are widely separated compared to those of *C. indica*. *Schima-Castanopsis* forest in Annapurna-Dhaulagiri area consists mostly of *Castanopsis indica* and *Engelhardia spicata*. *Castanopsis hystrix* is absent and *Castanopsis tribuloides* is not common. Paucity of chir pine forest and blue pine forest makes this area more suitable for *Schima-Castanopsis* and *Daphniphyllum himalense*.

Wet ravines remain rich in species with a number of other trees such as *Pyrus pashia*, *Myrica esculanta*, *Rhododendron arboretum*, *Duabanga sonneratioides*, *Homalium napaulense*, *Juglans regia* and *Lagerstroemia parviflora* and other common shrubs like *Melastoma normale*, *Osbeckia stellata*, *Mimosa rubicaulis*, *Berberis aristata*, *Berberis asiatica*, *Euphorbia pulcherima*, *Pogostemon benghalensis* etc. Nepalese alder (*Alnus nepalensis*) has a wide range in its natural distribution from 500 m to 2700 m along moist sites such as ravines, river banks and fresh landslide. It is a valuable species for poles, furniture and musical instrument.

3.3.3 Temperate Zone

Over 40 percent of the vegetation types of Nepal occur in the temperate zone. This zone is diverse in terms of landscape, forest habitat or agro-ecological zones. The zone broadly corresponds to the altitude of 2000-3000 m. It is rich in forest types, and largely comprise of conifers and oaks. Laurels, maples and rhododendrons are important forest species in humid and per-humid areas. Semi-arid and sub-humid areas have needle leafed coniferous species as dominant trees.

The temperate zone lying between 2500 m and 3000 m, which is called upper zone (cool temperate zone/montane zone), is characterized by the occurrence of *khasru* oak (*Quercus*

semecarpifolia) either as pure forest or as a dominant species in other associations. In the wettest part of the zone, the *khasru* oak is largely replaced by *Rhododendron arboreum*, *Acer* sp. and *Lithocarpus spicata*. There is preponderance of blue pine (*Pinus wallichiana*), spruce (*Picea smithiana*) and hemlock (*Tsuga dumosa*) as pure coniferous forests or as mixed forests with *khasru* oak. The lower temperate zone, lying between 2000 m and 2500 m, has a mixed forest of several oak species primarily consisting of *Quercus incana* (*Quercus leucotrichophora*) and *Quercus lanuginosa* (*Quercus lanata*). The occurrence of blue pine throughout the temperate zone shows its dominance. The following forest types may be described in the temperate zone of Nepal.

3.3.3.1 Upper Temperate Blue Pine Forest

The blue pine, which is the most common tree species in temperate zone of Nepal where climax forests exist, is being destroyed by human pressure. The blue pine found at lower limit overlap with the upper limit of chir pine at about 2000 m. Therefore, it is common to find both pines growing together between 1900 m and 2100 m. The lower temperate forest with an abundance of blue pine occurring at 2000 m to 2500 m is regarded as a secondary formation (Champion & Seth, 1968; Numata, 1966; Stainton, 1972; Dobremez, 1972; 1976; Shrestha, 1982). It replaces evergreen broadleaved forest consisting of *Quercus incana*, *Quercus lanuginosa*, *Rhododendron arboreum* and so on. Towards the upper limit of the temperate zone at 3000 m, the blue pine occurs with sub-alpine species such as *Abies spectabilis* and *Betula utilis*.

3.3.3.2 Temperate Juniper Forest

Juniper does not grow to a forest in the altitude below 2000 m. In temperate zone, the forest tends to remain pure, but it is not uncommon to find a few fir, birch and oak trees on the fringes. Rather it forms a shrub land of stunted bushes (*Juniperus indica*).

3.3.3.3 Spruce Forest

The spruce (*Picea smithiana*) does not form any extensive pure stands of forest in Nepal. It is west Himalayan conifer extending as far east as the upper Trisuli valley in the Ganesh Himal area. Found most commonly in the forests of *Juniperus indica*, the spruce is often associated with blue pine. Jumla, Mugu and Humla districts have western mixed coniferous forest. Coniferous forests with spruce as a dominant or conspicuous species occur along the altitudinal gradient between 2000 m and 3000 m. It prefers shady, north-facing slopes. In some parts of western Nepal, spruce is also associated with another west Himalayan conifer, *Abies pindrow*. Both coniferous trees are columnar in habit and often attain 50 m height and have drooping branchlets.

3.3.3.4 West Himalayan Fir-Hemlock-Oak Forest

The west Himalayan fir-hemlock-oak forest is widespread in the Seti and Mahakali zone of western Nepal. It is not common towards the area lying east of the Karnali river. The west Himalayan fir (*Abies pindrow*) occurs from 2100 m to 3000 m, and a temperate variety of the sub-alpine fir (*Abies spectabilis*) occurs from 3000 m to 4000 m. These two species hybridise in the region of their altitudinal overlap (Shrestha, 1982). In the Karnali region, the pindrow fir is commonly associated with spruce while in the Seti region it is associated with hemlock (*Tsuga dumosa*) and the khasru oak (*Quercus semecarpifolia*). Often, this forest type has a number of maples (*Acer* sp.), walnuts (*Juglans regia*) and horse chestnuts (*Aesculus indica*). Hemlocks (*Tsuga dumosa*) stand out as graceful trees attaining 30 m to 35 m in height among oaks, maples, blue pines and firs. The oak (*Quercus semecarpifolia*) takes over from the maple on drier southern aspects. Thus the fir-hemlock-oak forest is not uniform in its occurrence.

3.3.3.5 Temperate Mountain Oak

The khasru oak (*Quercus semecarpifolia*) is widespread across temperate zone on the south of the main Himalayan range. This is widespread in western Nepal. The khasru oak forest occupies montane level when the banj oak (*Quercus lanuginosa* and *Quercus incana*) ceases to occur at about 2500 m. This species is associated with coniferous forests. Often, oak has been replaced by blue pine following human interventions in the form of shifting cultivation and excessive extraction of fuelwood.

3.3.3.6 Rhododendron Forest

Rhododendron arboretum, the national flower of Nepal, is the most widely distributed tree in the Himalaya. It is regarded as a second layer member in a number of forest types in the temperate and sub-tropical regions. The species occurs over a wide range of altitudes from 1400 m to 3600 m in a variety of flower colour from scarlet red to pink and white. In western Nepal (Mahakali zone), it is mixed with khasru oak as mesophytic forest on drier slopes and with hemlock and fir in hygrophytic conditions.

3.3.3.7 Mountain Oak-Rhododendron Forest

The mountain oak forest, locally known as khasru (*Quercus semecarpifolia*), forms a distinct type of forest in association with *Rhododendron arboretum* towards the extreme western parts of Nepal. The forest occurs at 2500 m to 2900 m. This forest differs from other types of oak forest because of the abundance of *Rhododendron* trees. The forest remains dry most of the time.

3.3.3.8 Mixed Rhododendron-Maple Forest

This forest has been described as mixed broad leaved forest (Dobremez & Shakya, 1975). *Rhododendron arboreum* and several species of maple (*Acer campbellii*, *Acer sterculiaceum* and *Acer pectinatum*) remain prominent in the mixed forest at 2600 to 3000 m. Stainton (1972) called it upper temperate mixed broad leaved forest while referring to the ones occurring in central and eastern Nepal. Such forests have a number of lauraceous and other evergreen shrubs such as *Symplocos* sp. and *Ilex* sp. Though the forest is predominantly broad leaved; *Taxus wallichiana* and *Tsuga dumosa* are found on rare occasions.

3.3.3.9 Cedar Forest

Cedar forests are confined to the Karnali region of western Nepal at 2000 m to 3000 m. The Himalayan cedar, *Cedrus deodara*, is often regarded as a magnificent tree where it attains a height of 40-50 m with huge dimensions (girth 2.4-3.6 m). Cedar trees are also found in other coniferous forests especially those of spruce and blue pine. The two species replace the cedar at about 2400 m and beyond, while at altitudes below 2000 m, chir pine replaces the cedar (Shrestha, 1982).

3.3.3.10 Mixed Blue Pine-Oak Forest

Mixed blue pine oak forest corresponds to the lower west Himalayan temperate forest (Champion & Seth, 1968) which is dominated by *Pinus wallichiana*, *Quercus lanata*, *Quercus dilatata* and *Castanopsis tribuloides*. This forest occurs from 2000 m to 2500 m as a consequence of human disturbance to the oak forest. The blue pine and the oak associations vary in western and eastern Nepal in terms of oak species. In most cases, blue pine tends to colonize the oak/rhododendron association and forms a mixed forest with several broad leaved species.

3.3.3.11 Lower Temperate Oak Forest

The lower temperate forests of Nepal (2000-2500 m) have abundance of oaks (*Quercus incana*, *Quercus lanuginosa* and *Quercus glauca*) with *Rhododendron arboreum* and *Lyonia ovalifolia* in the climax formation of the broad leaved forest. This forest is widespread in western Nepal (west of the Kali Gandaki) where two species – *Quercus incana* and *Quercus lanuginosa* (= *Quercus lanata*) – occur in various associations and also form separate forests. The two species are often transformed to mixed forests due to aggressive colonization of pine trees on deforested areas. *Quercus incana* forest, described as ‘ban oak’ forest (Champion & Seth, 1968) in the lower west Himalayan temperate forest category, is widespread on southern slopes. Chir pine (*Pinus roxburghii*), which starts

mixing with the oaks at 1800 m, dominate the oak at higher altitude; and blue pine (*Pinus wallichiana*) takes over the oaks at 2000 m to 2500 m.

3.3.3.12 Deciduous Walnut-Maple-Alder Forest

The forest occurring at 2100-2900 m by streams, rivers and ravines is typically a west Himalayan type of forest (Shrestha, 1982) with species belonging to European genera such as *Aesculus*, *Juglans*, *Acer*, *Populus*, *Betula*, *Corylus*, *Ulmus*, etc. Some evergreen oaks are associated with this deciduous forest at north-facing slopes lying away from direct water sources. Dobremez (1984) identified such a forest type as mixed hygrophilic broad leaved forest with *Quercus incana*, *Quercus lanata*, *Aesculus indicus*, *Acerstachy ophyllum* in far western Nepal. A west Himalayan wet-loving oak, *Quercus dilatata* (*Quercus floribunda*) is also associated with the deciduous forest. A large number of maples (*Acer caesium*, *Acer cappadocicum*, *Acer sterculiaceum*, *Acer acuminatum*) occur in this type of forest. Nepalese alder (*Alnus nepalensis*) occurs along river vegetation.

3.3.4 Sub-alpine Forest

Sub-alpine forest region is limited to the mid hills of western Nepal where humid conditions prevail on the south of the main mountain range. Often called fir-hemlock-oak forest, it occurs in lower sub-alpine and upper temperate zone at 2800-3400 m and is characterized by the dominance of fir (*Abies spectabilis*) mixed with hemlock (*Tsuga dumosa*) on northern aspects and with oak (*Quercus semecarpifolia*) on southern aspects. It has a considerable amount of *Taxus wallichiana* as the second layer of the forest. The Himalayan hemlock (*Tsuga dumosa*) is one of the most elegant trees reaching a height of 40 m. It occurs in a number of forest types in moist localities. The tree is distinguished from other coniferous trees by its small ovoid cones at the tip of branchlets.

3.3.4.1 Sub-alpine Mountain Oak Forest

The sub-alpine mountain oak locally known as *khasru* oak (*Quercus semecarpifolia*) forms forest extending from temperate zone (2000 to 3000 m) to 4000 m. Often, oak forest descends to 3400 m without losing much of its characteristics. The tree line vegetation with excessive birch trees passes on to pure stands of the forest. The *khasru* oak (*Quercus semecarpifolia*) grows to 25 m or 30 m with a closed canopy. The canopy remains closed and the second layer of shrubs is generally missing. This species is a preferred fodder for cattle and is usually heavily lopped in the vicinity of villages. *Khasru* oak forest at lower elevations, i.e., in the temperate zone, is treated separately.

3.4 DEMOGRAPHY

The total population of Nepal is 2,64,94,504 with an increase of 3.3 million in the last 10 years covering 1,36,45,463 (51.50%) female and 1,28,49,041 (48.49%) male. The annual growth rate is 1.35% (CBS, 2011). The population density is 180 per sq.km. The literacy rate of five years and above is 65.9% in our country. 123 languages are spoken by 125 castes/ethnic groups as their mother tongue. *Chhetri* is the largest ethnic groups having 4,398,053 (16.6%) of the total population followed by *Brahman-Hill* 3,226,903 (12.2%), *Magar* 1,887,733 (7.1%), *Tharu* 1,737,470 (6.6%), *Tamang* 1,539,830 (5.8%), *Newar* 1,321,933 (5.0%), *Kami* 1,258,554 (4.8%), *Musalman* 1,164,255 (4.4%), *Yadav* 1,054,458 (4.0%) and *Rai* 6,20,004 (2.3%) whereas Nepali is spoken as mother tongue by 11,826,953 (44.6%) of the total population followed by *Maithili* 3,092,530 (11.7%), *Bhojpuri* 1,584,958 (6.0%), *Tharu* 1,529,875 (5.8%), *Tamang* 1,353,311 (5.1%), *Newar* 846,557 (3.2%), *Bajjika* 793,418 (3.0%), *Magar* 788,530 (3.0%), *Doteli* 787,827 (3.0%) and *Urdu* 691,546 (2.6%) respectively (CBS, 2011).

Parbat

The total population of Parbat district is 146,590 containing 81,289 (55.45%) female and 65,301(44.55%) male. The population density is 296.74 per sq. km. Out of 55 VDCs, Shivalaya has the highest population i.e. 12,470 and Bhoksing has the lowest population i.e. 891. The annual growth rate is 1.73%. There are total 35,719 households and average family member is about 4.10. Major castes of this district are *Brahmin* (35.73%), *Chhetri* (17.30%), *Magar* (10.96%), *Kami* (9.22%), *Damai* (7.51%), *Sarki* (6.66%), *Gurung* (3.69%), *Thakuri* (2.50%), *Newar* (2.38%), *Sanyasi/Dashnami* (1.43%), *Gharti/Bhujel* (0.49%), *Musalman* (0.42%), *Kumal* (0.34%), *Tamang* (0.24%), *Majhi* (0.20%), *Tharu* (0.16%), *Rai* (0.16%), *Bote* (0.09%), *Chhantyal* (0.08%), *Thakali* (0.07%), *Badi* (0.06%), *Limbu* (0.04%), *Teli* (0.04%), *Yadav* (0.04%) and others (0.21%) (CBS, 2011; DDC & VDC profile of Nepal, 2014).

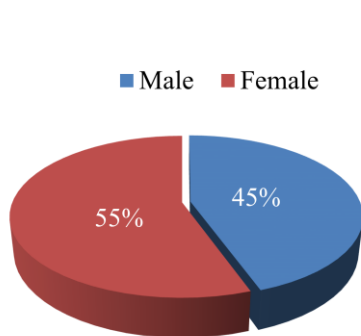


Fig. 8: Distribution of Male & Female

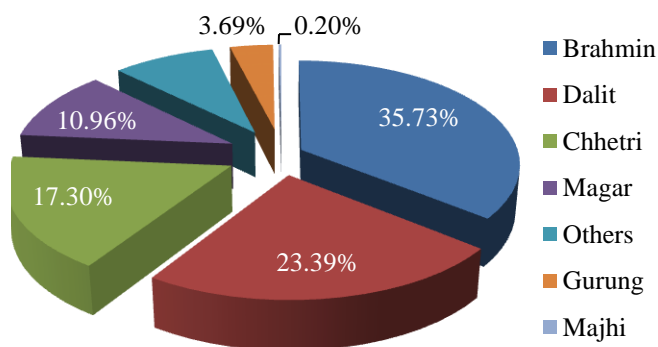


Fig. 9: Distribution of different Community

Table 8 The general population records of Parbat district

Particulars	1991	2001	2011	2015 (Projection)
Total population	143,547	157,826	146,590	142,374
Male	66,572	72,924	65,301	62,480
Female	76,975	84,884	81,289	79,894
Sex Ratio	86	86	80.33	78.20
Total Households	27,973	32,731	35,719	36,989
Average households size	5.1	4.82	4.10	3.85
Literacy rate of 5 years and above	52.1	56.82	73.8	82.01
Population density per sq.km	319	296.74	288.10	288.01

(CBS, 2011; DDC & VDC profile of Nepal, 2014)

Magars in Parbat district are the third most populated caste/ethnic group with 16,068 population (10.96%). *Gurung* and *Majhi* are less populated ethnic groups in comparison; *Gurung* population is 5,407 (3.69%), *Majhi* population is 292 (0.20%). The main places of *Magars* settlement are Kyang, Salija, Banou, Tribeni, Lekhfant, Behulibans, Dhairing, Shivalaya, Majhphant Mallaj etc. The main places of *Gurungs*' settlement are Chitre, Deupurkot, Durlung, Bachchha, Bhangara, Balakot, Bhoksing, Bhorle, Bhuktangle, Kurgha, Pakhapani etc. The main places of *Majhis*' settlement are Shivalaya, Pang, Bhachchha, Bihadi Ranipani, Falebas Devasthan and Nagliwang.

About 29,000 household living in Parbat rely on the forest that covers 19,997 ha. There are two nurseries established by Government of Nepal (GoN) to preserve forest. Communities have also established a few nurseries. Agriculture is one of the most important occupations, about 63.15% of the land is cultivable. Farmers are more inclined to produce cash crops like oil seed, potato, tobacco and sugarcane, and cereal crops like paddy, maize, millet, buckwheat, wheat and barley. Agriculture contributes to over 51% of household income. Livestock farming is the main occupation of the tribal communities due to excess availability of fodders. Goats, cows, bulls, buffaloes and sheep are the main cattle of the local people.

CHAPTER 4

4. MATERIALS AND METHODS

Presented data is based on personal observations of the studied area and interviews with the local informants. The indigenous knowledge of ethnic people regarding the use of plants species was collected through intensive ethnobotanical explorations. The studied area which comprise 38 VDCs were visited from August 2010 to July 2014. The visits were carried out eight times in different seasons, and each visit lasted for 7-10 days. *Gurung*, *Magar* and *Majhi* ethnic tribes were selected for this research.

The reported plant species are enumerated and arranged according to Bentham and Hooker's (1862-1883) system of classification. The genera under each family and species under each genus are arranged alphabetically. The enumeration of each species includes the correct botanical name, citations, the standard references as prescribed in three major sources (Hara *et al.*, 1978, 1982; Hara & Williams, 1979; Polunin & Stainton 1984; Press *et al.*, 2000), and taxonomic description. This information is followed by vernacular names and local names. The phenological data of flowering (Fls.) and fruiting (Frts.), distribution (Distrib.) and ecology are also provided in the enumeration. The ethnic uses of the plant species are given under two headings 'medicinal use' and 'other use'.

4.1 Demographic characteristics of the informants

A total of 553 informants (218 male and 335 female) aged between 30-79 years were selected purposively after focus group discussion (FGD) with local people from three different ethnic communities. Information related to their age, sex, level of education and ethnicity were recorded. Male participants were 39.42% and the female were 60.57% (Table 9 and 10). Among the informants, 79 (37 males, 42 females) were old age people (70-79 and above); 132 (49 males, 83 females) were of 60-69; 146 (57 males, 89 females) belonged to age group of 50-59; 115 (42 males, 73 females) fall in the age group of 40-49; and 81 (33 males, 48 females) were of 30-39 age group. The average age of the informants was 59 year old. Illiterate informants were 32.91%, informants with primary level were 54.25%, secondary level informants were 9.58%, and university level were 3.25% (Table10).

Table 9 Age and gender distribution of ethnic informants

Age group	Gender		No. of person	Percentage
	Male	Female		
30-39	33	48	81	14.64
40-49	42	73	115	20.79
50-59	57	89	146	26.40
60-69	49	83	132	23.86
70-79 +	37	42	79	14.28
Total	218	335	553	99.99

Table 10 Education levels of interviewed ethnic informants

Education level	No. of individuals	Percentage
Illiterate	182	32.91
Primary	300	54.25
Secondary	53	9.58
University	18	3.25
	553	99.99

4.2 Informants selection

Informants comprising farmers, social workers, teachers, housewives, local medicine men, local healers (*Dhami/Jhakri/Lama*), village headman and old knowledgeable men and women (about 45% *Magar*, 40% *Gurung* and 15% *Majhi*) were selected. A brief group discussion was held with the key informants before the data collection, in which objectives of research were explained to them. This was done in order to ensure informant's cooperation and build their confidence for providing reliable information.

4.3 Field survey and data collection

Since the research work focused on ethnobotany of Parbat district, field visits were made targeting the areas of indigenous inhabitation. Prior to the field visits, the study area was observed personally to know its physical and cross-cultural settings. Familiarity with the local people was developed through participation in their marriages, festivals and other social events. It was instrumental to know about the use of various plant resources later. The visits were carried out in four different seasons – spring, summer, autumn and winter– taking into account the time of flowering and fruiting of the plant species. Informants were requested to accompany during the field survey. Based on the need, one or more informants were taken to the field. When the plant species were brought from the forests, ethnic people (*Healers/Jhakri/Lama*) were consulted to confirm medicinal use of the plants and the disease/ailment for which the plant was used. Data regarding plant species and voucher specimens were collected following standard practice (Martin, 1995).

4.4 Interview with key informants (Healer:Dhami/Jhankri/Lama)

Data was obtained in Nepali, *Gurung*, *Magar* and *Majhi* languages through questionnaire and interview with the help of a local translator. Semi-structured questionnaire comprising local names of the plant species, plant part used, ailment, method of preparation, manufacture and dosages were administered during group discussions and personal meetings (Martin, 1995; Cotton, 1996). The method was applied to document detail information about the ethnobotanical plants, illness categories and indigenous traditional knowledge (ITK), and other

uses of plants among three ethnic groups *i.e.* Gurung, Magar and Majhi. Interviews were recorded using the standard structured and semi-structured questionnaire with the key informants. Focus group discussions (FGD) comprising 6-10 or 10-20 respondents were conducted involving local elder people, healers, ethnic leader, school teacher, medicinal men and women, forest ranger and knowledgeable people of the ethnic communities.

4.5 Plant collection, identification and preservation

Medicinal, edible and non edible use of each plant was confirmed and verified during the field visits. The reported uses were considered valid if at least 3 informants had similar information about the uses of the plant. Voucher specimens and ethnomedicinal information were collected and numbered from the field mostly during the flowering and fruiting periods. The ethnobotanical uses of the plants and their habit as well as ethnomedicinal information were noted down in field note book as well as ethnobotanical data sheet. Photographs were taken for each specimen to determine the taxonomic identification and for future specimen record. The specimens were identified with the help of standard botanical literature and local floras (Hooker, 1872-1897; Hara *et al.*, 1978; Hara & Willams, 1979; Hara *et al.*, 1982; Polunin & Stainton, 1984; Stainton, 1988; Press *et al.*, 2000), and National Herbarium and Plant Laboratory (KATH), Nepal. Local names and medicinal uses were documented carefully. The herbarium specimens were made accordingly (Jain & Rao, 1977). Voucher specimens were deposited at the Department of Environmental Science and Engineering (DESE), Kathmandu University, Nepal. A proforma sheet was designed for recording information on medicinal, edible and other uses of ethnobotanical plants, which is mostly based on Jain (1995) and the same is given in Appendix 1.

4.6 Statistical Analysis

The data obtained during the study were schematically recorded in an excel spreadsheet software (2010 version) and represented systematically in the tabular form. The information such as botanical name, voucher specimen number, local name, altitude, locality, family, parts used and ethnomedicinal uses were entered into the spreadsheet.

4.7 Informants consensus factor (F_{IC})

Informant consensus factor was calculated to find out the homogeneity in the information given by the informants. The F_{IC} is calculated by the following formula (Trotter & Logan, 1986; Heinrich *et al.*, 1998; Singh *et al.*, 2012; Bhat *et al.*, 2013).

$$F_{IC} = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where, N_{ur} is the number of use report in a particular illness category by informants and N_t is the number of taxa used to treat that particular category by informants.

4.8 Fidelity level (FL) value

The fidelity level (FL) value, the percentage of informants claiming the use of a certain plants for the same major purpose was calculated according to the following formula (Alexiades, 1996).

$$FL (\%) = \frac{I_p}{I_u} \times 100$$

Where, I_p is the number of informants who independently suggested the use of a plant species for a particular disease; I_u is the total number of informants who mentioned the same plant for any disease.

4.9 Phytochemical (Qualitative and Quantative) Analysis

4.9.1 Collection of plant material

For the estimation of protein, carbohydrate, fat, moisture content, crude fiber and starch, fresh plant material of edible plants were collected from study sites. Plants were collected in the polythene bags during morning hours and the collected plant material were withdrawn as root, stem, leaves, flowers and fruits, then soil particles were removed. For estimation of crude fiber, the plant parts were dried at 60°C for 72 hours and were separately powdered and stored in small polythene bags.

In the present work, proximate phytochemical analysis of 40 edible plants was carried out.

4.9.2 Total Protein

Total protein contents were estimated by following the method of Lowry *et al.* (1951). 500 mg (fresh weight) tissue samples were extracted with 5 ml of 5 % trichloroacetic acid (TCA). The homogenate was centrifuged at 2000 rpm for 20 minutes and the supernatant was discarded. The residue was dissolved in 10 ml of 0.1 N NaOH. 0.1 ml of this solution was made up to one ml by adding distilled water.

The following reagents were prepared.

- (a) Alkaline sodium carbonate solution.
(50 ml of 2 % Na_2CO_3 in 0.1 N NaOH)
- (b) Copper sulphate- Sodium tartrate solution.

(0.5 ml of 0.5% $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ in 0.5 ml of 1.0% sodium potassium tartrate, prepared fresh).

(c) Alkaline Copper reagent

(50 ml of reagent 'a' was mixed with 1 ml of reagent 'b'. This was mixed just before use).

Five ml of alkaline Copper reagent was added to the dissolved residue and allowed to stand for 10 minutes. 0.5 ml of folin-ciocalteau reagent (diluted with equal volume of water before use) was added and mixed immediately. The optical density (OD) was measured at 750 nm in a spectrophotometer. The reference curve was prepared by using 0.02 to 0.64 mg/ml solution of Bovine Serum Albumin (BSA) in 0.1 N NaOH. The quantity of proteins was expressed as mg/g fresh weight of tissue.

4.9.3 Carbohydrate

a) Estimation of Total Soluble Sugars: This was done by following the method of Dubois *et al.* (1956). 500 mg of fresh tissue was homogenized with 10 ml of 80% ethanol and centrifuged at 2000 rpm for 20 minutes. The supernatant was collected. To one ml of the alcoholic extract one ml of 5.0 % phenol was added and mixed. To this 5 ml of 96 % H_2SO_4 was rapidly added. It was gently agitated during addition of sulphuric acid and then allowed to stand in water bath at 26-30°C for 20 minutes. The OD of the yellow and orange colour was measured at 490 nm in a spectrophotometer after setting for 100% transmission against the blank (by substituting distilled water for test solution). The standard curve was prepared by using known concentrations of glucose. The quantity of sugar was expressed as mg/g fresh weight of tissue.

b) Estimation of Starch: This was done following the method of McCready *et al.* (1950). The residual mass obtained after the extraction of total soluble sugars of plant tissue was suspended in five ml of distilled water and subsequently 6.5 ml of 52.0% perchloric acid was added to the residue. After stirring the mixture, the contents were centrifuged for 20 minutes at 2000 rpm. The supernatant was decanted and collected. The whole procedure was repeated thrice. Supernatant was then pooled and the total volume was made up to 100 ml with distilled water. The mixture was then filtered through Whatman filter paper No. 42. One ml of aliquot of this filtrate was analyzed for starch content following the same procedure as that of total soluble sugars. Quantity of starch was calculated in terms of glucose equivalent and factor 0.9 was used to convert the values of glucose to starch.

4.9.4 Fat

For the extraction of lipid one gram of fresh tissue was taken and homogenized in a pestle and mortar with chloroform: methanol (2:1) mixture equal to 10 times the weight of the sample.

The crushed material was transferred to screw capped tubes and kept overnight for extraction of lipids from the tissue. The contents were filtered through a sintered glass funnel (Grade 3). The residue on the filter was given 2-3 washings with chloroform and methanol mixture. All the filtrates including the washings were pooled to give a final volume of 10 ml. This constituted the crude lipid extract in chloroform: methanol.

The crude lipid extract was given Folch washings (Folch *et al.*, 1957) to remove water soluble impurities. This was done by transferring the crude extract into a glass stopper centrifuge tube and adding one fifth of its volume of 1% NaCl. The contents were thoroughly shaken and phase separation was done by centrifugation at low speed. The lower chloroform layer containing lipids was then withdrawn by pasteur pipette. The upper aqueous phase, containing the water-soluble impurities was washed twice with 5 to 10 ml chloroform. The washings were pooled with lipid extract in the chloroform. This solution was evaporated to near dryness using few drops of benzene. The process resulted in the removal of water and other contaminations.

The lipid residue was transferred into a volumetric flask and the volume was made up to 10 ml. with chloroform. The percentage of total lipid was determined by evaporating 1 ml of aliquot of this extract to a constant weight.

4.9.5 Crude Fiber

For the estimation of crude fiber of plants, the procedure of A. O. A. C. (1995) was followed. To estimate crude fibre, Soxhlet's apparatus was used. The known quantity of each oven dried plant part (5 gm) was taken in thimble of Whatman filter paper. This thimble was taken in Soxhlet's extraction tube which was connected above with condenser and below with weighed oil flask. Petroleum ether was poured into extraction tube in the amount of 100 ml. or as required. The sample after extraction was transferred from the thimble to a beaker containing 200 ml. of 1.25 % sulphuric acid solution and contents were brought to boiling. After 30 minutes, this solution was cooled, washed and filtered through muslin cloth in Buchner's funnel. Material on the cloth was washed to remove the acid and again boiled with 20 ml. of 1.25 % NaOH for 30 minutes. This was again cooled, washed and filtered. The residue was transferred to a crucible and kept in oven for drying. The crucible was cooled in desiccators and weighed till it attained constant weight. The dried content was ignited in Muffle furnace and again weighed.

The loss in weight during ashing was the weight of crude fiber, and percentage of fiber was calculated as follows:

$$\text{Percentage of Crude fiber} = \frac{W_1 - W_2}{W \times 100}$$

Where,

W_1 = Weight of crucible + Residue before ashing.

W_2 = Weight of crucible + Residue after ashing.

W = Weight of sample.

4.9.6 Moisture content

5 g of the sample was placed in porcelain crucible and heated in air circulating oven at 105°C and was allowed to stay for about 2 h. Thereafter, the sample was cooked, weighed and reweighed until a constant weight was obtained. The percentage moisture was calculated by

$$\% \text{ Moisture} = \frac{W_1 - W_2}{(W_1 - W_0) \times 100}$$

Where,

W_0 = weight of the porcelain crucible

W_1 = weight of the crucible together with the wet sample

W_2 = weight of the crucible and the dried sample.

4.10 Preparation of plant extracts (Hot water extraction)

5 gm of dried finely powdered plant material was taken in a beaker, and 250 ml of distilled water was added. The mixture was heated on a hot plate with continuous stirring at 30 °C to 40 °C for 20 minutes. Then, the extract was filtered and the filtrate extract was kept in refrigerator for future use. The phytochemical screening (tannins, saponins, sterol, flavonoids, lignin, phenol and glycosides content) was carried out by using the methods of Edeoga *et al.* (2005). The extract was tested for the presence of bioactive compounds by using following standard methods.

Ninhydrin test (Protein and amino acids): Crude extract when boiled with 2 ml of 0.2% solution of Ninhydrin, violet colour appeared suggesting the presence of amino acids and proteins.

Benedict's test (Carbohydrates): Crude extract when mixed with 2 ml of Benedict's reagent and boiled, a reddish brown precipitate formed which indicated the presence of carbohydrates.

Test for phenol: Crude extract was mixed with 2ml of 2 % solution of ferric chloride. A blue green or black coloration indicated the presence of phenols and tannins.

Shinoda test (Flavonoids): Crude extract was mixed with few pieces of magnesium ribbon and concentrated HCl was added dropwise. Pink scarlet colour appeared after a few minutes which indicated the presence of flavonoids.

Test for saponins: Crude extract was mixed with 5 ml of distilled water in a test tube and shaken vigorously. The formation of stable foam was taken as an indication for the presence of saponins.

Salkowski's test (Glycosides): Crude extract was mixed with 2 ml of chloroform. Then 2 ml of concentrated sulphuric acid was added carefully and shaken gently. A reddish brown colour indicated the presence of steroidal ring.

Test for steroid: Crude extract was mixed with 2 ml of chloroform and concentrated H₂SO₄ was added sidewise. A red colour produced in the lower chloroform layer indicated the presence of steroids.

Test for terpenoids: Crude extract was dissolved in 2 ml of chloroform and evaporated to dryness. To this, 2 ml of concentrated H₂SO₄ was added and heated for about 2 minutes. A grayish colour indicated the presence of terpenoids.

Test for alkaloids: Crude extract was mixed with 2 ml of 1 % HCl and heated gently. Mayer's and Wagner's reagents were then added to the mixture. Turbidity of the resulting precipitate was taken as evidence for the presence of alkaloids.

4.11 DPPH Assay

Preparation of Stock solution

DPPH solution of 100µM was prepared by dissolving 3.94mg of (1, 1-diphenyl-2-picrylhydrazyl) DPPH in 100 ml of methanol. 100 mg ascorbic acid was dissolved in 100 ml methanol to prepare stock solution of 1000 µg/ml. 20 mg of plant extract was dissolved in 20 ml of methanol to prepare stock solution of 1000µg/ml.

The standard test solution of 7.5, 8.0, 8.5, 9.0, 9.5, 10µg/ml of ascorbic acid and plant extract solution was prepared. 2 ml methanol and 2 ml 100 µM DPPH solution were mixed in triplicate. It was then shaken in dark. The absorbance was then noted at 517 nm after 30 minutes. Similarly, 500 µl of ascorbic acid and extract of all concentration were mixed with 1.5 ml of DPPH.

$$\text{Percentage scavenging} = \frac{A_0 - AT}{A_0} \times 100\%$$

Where, A₀ = Absorbance of DPPH solution

A1= Absorbance of test or reference samples

The % scavenging was then plotted against concentration, and regression equation was obtained to calculate IC₅₀ values.

Reducing power

1ml of ascorbic acid as a standard and a sample of all concentration taken in each cuvette were mixed with 0.5 ml phosphate buffer and 0.5 ml of 1% K₃Fe(CN)₆. The solution was incubate for 20 minutes at 50°C, then 0.5 ml was discarded from each tube. 1ml of 10% TCA was added to it. The solutions were then centrifuged for 10 minutes. After centrifugation, 0.5 ml upper layer was mixed with 0.5 ml distilled water and 0.1% FeCl₃ was added to it. The increased absorbance at 700 nm of the reaction mixture indicated increasing reducing power. All the tests were carried out in triplicate and average absorption was noted for each time.

CHAPTER 5

5. RESULTS

5.1 ETHNOBOTANICAL ENUMERATION

In the following ethnobotanical enumeration, plants are arranged according to Bentham and Hooker's (1862-1883) system of classification. The genera under each family and species under each genus are arranged alphabetically, followed by botanical name, citations, the standard references as prescribed in three major sources (Hara *et al.*, 1978, 1982; Hara & Williams, 1979; Polunin & Stainton 1984; Press *et al.*, 2000), and taxonomic description. The vernacular name in Nepali (N) and local names in *Gurung* (G), *Magar* (M) and *Majhi* (Ma) languages are given in italics, which is followed by voucher specimen viz., name of collector with field number, and the place of collection with altitude. The phenological data – flowering (Fls.) and fruiting (Frts.), distribution (Distrib.) and ecology – are outlined simultaneously. Lastly, the medicinal and other uses of each species by the three ethnic communities is presented.

EQUISETACEAE

Equisetum debile Roxb. ex Vaucher, Mem. Soc. Phys. Geneve **1**: 387 (1822). A spore bearing herbaceous plant about 1m tall. Stem erect, hollow and cylindrical with branches, often only 2-3 in whorl, nodes encircled with a sheath of connate leaves. Internodes 4-10 cm long. It can be propagated by seeds or by splitting roots.

Vernacular (Nepali) and Local Name: '*Aankhe jhar*', '*Simi jhar*' (N, G, M); **Voucher specimen:** BM 0102, Bhoksing, 1557 m asl., (Photo Plate 1A); **Sporulation:** June-July; **Distrib.:** Nepal at 1200-3300 m, India, Bhutan and China; **Ecology:** Terrestrial, frequently growing in streams, ponds and shady places.

Medicinal use: About 2 teaspoonfuls once a day for 4 days is recommended to cure influenza, fever and hepatitis. Juice of the roots about 2 drops twice a day for a week is given for the treatment of acute conjunctivitis and inflammation of the tear duct. A paste of the roots is applied to treat gonorrhoea (*Gurung*). **Other use:** Boiled roots are taken as food (*Magar* and *Gurung*).

Equisetum diffusum D. Don., Prodr. Fl. Nep. 19 (1825). A perennial herb about 65 cm tall, erect, spore bearing. Stem tufted, branches, densely whorled. Leaves linear reduced to teeth of a foliar loose sheath, spike short-pedicelled, propagated by splitting of rhizome or spores.

Vernacular (Nepali) and Local Name: '*Aankhle jhar*' (N), '*Kurkure no*' (G), '*Laharjoka*' (M); **Voucher specimen:** BM 0204, Pakhapani, 1230 m asl., (Photo Plate 1B); **Sporulation:** June-July; **Distrib.:** Nepal at 1200-3300 m, India, Bhutan and China; **Ecology:** Terrestrial, frequently growing in streams, ponds and shady places. **Medicinal use:** Juice of the roots, about 4-5 teaspoonfuls thrice a day for 5-6 consecutive days, is prescribed to treat fever and headache (*Magar*). The same juice is recommended to cure urinary problem. A paste of the plant is applied to relieve external burns and scabies (*Gurung* and *Magar*). **Other use:** Leaves are cooked as vegetables (*Magar*).

LYCOPODIACEAE

***Lycopodium cernuum* L., Sp. Pl. ed. 1 (2): 1103 (1753).** An erect spore bearing herb about 20-50 cm tall. Densely arranged linear and somewhat fleshy shape leaves. Strobili solitary on tips of branches, cylindrical. It is propagated by spores.

Vernacular (Nepali) and Local Name: '*Sano Nagbeli*' (N, M); **Voucher specimen:** BM 0207, Chitre, 1700 m asl., (Photo Plate 1C); **Sporulation:** November-December; **Distrib.:** Nepal about 1200-3600 m, India, Bhutan, Pakistan and China; **Ecology:** Terrestrial mostly growing on shady and moist open places.

Medicinal use: Plant juice, in dosages about 4-5 teaspoonfuls twice a day for a week, is recommended to get rid of dysentery and body pain (*Magar*). **Other use:** The plant is used in different festivals and ceremonies (*Magar*).

***Lycopodium clavatum* L., Sp. Pl. ed. 1 (2): 1100, 1564 (1753).** A terrestrial spore bearing perennial herb. Trailing on substratum, dichotomous branching, rooting at regular intervals. Leaves numerous, spirally arranged, scaly, dense, linear shaped. Strobili with long peduncle about 3-7 cm long, cylindrical bracteate. Sporangia are brown yellowish when ripen, elongated in terminal axis. Propagated by spores or by splitting of plants vegetatively.

Vernacular (Nepali) and Local Name: '*Thulo nagbeli jhar*' (N), '*Maisindur*' (G), '*Sindur*' (Ma); **Voucher specimen:** BM 0156, Chitre, 1750 m asl., (Photo Plate 1D); **Sporulation:** April-August; **Distrib.:** Nepal at 1200-3600 m, India, Bhutan, Pakistan and China; **Ecology:** Terrestrial occurring on sunny and shady slopes, streams.

Medicinal use: Juice of the plant, about 3 teaspoonfuls twice a day for ten days, is prescribed to treat dysentery and body pain. The same amount of the juice is recommended to relieve gastric and urinary problem. A paste of the seeds is applied to

treat wounds, cracks and rheumatism (*Gurung and Majhi*). **Other use:** The plant is used in different festivals and ceremonies (*Gurung and Majhi*).

Lygodium japonicum (Thunb.) Swartz., J. Bot. (Schrader) 106 (1802). A creeping perennial fern with vine like fronds to 3 meters long. Fronds bright green, decompose, sterile lamina broader. Sporangia are large in two rows on each ultimate lobe. It is propagated by spores.

Vernacular (Nepali) and Local Name: '*Aankhle jhar*', '*Janai lahara*', '*Lute jhar*', '*Pinas*' (N, Ma), '*Ukuse jhar*' (M); **Voucher specimen:** BM 0224, Durlung, 1470 m asl., (Photo Plate 1E); **Sporulation:** June-July; **Distrib.:** Nepal at 1000-3800 m, China, India, Malaysia, Philippines, Korea and Japan; **Ecology:** Found in moist and shady places.

Medicinal use: Juice of the plant is applied externally to cure boils, wounds, whitlow and scabies. A paste of the plant is administered to treat joint aches (*Magar and Majhi*). The whole plant is kept in the houses with the belief that it will prevent from scabies and itching problems (*Magar and Majhi*). **Other use:** Tender fronds are cooked as vegetables. The plant is also used for religious purpose especially in '*Sawane sakranti*' (*Magar and Majhi*).

OLEANDRACEAE

Oleandra wallichii (Hook.) C. Presl., Tent. Pterid. 78. 1836. HB. 303 (1836). An epiphytic or terrestrial fern. Rhizome creeping, stout, with brown, linear brown scales. Stipes long, scaly, jointed close to the base. Fronds 15-30 cm long, 2-4 cm wide, oblong to elliptic, membranous, acuminate. Sori brown, large, single row on either side of and close to the midrib. Propagated by spores.

Vernacular (Nepali) and Local Name: '*Jhibre Unyu*' (N, M); **Voucher specimen:** BM 0122, Chitre, 1571m asl.; **Sporulation:** July-September; **Distrib.:** Throughout Nepal at 1300-3100 m, also in India, Western China, Vietnam, Taiwan and Southeast Asia; **Ecology:** Occurs on tree trunks and mossy rocks of shady places.

Medicinal use: Paste of the rhizomes is applied to forehead to relieve headache; the paste is also administered in the cases of bone dislocation and fracture (*Magar*). **Other use:** The whole plant is used to make compost manure.

POLYPODIACEAE

Drynaria propinqua (Wall. ex Mett.) J. Sm. ex Bedd., Ferns Brit. India 160 (1866). An epiphytic or terrestrial fern. Rhizome wide, creeping, with brown, linear lanceolate scales. Fronds glabrous, 30-50 cm long, 15-20 cm wide, with distinct stipe, lobes serrate, reaching down near the rachis. Sori yellowish brown, in a single row along the midvein. Propagated by spores or by nodal rootings.

Vernacular (Nepali) and Local Name: 'Uneu', 'Kammari' (N, G); **Voucher specimen:** BM 0134, Banou, 1719 m asl., (Photo Plate 1F); **Sporulation:** July-September; **Distrib.:** Throughout Nepal at 900-2800 m, Northern India, Bhutan, Southern and Central China, Myanmar, Thailand and Malaysia; **Ecology:** Growing in shady places near streams. **Medicinal use:** Paste of the rhizomes is applied to treat backache, sprain and dislocated bones. The paste is also counseled as a remedy for headache (*Gurung*). **Other use:** Plants are used as litter for animals to lie on and to make compost manure.

Lepisorus thunbergianus (Kaulf.) Ching., Bull. Fan. Mem. Inst. Biol. 4: 88 (1933). An indigenous small epiphytic fern about 10-30 cm tall. Leaves 12-30 cm long, 0.5-1.5 cm wide, simple, short-stalked, leathery, strap-shaped with entire margins. Rhizomes creeping densely scaly when young. Later naked and scales become brown. Sori without indusial, oblong shape in single row on each side of costae which is covered when young. It can be propagated by spores.

Vernacular (Nepali) and Local Name: 'Unyu' (N, G); **Voucher specimen:** BM 0182, Chitre, 1756 m asl., (Photo Plate 1G); **Sporulation:** July-September; **Distrib.:** Nepal about 2000 m, Japan, Korea, China, Taiwan and Philippines; **Ecology:** Growing on tree trunks or rocks on forested slopes. **Medicinal use:** Juice of the plant, in dosages about 2-3 teaspoonfuls twice a day for a week, is administered in the treatment of urinary tract infections, bacterial dysentery, chronic bronchitis and rheumatism (*Gurung*). **Other use:** The plant is used to make compost manure.

Loxogramme involuta (D. Don) C. Presl., Tent. Pterid. 215 (1836). An epiphytic fern. Rhizome creeping clothed with rust-colored lanceolate scales. Frond broad, lanceolate, acuminate, entire, lower part gradually narrowed into a short stipe, leathery. Sori brown, in parallel oblique lines from the midrib to the edge. Propagated by spores.

Vernacular (Nepali) and Local Name: '*Parpare*' (N, G, M); **Voucher specimen:** BM 0284, Deupur, 1543 m asl.; **Sporulation:** June-August; **Distrib.:** Throughout Nepal to about 900-3200 m, India, Srilanka and Indo-China; **Ecology:** Growing in mossy tree trunks and branches.

Medicinal use: Juice of the rhizome is applied externally to treat fresh cuts and wounds (*Gurung*). **Other use:** The plant is commonly used to make compost manure (*Gurung* and *Magar*).

ASPIDIACEAE

Diplazium polypodioides Bl., Enum. Pl. Javae fasc. 2: 194 (1828). A herbaceous fern about 30-80 cm tall, ribbed more or less glabrous. Fronds tripinnate glabrous and large, stalked 30-45 cm long, 15-25cm broad lanceolate glabrous in both surface. Sori oblong placed along the veinlets on either side.

Vernacular (Nepali) and Local Name: '*Hadeunyu*' (N, M), '*Hade unyun*' (N), '*Chyan*' (G); **Voucher specimen:** BM 0116, Chitre, 1530 m asl.; **Sporulation:** July-August; **Distrib.:** Nepal at 1000-2500 m, India, China, Bhutan, Malaysia and Thailand; **Ecology:** Terrestrial mostly growing on shady, moist and sloppy streams.

Medicinal use: Juice of the roots is applied to cure fresh cuts and wounds (*Magar*). **Other use:** Plants are used as litter for animals to lie on. It is also mixed with cattle dung to make manure, which is locally considered as pesticide (*Gurung* and *Magar*).

Diplazium stoliczkae Bedd., Ferns Brit. Ind. Suppl. 13, t. 361 (1876). A fern with smooth slightly hairy stripe about 10-80 cm tall. Rhizomes short, ascending stout densely clothed with lanceolate. Fronds 30-45 cm long pinnate herbaceous and veins pinnate. Sori oblong placed on the lateral veins.

Vernacular (Nepali) and Local Name: '*Kalineuro*' (N, M, G); **Voucher specimen:** BM 0129, Pakhapani, 1370 m asl., (Photo Plate1H); **Sporulation:** July-August; **Distrib.:** Nepal at 500-3500 m, India and Bhutan; **Ecology:** Terrestrial, growing on moist and shady places of the forest areas.

Medicinal use: Juice of the tender fronds, about 2-3 teaspoonfuls thrice a day for 3-4 consecutive days, is recommended to treat diarrhoea and dysentery (*Magar* and *Gurung*). **Other use:** The tender shoots are cooked as vegetables. The tender shoots collected from nearby forest are sold in local markets. The plants are also used to make manure (*Magar*).

MARATTIACEAE

Angiopteris evecta (G. Forst.) Hoffm., Comm. Soc. Reg. Gott. 12. 29 t. 5. (1796). A perennial, commonly known as vessal fern about 4-7 m in height, with trunk broad and massive to 80 cm tall. Fronds glossy, around 5 m long, arching, stipes green and smooth, 2-pinnate, pinnae to 1.2 m long and 40 cm wide. Pinnules narrow-oblong to elliptic. Sori submarginal, made up of oblong groups of 4–6 pairs of globose sporangia.

Vernacular (Nepali) and Local Name: ‘Sindoore’, ‘Gaikhure’ (N, M); **Voucher specimen:** BM 0403, Pakhapani, 1400 m asl.; **Spouralation:** June-November; **Distrib.:** Nepal to about 2100 m, Australia, Madagascar, Malaysia, Sri Lanka, Thailand and Vietnam; **Ecology:** Moist forest and rainforest at low to middle elevations.

Medicinal use: A decoction of the leaves, about 4-5 teaspoonsfuls once a day for a week, is taken orally along with lemon juice to treat intestinal ulcer and stomachache. Petiole and leaf paste with common salt is applied externally to cure fire burns. Juice of the dry rhizome, in dosages about 3-5 teaspoonsfuls twice a day for 12-15 consecutive days, is administered to cure gynaecological problems (*Magar*). **Other use:** The plant is cultivated as an ornamental fern in nearby courtyard. Starchy rhizomes are sometimes cooked as vegetables.

LINDSAEACEAE

Sphenomeris chinensis (L.) Maxon., J.Wash. Acad. Sci. **3** (5): 144 (1913). A terrestrial ferns with moderately long creeping rhizome, rhizome scales elongate triangular in shape to some scales wholly uniseriate and hair-like. Fronds with stipes abaxially terete, adaxially upward sulcate. Laminas much dissected without terminal pinna, not free and conform. Veins free, simple or forked in the ultimate divisions. Sori paucinerval, on the apical margin of the segments, indusium attached at the base and the sides. Paraphyses 2-3-celled. Spores monolete or trilete. Propagated by spores.

Vernacular (Nepali) and Local Name: ‘Chhabo’ (N, M), ‘Amaaro’ (Ma); **Voucher specimen:** BM 0113, Chitre, 1990 m asl.; **Fls.-Frts.:** July-December; **Distrib.:** Nepal at 2000 m, India, China, Madagascar, New Zealand and Japan; **Ecology:** Found in moist and open places.

Medicinal use: Paste of the leaves is applied on swollen areas of the body and sprain of feet (*Majhi*). **Other use:** The plant leaves are used for manure (*Magar* and *Majhi*).

DAVALLIACEAE

Araiostegia pulchra (D. Don) Copel., Philip. Journ. Sci. **34**: 241 (1927). A beautiful fern. Rhizomes long creeping covered with spreading, obtuse, brown scales. Stipes 4.2-17 cm long, erect, glabrous covered with deciduous scales. Fronds long and broad, lanceolate, pinnae obovate-lanceolate in shape 4-7 cm long and 2-10 cm broad, lower ones the largest, lobes narrowly lanceolate, non-distant and non-acute. Sori copious, broad, segments and placed at the base of the teeth.

Vernacular (Nepali) and Local Name: '*Mariesii*' (N, M); **Voucher specimen:** BM 0146, Banou, 1701m asl.; **Sporulation:** July-August; **Distrib.:** Himalayas Eastern and Central Nepal at the altitude of 1400-3100 m and Indo-China; **Ecology:** Growing on mossy tree trunks and occasionally terrestrial on rocks of moist places.

Medicinal use: Rhizome juice, in dosages about 4-5 teaspoonfuls twice a day for 4-5 days, is recommended to relieve body pain and to cool down the body temperature (*Magar*). **Other use:** The plant is used for decoration especially at the garden.

Nephrolepis auriculata (L.) Trimen., J. Linn. Soc. Bot. **24 (160)**: 152 (1887). A tuberous terrestrial fern about 40-80 cm tall. The mature spores are yellow-brown, monolet, opaque, bean shaped in equatorial view and elliptical in polar view with a smooth surface. The spore germination pattern is of the Vittaria type. The mature prothalli are symmetrically heart-shaped. Unicellular hairs spread on the upper and lower surfaces and along the margin of the prothalli.

Vernacular (Nepali) and Local Name: '*Paani amala*' (N, M, Ma), '*Kyuphun*' (G); **Voucher specimen:** BM 0108, Kyang, 1650 m asl. (Photo Plate 1I); **Sporulation:** Spores all year round; **Distrib.:** Nepal at 800-2400 m, India, Bhutan and China; **Ecology:** Rain forest, open and moist places.

Medicinal use: Tuber juice, about 5-8 teaspoonfuls twice a day for 3-5 consecutive days, is prescribed in fever, indigestion, cough and cold (*Gurung*). **Other use:** Tubers are eaten raw, and the plant is used for ornamental purpose (all tribes).

Nephrolepis cordifolia (L.) C. Presl., Tent. Pterid. 79 (1836). A tuberous terrestrial epiphytic or epilithic (on rock) fern around 75 cm tall. Rhizomes are short, sub-erect with spreading orange-brown to pale brown linear scales, roots bear globose tubers. Fronds 50-90 cm long, 5 cm

broad, pinnately divided, linear-lanceolate, numerous pinnae, sessile, rounded or blunt apex. Propagated by root tubers or vegetative splitting of plant.

Vernacular (Nepali) and Local Name: '*Paniamala*' (N, M), '*Kyudabi*' (G); **Voucher specimen:** BM 0417, Falamkhani, 1722 m asl.; **Sporulation:** June-October; **Distrib.:** Nepal at 800-2400 m, India, Bhutan and China; **Ecology:** Growing extensively on rock crevices, moist places sometime on tree trunks, shady places and dry open places.

Medicinal use: A decoction of roots and tubers, about 5-7 teaspoonfuls twice a day for a week, is prescribed to cure fever, indigestion and headache (*Gurung* and *Magar*). The same amount of decoction is recommended twice a day as contraceptive (*Magar*). This juice is considered effective to treat cough and cold. It is also used to relieve liver disorder (*Gurung* and *Magar*). **Other use:** Tubers are eaten raw, and the plant is used for ornamental purpose (*Gurung* and *Magar*).

PODOCARPACEAE

Podocarpus neriifolius D. Don, in Lamb., Descr. Gen. Pinus 2: 21 (1824). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 28 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 235 (2000). A glabrous evergreen coniferous medium sized tree about 8-10 m tall. Branches irregular or whorled. Leaves scattered, crowded towards the apex, sub sessile or short petiolate, acute or acuminate 3.5-1.9 cm long and 0.5-1.5 cm broad. Male flowers 2-3, fascicled, bracteates present at base. Stamens numerous, spirally arranged, anther 2 celled, opening by apical pores. Pollen cones solitary and yellowish. Bark grayish brown, fibrous. Seed cone red, fleshy. Seeds globosely arranged, surrounded by yellow or orange fleshy scale. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Gunsee*' (N, M); **Voucher specimen:** BM 0190, Lespar, 1491m asl.; **Distrib.:** Eastern and central Nepal at 850-1500 m, India, China, Bhutan, Myanmar, Malaysia and Taiwan; **Fls.-Frts.:** May-August; **Ecology:** Humid tropical regions.

Medicinal use: Juice of the leaves, in dosages about 4-5 teaspoonfuls twice a day for 7-10 consecutive days, is useful to treat diarrhoea, dysentery, leprosy, rheumatism, gout, headache, cough and cold. It is also used as tonic (*Magar*). **Other use:** The plant is used as timber, furniture, musical instruments- *Madal*, carvings, and paper (*Magar*).

TAXACEAE

Taxus wallichiana (Zucc.), Abh. Bayer. Akad. Wiss. **3**: 803, t. 5(1843). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 28 (1978). Polunin & Stainton, Fl. Hima. 387 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 307 (2000). A strongly shade-tolerant evergreen coniferous tree, growing a large size and heights of over 30-40 m tall and diameters of nearly 3 m. Its growth is very slow and very long-lived. Tree bark thin, reddish-grey in colour. Leaves are thin, flat, slightly falcate (sickle-shaped) in two rows, 1.5-2.8 cm by about 2 mm, dark green above, pale beneath, arranged spirally on the shoots but twisted at the base to appear in two horizontal ranks on all except for erect lead shoots. Seed surrounded by a red fleshy aril, looks like a berry, about 7 mm in diameter. The shoots are green at first, becoming brown after three or four years. It can also be propagated from cuttings and seeds.

Vernacular (Nepali) and Local Name: 'Lothsalla' (N, G), 'Salin' (M); **Voucher specimen:** BM 0398, Lespar- Kyang, 2450 m asl., (Photo Plate 2A, B, C); **Fls.-Frts.:** March-November; **Distrib.:** Nepal between 2300-4400m, India, Afghanistan, Pakistan, Bhutan, Myanmar, China and Malaysia; **Ecology:** Found especially on limestone but associated with mixed forest, particularly at higher altitudes.

Medicinal use: A decoction of the leaves, in dosages about 4-5 teaspoonfuls twice a day for a week, is prescribed to treat cough, bronchitis and asthma. The same decoction is used to treat cancer (*Magar*). A decoction of the leaves is used as an insecticide (*Gurung*). **Other use:** Ripen fruits are eaten fresh. The stem bark is used as red dye and also sold in market. Timber is used for construction of house and furnitures. The plant twigs are looped for fodder (*Gurung* and *Magar*). This plant makes an excellent hedge, and the wood is burnt as incense.

PINACEAE

Abies spectabilis (D. Don) Mirb., Mem. Mus. Hist. Nat. Paris **13**: 70 (1825). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 25 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 233 (2000). An evergreen monoecious, coniferous tree up to 30 m tall. Leaves nearly sessile, linear, flattened, notched at the top. Male cones usually clustered, yellowish, female cones solitary, situated a little below the tips of shoots. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bungasalla', 'Talish patra' (N), 'Thingre salla' (M); **Voucher specimen:** BM 0311, Lespar- Kyang, 2750 m asl., (Photo plate 2D); **Fls.–**

Frts.: June-July; **Distrib.:** Nepal at 2400-4200 m, Afghanistan, Himalaya India and China; **Ecology:** Growing in mixed forest with Rhododendron.

Medicinal use: Juice of the leaves, about 5 teaspoonfuls twice a day for 5 days, is taken to cure asthma and bronchitis. Essential oil from the needles is used in case of colds, rheumatism and nasal congestion (*Magar*). **Other use:** Wood is used for thatching roofs and other construction. It is also used as fuelwood. Dried needles mixed with other ingredients are used to prepare incense.

Cedrus deodara (Roxb. ex D. Don) G. Don, Loud. Hort. Brit. ed. **1:** 388 (1830). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 25 (1978). Polunin & Stainton, Fl. Hima. 386 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 233 (2000). An evergreen coniferous tree about 30-80m with spreading branches. Leaves either solitary or in dense clusters, subrigid, straight, acuminate, needle-like, sharply pointed, 2- 5.5 cm, glaucous green. Male cones cylindrical 5-12 cm, erect. Female cones ovoid-cylindrical, erect, large 10-13 cm by 8-10 cm with numerous thin scales; young cones bluish purple. Scales numerous and spirally arranged. Seeds triangular or broadly crescent shaped.

Vernacular (Nepali) and Local Name: 'Deodar', 'Devdar' (N, M); **Voucher specimen:** BM 0150, Sirpu-Lespar, 2780 m asl.; **Fls.-Frts.:** March-April; **Distrib.:** Western and central Nepal at 1100-2900 m, Afghanistan and north-western India; **Ecology:** cultivated tree in the valley.

Medicinal use: The wood is boiled in water, strained and boiled until gelatinous mass is formed. A decoction in dosages about 3-4 teaspoonfuls once a day for a week is considered good in fever, rheumatic pains, hemorrhage and pulmonary problems. Paste of the wood is applied to forehead to relieve headache. Resin of the wood is used to treat bruises, skin diseases and injuries to joints. Seed oil is diaphoretic and applied to treat skin diseases (*Magar*). **Other use:** Wood is used for construction, and as fuelwood.

Pinus roxburghii Sarg., Silva N. Amer. **11:** 9 (1897). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 26 (1978). Polunin & Stainton, Fl. Hima. 388 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 234 (2000). An evergreen large coniferous tree about 45 m tall. It is also called three needle pine, leaves needle with grayish basal sheath with cluster-3 needle nearly 20-33 cm long. Male catkins small and oval. Female cones ovoid and conical in shape. Seeds are oval in shape with membranous wings.

Vernacular (Nepali) and Local Name: 'Khotessallo' (N), 'Siuri' (G), 'Aragi' (M);

Voucher specimen: BM 0209, Falamkhani, 1700 m asl.; **Fls.-Frt.:** May-November;

Distrib.: Nepal at 800-2000 m, Afghanistan, Northern India and Bhutan; **Ecology:** Widely growing on open places also cultivated tree.

Medicinal use: Resin is applied externally to cuts and wounds. 2-3 pea sized resin is given four times a day in a week to relieve gastric trouble (*Magar* and *Gurung*). **Other use:** Wood is used for furniture and house construction. Resin is used for flammable purpose and to make turpentine oil. Needles are used as litter for animals to lie on which is later used as pesticide. (*Magar* and *Gurung*).

Pinus wallichiana A. B. Jackson., Kew Bull. **1938:** 85 (1938). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 26 (1978). Polunin & Stainton, Fl. Hima. 387 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 234 (2000). An evergreen pyramidal coniferous tree upto 50 m tall. Needles are 5 in number, borne on short-short in clusters about 15-20 cm long. Female cones in clusters of 2-3, long cylindrical about 25 cm long.

Vernacular (Nepali) and Local Name: 'Gobresalla', 'Ranee salla' (N, M); **Voucher**

specimen: BM 0212, Lepar-Kyang, 2150 m asl., (Photo Plate 2E); **Fls.-Frts.:** May-November; **Distrib.:** Nepal at 1800-3500 m, Afghanistan, Bhutan and Northwestern India; **Ecology:** Growing wild in temperate open forest also cultivated tree.

Medicinal use: Resin is applied to treat fresh cuts and wounds. **Other use:** Wood is used for timber and resin is extracted for commercial purpose. Needles are used as litter for animals to lie on which is later used as pesticide (*Magar*).

Tsuga dumosa (D. Don) Eichler, Pfl.-fam. **II-1:** 80 (1887). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 26 (1978). Polunin & Stainton, Fl. Hima. 385 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 234 (2000). An evergreen coniferous tree, distinguished by its small ovoid cones 1.5-2.5 cm long, with thin rounded scales. Leaves sessile, about 2.5 cm long, linear, entire, more or less distichous, apex obtuse, mealy white beneath, with recurved margins. Cones are ovoid.

Vernacular (Nepali) and Local Name: 'Chunne salla', 'Thingre salla' (N, M);

Voucher specimen: BM 0177, Sirpu-Lespar, 3132m asl. (Photo Plate 2F); **Fls.-Frts.:** May-June; **Distrib.:** Throughout Nepal at 2000-3600m. Northern India and Myanmar; **Ecology:** Occurs in Himalaya.

Medicinal use: A decoction of needles, in dosages about 3-4 teaspoonsfuls twice a day for a week, is prescribed to treat cronic bronchitis (*Magar*). **Other use:** Timber is used for construction purpose and fuelwood. Leaves are sometimes burnt as incense in Buddhist religious shrines. Cones are used for decorative purpose.

CUPRESSACEAE

Juniperus indica Bertol., Misc. Bot. **23**: 228, t. 1 (1862). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 27 (1978). Polunin & Stainton, Fl. Hima. 390 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 86 (2000). A large gregarious shrub about 2m tall. Leaves closely appressed, overlapping, decussate. Fruit one seeded, at first brown then shining blue, 6-13 mm. Cones yellowish in terminal, short lateral branches. Seed cone ovoid and black.

Vernacular (Nepali) and Local Name: '*Dhupi*', (N) '*Pamo*' (M); **Voucher specimen:** BM 0123, Bhuktangle, 3350 m asl.; **Fls.-Frts.:** May- June; **Distrib.:** Throughout Nepal at 3300-4600m, northern India, Western China and northern Myanmar; **Ecology:** found in moist, well drained soils of high Himalayas.

Medicinal use: Juice of the leaves, in dosages about 2-3 teaspoonfuls twice a day for a week, is recommended in the treatment of epilepsy. Roasted fruits are useful in the treatment of asthma. Oil obtained from the fruits is used as tonic and is good for earache and toothache. A decoction of the leaves and bark, in dosages about 3-4 teaspoonfuls once a day for 5-7 consecutive days, is prescribed in diarrhoea, abdominal pain, diseases of spleen and abdomen (*Magar*). **Other use:** Woods and leaves are used as incense.

RANUNCULACEAE

Anemone rivularis Buch.-Ham. ex DC., Syst. Nat. **1**: 211 (1817). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 12 (1979). Polunin & Stainton, Fl. Hima. 13 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 251 (2000). A deciduous, herbaceous perennial plant about 60 cm height with a clump forming habit. Its dark green leaves are deeply lobed with three leaflets. Its leaflets are also deeply lobed with serrate margins and up to 10cm long. Its white flowers are saucer shaped, up to 3m across and appear in umbels at the ends of erect branched stems.

Vernacular (Nepali) and Local Name: '*Bagh paile*' (N, M, G); **Voucher specimen:** BM 0171, Bhuktangle, 2100 m asl.; **Fls.-Frts.:** April-July; **Distrib.:** Nepal Himalayas at

1600-4000 m, India, Sri-lanka, Myanmar and China; **Ecology:** It occurs in open slopes and shady places.

Medicinal use: A decoction of the plant, about 2-3 teaspoonsfuls thrice a day for 5 consecutive days, is given to cure bronchitis (*Magar*). Liquid extract of the leaves about 2 drops is dripped into the ear twice a day as a remedy of earache. Juice of the leaves about 2 drops is inhaled through nostril to relieve sinusitis (*Gurung* and *Magar*). Rhizome powder is given to the cattle poisoned after eating plants (*Magar*). **Other use:** Rosted seeds are pickled (*Gurung* and *Magar*).

Anemone vitifolia Buch.-Ham. ex DC., Syst. Nat. **1:** 211 (1817). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 13 (1979). Polunin & Stainton, Fl. Hima. 12 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 251 (2000). An erect, stout, branched herb about 50 cm tall. The lower leaves long-stalked, five-lobed, orbiculate, serrate, white tomentose beneath, upper leaves short-stalked. Flowers white with pink margins under the petals. Fruit an achene.

Vernacular (Nepali) and Local Name: 'Dhanero', 'Kapase' (N), 'Panta' (G), 'Bhaisya marelo' (M); **Voucher specimen:** BM 0503, Lespar- Kyang, 2017 m asl., (Photo Plate 3A); **Fls.–Frts.:** August-September; **Distrib.:** Nepal Himalayas at 1600-3000 m, India, Burma to China; **Ecology:** It occurs in open slopes and shady places.

Medicinal use: Paste of the roots is applied twice a day to treat scabies (*Gurung*). Juice of the roots is used in case of toothache and to remove lice. A decoction of the leaves about 5 teaspoonfuls twice a day is given to relieve headache, dysentery, vermifuge, scabies and used to kill head lice (*Magar*). In dosages about 3-4 teaspoonfuls of this juice is recommended twice a day for 5 consecutive days to cure dysentery (*Gurung* and *Magar*). **Other use:** The plant is used to intoxicate fish (*Magar*).

Clematis gouriana Roxb. ex DC., Syst. Nat. **1:** 138 (1817). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 14 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 252 (2000). A woody climber. Leaves are stalked pininate, leaflets 1.5-6.5 cm long, oblong to lanceolate, acuminate, distantly dentate, base cordate, glabrous. Flowers are small, creamy in colour, densely axillary panicles. Fruits an achene, lanceolate. It is propagated by seeds.

Vernacular (Nepali) and Local Name: 'Junge lahara' (N, G), 'Kureni' (M); **Voucher specimen:** BM 0101, Dhairing, 1250 m asl.; **Fls.–Frts.:** August-September; **Distrib.:** Nepal Himalayas at 600-1600 m, India, Sri-lanka, Myanmar and China; **Ecology:** It occurs in open slopes and shady places.

Medicinal use: Juice of the leaves, about 3-4 teaspoonfuls twice a day for a week, is administered to cure parasitic worms. A decoction of the roots, about 4-5 teaspoonfuls thrice a day for three days, is prescribed to administer stomachache, fever and musculoskeletal disorder (*Magar*). **Other use:** The plant is used for fodder to cattle (*Gurung* and *Magar*).

Delphinium altissimum Wall., Pl. As. Rar. 2: 25, t. 128 (1831). Press *et al.*, Ann. Check. Fl. Pl. Nep. 253 (2000). Polunin & Stainton, Fl. Hima. 8 (1984). A small perineal herb about 1 m tall, glabrous, branched. Leaf blade 10-15 cm wide, base cordate; primary lobes separate blade, central lobe broadly rhombic, 3-lobulate, apex acute, and lobules narrowly ovate or lanceolate. Flowered compound raceme, densely appressed puberulent, bracts 3-parted. Pedicels 2.2 cm bracteoles borne proximally or near middle of pedicel, lanceolate-linear. Sepals purple-blue, abaxially appressed puberulent, spur cylindrical in shape about 1.7 cm long and straight. Petals undivided, glabrous. Staminode limb broadly ovate, 2-lobed, sparsely white barbate. Filaments glabrous. Carpels 3, ovaries puberulent.

Vernacular (Nepali) and Local Name: '*Junge lahara*' (N, M, G); **Voucher specimen:** BM 0167, Bhuktangle, 2300 m asl.; **Fls.–Frts.:** August–September; **Distrib.:** Nepal Himalayas, forest margins, grassy places at 1400-2500 m, Bhutan and India; **Ecology:** Open rocky slopes of limestone.

Medicinal use: An infusion of the whole plant is used to remove worms from wounds of animals (*Magar*). **Other use:** The whole plant is used for manure (*Gurung*).

Ranunculus laetus Wall.ex D. Don, in Royle, III. B. Him. 53 (1834). Hara & Enum, Fl. Pl. Nep. 2: 19 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 256 (2000). A perennial herb about 30-70 cm tall with a creeping rootstock producing numerous fibrous roots and flowering stems. Stems usually much branched with spreading hairs, especially near the base often glabrescent later. Basal leaves with long petioles densely patent-hairy, rounded-reniform, with obovate segments, lobes obovate, Stem leaves sessile, lower ones shortly decreasing in size upwards. Flowers 17-25 mm in diameter, yellowish in colour. Sepals 5-7, lanceolate to ovate-lanceolate, acute. Petals roundish obovate, sometimes tapering into a claw.

Vernacular (Nepali) and Local Name: '*Nakoorejhar*' (N), '*Bokua*' (Ma); **Voucher specimen:** BM 0305, Pangrang, 1547 m asl.; **Fls.–Frts.:** June–September; **Distrib.:** Throughout Nepal 1500-2700 m, Afghanistan, India, and China; **Ecology:** Open and moist places.

Medicinal use: Fresh leaves paste is applied on skin twice a day for a week to treat skin infection. A decoction of the leaves and stem, about 5 teaspoonfuls twice a day is prescribed to cure indigestion and sinusitis (*Majhi*). **Other use:** The plant is used for fodder to cattle.

Thalictrum reniforme Wall., Pl. As. Rar. **2(6):** 26 (1831). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 22 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 258 (2000). Polunin & Stainton, Fl. Hima. 14 (1984). A shrub about 1.5-2 m height. Leaves are stalked pinnately subsessile, orbiculate or ovate, flowers purplish, whitish, or yellowish in colour. It is also propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: ‘*Dampate*’, ‘*Bansuli*’ (N, Ma), ‘*Pajeni*’ (G), ‘*Bajuri*’ (M); **Voucher specimen:** BM 0326, Lespar- Kyang, 2671 m asl., (Photo Plate 3B); **Fls.-Frts.:** July-September; **Distrib.:** Nepal to Bhutan at 2500-3500 m, India and Myanmar; **Ecology:** Forests, shrubberies.

Medicinal use: Juice of the roots, about 5-6 teaspoonfuls twice a day is recommended to cure abdominal pain, blood purification, leucoderma and piles (*Magar*). The plant is grounded with black pepper (3:1) and about 3 teaspoonfuls twice a day for a week, is given to cure leucorrhoea. Fresh root is chewed to get relieve from toothache. **Other use:** The plant is used for fodder to cattle (*Magar, Gurung* and *Majhi*).

MAGNOLIACEAE

Michelia champaca L., Sp. Pl. 536 (1753). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 25 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 192 (2000). An evergreen tree, around 20 m tall. Leaves petiolate, 15-20 cm long, 5-8 cm wide, oblong to lanceolate, shiny dark green on upper surface. Flowers are solitary, axillary, yellow and scented. Fruits are ovoid, elliptical capsules, dark with white specks and red seeds. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Champ*’ (N, M, G); **Voucher specimen:** BM 0189, Chitre, 1651 m asl., (Photo Plate 3C); **Fls.-Frts.:** June-September; **Distrib.:** Central Nepal at 600-1700 m, India and China; **Ecology:** Mostly growing on shady as well as sunny open places, some times found in mixed forest, cultivated near villages.

Medicinal use: Dried powder of the roots, in dosages about 3 teaspoonfuls, is mixed with a glass of milk and recommended once a day for a week to cure abscesses (*Magar*). Flowers paste is applied externally to treat gonorrhoea for a week (*Gurung*). Juice of the

leaves with honey, about 2-3 teaspoonfuls twice a day for a week is prescribed in case of colic pain. A paste of the seeds and fruits is used to treat chapped skins and cracks in feet (*Magar*). **Other use:** Wood is used to make musical instruments such as Sarangi, Madal and Dhol. It is also used for furniture. Flowers are used in various religious and cosmetic purposes (*Gurung* and *Magar*).

Michelia doltsopa Buch.-Ham. ex DC., Syst. Nat. 1: 448 (1817). Hara & Williams, Enum. Fl. Pl. Nep. 2: 25 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 192 (2000). Polunin & Stainton, Fl. Hima. 19 (1984). A large deciduous tree with young buds and flowers covered with red or brown hairs. Leaves oval to oblong 10-20 cm long, dark, glossy green above and some what glaucous beneath with short rufous hairs when young becoming hairless. Flowers are pale yellow to white very fragrant, 8-10 cm across, solitary in the leaf axils. Petals 12-16 cm, ovate to oblanceolate, fruits with a spike 10-20 cm long and seeds are red in colour.

Vernacular (Nepali) and Local Name: '*Rani Chanp*' (N, M); **Voucher specimen:** BM 0077, Lespar, 2400 m asl., (Photo Plate 3D); **Fls.-Frts.:** June-September; **Distrib.:** Central Nepal at 2000-2500 m, India and China; **Ecology:** Mostly growing on shady as well as sunny open places, some times found in mixed forest.

Medicinal use: Juice of the leaves, about 2-3 teaspoonfuls in equal amount of honey, twice a day for a week is administered in case of colic pain. A paste of the seeds and fruits is used to treat chapped skins and cracks in feet (*Magar*). **Other use:** Wood is used to make furniture and fuelwood. Flowers are used in various cosmetic religious purpose. Leaves are looped for fodder (*Magar*).

Michelia kisopa Buch.-Ham. ex DC., Syst. Nat. 1: 448 (1817). Hara & Williams, Enum. Fl. Pl. Nep. 2: 25 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 192 (2000). Polunin & Stainton, Fl. Hima. 19 (1984). A tall aromatic tree about 25-35 m in height. Leaves simple, stalked, oblong to lanceolate, greyish hair in beneath about 15 cm long, leathery and pubescent. Flowers 2-3 cm across, solitary, axillary at the tips of branches, yellow. Fruits spike to 8 cm and it is propagated by seeds.

Vernacular (Nepali) and Local Name: '*Kaula*', '*Seto chanp*', '*Ban chaanp*' (N, M); **Voucher specimen:** BM 0046, Lespar, 2150 m asl.; **Fls.-Frts.:** September-January; **Distrib.:** Himalayas in Nepal central at 1280-2180 m, India and Bhutan; **Ecology:** Growing on open and sunny place.

Medicinal use: Dried powder of the roots, in dosages about 3 teaspoonfuls in a day for 5-6 consecutive days, is recommended with a glass of milk to treat abscesses. A paste of the flowers is applied externally to treat gonorrhoea (*Magar*). **Other use:** Powdered bark, mixed with corn flour (*Zea mays*) is baked to make delicious bread. Timber is used to make musical instrument, Madal. It is also used to make furniture for decorative purpose (*Magar*). The flowers are used for cosmetic products.

MENISPERMACEAE

Cissampelos pareira L., Sp. Pl. 1031 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 27 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 196 (2000). A climbing herb about 2-4 m tall. Leaves petiolate, 2.5-8 cm long, 2-7.5 cm wide, orbiculate to reniform with cordate or truncate base. Flowers minute, clustered, yellowish and fruit drupe, subglobose, red when ripen.

Vernacular (Nepali) and Local Name: 'Batulpate lahara' (N), 'Gurubuti', 'Lungri' (G), 'Dalli lahara', 'dhakani' (Ma); **Voucher specimen:** BM 0262, Pakhapani-Sarthan, 1017 m asl. (Photo Plate 3E); **Fls.-Frt.:** April-November; **Distrib.:** Throughout Nepal about 3000 m; **Ecology:** Climber on sunny places, common in moist and shady places.

Medicinal use: Juice of the plant, about 5-6 teaspoonfuls twice a day for ten days, is prescribed after delivery to stop bleeding and diarrhoea (*Gurung*). Same juice, about 3 teaspoonfuls thrice a day, is given in case of fever and indigestion. A decoction of the leaves is applied to cure dislocated bones, skin diseases and as cooling agent in gonorrhoea (*Majhi*). **Other use:** Fiber is extracted from the stem and used for temporary binding of fuel-wood (*Majhi*).

Tinospora sinensis (Lour.) Merr., Sunyatsenia 1: 193 (1934). Hara & Williams, Enum. Fl. Pl. Nep. 2: 29 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 197 (2000). A large deciduous climber with succulent stem, aerial roots. Leaves petiolate, 7.5-20 cm long, 7.5-17.5 cm wide, orbiculate, cordate, alternate, palmately 5-7 nerved. Flowers yellowish in racemes and fruit ellipsoidal drupe, red when ripe.

Vernacular (Nepali) and Local Name: 'Gurjo' (N, M), 'Guruj' (Ma); **Voucher specimen:** BM 0213, Behulibans, 1091 m asl., (Photo Plate 3F); **Fls.-Frts.:** March-May; **Distrib.:** Nepal to about 1200 m, India, Bhutan, Sri Lanka, China, Thailand, Vietnam and Malaysia; **Ecology:** Occures in the sunny places.

Medicinal use: A stem extract, 4-5 teaspoonfuls once a day for two days is taken orally with water to treat dysentery. Juice of the plant is used as a tonic and febrifuge (*Majhi*). The plant juice, in dosages about 4-5 teaspoonfuls for a week, is administered to cure stomachache and urinary problems (*Magar*). Leaf extracts, in dosages about 5 teaspoonfuls twice a day for 5 consecutive days, is recommended to relieve fever and to stimulate urination (*Magar*). **Other use:** Leaves are consumed as herbal tea. The plant is used for fodder. Tuber is used to make wheels in agricultural instruments (*Magar* and *Majhi*).

BERBERIDACEAE

Berberis aristata DC., Syst. Nat. 2: 8 (1821) var. **aristata**. Hara & Williams, Enum. Fl. Pl. Nep. 2: 29 (1979). Polunin & Stainton, Fl. Hima. 21 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 25 (2000). A large thorny shrub usually 2 m tall, pale yellow branches, usually elliptic and often spineless leaves about 2.5-5cm, short-stalked clusters of numerous yellow flowers longer than leaves. Flowers about 6 mm long. Fruits dark red in colour to ripen blue purple, 6-8 mm.

Vernacular (Nepali) and Local Name: 'Chutro' (N, M), 'Komme', 'Tisy' (G); **Voucher specimen:** BM 0410, Banou, 1950 m asl., (Photo Plate 3G); **Fls.–Frts.:** March-October; **Distrib.:** Throughout Nepal at 1200-3500 m, India; **Ecology:** Growing on open and moist places.

Medicinal use: A decoction of the roots, about 2-3 teaspoonfuls twice a day for a week, is administered to cure fever, dysentery, skin troubles and in blood purification (*Gurung* and *Magar*). Paste of the stem bark is used to treat piles, sore throat and skin diseases (*Gurung*). **Other use:** Ripen fruits are eaten fresh and also used to distill local alcohol. The root and stem barks are the source of yellow dye (*Gurung* and *Magar*).

Berberis asiatica Roxb. ex DC., Syst. Nat. 2: 13 (1821). Hara & Williams, Enum. Fl. Pl. Nep. 2: 29 (1979). Polunin & Stainton, Fl. Hima. 20 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 25 (2000). Shrub, much branched, spiny, evergreen, around 3 m tall. Leaves simple, short-petioled, clustered, 1.5-9 cm long, 0.5-2 cm wide, elliptical to ovate, oblong, margins 2-5 spiny teeth. Flowers pale yellow in flat topped clustered racemes, pedicellate. Fruits berries, fleshy or pulpy, dark purple, oblong-ovoid. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Chutro' (N), 'Chotr' (G), 'Chutra' (M); **Voucher specimen:** BM 0426, Pakhapani, 1350 m asl., (Photo Plate 3H); **Fls.–Frts.:**

March-July; **Distrib.:** Throughout Nepal at 600-2500 m, Bhutan, India and China;

Ecology: Growing on open, sunny and dry places.

Medicinal use: Juice of the stem bark, in dosages about 4-5 teaspoonfuls twice a day for 10-15 consecutive days, is prescribed to treat dysentery and piles. Stem paste is applied to cure conjunctivitis (*Gurung and Magar*). **Other use:** Fresh ripen fruits are eaten and also used to distill local alcohol which is very popular in ceremonies of the ethnic community (*Gurung and Magar*).

Mahonia napaulensis DC., Syst. Nat. 2: 21 (1821). Hara & Williams, Enum. Fl. Pl. Nep. 2: 31 (1979). Polunin & Stainton, Fl. Hima. 22 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 27 (2000). An evergreen shrub about 3 m tall. Leaves are alternate, large 30-40 cm, crowded, pinnate with 4-7 pairs of stiff, overlapping ovate leaflets with spiny marginal teeth and pointed apices, lanceolate arranged and upper surface is dark green. Inflorescence terminal cluster of many flower spikes. Flowers yellow. Fruits an ellipsoid berries about 1 cm long, purplish when ripen, 1-3 seeded.

Vernacular (Nepali) and Local Name: '*Jamanemandro*' (N), '*Komo*' (G); **Voucher specimen:** BM 0421, Chitre, 1750 m asl., (Photo Plate 3I); **Fls.-Frts.:** February-June; **Distrib.:** Throughout Nepal at 1200-3000 m, Bhutan and India; **Ecology:** Mostly found in moist places of the mixed forest, cultivated near by villages.

Medicinal use: A decoction of the stem bark, in dosages about 3-4 teaspoonfuls twice a day for a week, is recommended to cure dysentery and diarrhoea (*Gurung*). **Other use:** Ripen fruits are eaten fresh and pickled. Flowers are used for ornamental purpose. Stem bark is the source of yellow dye (*Gurung*).

Podophyllum hexandrum Royle, III. B. Him. 64 (1834). Hara & Williams, Enum. Fl. Pl. Nep. 2: 32 (1979). Polunin & Stainton, Fl. Hima. 23 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 27 (2000). A distinctive herbaceous plant about 40-80 cm tall with an erect unbranched stem. Leaves usually 2 blade rounded, about 10-25 cm in diameter, deeply cut into 3-5 lobes, purple dotted. Flower cup shaped, 2-4 cm across, sepals 3, soon falling, petals and stamens are 6 in number. Fruit a berry, solitary, terminal, drooping. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Laghupatra*' (N, M), '*Shinmendo*' (G); **Voucher specimen:** BM 0143, Bhuktangle, 3120 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Throughout Nepal at 3000-4500 m, Afghanistan, India, Bhutan, Tibet and China; **Ecology:** Scrub forests and alpine meadows, usually in humus rich soils.

Medicinal use: The plant juice, about 3-4 teaspoonfuls once a day for a week is given to increase the flow of the bile and its discharge from the body (*Magar*). Juice of the roots, in dosages about 3-5 teaspoonfuls twice a day for a month, is administered to controls the growth of gynaecological cancer tumor (*Magar*). A decoction of the roots, in dosages about 4-5 teaspoonfuls twice a day for a week, is prescribed as anti-rheumatic (*Gurung*). The seeds powdered, about 1-2 teaspoonfuls once a day for a week is prescribed to get rid of kidney problems, skin diseases, cough and cold. It is very helpful to ease childbirth and in expulsion of placenta (*Magar* and *Gurung*). **Other use:** Ripen fruits are eaten fresh (*Magar*).

PAPAVERACEAE

Corydalis megacalyx Ludlow., Bull. Br. Mus. (Nat. Hist.) B. **5**: 58, t. 8, f. 7 (1975). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 34 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 230 (2000). Small perennial herb about 10 to 15 cm tall, with long rootstock. Leaves pinnate, leaflets lobed or pinnately cut into minute linear segments. Flowers yellow, striped with dark brown, in dense clusters, cylindric, straight.

Vernacular (Nepali) and Local Name: '*Bhutkesh*' (N, M); **Voucher specimen:** BM 0091, Lespar, 3290 m asl.; **Fls.–Frts.:** May–September; **Distrib.:** Nepal at 3000–5500 m; **Ecology:** Alpine grassland with mixed stocks of *Cyperaceae* and *Gramineae* among rocks on loose screes.

Medicinal use: A decoction of the entire plant, about 5 teaspoonfuls twice a day for a week, is given to relieve chronic fever, jaundice and blood disorder. **Other use:** The plant is used for fodder to goats and sheep (*Magar*).

Dactylicapnos scandens (D. Don) Hutch., Bull. Misc. Inform. Kew **1921**: 105 (1921). Climbers, perennial, herbaceous, branched carrotlike rootstock. Stems 2–5 m, thin, sulcate, branched and leafy throughout. Leaves blade glaucous abaxially, dark green adaxially, with 1 pair of primary pinnae usually displaced (alternate), rachis ending in a thin branched cirrose tendril. Raceme 1–5 cm, 6–14 flowered, nutant, peduncle 2–8 cm, bracts narrowly oblanceolate, margin entire or slightly dentate, apex acute. Capsule purple, red, whitish, or pale yellow when mature, ovoid to lanceolate. Seeds black, colliculate.

Vernacular (Nepali) and Local Name: '*Paheleful*' (N), '*Pechkeniful*' (Ma); **Voucher specimen:** BM 0458, Bihadi-Ranipani, 1250 m asl.; **Fls.–Frts.:** July–December; **Distrib.:**

Nepal at 1200-2500 m, Bhutan, India, Myanmar, Sri Lanka, Northern Thailand and Northern Vietnam; **Ecology:** Forest understories slopes, stony places, ditch sides, grasslands and valleys.

Medicinal use: Dried roots are boiled with water and filtered of which, in dosages about 5-7 teaspoonfuls once a day for a week, is administered to treat toothache, headache and stomachache (*Majhi*). A decoction of the roots made by soaking with alcohol is given about 5 teaspoonfuls twice a day to treat dysentery, body pain and wounds. **Other use:** The plant is used as palatable fodder for goats (*Majhi*).

Dicentra macrocapnos Prain, J. As. S. Beng. **65:** 12 (1896). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 35 (1979). Polunin & Stainton, Fl. Hima. 32 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 231 (2000). A slender herbaceous perennial climber plant about 2 m tall with short stalked. Stems thin, sulcate, branched and leafy. Petiole 0.5-3 cm long, leaf blade glaucous abaxially, with one pair of usually alternate pinnae, rachis ending in a thin branch. Leaflets twice ternately compound, ultimate leaflets ovate. Raceme 1-3 cm, 6-14-flowered, obliquely nutant, bracts linear to narrowly oblanceolate. Seeds black, rounded-ellipsoid, about 2 mm, with rather small elaiosome.

Vernacular (Nepali) and Local Name: '*Jogi lahara*' (N, M, G); **Voucher specimen:** BM, 0001, Tilahar, 1791 m asl., (Photo Plate 4A); **Fls.–Frts.:** August–September; **Distrib.:** Eastern Nepal at 1500–2900 m, India, China; **Ecology:** Nearby forest and rocky areas.

Medicinal use: A whole plant juice is applied twice a day to cure fungal diseases and to prevent the attack of the aphids (*Magar*). It is also used as insecticide and systemic fungicide (*Magar* and *Gurung*). **Other use:** Whole plant is used as fodder to goats (*Magar*).

Meconopsis regia G. Taylor, J. B. **67:** 259 (1929). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 37 (1979). Polunin & Stainton, Fl. Hima. 26 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 232 (2000). An evergreen perennial herb about 1-1.5 m tall. Leaves narrowly elliptic, serrate, lanceolate which are regularly and coarsely toothed, not lobed and densely covered with fewer and larger yellow flowers 3.5 cm long, with golden or silvery hairs. Petals 6.5 cm long. Flowers four to six-petalled, yellow colour 8 cm or more wide, singly or in clusters of up to four arranged in leafy raceme. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kesar' (N, M); **Voucher specimen:** BM 0222, Salija, 2900 m asl.; **Fls.-Frts.:** June- July; **Distrib.:** Throughout Nepal about 2700-3600 m, India, Pakistan and China; **Ecology:** Open slopes, grazing grounds.

Medicinal use: Root juice, in dosages about 3-5 teaspoonfuls four times a day for 2-3 days, is prescribed as antidote in snake bites and to cure lungs problem. It is also applied externally in skin diseases (*Magar*). **Other use:** The plant is used for cosmetic products.

BRASSICACEAE

Rorippa nasturtium-aquaticum (L.) Hayek, Sched. Fl. Stir. Exs. **22** (1905). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 45 (1979). Polunin & Stainton, Fl. Hima. 43 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 83 (2000). A glossy green, somewhat fleshy-stemmed wide spread perennial herb, found growing in open running watercourses or near cool shallow springs, spring holes, spring fed stream margins, and brooks, with lax terminal clusters of small white flower. Leaves stalked, flowers white, petal 4-5 mm. Lower leaves stalked, with 1-5 leaflets, upper leaves with eared bases and with 5-9 narrower blunt leaflets, stem hollow, rooting from the lower nodes. Fruits oblong, 1-2 cm, on spreading stalks. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Khole sag' (N), 'Simsag' (N, M), 'Pani Sag' (Ma); **Voucher specimen:** 0058 BM, Bhorle, 1123 m asl.; **Fls.-Frts.:** July-August; **Distrib.:** Throughout Nepal at 1100-2300 m, India, Bhutan, China, Pakistan, Europe and Africa; **Ecology:** Wetland, stream bank, moist and shady places.

Medicinal use: A decoction of the whole plant, in dosages about 7-10 teaspoonfuls twice a day for a week, is recommended in urinary problems and stomachic (*Magar*). Juice of the plant, about 5-7 teaspoonfuls thrice a day for 10-15 consecutive days is prescribed in the treatment of tuberculosis (*Magar*). Freshly prepared juice mixed with seeds paste and applied externally for a month as an effective hair tonic to promote the growth of thick hair (*Magar*). Fresh leaves are cooked as vegetables to cure constipation (*Majhi*). **Other use:** The tender portions of the plants are cooked as vegetables which has a high content of vitamin C and minerals (*Magar* and *Majhi*).

CAPPARACEAE

Cleome viscosa L., Sp. Pl. 672 (1753). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 46 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 37 (2000). An annual herb around 1 m tall. Leaves

digitate, petioled, 3-5 foliate, leaflets sub-sessile, oblanceolate or elliptic, apex acute or obtuse. Flowers yellow, solitary, in terminal or axillary racemes. Fruit a linear cylindrical capsule, narrow at both ends, striated, two valved. Seeds, dark brown, wrinkled, kidney shaped, oily. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Tori jhar*' (N), '*Burbule*' (Ma); **Voucher specimen:** BM 0163, Tribeni, 981 m asl., (Photo Plate 4B); **Fls.–Frts.:** June–November; **Distrib.:** Nepal to about 1200 m, India, Bangladesh and Bhutan; **Ecology:** A tolerant ruderal plant on arable land, along roadsides, often in great quantities.

Medicinal use: Root juice about 2 drops twice a day is internally dripped in ear to relieve earache. A teaspoonful of grounded seeds poured in a glass of water is given once a day for 4-5 days to expel worms especially roundworms, release gas from stomach. The same is given as stimulant. Poultice of the seeds is applied to treat chronic pain in joints and on boils (*Majhi*). **Other use:** Tender leaves and shoots are cooked as vegetables. Roasted seeds are pickled and also added in curries (*Majhi*).

Crateva unilocularis Buch.-Ham., Trans. Linn. Soc. London **15:** 121 (1827). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 46 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 37 (2000). A moderate sized, deciduous, tree around 16 m height. Leaves long petioled, ovate-lanceolate, 5.8-12 cm long, 1.3-4.9 cm wide, apex acuminate. Flowers pedicellate, large in terminal corymbs, white or yellow. Fruits, globose, fleshy, dotted. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Sipleegaan*' (N, G), '*Sipleekan*' (M); **Voucher specimen:** BM 0400, Bihadi- Ranipani, 1295 m asl., (Photo Plate 4C); **Fls.–Frts.:** March–October; **Distrib.:** Nepal to about 800-1300 m, India and China; **Ecology:** Growing on wet and shady areas.

Medicinal use: Paste of the leaves is applied to cure rheumatism. Juice of the stem bark, in dosages about 3 teaspoonfuls once a day for a week, is consumed to treat urinary disorder, kidney problems, blood pressure and bladder stones (*Gurung* and *Magar*). **Other use:** The young twigs with leaf is boiled and cooked as vegetables. Young dried leaves are sold to local markets as dried vegetables (*Magar*).

POLYGALACEAE

Polygala arillata Buch.-Ham. ex D. Don., Prodr. Fl. Nepal. 199 (1825). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 50 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 235 (2000). Polunin &

Stainton, Fl. Hima. 47 (1984). An erect shrub about 2 m tall. Leaves stalked, oblong to lanceolate, acuminate, entire, glabrous. Flowers yellow in racemes. Fruit a capsule, reniform.

Vernacular (Nepali) and Local Name: '*Luinche phul*' (N, M), '*Luinche ful*' (Ma);

Voucher specimen: BM 0393, Kyang, 1920 m asl., (Photo Plate 4D); **Fls.–Frts.:** May–August; **Distrib.:** Himalayas from Nepal eastwards at 1830–2770 m, India and Burma;

Ecology: Occurs on shady and cool places.

Medicinal use: Juice of the leaves is applied externally twice a day for a week to cure muscular swellings (*Majhi*). A paste of the roots is applied to forehead to relieve headache. Same paste of the roots (made tablets, about 2–3 tablets twice a day) is administered for a week to treat inflammation of the body and rheumatic pain (*Magar*). **Other use:** The plant is used to make *Marcha*, fermenting cake for the local alcohol distillation (*Magar* and *Majhi*).

CARYOPHYLLACEAE

Drymaria cordata (L.) Willd. ex Roem. & Schult., Syst. Veg. 5: 406 (1819). Hara & Williams, Enum. Fl. Pl. Nep. 2: 54 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 40 (2000). A diffused annual herb. Leaves are simple, opposite, petiolate, ovate in shape. Flowers are grish white colour, grandular puberulous, forked cyme. Fruits capsules.

Vernacular (Nepali) and Local Name: '*Abhijalo*' (N), '*Peperano*' (G); **Voucher specimen:** BM 0208, Hosrangdi, 1010 m asl., (Photo Plate 4E); **Fls.–Frts.:** October–December; **Distrib.:** Throughout Nepal at 900–4300 m, India, Pakistan, Bhutan, Taiwan, Africa and America; **Ecology:** Growing in open places, along roadsides and on uncultivated land.

Medicinal use: Plant juice, in dosages about 3–4 teaspoonfuls once a day for a week, is given in case of fever and indigestion. Paste of the plant is applied to forehead to treat headache and also applied on boils in early maturation. **Other use:** Tender leaves and shoots are cooked as vegetables (*Gurung*).

Drymaria villosa Cham. & Schlecht., Linnaea 5: 232 (1830). Hara & Williams, Enum. Fl. Pl. Nep. 2: 54 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 41 (2000). A herb, leaves simple, short-petioled, 0.3–0.6 cm long, 0.2–0.4 cm wide, ovate, apex rounded. Flowers white. Propagated by seeds or nodal rootings.

Vernacular (Nepali) and Local Name: 'Abijalo' (N, G); **Voucher specimen:** BM 0166, Chuwa, 920 m asl.; **Fls.-Frts.:** Throughout the year; **Distrib.:** Nepal from 900-1900 m, India, Malaysia, Africa, Central and South America; **Ecology:** Mostly growing on shady and moist places.

Medicinal use: Juice of the plant, in dosages about 6 teaspoonfuls thrice a day for a week, is prescribed to treat gastric disorders (*Gurung*). **Other use:** Tender leaves are cooked as vegetables.

Spergula arvensis L., Sp. Pl. 440 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 57 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 43 (2000). An annual weed, semi erect herb about 30 cm tall. Leaves are short-stalked, opposite, 1-3cm long, acute, glandular pubescent. Flowers white in terminal cymes. Fruit a capsule, ovide in shape. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Jhyau jhar' (N, M); **Voucher specimen:** BM 0211, Lespar, 2100 m asl.; **Fls.-Frts.:** Most part of the year; **Distrib.:** Nepal at 1200 to 2500 m, India and Bhutan; **Ecology:** Growing on moist and shady places.

Medicinal use: Paste of the whole plant is applied twice a day for early maturation of boils (*Magar*). **Other use:** The whole plant is used as good source of fodder to the cattle.

HYPERICACEAE

Hypericum cordifolium Choisy in DC., Prodr. 1: 545 (1824). Hara & Williams, Enum. Fl. Pl. Nep. 2: 61 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 145 (2000). A shrub, around 2 m tall. Leaves simple, sessile, lanceolate, apex acute, base clasping stem. Flowers yellowish in dense cymes. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Arelī' (N), 'Pyaunli' (G), 'Chita' (M), 'Sli pate' (Ma); **Voucher specimen:** BM 0202, Dhairing, 1200 m asl.; **Fls.-Frts:** February-April; **Distrib.:** Nepal from 900-1900 m; **Ecology:** Mostly found in open and moist slopes.

Medicinal use: Extract of the plant, in dosages about 2-3 teaspoonfuls thrice a day for a week, is effective for restoring menstrual period (*Gurung*). Root extract, in dosages about 5-6 teaspoonfuls twice a day, is effectively prescribed to cure diarrhoea and dysentery. Paste of the stem bark is applied thickly on dislocated bones, muscular pain and backaches (*Majhi*). **Other use:** The plant holds socio-religious significance, flowers are offered to deities during various ritual and ceremonies (all tribes).

Hypericum elodeoides Choisy., Prodr. **1**: 551 (1824). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 61 (1979). Polunin & Stainton, Fl. Hima. 56 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 145 (2000). An erect, stout glabrous perennial herb with terete woody stem. Leaves sessile, clasping the stem, ovate to lanceolate, acute, entire, closely pellucid punctuate. Flowers yellowish, small and in many-flowered terminal cymes, propagated by seeds.

Vernacular (Nepali) and Local Name: 'Jibre ghans' (N), 'Tida' (G, M); **Voucher specimen:** BM 0294, Kyang, 1817 m asl.; **Fls.–Frts.:** July–September; **Distrib.:** Eastern and Central Nepal at 1200–3000 m, India and Burma; **Ecology:** On dry slopes along trails.

Medicinal use: A decoction of the roots, in dosages 5–6 teaspoonfuls twice a day in a week, is given in case of fever (*Gurung* and *Magar*). **Other use:** The plant is gathered for fodder.

Hypericum japonicum Thunb. ex (Murray)., Syst. Veg. ed. **14**: 702 (1784). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 62 (1979). A small herb, 6–30 cm tall, leaves are elliptic, ovate, acute and three-veined. Flowers are yellow in colour, dichotomous cymes and propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kanikeghans' (N), 'Boksi jhar' (M, Ma); **Voucher specimen:** BM 0505, Kyang, 1910 m asl.; **Fls.–Frts.:** March–July; **Distrib.:** Throughout Nepal at 1000–2600 m, Southern India, Sri Lanka, China, Korea, Japan, Australia and New Zealand; **Ecology:** Usually grows on rocky and open places.

Medicinal use: Juice of the plant, in dosages about 4 teaspoonfuls thrice a day for a week, is given to cure stomach disorder, dysentery, fever and indigestion (*Majhi*). It is also externally applied in the body during pain especially around neck (*Magar*). **Other use:** The plant is used for fodder to cattle.

Hypericum oblongifolium Choisy, Prodr. Monogr. Hyperic. 42, t, 4 (1821). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 62 (1979). Polunin & Stainton, Fl. Hima. 57 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 145 (2000). Glabrous shrub with terete branches. Leaves, sessile, 2–3 cm long, elliptic or ovate to lanceolate, entire, glaucous beneath, tip acute or rounded. Flowers bright yellow in a short terminal cyme. Fruit a capsule. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Khareto' (N, M, Ma); **Voucher specimen:** BM 0345, Pang, 1800 m asl.; **Fls.–Frts.:** April–October; **Distrib.:** Western and Central Nepal at 800–2100 m, Pakistan and India; **Ecology:** Found in open places along river banks or among shrubs.

Medicinal use: Juice of the leaves is considered to be an antidote against snake bites (*Majhi*). **Other use:** The plant is gathered for fodder. The flowers have aesthetic value.

Hypericum uralum Buch.-Ham. ex D. Don, B. Mag. **50:** t. 2375 (1823). Prodr. Fl. Nep. 218 (1825). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 62 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 145 (2000). A shrub about 1 m tall with branched four angle arching. Leaves short stalked 1.5-3.5 cm long ovate and entire. Flowers yellow in colour, it is propagated by seeds.

Vernacular (Nepali) and Local Name: 'Yurilo' (N, M, Ma); **Voucher specimen:** BM 0078, Durlung, 1880 m asl., (Photo Plate 4F); **Fls.-Frts.:** April-October; **Distrib.:** Western and Central Nepal at 1200-3600 m, India, Myanmar, China and Thailand; **Ecology:** Found in open places along river banks or among shrubs.

Medicinal use: The seeds powder, in dosages about 3-4 teaspoonfuls twice a day for a week, is administered with honey (2-3 teaspoonfuls) against food poisoning, and used in abortification. Paste of the seeds is used both externally and internally to cure dog bites and bee stings (*Magar* and *Majhi*). **Other use:** The plant is used for fodder. It is also used in fish poisoning (*Majhi*).

THEACEAE

Camellia kissi Wall., Asiat. Res. **13:** 429 (1820). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 63 (1979). Polunin & Stainton, Fl. Hima. 58 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 308 (2000). A shrub or small tree about 2 m tall. Leaves are subsessile, 3-12 cm long, 2-5 cm wide, elliptic and glabrous. Flowers are usually axillary, solitary and white in colour. Fruit a capsule, globose, reddish in colour.

Vernacular (Nepali) and Local Name: 'Banchiya' (N, G), 'Chiya pate' (M); **Voucher specimen:** BM 0288, Bachchha, 1910 m asl., (Photo Plate 4G); **Fls.-Frts.:** October-January; **Distrib.:** Central and Eastern Nepal at 900-2100 m, Northeastern India, Western and Southern China; **Ecology:** Growing on moist places in forest.

Medicinal use: Leaves juice, about 4-5 teaspoonfuls twice a day for 8-10 consecutive days, is used as appetizer and digestive problems (*Magar*). Leaves are steamed, dried and used as an herbal tea to cure in blood pressure (*Magar*). **Other use:** Young leaves are dried and used to make tea. Flowers are boiled and pickled (*Magar* and *Gurung*).

Eurya acuminata DC., in Mem. S. Phys. Geneve **1**: 418 (1822). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 64 (1979). Polunin & Stainton, Fl. Hima. 58 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 308 (2000). An evergreen shrub around 5-6 m tall. Leaves simple, short petioled, 1.8-13.5 cm long, 1-4 cm wide, oblong to lanceolate, apex acuminate. Flowers, minute, yellowish. Fruit globose with crowning of remains of style. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bilaune' (N), 'Chonsi', 'Jhuinsin' (G);

Voucher specimen: BM, 0017, Balakot, 1700 m asl.; **Fls.-Frts.:** November-December;

Distrib.: Nepal to about 2800 m, India, Sri Lanka, China and Malaysia; **Ecology:** Growing on open places.

Medicinal use: Leaves and fruits are chewed in case of stomachic. The fresh root extract, in dosages about 4-5 teaspoonfuls twice a day for 3 days, is given to relieve diarrhoea (*Gurung*). **Other uses:** Tender foliage is very good source of fodder. Wood provides excellent for timber fuelwood.

Schima wallichii (DC.) Korth., Bijdr. Ternstr. 143 (1839 -1842). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 64 (1979). Polunin & Stainton, Fl. Hima. 59 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 308 (2000). A semi-deciduous tree about 15-50 m tall. Leaves petiolate, 10-18 cm long, 2-8 cm wide, elliptical, oblongate, lanceolate. Flowers in terminal clusters, white, large and scented. Fruit globose capsule characterized by persistent calyx. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Chilaune' (N), 'Kyosin' (G), 'Hyansing' (M);

Voucher specimen: BM 0364, Pakhapani-Sarthan, 1250 m asl., (Photo Plate 4H); **Fls.-**

Frts.: March-January; **Distrib.:** Throughout Nepal at 500-2100 m, Northern India, Bhutan, Bangladesh, China and Myanmar; **Ecology:** Mostly growing on mixed forest.

Medicinal use: Powder of the stem bark is used to treat fresh cuts and wounds and liver fluke in animals (*Gurung* and *Magar*). **Other use:** Wood is used to make musical instrument, Madal. The timber is used in house construction and as fuelwood. Young leaves are lopped for fodder. It is also used to produce onomatopoeic sound, popularly known as 'pipiya'. Leaves and bark are grounded and used during fish poisoning (*Gurung* and *Magar*).

DIPTEROCARPACEAE

Shorea robusta Gaertn., Fruct. 3: 48, t. 186 (1805). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 66 (1979). Polunin & Stainton, Fl. Hima. 60 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 99

(2000). A large evergreen tree about 18-30 m tall. Leaves petiolate, 8-20 cm long, 5-13 cm wide, ovate to oblong, base cordate or rounded. Flowers borne in axillary or terminal panicles, creamish. Fruit ovoid, indehiscent, winged, brownish yellow. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Sal' or 'Agrath' (N, Ma), 'Jhesin' (G), 'Agras', 'Phoksin' (M); **Voucher specimen:** BM 0214, Tilahar, 1000 m asl., (Photo Plate 4I); **Fls.-Frts.:** March-June; **Distrib.:** Throughout Nepal at 200-1000 m, India, Bhutan, China and Pakistan; **Ecology:** Open tracks and on outer ridges of the hill side some time in mixed forest.

Medicinal use: Bark juice, about 3-4 teaspoonfuls twice a day for a week, is useful to cure ulcer, wounds, diarrhoea and dysentery (*Gurung and Magar*). Paste of the roasted fruits is applied in dislocated bones as plaster. The resin is also used to treat gonorrhoea; young leaves are heated over the fire and pressed against the stomach of a child to cure dysentery (*Majhi*). **Other use:** The wood is used to make furniture and for house construction (*Majhi and Magar*).

SAURAUACEAE

Saurauia napaulensis DC., Mem. Ternstr. 29 (1822); in Mem. S. phys. Geneve 1: 142 (1822). Hara & Williams, Enum. Fl. Pl. Nep. 2: 65 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 286 (2000). It is a deciduous small to medium tree about 4-20 m tall. Leaves 20-35 cm by 6.5-12 cm, apex acuminate, base rounded, margins with fine teeth, 30-35 pairs of straight prominent veins. Flowers about 1.5 cm in diameter, pink, in branched axillary inflorescences. Fruit a globose berry, about 8 mm in diameter. Propagated by seeds and cuttings.

Vernacular (Nepali) and Local Name: 'Gogane', 'Gobino', (N), 'Gogan', 'Gowan' (M); **Voucher specimen:** BM 0299, Pakhapani-Sarthan, 1370 m asl., (Photo Plate 5A); **Fls.-Frts.:** December-February; **Distrib.:** Nepal at 750-2100 m, India, Myanmar, Thailand and Indo-China, W.China; **Ecology:** Found in mixed forest and terrain in cultivated land.

Medicinal use: Juice of the stem barks, in dosages about 3-4 teaspoonfuls thrice a day for a week, is recommended as a remedy to cure fever. Juice of the fruits, in dosages about 5 teaspoonfuls once a day for 5-7 consecutive days, is prescribed orally to relieve cough and cold (*Magar*). **Other use:** Fruits are edible and sold it to the local markets (*Magars*). Plant is looped for fodder to the cattle.

MALVACEAE

Gossypium herbaceum L., Sp. Pl. 693 1753. An erect shrub with woody stem. Leaves alternate, 3-5 lobed hairy on the ventral surface, leaf-lobes broadly ovate, apex acuminate, long petiole and glandular. Flowers in axillary solitary racemes, yellow. Sepals truncate, much shorter than the bracteoles, glandular, slightly 5- toothed. Petals spreading, obovate. Capsule ovate, globose. Seeds 5-7 in each cell ovoid, densely clothed with hairs and yellowish in colour.

Vernacular (Nepali) and Local Name: '*Ban Kapas*' (N, M); **Voucher specimen:** BM 0218, Behulibans, 1017 m asl.; **Fls.–Frts.:** October-November; **Distrib.:** Throughout Nepal about 1500 m, Pakistan, India, Arabia and Africa; **Ecology:** Cultivated shrub, sometimes an escape in moist and shady places.

Medicinal use: Leaves juice, about 4-5 teaspoonfuls twice a day for 9-10 consecutive days, is administred to cure burning sensation of stomach, anaemia, dysentery and rheumatoid arthritis. The same juice is used to treat scorpion sting and snake bites (*Magar*). Powder of the roots, in dosages about 3-4 teaspoonfuls, is swallowed once a day for a month with a glass of water from rinsing the rice in the morning to cure leucorrhoea. Barks juice, in dosages about 5-7 teaspoonfuls twice a day for 3-4 consecutive days is given in an abortification (*Magar*). **Other use:** Cotton is used by women to reduce painful menstrual complaints and profuse menstrual bleeding. The cotton is used in various purposes in the rituals and ceremonies and to yield fiber (*Magar*).

Urena lobata L., Sp. Pl. ed. 1, 2: 692 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 69 (1979). Polunin & Stainton, Fl. Hima. 62 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 194 (2000). An erect shrub more or less hairy around 2.5 m tall. Leaves simple, petiolate, lanceolate to ovate, orbiculate, cordate, apex acute. Flowers axillary, solitary or somewhat fascicled, pinkish. Fruit globose, barbed with spines. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Lisekuro*' (N), '*Furse pamale*' (G), '*Bishkhapre*' (M), '*Saronto*' (Ma); **Voucher specimen:** BM 0337, Bihadi-Ranipani, 1217 m asl., (Photo Plate 5B); **Fls.–Frts.:** September-December; **Distrib.:** Nepal at 1200-1800 m, India and Bhutan; **Ecology:** Occurs on open place.

Medicinal use: Paste of the plant is applied to treat in skin diseases and rheumatic pain (*Gurung*). Roots of the plant along with *Achyranthes aspera* is pounded overnight, and

the juice in dosages about 4-5 teaspoonfuls thrice a day for 5 days, is used to treat tonsillitis, diarrhoea and dysentery (*Majhi*). A decoction of the leaves, in dosages about 6-7 teaspoonfuls once a day for a week, is recommended to cure stomach disorder and snakebite (*Magar*). **Other use:** Leaves and twigs of the plant are lopped for good quality of fodder (all tribes).

BOMBACACEAE

Bombax ceiba L., Sp. Pl. 511 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 69 (1979). Polunin & Stainton, Fl. Hima. 63 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 28 (2000). A deciduous large tree about 40-45 m tall. Leaves simple, long petioled, digitate, palmate, leaflets 5-7, lanceolate, 5-20 cm long, 2-6 cm wide, base tapering. Flowers fascicled, red, numerous, fleshy elliptical petals with woolly hairs outside. Fruit a capsule, five-valved, oblong or ovoid, 10-13 cm long. Seeds are smooth, black, embedded in white silky wool. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Simal*' (N, M, Ma), '*Simaltun*' (G); **Voucher specimen:** BM 0490, Pakhapani, 1250 m asl., (Photo Plate 5C); **Fls.-Frts.:** December-May; **Distrib.:** Nepal at 200-1400 m, India, Bhutan, Western China and Malaysia; **Ecology:** Mostly found in sub-tropical open places.

Medicinal use: Bark juice, about 5 teaspoonfuls twice a day for a week, is prescribed to cure diarrhoea, dysentery and tuberculosis (*Magar* and *Majhi*). Roots juice is used to relieve cuts and wounds (*Magar*). The flowers are good to cure skin diseases (all tribes).

Other use: Flowers and fruits are eaten fresh, it is also used to make cosmetic products. Wood is used to make furniture, wooden boxes and boats (*Majhi*). It is also used to make musical instruments, Madal, Dhol and Dholak (all tribes).

ELAEOCARPACEAE

Elaeocarpus sphaericus (Gaertn.) K. Schum., Engl. Pflanzenfam. III-6: 5 (1890). Hara & Williams, Enum. Fl. Pl. Nep. 2: 72 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 100 (2000). A tree about 20 m tall, with spreading crown. Leaves simple, petiolate, 8-18 cm long, 2.5-6 cm wide, elliptic to lanceolate, apex acute or acuminate. Flowers whitish, in dense racemes, tubercled, on older leaf axils. Fruits globose drupes, purple when ripe, generally five seeded. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Rudraksha*' (N, M); **Voucher specimen:** BM 0215, Shivalaya, 890 m asl.; **Fl.–Frts.:** May–December; **Distrib.:** Nepal at 600–1300 m, India, Bhutan, Taiwan and Japan; **Ecology:** Open places, cultivated in home garden. **Medicinal use:** Fruits juice, about 6–7 teaspoonfuls thrice a day for a week, is administered to cure blood pressure and mental disorder (*Magar*). **Other use:** The plant has great religious value (especially Hindus). The hard seeds are used as ornaments (all tribes).

LINACEAE

Reinwardtia indica Dum., Comm. Bot. 19 (1822). Hara & Williams, Enum. Fl. Pl. Nep. 2: 73 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 189 (2000). An erect perennial herb about 1.5 m tall. Leaves are short and stalked ovate to lanceolate, acute. Flowers are yellow in colour, solitary and axillary. Fruit a capsule and globose.

Vernacular (Nepali) and Local Name: '*Pyaullee*' (N), '*Gyumi*', '*Nime pa*' (G) '*Gebatisar*' (M); **Voucher specimen:** BM 0366, Chuwa, 910 m asl., (Photo Plate 5D); **Fls.–Frts.:** January–April; **Distrib.:** Throughout Nepal at 300–2300 m, Northern India, Bhutan, Thailand, Myanmar and China; **Ecology:** Occurs on open dry as well as shady places.

Medicinal use: Paste of the roots is applied externally to cure boils and headache. Juice of the roots, 3 teaspoonfuls twice a day for 8–10 consecutive days, is administered to cure in fever, scabies and indigestion (*Gurung* and *Magar*). **Other use:** The flowers are used to make cosmetic products. It is also eaten fresh and also pickled (*Gurung* and *Magar*).

GERANIACEAE

Geranium nepalense Sweet., Geran. 1: t, 12 (1820). Hara & Williams, Enum. Fl. Pl. Nep. 2: 76 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 119 (2000). A slender hairy diffused herb up to 45 cm tall. Leaves opposite, stipules subulate lanceolate brown. Peduncles slender, 2–5 cm long, hairy, 1–2 flowered, bracteate. Flower 0.5–1.5 cm in diameter, light pink or purple. Sepals 5, equaling the petal, slightly hairy. Fruit an elongated 5-lobed capsule up to 2.5 cm long.

Vernacular (Nepali) and Local Name: '*Chunetro ghans*' (N), '*Ratamul*' (N), '*Pueran*' (M); **Voucher specimen:** BM 0473, Bachchha, 1322 m asl.; **Fls.–Frts.:** Most of the year; **Distrib.:** Throughout Nepal at 1000–4000 m, Tibet, China, Afghanistan and India; **Ecology:** Occurs on moist shady places along ditches and streams.

Medicinal use: Juice of the roots, about 5 teaspoonfuls thrice a day for a week, is prescribed to cure renal diseases (*Magar*). **Other use:** Fruits are chewed freshly.

OXALIDACEAE

Oxalis corniculata L., Sp. Pl. 435 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 77 (1979). Polunin & Stainton, Fl. Hima. 68 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 228 (2000). A small perennial creeping herb. Leaves petiolate, trifoliate, leaflets sub-sessile, deeply lobed at apex, base cuneate, leaflets 6-15 mm wide, obcordate. Flowers small, solitary or in pairs on axillary stalk, yellowish. Fruit capsules, linear oblong, tomentose, straight. Seeds numerous, brown. Propagated by seeds or nodal rootings from prostrate branches.

Vernacular (Nepali) and Local Name: 'Chariamilo' (N, M), 'Chino', 'Kyuba' (G), 'Chariumal' (Ma); **Voucher specimen:** BM 0390, Pangrang, 1130 m asl.; **Fls.-Frts.:** March-August; **Distrib.:** Nepal at 300-2900 m, Pakistan, India, Bhutan, Sri Lanka and Bangladesh; **Ecology:** Occurs in waste grounds and roadsides in lowland and hills.

Medicinal use: Leaves juice, about 4-5 teaspoonfuls twice a day for 5-7 consecutive days, is prescribed to cure stomach pain and fever (*Majhi*). **Other use:** The whole plant is used in the preparation of pickle and chutney (all tribes).

Oxalis corymbosa DC., Prodr. 1: 696 (1824). Hara & Williams, Enum. Fl. Pl. Nep. 2: 77(1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 228 (2000). A perennial herb about 10-30 cm tall, stemless, pubescent. Leaves basal; petiole 5-30 cm, with long sparse to moderately dense spreading white trichomes with dark calli especially near margin, apex deeply emarginate. Inflorescence corymbose cymes irregularly branched. Pedicels, bracts, and sepals pubescent. Capsule rarely formed.

Vernacular (Nepali) and Local Name: 'Chari amilo' (N, M), *Chariumal* (Ma); **Voucher specimen:** BM 0321, Pakhapani-Sarthan, 1230 m asl.; **Fls.-Frts.:** March-December; **Distrib.:** Nepal about 400-2800m, India, China and Tropical South America; **Ecology:** Commonly found in the cardamom plantations and road sides on the high ranges.

Medicinal use: Juice of the plant, about 6 teaspoonfuls thrice a day for a week, is prescribed in case of stomach acidity, peptic ulcer, diarrhoea, and desentery (*Majhi*). It is also dripped in the ear to cure earache; and to treat conjunctivitis. Juice of the leaves, in dosages about 5 teaspoonfuls once a day for a week, is recommended to control fever and

hemorrhoids (*Magar*). **Other use:** The plant is used for preparation of pickle and chutney (*Magar* and *Majhi*).

Oxalis latifolia Humb., Bonpl. & Kunth, Nov. Gen. Sp. **5**: 184, t. 467 (1821). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 77 (1979). Polunin & Stainton, Fl. Hima. 68 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 228 (2000). An erect, fleshy, perennial, slightly pubescent herb around 30 cm tall. Leaves radical, basal, long petioled, stipulate, broadly obovate, trifoliate, leaflets sessile, 0.5-2.5 cm long, 1-6 cm wide. Flowers small, deep purple in colour. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Thulo chari amilo*' (N, M); **Voucher specimen:** BM 0219, Majhphand-Mallaj, 1751 m asl.; **Fls.-Frts.:** June-December; **Distrib.:** Nepal at 800-1600 m, India, Bhutan, China, Bangladesh and Malaysia; **Ecology:** Occurs in moist and shady places among the bushes, rocks and walls.

Medicinal use: Juice of the whole plant, in dosages about 4-5 teaspoonfuls twice a day for a week, is given in case of fever and headache (*Magar*). **Other use:** Leaves are used to make pickle and vegetables.

BALSAMINACEAE

Impatiens bicornuta Wall. in Roxb., Fl. Ind. **2**: 460 (1824). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 78 (1979). Polunin & Stainton, Fl. Hima. 70 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 22 (2000). Branched herb. Leaves stalked, 10-27 cm long, 3-5.5 cm wide, elliptic or oblong to lanceolate, acuminate and crenate. Flowers pinkish, long stalked racemes. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Tiuri*' (N), '*Manchuto ghans*' (M); **Voucher specimen:** BM 0492, Kyang, 1780 m asl.; **Fls.-Frts.:** July-October; **Distrib.:** Throughout Nepal at 1700-2600 m; **Ecology:** Found in moist, shady places, generally along stream banks.

Medicinal use: Paste of the leaves is used to relieve joint pains. A decoction of the plant, in dosages about 6-7 teaspoonfuls once a day for a week, is regarded as cooling agent and used in inflammation of the body (*Magar*). **Other use:** Tender leaves and shoots are cooked as vegetables.

Impatiens puberula DC., Prodr. **1**: 687 (Jan. 1824). Hara & Williams, Enum. Fl. Pl. Nep. **2**:

79 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 23 (2000). Pubescent herb. Leaves stalked, alternate, elliptic to lanceolate, acuminate, crenate, hairy on both surfaces. Flowers solitary, purple in colour, incurved. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Bhenda ghans*', '*Masino ratanaulo*' (N, Ma);

Voucher specimen: BM 0512, Lespar, 2181m asl., (Photo Plate 5E); **Fls.–Frts.:** July–October; **Distrib.:** Central and Eastern Nepal at 1500–2700 m, India and Bhutan;

Ecology: Found in moist, shady places.

Medicinal use: Paste of the plant is used as home remedy to treat bee stings, insect bites, stinging nettle rashes, and it is also applied externally to abdomen to relieve indigestion.

Other use: Seeds are used to make pickle (*Majhi*).

Impatiens urticifolia Wall. in Roxb., Fl. Ind. 2: 457 (1824). Hara & Williams, Enum. Fl. Pl. Nep. 2: 80 (1979). Polunin & Stainton, Fl. Hima. 70 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 24 (2000). Plants 40–80 cm tall, pubescent. Leaves alternate, evenly distributed along the stem, with petioles 5–25 mm long, lamina lanceolate or broadly lanceolate apex acuminate or acute, base long attenuate to attenuate, margins crenulate, nearly glabrous on both surfaces. Flowers yellow with brown spots or streaks within, and with distinctive lip-petals with narrow pointed tail-like tips, and with a short bag-like lower sepal with a short blunt spur.

Vernacular (Nepali) and Local Name: '*Tiuri*' (N, M); **Voucher specimen:** BM 0367, Pang, 2026 m asl.; **Fls.–Frts.:** June–August; **Distrib.:** Western Nepal at 2000–3800 m and China; **Ecology:** Shrubberies, forests, damp places.

Medicinal use: Paste of the roots is used to cure burns. Juice of the leaves, about 2–3 teaspoonfuls thrice a day for a week, is given to treat urine infection and sensation of heat. **Other use:** The plant is looped for fodder (*Magar*).

RUTACEAE

Boenninghausenia albiflora (Hook.) Rchb. ex Meisn., Consp. 197 (1828). Hara & Williams, Enum. Fl. Pl. Nep. 2: 81 (1979). Polunin & Stainton, Fl. Hima. 72 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 279 (2000). A perennial large erect herb about 64 cm tall. Stem slender, erect, glabrous, branched. Leaves bipinnately compound, gland dotted, sessile and terminal. Flowers in a long terminal leafy panicles, white, bisexual. Fruit distinct and several seeded.

Vernacular (Nepali) and Local Name: '*Dampate*', '*Gwane jhar*' (N), '*Makhamar*', '*Kopyanchhi*' (G); **Voucher specimen:** BM 0485, Durlung, 1920 m asl.; **Fls.–Frts.:**

August-November; **Distrib.:** Throughout Nepal at 500-3000 m, Northern India, China, Japan and Phillippines; **Ecology:** Generally in moist places.

Medicinal use: Juice of the plant is applied in fresh cuts to stop bleeding. It is also applied to treat scabies. It is believed that if the whole plant is kept under the bed or pillow at night while sleeping it relieve fever and headache (*Gurung*). Leaves juice is applied to stop bleeding from cuts and wounds; and paste of the leaves is applied to forehead to relieve fever and headache. A squeezed leaf is rubbed on the body of cattle to remove lice. **Other use:** The plant is used for fodder and green manure.

Murraya paniculata (L.) Jack, Malay. Misc. **1:** 31 (1820). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 82 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 280 (2000). An evergreen shrub with gray corky bark. Leaves stalked, three to nine-foliolate, leaflets short-stalked, 2.5 cm wide, obliquely rhombic, more or less acuminate, entire, leathery when mature, shiny above. Flowers white, fragrant, in axillary or terminal corymbs. Fruit a berry, narrowed at both ends, bright red or dark red when ripe, two seeded.

Vernacular (Nepali) and Local Name: '*Bajardanta*', '*Kamini phool*' (N, M); **Voucher specimen:** BM 0100, Kurgaha, 1170 m asl.; **Fls.–Frts.:** March-December; **Distrib.:** Eastern and central Nepal at 400-1200 m, India, Sri Lanka and China; **Ecology:** In open and dry places.

Medicinal use: Juice of the stem barks, about 3 teaspoonfuls twice a day for 5 days, is used against fever, venereal diseases, intestinal worms and dysentery. Fresh leaves are chewed to get rid of toothaches. A decoction of the leaves, 5 teaspoonfuls once a day for a week, is prescribed to administer irregular menstruation, leucorrhoea and to promote delivery (*Magar*). **Other use:** Paste of the flowers is used in cosmetics. It is also used as food flavor additive for cuisine in preparing meat, fish and soup (*Magar*).

Zanthoxylum acanthopodium DC., Prodr. **1:** 727 (1824). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 83 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 281 (2000). Spiny shrub, young branches densely pubescent. Leaves stalked, odd-pinnate, leaflets sessile, 1.5-5 cm long, 0.8-2 cm wide, oblong to lanceolate, acuminate, crenate and pubescent on both surfaces, with one or two spines on the midvein. Flowers dark purple. Fruit reddish, globose, in dense clusters. Seeds shiny black.

Vernacular (Nepali) and Local Name: '*Annkhe timur*' (N), '*Bhote timur*' (G), '*Bhaise timur*' (N, M); **Voucher specimen:** BM 0528, Lespar- Kyang, 2527 m asl., (Photo Plate

5F); **Fls.–Frts.:** April-October; **Distrib.:** Nepal at 1600-2800 m, India, Bhutan and Eastern China; **Ecology:** Found in rocky places and hanging from cliffs.

Medicinal use: A decoction of the leaves is used externally to cure abdominal pains. Paste of the fruits is applied to relieve toothache (*Gurung* and *Magar*). **Other use:** Seeds are used in making pickle. Powder of dried seeds is used for flavoring foodstuffs. Seeds contain essential oil (*Magar*).

Zanthoxylum armatum DC., Prodr. 1: 727 (1824). Hara & Williams, Enum. Fl. Pl. Nep. 2: 83 (1979). Polunin & Stainton, Fl. Hima. 73 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 281 (2000). A shrub or small tree about 5-10 m tall, spiny with strong prickles on branches. Leaves pinnate, sessile, lanceolate, terminal leaflet larger in comparison. Flowers small, yellowish white in terminal or axillary loose clusters. Fruits globose, wrinkled, red when mature, aromatic, splits into two valves. Seed solitary, globose, shining black. Propagated by seeds or cutting of branch.

Vernacular (Nepali) and Local Name: ‘Timur’ (N, M, Ma), ‘Prumo’ (G); **Voucher specimen:** BM 0422, Falamkhani, 1530 m asl., (Photo Plate 5G); **Fls.–Frts.:** May-November; **Distrib.:** Throughout Nepal at 1100-2900 m, India, Bhutan, Taiwan, Japan and Korea; **Ecology:** Open and moist places within mixed forest.

Medicinal use: Juice of the stem barks, about 3 teaspoonfuls twice a day for 3-4 days, is prescribed to cure fever, cholera and stomach disorder (*Gurung* and *Magar*). Fruits are chewed raw in case of toothache (*Majhi*). **Other use:** Fruits are widely used to make pickle. Fruits, barks as well as thorns are used to cure fish poisoning (all tribes).

BURSERACEAE

Garuga pinnata Roxb., Pl. Coromandel 3: 5, t. 208 (1819). Hara & Williams, Enum. Fl. Pl. Nep. 2: 84 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 32 (2000). A deciduous tree about 25 m tall. Leaves petiolate, imparipinnate, 5-15 cm long, 3-6.0 cm wide, elongated, lanceolate to oblanceolate. Flowers clustered in much branched terminal panicles, yellow. Fruit drupes, globose, black when ripe. Propagate by seeds or cuttings.

Vernacular (Nepali) and Local Name: ‘Ramsinghe’, ‘Dabadabe’ (N, M, Ma); **Voucher specimen:** BM 0556, Chuwa, 930 m asl.; **Fls.–Frts.:** April-August; **Distrib.:** Throughout Nepal about 1200 m, Bhutan, India, Bangladesh, China, Thailand, Malaysia and Myanmar; **Ecology:** Mostly grown in uncultivated and open places.

Medicinal use: A decoction of the roots is useful for the treatment of skin diseases. Juice of the bark is used to treat dislocated bones and wounds (*Magar*). Same Juice, about 2 teaspoonfuls thrice a day for a week, is given in case of stomach disorder. Juice of the leaves, in dosages about 3-4 teaspoonfuls once a day for a week, is administered to relieve asthma (*Magar*). Juice of the root barks, about 3-5 teaspoonfuls twice a day, is administered to get rid of respiratory disease (*Majhi*). **Other use:** The leaves are lopped for highly palatable fodder. Wood is used to make musical instrument, Madal (*Magar* and *Majhi*).

MELIACEAE

Azadirachta indica A. Juss., Mem. Mus. Nat. Hist. Paris **19**: 220, t. 2, n. 5 (1830). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 85 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 196 (2000). An evergreen tree up to 15 m tall. Leaves compound, imparipinnate, petiolate, leaflets sub-sessile, 3-10 cm long, 1-3 cm wide, lanceolate and oblique at base. Flowers loosely clustered in numerous axillary panicles, small.

Vernacular (Nepali) and Local Name: 'Neem' (N), 'Nim' (G, M); **Voucher specimen:** BM 0431, Tribeni, 896 m asl.; **Fls.–Frts.:** March-August; **Distrib.:** Throughout Nepal at 200-900 m, Pakistan, India, Bangladesh, Thailand and Indonesia; **Ecology:** Common in open places around villages.

Medicinal use: Juice of the stem barks and leaves, about 3-4 teaspoonfuls thrice a day for a week, is recommended to cure fever, intestinal worms, ulcer, malarial fever, urinary complaint, cough and cold, headache and body pain (*Gurung* and *Magar*). Fruits juice is applied externally to cure skin disease (*Magar*). **Other use:** Twigs are used as toothbrush. Wood is used to make musical instruments: Madal, Dhol and Dholak. It is also used for furniture and fuelwood (*Gurung* and *Magar*).

Cipadessa baccifera (Roth.) Miq., Ann. Mus. Bot. Lugduno- Batavum **4**: 6 (1863). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 85 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 196 (2000). A dense shrub about 5 m tall. Leaves about 10-28 cm long, imparipinnate, alternate spiral, often crowded at twig end. Flowers white, inflorescence, axillary panicles. Seeds drupe, globose, 0.7 cm across and black shiny in colour. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kaligeri' (N, M); **Voucher specimen:** BM 0119, Dhairing 1532 m asl., (Photo Plate 5H); **Fls.–Frts.:** September-November;

Distrib.: Throughout Nepal at 250-1700 m, India and Bhutan; **Ecology:** Open places and with mixed forest.

Medicinal use: Juice of the roots, about 3 teaspoonfuls thrice a day for a week, is prescribed to treat cough and cold. A paste of the barks is applied to relieve bleeding of gums (*Magar*). **Other use:** Ripen fruits are eaten fresh. Leaves are lopped for fodder. A stalk of the plant is encircled in oval shape to attach fishing net called ‘*Kundelo*’ (*Magar*).

Cipadessa fruticosa Blume., Bijdr. 162 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 85 (1979). A shrub, about 1-4 m tall. Leaves compound, 8-30 cm long, petiolate, imparipinnate, leaflets sub-sessile, elliptical, 9-13. Flowers in axillary panicles, small and greenish white. Fruits small, globose, purple to black when mature. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Kalopainleti*’ (N), ‘*Kali kath*’ (M); **Voucher specimen:** BM, 0175, Thulipokhari, 1312 m asl.; **Fls.-Frts:** April-October; **Distrib.:** Nepal to about 1400 m, India, Sri Lanka, China, Indonesia and Malaysia; **Ecology:** Open and surrounding settlements.

Medicinal use: Juice of roots extract, about 3 teaspoonfuls once a day for 5-7 days, is prescribed to cure indigestion and stomach disorders. A decoction of the stem barks, in dosages about 2-3 teaspoonfuls is recommended as worm expellant (*Magar*). Extract of grounded bark, about 4 teaspoonfuls in a day for a week, is given to treat indigestion. Paste of the bark is pressed with teeth, about 15-20 minutes to get relieve from bleeding and swelling gums. **Other use:** Ripen fruits are eaten fresh. Leaves are used to flavor curries and make pickle (*Magar*).

Melia azedarach L., Sp. Pl. 384 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 85 (1979). Polunin & Stainton, Fl. Hima. 74 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 196 (2000). A deciduous tree about 10 m tall. Leaves petiolate, large, bi or occasionally tri-pinnate, ovate to lanceolate, long, pointed, apex acuminate, slightly inequilateral at the base. Flowers lilac-blue, fragrant, in long peduncled axillary panicles. Fruits drupe, globular or ellipsoidal, smooth when immature, wrinkled when ripe, yellowish, persistent even after shedding of leaves. Propagated by seeds or cuttings of branch.

Vernacular (Nepali) and Local Name: ‘*Bakaino*’ (N), ‘*Bakainu*’ (G, M, Ma); **Voucher specimen:** BM 0155, Falebas-Devasthan, 890 m asl.; **Fls.-Frts.:** March-July; **Distrib.:**

Throughout Nepal at 200-1700 m, India, Bhutan, Sri Lanka, Bangladesh, Pakistan and Iran; **Ecology:** Mostly in open places around villages also cultivated as tree.

Medicinal use: Juice of the barks, in dosages about 4-5 teaspoonfuls once a day for a month, is prescribed to cure leprosy and skin diseases (*Magar* and *Majhi*). Paste of the barks is applied externally to treat headache and rheumatic pain (*Gurung*). Fruits and flowers are boiled in water and applied to kill lice. **Other use:** Wood is used to make furniture, and for fuelwood. Leaves are lopped for fodder (all tribes).

Toona ciliata M. Roemer., Syn. Monogr. 1: 139 (1846). Hara & Williams, Enum. Fl. Pl. Nep. 2: 85 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 196 (2000). A deciduous tree about 50 m tall. Leaves, compound, petiolate, paripinnate, leaflets numerous, 3-20 cm long, 1-6.5 cm wide, ovate to lanceolate, base oblique. Flowers in drooping panicles, whitish, yellowish, fragrant. Fruits oblanceolate capsules, dark brown when ripe, possess wings at ends. Propagate by seeds.

Vernacular (Nepali) and Local Name: 'Tuni' (N, G) 'Toona' (M); **Voucher specimen:** BM 0176, Pakhapani, 1230 m asl.; **Fls.-Frts.:** April-September; **Distrib.:** Throughout Nepal at 800-1700 m, India, Sri Lanka, Bhutan and Malaysia; **Ecology:** Open places sometimes found in mixed forest.

Medicinal use: Bark juice, in dosages about 5 teaspoonfuls twice a day for a week, is administered to cure dysentery and boils (*Magar*). **Other use:** Wood is famous for its fragrance so used in making bee hives. It is also used to make furniture, carving, musical instruments, Madal and Dhol. Leaves are lopped for fodder (*Gurung* and *Magar*).

RHAMNACEAE

Zizyphus incurva Roxb., Fl. Ind. (Roxb.) ed. 2, 2: 364 (1824). Hara & Williams, Enum. Fl. Pl. Nep. 2: 92 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 260 (2000). A medium sized tree, around 4-5 m tall. Leaves petiolate, 2-11.5 cm long, 1.5-6 cm wide, ovate or oblong, apex acuminate. Flowers small, yellowish in axillary cymes. Fruits rough textured, oval. Propagated by seeds or root suckers.

Vernacular (Nepali) and Local Name: 'Hade bayer' (N, Ma), 'Kande puja' (G), 'Hare bayar' (M); **Voucher specimen:** BM 0216, Falebas-Devasthan, 830 m asl.; **Fls.-Frts.:** August-January; **Distrib.:** Eastern and Central Nepal about at 500-1900 m, India, Bhutan, China and Myanmar; **Ecology:** Occurs on the sunny places.

Medicinal use: A decoction of the roots, in dosages about 4 teaspoonfuls twice a day for a week, is given to treat fever, headache and stomach disorder (*Gurung*). Stem bark juice, about 5-6 teaspoonfuls twice a day for a week, is prescribed to treat diarrhoea and dysentery (*Majhi*). **Other use:** Ripen fruits are eaten fresh and pickled. Fruits are used to distill alcoholic beverage. Plant leaves are useful for fodder to cattle (all tribes).

Zizyphus mauritiana Lam., Encycl. **3(1)**: 319 (1789). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 92 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 260 (2000). A deciduous tree about 4-6 m tall, prickly with paired thin spines. Leaves petiolate, 3.5-6 cm long, 2-3.5 cm wide, ovate or oblong, three-veined, base oblique. Flowers pedicellate, crowded in dense axillary cymes, greenish yellow. Fruit spherical or oval, redish brown or yellowish when ripe. Propagated by seeds or root suckers.

Vernacular (Nepali) and Local Name: '*Bayer*' (N, M), '*Baher*' (G), '*Boyar*' (Ma); **Voucher specimen:** BM 0271, Bihadi- Barachaur, 851 m asl., (Photo Plate 5I); **Fls.–Frts.:** August- March; **Distrib.:** Throughout Nepal at 200-1200 m, Afghanistan, India, Bhutan and Australia; **Ecology:** Occurs on the sunny place in tropical and subtropical zones.

Medicinal use: A decoction of the roots, in dosages about 3 teaspoonfuls twice a day for ten days, is recommended to treat fever, dysentery, diarrhoea and menstrual disorders (*Gurung*). A paste of the roots is rubbed to cure backache (*Majhi*). Leaves juice is used to reduce toothache. Young roasted fruits are eaten to relieve cough and cold (*Magar*). **Other use:** The fruits are eaten fresh and pickled. Fruits are also used to distill homemade alcohol. The wood is used to make walking stick. The plant is also used in biofencing, and considered as good fodder to goats (*Gurung*, *Magar* and *Majhi*).

VITACEAE

Cissus repens Lam., Encycl. **1**: 31 (1789). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 94 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 327(2000). A scandant shrubby climber. Leaves simple, alternate, stalked, pale green, broadly ovate; tendrils opposite to leaves, forked. Flowers in compound umbellate cymes. Fruit berries, sub-globose, usually one seeded.

Vernacular (Nepali) and Local Name: '*Jogilahara*', '*Charchare lahara*' (N), '*Pureni*' (M); **Voucher specimen:** BM 0352, Pakhapani-Sarthan, 1001 m asl.; **Fls.–Frts.:** July-

May; **Distrib.:** Nepal at 100-1800 m, Bhutan, India, Thailand and China; **Ecology:** Forests in valleys, shrublands on hillsides.

Medicinal use: Paste of the leaves and roots is applied to administer dislocated bones and crake muscles (*Magar*). **Other use:** Stems and roots yield strong fiber. Young shoots are cooked as vegetables (*Magar*).

SAPINDACEAE

Sapindus mukorossi Gaertn., Fruct. 1: 342, t. 70, f. 3 g, h (1788). Hara & Williams, Enum. Fl. Pl. Nep. 2: 96 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 285 (2000). A deciduous tree about 10 m tall. Leaves compound, petiolate, pinnate, leaflets shortly petiolate, 5.5-13 cm long, 2-4 cm wide, lanceolate, base oblique. Flowers, numerous, small, purple or whitish yellow. Fruit globose, fleshy, saponaceous, yellow when ripe, wrinkled. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Reetha' (N), 'Jharlyang' (M), 'Ritha' (G);

Voucher specimen: BM 0370, Bihadi-Ranipani, 921 m asl.; **Fls.–Frts.:** February-October; **Distrib.:** Throughout Nepal at 300-1500 m, India, Pakistan, Bhutan, China and Taiwan; **Ecology:** Open places sometimes, cultivated as roadside tree.

Medicinal use: Paste of the fruits is applied twice a day to cure burns and boils (*Magar*).

Other use: The seeds are grounded and leather of the fruits is used to wash hair and clothes (*Gurung* and *Magar*).

ANACARDIACEAE

Choerospondias axillaris (Roxb.) B. L. Burtt & A.W. Hill., Ann. Bot. (Oxford), n.s. 1: 254 (1937). Hara & Williams, Enum. Fl. Pl. Nep. 2: 100 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 9 (2000). A large deciduous tree, around 20-30 m tall. Leaves pinnately compound, imparipinnate, petioled, leaflets sub-sessile, ovate to lanceolate, 11-17 in number, 10 cm long, 4 cm wide, pointed at apex. Flowers small, greenish-white, in panicles at end of branches. Fruit smooth, oblong, fleshy, yellowish when ripe. Propagated by seed.

Vernacular (Nepali) and Local Name: 'Lapsee' (N, M, Ma), 'Khaiya', 'Kalan' (G);

Voucher specimen: BM 0416, Durlung, 1485 m asl., (Photo Plate 6A); **Fls.–Frts.:** April-December; **Distrib.:** Throughout Nepal at 1200-1500 m, Northeastern India and Thailand; **Ecology:** Current cultivated finely looking tree in warm temperate places.

Medicinal use: It is a good source of vitamin C (all tribes). **Other use:** Fruits are eaten fresh or pickled. The ripen fruits are boiled and crushed to prepare pickle and chutney for household use. The same is used to produce varieties of edible pulp cake indigenously called *Titaura* to sell in markets (all tribes).

Lannea coromandelica (Houtt.) Merr., J. Arnold Arbor. **19:** 353 (1938). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 101 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. **9** (2000). A medium size deciduous tree, upto 25 m tall. Leaves petiolate, imparipinnate, leaflets 5-11 cm long, 3-8 cm wide, ovate to oblong. Flowers crowded in cyme, unisexual, greenish yellow. Fruit drupe, ovoid, succulent. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Dabadabe*' (N, M); **Voucher specimen:** BM 0445, Pakhapani-Simle, 1090 m asl.; **Fls.–Frts.:** March-June; **Distrib.:** Throughout Nepal at 200-1400 m in India and Sri Lanka; **Ecology:** Moist and open places.

Medicinal use: Juice of the bark, in dosages about 3-4 teaspoonfuls thrice a day for a week, is recommended to treat ulcer (*Magar*). **Other use:** Leaves are lopped for fodder to cattle. Wood is used as fuel, for furniture and construction purpose (*Magar*).

Rhus javanica L., Sp. Pl. 265 (1753). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 101 (1979). Polunin & Stainton, Fl. Hima. 84 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. **10** (2000). A deciduous tree about 8 m tall. Leaves pinnately compound, petiolate, imparipinnate, leaflets sessile, 5-13 in number, 5-16 cm long, 3-8 cm wide, lanceolate, oblong to ovate, apex acuminate. Flowers small, yellowish green, in large terminal panicles. Fruit a drupe, 4 mm, orbicular, compressed and reddish when mature. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Bhakamilo*' (N), '*Tibi*' (G), '*Muruk*' (M); **Voucher specimen:** BM 0332, Balakot, 1540m asl., (Photo Plate 6B); **Fls.–Frts.:** July-November; **Distrib.:** Nepal at 1300-2400 m, India, Bhutan, Sri Lanka, China, Korea, Japan and Myanmar; **Ecology:** Common in blue pine, chir-pine forests along open hillsides.

Medicinal use: Fruits are grounded to make juice, in dosages about 2-3 teaspoonfuls twice a day for three days, is used to treat diarrhoea and blood dysentery (*Gurung*). A paste of the fruits is applied to treat swelling and wounds. Fruits are chewed in case of stomachache and also used as appetizer. The fruit powdered is given to cure profuse menstruation. A decoction of fruit is administered to cure animal's foot and mouth

disease (*Magar*). **Other use:** Fruits are used to make chutney and pickles (*Gurung* and *Magar*).

Rhus succedanea L., Mant. Pl. 2: 221 (1767) var. **succedanea**. Hara & Williams, Enum. Fl. Pl. Nep. 2:102 (1979). Polunin & Stainton, Fl. Hima. 84 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.10 (2000). A deciduous tree about 10-20 m tall. Leaves compound, petiolate, imparipinnate, leaflets 7-15, ovate to oblong, to lanceolate, apex acuminate, 7-16 cm long, shining, reddish before shedding. Flowers small, greenish yellow in slender, drooping, branched, clusters of axillary panicles. Fruit oblique drupe, brown. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kagbhalayo' (N), 'Bhayo' (G), 'Ban amre' (M);

Voucher specimen: BM 0225, Pakhapani-Sarthan, 1245 m asl., (Photo Plate 6C); **Fls.–**

Frts: September-December; **Distrib.:** Nepal at 1200-2400 m, Northern India, Bhutan, China, Myanmar and Thailand; **Ecology:** A common deciduous tree in temperate Himalaya.

Medicinal use: Young leaves juice about two teaspoonfuls once a day for three days is administered to treat diarrhoea, dysentery and skin disease (*Magar*). **Other use:** Timber is used for construction purpose and as fuelwood (*Gurung* and *Magar*). It is believed that if the plant leaves are kept in home, it removes the blemish on the body (*Gurung* and *Magar*). Ripen fruits are eaten fresh and pickled.

Semecarpus anacardium L. f., Suppl. Pl. 182 (1781). Hara & Williams, Enum. Fl. Pl. Nep. 2: 102 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.10 (2000). A tree about 10 m tall. Leaves petiolate, 13-45 cm long, 6-26 cm wide, ovate to oblong, apex rounded, narrowed towards base. Yellowish flowers in simple terminal panicle. Fruit oblong drupe, shiny black when ripe, seated on a fleshy orange receptacle. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bhalaayo' (N, M), 'Khur dan' (G), 'Bhalay'

(Ma); **Voucher specimen:** BM 0203, Chitre, 1560 m asl.; **Fls.–Frts.:** May-December;

Distrib.: Throughout Nepal at 900-1700 m, India, Bhutan, Bangladesh and Myanmar;

Ecology: Moist deciduous and semi-evergreen forests.

Medicinal use: Fruits juice, about two teaspoonfuls twice a day for a week, is administered to cure dysentery, diarrhoea, fever and asthma (*Gurung*). Latex is used to treat rheumatism. Paste of the seeds is mixed with honey and about 2 teaspoonfuls twice a day for two days is given to treat gastric trouble. Leaf ash of the plant is used as antidote in snakebite and scorpion sting (*Majhi*). **Other use:** Wood is used as fuelwood,

and for construction purpose (*Gurung* and *Magar*).

Spondias pinnata (L.f.) Kurz., Prelim. Rep. Forest Pegu App. A: A44, B42 (1875). Hara & Williams, Enum. Fl. Pl. Nep. 2: 102 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.10 (2000). A medium size tree about 5-12m tall. Leaves stalked, alternate, odd-pinnate, leaflets, 7-11, short-stalked, opposite, 7.5-17 cm long, 3.5-7.5 cm wide, elliptic to oblong, entire, glabrous. Flowers greenish white in spreading terminal panicles. Fruit a drupe, greenish yellow, oblong.

Vernacular (Nepali) and Local Name: '*Amaro*' (N, M); **Voucher specimen:** BM 0229, Ramja Deurali, 1217 m asl., (Photo Plate 6D); **Fls.-Frts.:** March-September; **Distrib.:** Throughout Nepal at 300-1400 m, India, Bhutan, Bangladesh and Sri Lanka; **Ecology:** Open hillsides and moist places.

Medicinal use: Juice of the bark, in dosages about 3-5 teaspoonfuls thrice a day for a week, is given to treat rheumatism (*Magar*). **Other use:** The fruits are eaten fresh and pickled.

FABACEAE

Abrus precatorius L., Syst. Nat. ed. 12, 2: 472 (1767). Hara & Williams, Enum. Fl. Pl. Nep. 2:103 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.164 (2000). A perennial shrub, climber, numerous slender branches. Leaves compound, short petioled, paripinnate, leaflets in 10-20 pairs, 0.8-2.3 cm long, 0.5-0.8 cm wide, oblong or obovate. Flowers red, pinkish white in many flowered racemes. Fruit a pod, stout, rigid, bulgy. Seeds sub-globose, polished. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Rati geri*' (N, M), '*Reto geri*' (Ma), '*Janai lahara*' (G); **Voucher specimen:** BM 0513, Pang, 1200 m asl.; **Fls.-Frts.:** May-December; **Distrib.:** Nepal to about 1300 m, India, Pakistan and Bangladesh; **Ecology:** Common in open or shady places, trailing over thickets and hedges, in tropics and subtropics.

Medicinal use: A decoction of roots, in dosages about 5 teaspoonfuls twice a day, is prescribed to promote discharge of urine. It is also tonic which is effective in treatment of jaundice (*Magar*). Paste of roots is applied in boils to dry it up. Tender leaves are chewed with sugar to get rid of throat constriction, cough and sore throat. Extract of leaves, 4 teaspoonfuls thrice a day is taken to cure combating fever and dry cough (*Majhi*). Paste of seeds is applied in sciatica, muscular swellings and skin diseases (*Magar*). Seed paste

is used to feed cattle for the treatment of constipation. **Other use:** Thin stem and twig are used as ropes for temporary binding. Tender leaves are cooked as vegetables (*Magar and Gurung*).

Butea minor Buch.-Ham. ex Baker, in Wall., Cat. 188, n. 5439 (1831-1832). Hara & Williams, Enum. Fl. Pl. Nep. 2: 109 (1979). Polunin & Stainton, Fl. Hima. 91 (1984). Shrub, about 2 m tall. Leaves petiolate, trifoliate, large, leaflets 15-38 cm long, broadly ovate, terminal leaflet long stalked, two lateral leaflets asymmetrical. Flowers orange red in axillary and terminal spike-like clusters. Fruit densely haired pod. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bhuletro' (N, Ma, G), 'Dharpat' (M); **Voucher specimen:** BM,0088, Pangrang, 1163 m asl., (Photo Plate 6E); **Fls.-Frts.:** April-August; **Distrib.:** Nepal from 300-2000 m in rocky areas, India and Bhutan; **Ecology:** Grown in rocks, slopes, river gorges, open and moist places.

Medicinal use: The seed is pounded and taken about 8-10 teaspoonfuls twice a day with water as worm expellant from the intestine (*Magar*). **Other use:** Leaves are sewn together by small bits of thin spliced bamboo sticks to make plates. Fiber is extracted from bark to make ropes (all tribes).

Dalbergia sissoo Roxb. ex DC., Prodr. 2: 416 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 115 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.171 (2000). A deciduous tree about 20-30 m tall. Leaves petiolate, imparipinnate, 3-5, 2-7 cm long, 1.5-6 cm wide, broadly obliquely ovate, acuminate. Yellowish white sessile flowers in axillary panicles. Fruit light brown strap shaped pod with 1-4 seeds. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: 'Sisau' (N, G, M); **Voucher specimen:** BM 0443, Hosrangdi, 890 m asl., (Photo Plate 6F); **Fls.-Frts.:** March-February; **Distrib.:** Nepal at 100-1100 m, India, Bhutan and Bangladesh; **Ecology:** Open, moist and mixed forest.

Medicinal use: A decoction of leaves and roots, in dosages about 8-10 teaspoonfuls thrice a day, is used as stimulant of vigor during child delivery (*Magar*). **Other use:** Wood is used to make furniture and in house construction. It is also used to make musical instruments, mostly Madal and Dhol (*Gurung and Magar*).

Desmodium concinnum DC., in Ann. Sci. Nat. 4: 101 (Jan. 1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 117 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.172 (2000). An erect deciduous

shrub about 2 m tall, branches slender, attenuate, bark smooth or brownish, lenticels minute, pale. Leaves stalked, trifoliate, leaflets 1-7.5 cm long, 0.8-3 cm wide, elliptic to oblong, rounded at both ends, entire, with silky appressed hairs on both sides. Flowers blue in slender axillary and terminal drooping racemes. Fruit a pod.

Vernacular (Nepali) and Local Name: 'Gahate jhar' (N, M); **Voucher specimen:** BM 0050, Lunkhi-Deurali, 1493 m asl.; **Fls.–Frts.:** Septembre-May; **Distrib.:** Eastern and Central Nepal at 1200-1700 m, India, Western China and Myanmar; **Ecology:** Generally found in mixed forest.

Medicinal use: Juice of the roots, about 2 teaspoonfuls thrice a day for a week, is given in case of indigestion (*Magar*). **Other use:** The plant is used for fodder to the cattle (*Magar*).

Desmodium gangeticum (L.) DC., Prodr. 2: 327 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 117 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 172 (2000). Herb, diffuse, erect, around 1 m tall. Leaves simple, petiolate, 2-19 cm long, 1-6.5 cm wide, oblong to ovate, apex acuminate, rounded towards base. Flowers pinkish or lilac in terminal or axillary racemes. Fruit a pod, 6-8 jointed. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Dampate' (N, G, Ma); **Voucher specimen:** BM 0047, Bihadi Barachaur, 920 m asl.; **Fls.–Frts.:** May-November; **Distrib.:** Nepal to about 1000 m, India, Bangladesh, Bhutan and Africa; **Ecology:** Open as well as shady places.

Medicinal use: The root extract, in dosages about 2-5 teaspoonfuls thrice a day is taken for a week, to treat gastric disorders (*Gurung* and *Majhi*). Roots juice, about 5-7 teaspoonfuls for a month, is administered daily which is considered as tonic that stimulates the sexual desire (*Gurung*). **Other use:** The plant is used as fodder to cattle.

Desmodium heterocarpon (L.) DC., Prodr. 2: 337 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 118 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 172 (2000). A prostrate subshrub, twigs clothed with long silky hairs. Leaves stalked, trifoliate, leaflets 1.5-4 cm long, suborbiculate to broadly elliptic, rounded at both ends, glabrous above, appressed silky hairs beneath. Flowers purple in axillary and terminal racemes. Fruit a pod, clothed with minute, hooked, rusty hairs. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bakhre ghans' (N, M), 'Bangahat' (G, Ma); **Voucher specimen:** BM 0295, Bajung, 1209 m asl.; **Fls.–Frts.:** July-December; **Distrib.:** Nepal at 400-2100 m, India, Bhutan, Sri Lanka, China, Japan, Malaysia,

Australia and Islands of the Pacific Ocean; **Ecology:** Found in moist or dry places in and about *Shorea robusta* forest.

Medicinal use: A decoction of the plant, about 5-10 teaspoonfuls once a day is tonic and also useful to cure cough. Juice of the roots, about 4 teaspoonfuls twice a day is given to treat diarrhoea and skin disease (*Majhi* and *Gurung*). **Other use:** The plant is used as fodder to the cattle (all tribes).

Desmodium multiflorum DC., Ann. Sci. Nat., ser. **14**: 101 (1825). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 118 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 173 (2000). An erect shrub about 1.5 m tall. Leaves staled, trifoliolate, leaflets subsessile, 3-7.5 cm long, 1.5-3.5 cm wide, elliptic to ovate, obtuse at both ends, usually mucronate, glabrous above, more or less silky haired beneath. Flowers pinkish to purplish in axillary and terminal racemes. Fruit a pod, four to eight jointed, densely appressed hairy.

Vernacular (Nepali) and Local Name: '*Bakhre ghans*' (N, G), '*Bhatte*' (M); **Voucher specimen:** BM 0514, Banou, 1320 m asl., (Photo Plate 6G); **Fls.-Frts.:** August-December; **Distrib.:** Throughout Nepal at 1000-2500 m, Bhutan and Northern India; **Ecology:** Open and dry places.

Medicinal use: A decoction of the roots, about 4 teaspoonfuls twice a day for 5-7 consecutive days, is given to treat ulcer (*Gurung*). Powder of the roots, in dosages of 2 teaspoonfuls twice a day for a week, is consumed with luke-warm water to cure stomach disorder (*Magar*). **Other use:** Plant is a good source of fodder to goat.

Dolichos staintonii H. Ohashi & Tateishi, Bull. Sci. Mus., Tokyo Ser. B. (Bot.), **3**: 72, f. 1 & 2 (1977). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 119 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 173 (2000). A herbaceous climber. Leaves single blades, pinnate, divided into three leaflets. Flowers solidary, white or purple, occasionally yellow. Fruit flattened legume pod. Propogated by seeds.

Vernacular (Nepali) and Local Name: '*Jungalee bhatamas*' (N, M, G); **Voucher specimen:** BM 0192, Kyang, 2420 m asl.; **Fls.-Frts.:** July-November; **Distrib.:** Central Nepal to about 1000-3000 m, India; **Ecology:** On open and moist places.

Medicinal use: The seeds juice, in dosages about 4-5 teaspoonfuls once a day for a week, is recommended as tonic to administer asthma, bronchitis, urinary discharges, hiccoughs, heart trouble and other diseases of brain (*Magar* and *Gurung*). **Other use:** The young pods and seeds are used as vegetables.

Erythrina arborescens Roxb., Pl. Coromandel **3**: 14, t. 219 (1811). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 120 (1979). Polunin & Stainton, Fl. Hima. 90 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 174 (2000). A tree deciduous around 6 m tall. Leaves petiolate, trifoliate, 11-23 cm long, 10-24 cm wide, broadly ovate, truncate at base. Flowers scarlet, large in dense spike-like clusters. Fruit a pod, tapering. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Phaleto*' (N, M, G); **Voucher specimen:** BM 0188, Karkineta, 1480 m asl.; **Fls.-Frts.:** September-November; **Distrib.:** Nepal to about 3000 m, India, China and Burma; **Ecology:** Commonly occurring in open places and mixed forest.

Medicinal use: Bark extract is applied externally on boils. Barks of the plant is boiled in water for about ten minutes, and the filtered liquid in dosages about 3-4 teaspoonfuls for a week is prescribed to deworm (*Gurung*). **Other use:** The plant is looped for fodder to cattle. It is also planted to prevent soil erosion (*Magar*).

Erythrina stricta Roxb., Fl. Ind. ed. 2, **3**: 251 (1832). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 120 (1979). Polunin & Stainton, Fl. Hima. 91 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 174 (2000). A large tree, trunk and branches covered with sharp, conical, whitish prickles. Leaves stalked, trifoliolate, leaflets stalked, 5-13 cm long, 3-12 cm wide, broadly ovate, entire. Flowers scarlet in dense spike-like clusters.

Vernacular (Nepali) and Local Name: '*Phaledo*' (N, M, G); **Voucher specimen:** BM 0235, Falamkhani, 1581 m asl.; **Fls.-Frts.:** March-July; **Distrib.:** Nepal at 1000-1600 m, India and China; **Ecology:** Commonly found in cultivated areas.

Medicinal use: Bark juice is applied to treat skin diseases of cattle (*Gurung* and *Magar*).

Other use: Leaves are lopped for fodder. Wood is used as fuelwood, and for live post in biofencing in arable land (*Gurung* and *Magar*).

Flemingia marcophylla (Willd.) Merr., Philip. J. Sci. Ser. B **5**: 130 (1910). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 120 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 174 (2000). A shrub about 5 m tall. Leaves stalked, digitately trifoliolate, leaflets short-stalked, 3.5-19 cm long, 1.5-9.5 cm wide, elliptic to ovate, entire, narrowed toward the tip, base cuneate. Flowers purplish in a raceme. Fruit a pod, oblong, tomentose, two-seeded. Flowers and fruits.

Vernacular (Nepali) and Local Name: '*Ban bhatamas*' (N), '*Bhatmase lahara*' (M); **Voucher specimen:** BM 0228, Majhphant Mallaj, 1690 m asl., (Photo Plate 6H); **Fls.-**

Frts.: March-December; **Distrib.:** Throughout Nepal at 300-1700 m, India, Sri Lanka, China and Malaysia; **Ecology:** Occurs in open and dry places.

Medicinal use: A paste of the roots is applied to cure swelling caused by burns. **Other use:** The plant is lopped as highly palatable fodder to the cattle. Fruits are roasted and eaten.

Glycyrrhiza glabra L., Sp. Pl. 2: 742(1753). A perennial shrub about 1 m tall. Leaves pinnately compound, impair-pinnate, alternate, stalked, oblong to elliptical-lanceolate, acute or obtuse. Flowers violet in long racemes. Fruits pods, oblong to linear, flattened. Seeds reniform.

Vernacular (Nepali) and Local Name: 'Jetheemandhu' (N, M); **Voucher specimen:** BM 0377, Lespar- Kyang, 2420 m asl., (Photo Plate 6I); **Fls.–Frts.:** July-August; **Distrib.:** Nepal at 1200-3200m, India, Kazakhstan, Kyrgyzstan, Afghanistan, Mongolia and Pakistan; **Ecology:** Found in dry and sunny places in the mixed forest.

Medicinal use: A decoction of the underground stem and roots, in dosages about 5 teaspoonfuls twice a day for a week, is administered to cure genito-urinary diseases, coughs, sore throat, chronic respiratory and digestive disorders. It is also used to treat scorpion stings (*Magar*). **Other use:** Dry roots are consumed as vegetables (*Magar*).

Indigofera bracteata Grah. ex Baker, Fl. Br. Ind. 2: 100 (1876). Hara & Williams, Enum. Fl. Pl. Nep. 2:122 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.175 (2000). Shrubs erect or prostrate about 20-90 cm tall. Stems and young branches glabrous. Stipules narrowly lanceolate and glabrous. Leaves 3-11 cm, petiole and rachis glabrous. Racemes 8-15 cm, densely flowered.

Vernacular (Nepali) and Local Name: 'Phusre ghans' (N), 'Sakhino' (G); **Voucher specimen:** BM 0494, Durlung, 1586 m asl.; **Fls.–Frts.:** May-July; **Distrib.:** Nepal at 1500-3000 m, India, China and Bhutan; **Ecology:** Grasslands in mountain forests.

Medicinal use: Paste of the leaves is applied to relieve muscular swelling. Leaves juice, about 5 teaspoonfuls twice a day for a week, is given to treat leprosy and menstrual disorder (*Gurung*). **Other use:** The plant is lopped for fodder to cattle.

Mucuna nigricans (Lour.) Steud., Nom. Bot. ed. 2, 2(12-13): 163 (1841). Hara & Williams, Enum. Fl. Pl. Nep. 2: 126 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.177 (2000). A woody climber with hollow branches. Leaves stalked, trifoliolate, leaflets 10-18cm long, ovate to

oblong, lateral leaflets oblique. Flowers dark purple in axillary racemes. Fruit a pod, oblong, clothed with deciduous, brownish yellow, irritating bristles. A woody climbing branches herb.

Vernacular (Nepali) and Local Name: '*Baldhendro*' (N, G, M); **Voucher specimen:** BM 0391, Pakhapani-Sarthan, 1230 m asl., (Photo Plate 7A); **Fls.–Frts.:** August–December; **Distrib.:** Central to Eastern Nepal at 600–1300 m, China, India, Bangladesh and Bhutan; **Ecology:** Found in shrubs and trees in broad leaved forest.

Medicinal use: The watery sap of the stem, in dosages about 3–4 teaspoonfuls in a day for a week, to relieve cough and cold (*Gurung* and *Magar*). **Other use:** Seeds are used as a gum. Foliage is lopped for fodder.

***Mucuna pruriens* (L.) DC., Prodr. 2: 405 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 126 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 177 (2000).** A slender annual twinning plant. Leaves trifoliate, petiole 7–12 cm long, appressedly silky, stipules lanceolate 5 mm. long leaflets membranous, broadly ovate, elliptic or rhomboid ovate, the terminal leaflets slightly shorter, densely clothed with silvery-grey hairs beneath and pubescent above. Flowers purple in axillary pendulous. Fruit pods 5–8 cm long and 1–2 cm wide, longitudinally ribbed.

Vernacular (Nepali) and Local Name: '*Kaauaso*' (N, M, G); **Voucher specimen:** BM 0227, Pakhapani-Sarthan, 1221 m asl., (Photo Plate 7B); **Fls.–Frts.:** July–December; **Distrib.:** Nepal at 350–1300 m, China, India, Bhutan and Pakistan; **Ecology:** Along rivers, in plains and lower hills.

Medicinal use: A decoction of roots, about 5–6 teaspoonfuls once a day for a week, is prescribed to treat dysentery and uterine trouble. Young pods are rubbed on skin as antidote to administer scorpion bites (*Magar* and *Gurung*). **Other use:** Young pods are boiled and cooked as a vegetable. Foliage is lopped for fodder.

***Parochetus communis* Buch.-Ham. ex D. Don., Prodr. Fl. Nep. 240 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 127 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 178 (2000).** Herb with leaves stalked, trifoliate, leaflets sessile, 0.5–2.8 cm long, deeply lobed at the apex, entire or minutely dentate near the tip, slightly pubescent. Flowers bluish, solitary or in pairs at the end of the stalk. Fruit a pod, Glabrous, linear, tipped with a persistent style.

Vernacular (Nepali) and Local Name: '*Chengi phul*' (N, G); **Voucher specimen:** BM 0382, Durlung, 1517 m asl.; **Fls.–Frts.:** March–July; **Distrib.:** Nepal at 900–4000 m, Bhutan, India, China, Southeast Asia and Africa; **Ecology:** In open and sunny places.

Medicinal use: Juice of the leaves is applied externally to cure boils, cuts and wounds (*Gurung*). **Other use:** The plant is looped for fodder.

Tamarindus indica L., Sp. Pl. 34 (1753). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 131 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 180 (2000). Tree about 25 m tall. Leaves petiolate, paripinnate, leaflets short petioled, 1-2 cm long, 0.5-0.8 cm wide, oblong to obtuse. Flowers yellowish with pink stripes, in racemes. Fruit a pod, oblong, brownish ash colored, pulpy mesocarp, acidic. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Imlee*' (N, M), '*Tate amilo*' (G); **Voucher specimen:** BM 0223, Saligram, 690 m asl.; **Fls.-Frts.:** March-June; **Distrib.:** Throughout Nepal at 400-1200 m, Pakistan, India, Bhutan and Thailand; **Ecology:** Occurs in open places around villages.

Medicinal use: Bark juice, about 4-5 teaspoonfuls twice a day is administered for a week, to treat fever, diarrhoea and asthma (*Magar*). A paste of the leaves is applied to relieve rheumatism (*Gurung*). It is also useful to cure jaundice, ringworm and boils. A decoction of the leaves, about 5-6 teaspoonfuls once a day for a week is given to relieve cough and cold (*Gurung* and *Magar*). **Other use:** Ripen as well as immature fruits are eaten fresh and pickled (*Gurung* and *Magar*).

Trifolium repens L., Sp. Pl. 767 (1753). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 131 (1979). Polunin & Stainton, Fl. Hima. 96 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 181 (2000). A prostrate annual herb. Leaves stalked trifoliolate, leaflets sessile, ovate, tip rounded. Flowers condensed in a globose head, white or tinged pink.

Vernacular (Nepali) and Local Name: '*Seto behuli*' (N, G); **Voucher specimen:** BM 0239, Lekhfant, 2190 m asl.; **Fls.-Frts.:** March-December; **Distrib.:** Central Nepal at 1100-2500 m, India, Bhutan, Sri Lanka and Pakistan; **Ecology:** In open and grassy places.

Medicinal use: Leaves and roots juice, about 5 teaspoonfuls twice a day for a week, is prescribed to treat fever and headache (*Gurung*). **Other use:** The whole plant is considered to make pickle. It is also fed for the animal's lactation to increase milk production.

CAESALPINIACEAE

Bauhinia purpurea L., Sp. Pl. 375 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 108 (1979). Polunin & Stainton, Fl. Hima. 88 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 167 (2000). A deciduous tree, around 6 m tall. Leaves petiolate, wide cleft half-way to the base, ovate to almost cordate, apex bilobed, lobes obtuse. Purplish pink flower in panicle or corymbose raceme. Fruit, flat, stout, glabrous, greenish purple pod. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Tanki' (N, G, Ma), 'Tatekoiralo' (M); **Voucher specimen:** BM 0005, Pang, 1721 m asl., (Photo Plate 7C); **Fls.–Frts.:** September–February; **Distrib.:** Throughout Nepal at 500–3000 m, India, Bhutan and China; **Ecology:** Commonly grown as an agroforestry in border areas of agricultural fields.

Medicinal use: Barks juice, in dosages about 5–7 teaspoonfuls four times a day for a week, is administered to cure diarrhoea and dysentery (*Gurung* and *Magar*). **Other use:** Young flowers and young fruits are cooked as vegetables and pickled. Wood is used to make agricultural tools, construction as well as fuelwood. The leaves are looped for fodder (all tribes).

Bauhinia vahlii Wight & Arn., Prodr. Fl. Ind. Or. 297 (1834). Hara & Williams, Enum. Fl. Pl. Nep. 2: 108 (1979). Polunin & Stainton, Fl. Hima. 89 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 167 (2000). Gigantic woody, large evergreen climber, branches end in paired tendrils. Leaves petiolate, rounded with cordate base, cleft through a third of the length, rounded lobe at apex, 10–40 cm long and across. Flowers creamish in dense, pedicellate, flat-topped terminal clusters. Fruits woody pod, flattened, 20–30 cm long, 4–5 cm broad, covered by rusty velvet hairs. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bhorla' (N, M, Ma), 'Malu, peli' (G); **Voucher specimen:** BM 0020, Nagliwang, 1471 m asl., (Photo Plate 7D); **Fls.–Frts.:** April–January; **Distrib.:** Throughout Nepal at 300–1500 m, India and Bhutan; **Ecology:** Commonly found in mixed forest, sometimes in open and dry places, especially in *Shorea robusta* forest.

Medicinal use: A decoction of the leaves, in dosages about 5 teaspoonfuls twice a day for ten days, is given to treat diarrhoea and dysentery (*Magar* and *Majhi*). Barks juice is applied to cure boils. Juice of the roots, about 4 teaspoonfuls twice a day, is also given to cure dysentery (*Gurung*). **Other use:** Roasted seeds are eaten. Tender pods and flowers

are cooked as vegetables, and pickled. Trunk of the plant is used to make *Damphu* and *Dhol* (*Gurung* and *Magar*). The leaves are lopped for fodder to cattle (all tribe).

Bauhinia variegata L., Sp. Pl. 375 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 109 (1979). Polunin & Stainton, Fl. Hima. 88 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 167 (2000). A medium sized deciduous tree, 10 m tall. Leaves petiolate, diameter may sometimes outgrow length, 10-15 cm long, cordate, pubescent when young, cleft at apex two-lobed. Flowers, large, white or purplish, in short racemes at end of branches or axil of leaf, fragrant, 5-6 cm, one petal among five darker with purplish veins. Fruit, hard, flattened pod, glabrous, 20-30 cm long, 2.5 cm broad, slightly curved. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Koiralo' (N, G), 'Byah agan', 'Kurugan' (M), 'Koirali' (Ma); **Voucher specimen:** BM 0397, Pakhapani-Kokhe, 1360 m asl., (Photo Plate 7E); **Fls.-Frts.:** February-June; **Distrib.:** Throughout Nepal at 500-1800 m, India, Bhutan, China and Myanmar; **Ecology:** Commonly grown as an agroforestry in border areas of agricultural fields.

Medicinal use: Stem bark juice, about 7-8 teaspoonfuls twice a day for a week, is prescribed as a tonic and blood purifier (*Majhi*). It is also useful in treating piles. A paste of the bark is applied to treat cuts and wounds (all tribes). **Other use:** Fresh flowers are boiled and cooked as vegetables, and pickled. The wood is used to make *Madal* (all tribes).

Cassia fistula L. Sp. Pl. 377 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 111 (1979). Polunin & Stainton, Fl. Hima. 89 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 169 (2000). Deciduous tree about 10 m tall. Leaves stalked, even-pinnate, leaflets short-stalked, opposite in three to eight pairs, 7-15 cm long, 3-9.5 cm wide, ovate to oblong, acuminate, entire. Flowers bright yellow in drooping axillary racemes. Fruit a pod 20-30 cm long, brownish black when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Rajbriksha' (N, M, G, Ma); **Voucher specimen:** BM, 0095, Falebas Devasthan, 935 m asl., (Photo Plate 7F); **Fls.-Frts.:** May-October; **Distrib.:** Throughout Nepal about 1500 m, India, China and Malaysia; **Ecology:** Occurs in open and dry places or with other trees in the forest.

Medicinal use: Root juice is applied to treat skin diseases and syphilis (*Majhi*). Stem barks is boiled with salt water and juice is used for a week in gargling to relieve sore throat. Fruits pulp, in dosages about 5 teaspoonfuls once a day for 5-7 consecutive days,

is useful in the treatment of asthma, diabetes and eczema (*Magar* and *Majhi*). Also this pulp is given in case of hematuria (presence of blood in urine), diarrhoea and dysentery (*Gurung*). The fruits powdered is used to treat scorpion and snake bite (*Majhi*). Seeds flour, about 3-4 teaspoonfuls twice a day for 4-5 consecutive days, is administered with water in an abortion (*Magar* and *Majhi*). **Other use:** The wood makes an excellent charcoal. Barks contain tannin. Twigs are lopped for fodder (all tribes).

Cassia mimosoides L., Sp. Pl. 379 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 111 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 169 (2000). An herb about 50 cm tall. Leaves stalked, even-pinnate, leaflets many, linear, mucronate, base oblique, margin ciliate. Flowers yellow, axillary. Fruit a pod, linear, flat.

Vernacular (Nepali) and Local Name: '*Amalajhar*' (N, G, M); **Voucher specimen:** BM 0233, Bhangara, 1432 m asl.; **Fls.-Frts.:** July-December; **Distrib.:** Throughout Nepal at 500-2500 m, India, Bhutan, China and Bangladesh; **Ecology:** Mostly found in open grassland.

Medicinal use: Roots juice, about 5 teaspoonfuls thrice a day for 5 days, is recommended to treat stomach pain (*Gurung*). Paste of the plant is applied to cure leprosy (*Magar*). **Other use:** Young leaves are used to make herbal tea.

Cassia occidentalis L., Sp. Pl. 377 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 111 (1979). Polunin & Stainton, Fl. Hima. 90 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 169 (2000). A shrub erect around 1 m tall. Leaves pinnately compound, petiolate, paripinnate, leaflets in 3-5 pairs, leaflets ovate to oblong, 2-9.5 cm long, 1-3.5 cm wide, apex acuminate. Flowers short peduncled, yellow or orange, in few flowered axillary or terminal corymbs. Fruit a pod, 10-12 cm long, flat containing 20-30 seeds. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Thulo tapre*' (N), '*Tapre*' (M); **Voucher specimen:** BM 0220, Banou, 1391 m asl., (Photo Plate 7G); **Fls.-Frts.:** June-January; **Distrib.:** Nepal to about 1500 m, Pakistan, India, Bhutan, Sri Lanka, Thailand and Malaysia; **Ecology:** Open areas and on uncultivated land.

Medicinal use: The plant is dipped in hot water and the water is used in gargling to cure sore throat. Roots extract, in dosages about 6-7 teaspoonfuls for a week, is recommended to expel worms from human intestine. This same extract is also given to cure combat fever. A decoction of the leaves is applied externally on eczema and ringworm infection. Seeds are effective as diuretic and expectorant (*Magar*). **Other use:** Plants are raised as

live bio-fences around croplands. Seeds are roasted and brewed to prepare hot beverage similar to coffee (*Magar*).

Cassia tora L., Sp. Pl. 376 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 112 (1979). Polunin & Stainton, Fl. Hima. 90 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 169 (2000). Shrub gregarious, around 2 m tall. Leaves pinnately compound, petiolate, 7.5-10 cm long, leaflets in 3 pairs, 1-5.5 cm long, 0.8-2.5 cm wide, ovate to oblong, apex rounded, base generally rounded. Flowers usually in sub-sessile pairs, axillary, orange-yellow. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Chhinchhine*' (N), '*Tapre*' (M, Ma); **Voucher specimen:** BM 0096, Pang, 1190 m asl.; **Fls.-Frts.:** March-November; **Distrib.:** Nepal to about 1400 m, India, Pakistan, Bhutan, Burma; **Ecology:** Found in open areas, grasslands, and on uncultivated land.

Medicinal use: Paste of the roots is mixed with juice of lemon and applied on ringworm infections of human skin. A decoction of leaves, about 7 teaspoonfuls once a day for a week, is effective in treatment of indigestion and constipation (*Majhi*). Decoction prepared from fruit is therapeutic in combating fever (*Magar*). Paste of leaves and seeds are also used to cure ringworm infections and other skin ailments (*Magar* and *Majhi*).

Other use: Tender leaves are cooked as vegetables. Roasted seeds are brewed to prepare hot beverage similar to coffee (*Magar*).

MIMOSACEAE

Acacia catechu (L. f.) Willd., Sp. Pl. 4: 1079 (1806). Hara & Williams, Enum. Fl. Pl. Nep. 2: 103 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 164 (2000). Deciduous tree about 15 m tall. Leaves stalked, bipinnate in 10-30 pairs, pinnules, in 30-50 pairs, linear. Flowers creamy white in axillary pedunculate spikes. Fruit a pod, flat. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Khayar*' (N, G, M, Ma); **Voucher specimen:** BM 0159, Falebas Devasthan, 974 m asl., (Photo Plate 7H); **Fls.-Frts.:** March-November; **Distrib.:** Throughout the Nepal about 1200 m, India, Myanmar, Thailand and Southern China; **Ecology:** Generally found in open places.

Medicinal use: A decoction of the roots is applied to swellings caused by pain or injury. An extract of the tree '*catechu*', in dosages about 2-3 teaspoonfuls twice a day for a week, is taken with hot water to treat diarrhoea, dysentery, hemorrhoids, leucorrhoea

and uterine hemorrhage (*Majhi* and *Magar*). The infusion of *catechu* is valuable to treat nose bleeding, skin eruptions and sore nipples (*Magar* and *Gurung*). **Other use:** Wood is collected commercially for the preparation of catechu. Wood is strong, water resistant and is used as poles, timber, and for other household purposes. It is also used as fuelwood and is ideal to make charcoal (all tribes).

Albizia chinensis (Osbeck) Merrill., Am. J. Bot. **3**: 575 (1916). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 104 (1979). Polunin & Stainton, Fl. Hima. 87 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 164 (2000). A deciduous tree. Leaves petiolate, bipinnate, leaflets 20-25 pairs, oblong. Creamish flowers in axillary or terminal panicles. Fruit, brown pod, persistent for long period. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Rato siris*' (N, G, Ma); **Voucher specimen:** BM 0268, Pangrang, 1341 m asl.; **Fls.-Frts.:** April-November; **Distrib.:** Nepal from 200-1400 m, India, Sri Lanka, Malaysia and China; **Ecology:** Found in swampy places.

Medicinal use: Stem barks extract is therapeutic to heal cuts and open wounds (*Majhi*). Paste of the barks is applied to cure scabies (*Gurung*). **Other use:** The barks of the stem is pounded and strewn in water to stupefy fish. Leaves are lopped for fodder to the cattle. Wood is used as timber and firewood (*Gurung* and *Majhi*).

Mimosa pudica L., Sp. Pl. 518 (1853). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 126 (1979). Polunin & Stainton, Fl. Hima. 87 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 177 (2000). An under-shrub, diffuse and spreading, with prickly hairy stem. Leaves simple, petiolate, pinnate, digitate, sensitive to contact, 4 cm long, leaflets in 12-22 pairs, sessile, narrowly oblong, acute apex. Flowers small, pinkish, in stalked globose head, axillary. Fruit flat pod, slightly curved, 3-5 joints, covered with yellowish bristles. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Lajawati jhar*' (N, M, Ma), '*Mhaira*' (G); **Voucher specimen:** BM 0237, Bihadi Barachaur, 1237 m asl., (Photo Plate 7I); **Fls.-Frts.:** August-December; **Distrib.:** Throughout Nepal at 500-1500 m, India, Bhutan, and Bangladesh; **Ecology:** In open and moist places.

Medicinal use: Juice of the plant, about 5-6 teaspoonfuls thrice a day for a week, is prescribed to treat uric acid, asthma, fever and cough (*Magar* and *Majhi*). Paste of the leaves is applied to relieve glandular swelling of childrens. Juice of the roots, about 5-6 teaspoonfuls once a day for ten days, is given to cure kidney and urinary problem specially to remove stone from kidney (*Magar*). It is also believed that paste of the roots

is used to cure piles (all tribes). **Other use:** Whole plant is used as good source of fodder to cattle (*Magar* and *Majhi*).

ROSACEAE

Fragaria nubicola Lindley ex Lacaita., J. Linn. S. Bot. **43**: 467 (1916). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 137 (1979). Polunin & Stainton, Fl. Hima.123 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 263 (2000). Herb with filiform runners and stout root stock. Leaves staled, trifoliolate, leaflets sessile, 0.7-5 cm long, 0.5-3cm wide, obovate or orbiculate, dentate, hairy on both surfaces. Flowers white on one or two flowered peduncles. Propagated by seeds or root suckers.

Vernacular (Nepali) and Local Name: '*Bhuin ainselu*' (N, M), '*Bhuin kaphal*' (G);

Voucher specimen: BM 0226, Bhangara, 1790 m asl., (Photo Plate 8A); **Fls.–Frts.:** April-October; **Distrib.:** Nepal at 1000-3000 m, Bhutan, India and China; **Ecology:** Found in open grassland.

Medicinal use: Juice of the whole plant, about 4-5 teaspoonfuls twice a day, is given for a week to treat profuse menstruation (*Magar*). Young fruits are chewed to get rid of blemishes on the tongue (*Gurung*). **Other use:** Ripen fruits are eaten fresh (*Gurung* and *Magar*).

Potentilla fulgens Wall. ex Hook., in B. Mag. **53**: t. 2700 (1826). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 140 (1979). An annual herb about 15-20 m tall. Elliptic toothed leaflets, the larger 1.3-4 cm, alternating with much smaller more rounded leaflets. Flowers pale yellow, rather small 8-13 mm across, either in a lax erect leafy branched cluster, or in a short flat-topped cluster, calyx shaggy-haired, epicalyx-lobes broad, toothed. Leaves narrow oblong, 20-25 cm long, leaflets many, very unequal, stems several, 12-42 cm. It is propagated by stem and seeds.

Vernacular (Nepali) and Local Name: '*Bajradanti*' (N, M); **Voucher specimen:** BM 0344, Lespar- Kyang, 2400 m asl.; **Fls.–Frts.:** June-July; **Distrib.:** Nepal at 1700-4200 m, Bhutan, Sri Lanka, India and China; **Ecology:** Shrubberies, open slopes in open areas.

Medicinal use: A decoction of the roots and leaves is used in gum bleeding, toothache pyorrhoea (inflammation of gums) (*Magar*). **Other use:** Fresh leaves are chewed to strengthen the teeth. Root is used as toothbrush.

Potentilla polyphylla Wall. ex Lehm., Nov. Stirp. Pugill. **3**: 13 (1831). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 140 (1979). Polunin & Stainton, Fl. Hima. 125 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 266 (2000). Plant is distinguished by its leaves, an annual herb about 10-15 m tall. Elliptic toothed leaflets, the larger 1.3-4 cm, alternating with much smaller more rounded leaflets. Flowers pale yellow, rather small 8-13 mm across, either in a lax erect leafy branched cluster, or in a short flat-topped cluster, calyx shaggy-haired, epicalyx-lobes broad, toothed. Leaves narrow oblong, 15-25 cm long, leaflets many, very unequal, stems several, 10-40 cm. It is propagated by stem and seeds.

Vernacular (Nepali) and Local Name: '*Bajradanti*' (N, M); **Voucher specimen:** BM 0482, Lespar- Kyang, 2300 m asl., (Photo Plate 8B); **Fls.–Frts.:** June-August; **Distrib.:** Nepal at 1500-4000 m, Bhutan, Sri Lanka, India and China; **Ecology:** Shrubberies, open slopes in open areas.

Medicinal use: Root juice, about 4 teaspoonfuls twice a day for a week, is prescribed to treat throat, tooth infection, peptic ulcer, cough and cold. Paste of the roots with saliva is applied to treat fresh cuts and wounds (*Magar*). **Other use:** The plant roots are used as toothbrush (*Magar*).

Prunus cerasoides D. Don., Prodr. Fl. Nepal. 239 (1825). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 141 (1979). Polunin & Stainton, Fl. Hima. 114 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 267 (2000). A deciduous tree around 15 m tall. Leaves simple, petiolate, 6-12.5 cm long, 2-5 cm wide, ovate to lanceolate, acute. Flowers pedicellate, bracteate, pinkish or white. Fruit, drupes, ovoid, fleshy, red when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Paiyau*' (N, Ma), '*Chyarbu*', '*Payem*' (G), '*Pange*' (M); **Voucher specimen:** BM 0404, Deupurkot, 1757 m asl., (Photo Plate 8C); **Fls.–Frts.:** October-March; **Distrib.:** Throughout Nepal at 1000-2400 m, Northern India, Bhutan, southern Tibet, Western China and Myanmar; **Ecology:** Found in open places, sometimes in the mixed forest.

Medicinal use: Stem barks juice is applied externally to cure backache. Paste of the roasted fruits, about 4-5 teaspoonfuls twice a day for a week, is prescribed to relieve diarrhoea and dysentery. Young leaves juice, in dosages about 3-5 teaspoonfuls twice a day for 3-4 consecutive days, is recommended in an abortification (*Gurung* and *Majhi*). **Other use:** Ripen fruits are eaten fresh and pickled. Leaves are looped for fodder. Wood is used for the construction of houses, and used as fuelwood. The plant is used in

ceremonies and festivals (all tribes). Ripen fruits are eaten fresh and used to distill local alcohol (*Gurung* and *Magar*).

Pyracantha crenulata (D. Don) M. Roem., Syn. Monogr. **3**: 220 (1847). Hara & Williams, Enum. Fl. Pl. Nep. **2**:143 (1979). Polunin & Stainton, Fl. Hima. 120 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 268 (2000). A spiny shrub 2-3 m tall. Leaves crowded on lateral branchlets, petiolate, simple, oblong or obovate, crenate-serrulate, glabrous, inflorescence axillary corymbs. Flowers pedicellate, white. Calyx-tube hemispheric, lobes 5, obtuse, entire. Petals 5, free, ovate or elliptic. Stamens numerous, filaments 0.2 cm long, anther bilobed, dorsifixed. Carpels 5, free. Styles 5, thick. Stigma capitate. Fruit globose, bright red.

Vernacular (Nepali) and Local Name: ‘*Kathgedi*’, ‘*Ghogailo*’ (N), ‘*Bhonpujo*’ (G), ‘*Ghangaru*’ (M); **Voucher specimen:** BM 0531, Kyang, 1751 m asl.; **Fls.–Frts.:** April–October; **Distrib.:** Temperate Himalaya in Nepal east, central and west; **Ecology:** Occurs on dry place.

Medicinal use: Grounded dry fruits, in dosages about 3-4 teaspoonfuls twice a day for a week, is taken with a cup of yogurt (‘*kachaura*’) to cure blood dysentery (*Gurung* and *Magar*). **Other use:** The plant is used for fodder.

Pyrus pashia Buch.-Ham. ex D. Don., Prodr. Fl. Nepal. 236 (1825). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 143 (1979). Polunin & Stainton, Fl. Hima. 121 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 268 (2000). A deciduous tree about 8-15 m tall. Leaves petiolate, 3-8 cm long, 1-3 cm wide, ovate to lanceolate. Flowers, pedicellate, whitish in clusters on short terminal apex. Fruit globose, rough texture. Propagated by seeds or by grafting.

Vernacular (Nepali) and Local Name: ‘*Mayal*’ (N, G), ‘*Mel*’ (M, Ma); **Voucher specimen:** BM 0251, Bachchha, 1090 m asl., (Photo Plate 8D); **Fls.–Frts.:** February–November; **Distrib.:** Throughout Nepal at 750-2600 m, Bhutan and India; **Ecology:** Mostly found in open places.

Medicinal use: The juice of young fruits, about 6-7 teaspoonfuls twice a day for 4 days, is given to administer diarrhoea and dysentery (all tribes). **Other use:** Ripen fruits are eaten fresh. Wood is used to make walking sticks and fuelwood. Fruits are also used to distill alcoholic beverage (*Gurung* and *Magar*). Leaves are lopped for fodder to cattle.

Rubus ellipticus Sm. in Rees, Cycl. **30**: Rubus n. 16 (1819). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 144 (1979). Polunin & Stainton, Fl. Hima. 111 (1984). Press *et al.*, Ann. Check. Fl. Pl.

Nep. 269 (2000). A shrub large, straggling shrub about 5 m tall. Leaves petiolate, pinnately trifoliate, leaflets elliptical to ovate toothed, obtuse. Flowers white in dense short branched clusters, axillary and terminal panicles. Fruits yellowish, aggregate of drupelets, sweet. Propagated by seeds or root offshoots.

VernacularName: 'Ainselu' (N), 'Palan' (G), 'Dhewasi', 'Juis' (M), 'Melanchi' (Ma);

Voucher specimen: BM 0373, Chitre, 1950 m asl., (Photo Plate 8E); **Fls.–Frts.:** February-July; **Distrib.:** Throughout Nepal at 900-2300 m, India, Bhutan, Sri Lanka and Myanmar; **Ecology:** Found along open slopes.

Medicinal use: Roots juice, about 3-6 teaspoonfuls twice a day for 4 days, is given to cure fever, gastric trouble, diarrhoea and dysentery (*Gurung*). A paste of the roots is used to treat wounds. Juice of the leaves with equal amount of *Centella asiatica*, in dosages about 5-6 teaspoonfuls for a week, is prescribed to cure peptic ulcer (*Magar* and *Majhi*).

Other use: Ripen fruits are eaten fresh and distilled into alcoholic beverage (all tribes). It is also sold to the local market (*Magar* and *Majhi*).

Rubus hoffmeisterianus Kunth & Bouche, Ind. Sem. Hort. Berol. 1847 coll.: 14 (1848). Hara & Williams, Enum. Fl. Pl. Nep. 2: 145 (1979). Polunin & Stainton, Fl. Hima. 112 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 269 (2000). A rambling shrub upto 2 m, with slender finely-hairy young branches with recurved prickles, with leaves usually with 3 leaflets, and with pink flowers. Flower clusters terminal and axillary, few flowered, hairy, petals obovate, little shorter than the ovate acute calyx-lobes. Leaflets mostly 3-5cm, the terminal largest, often stalk with rachis. Fruits red or orange.

Vernacular (Nepali) and Local Name: 'Hade ainselu' (N, M, G); **Voucher specimen:** BM 0330, Balakot, 1491 m asl., (Photo Plate 9A); **Fls.–Frts.:** April-November; **Distrib.:** Throughout Nepal at 100-2300 m, India, Pakistan and Afghanistan; **Ecology:** Occurs in moist places.

Medicinal use: Paste of the leaves and fruits is applied to cure skin diseases (*Gurung*).

Other use: Ripen berries are eaten fresh and distilled into alcoholic beverage (*Gurung* and *Magar*).

Rubus nepalensis (Hook. f.) Kuntze, Meth. Sp. Rubus 125 (1879). Hara & Williams, Enum. Fl. Pl. Nep. 2: 145 (1979). Polunin & Stainton, Fl. Hima. 110 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 270 (2000). Herb with creeping stems. Leaves stalked, trifoliolate, leaflets

broadly ovate, long-pointed, doubly dentate, hairy on both surfaces. Flowers white, nodding. Fruit scarlet. Propagated by root offshoots or seeds.

Vernacular (Nepali) and Local Name: '*Bhui kafal*', '*Bhui ainselu*' (N, M, Ma);

Voucher specimen: BM 0497, Bihadi-Ranipani, 1790 m asl., (Photo Plate 9B); **Fls.–**

Frts.: May–November; **Distrib.:** Nepal at 2100–3200 m and northern India; **Ecology:**

Found on rocky ground along riverbanks.

Medicinal use: The infusion of leaves, about 4 teaspoonfuls twice a day for three days, is prescribed to cure fever (*Magar*). A decoction of the roots, about 6 teaspoonfuls once a day for a week, is administered to relieve gastric trouble (*Magar* and *Majhi*). **Other use:**

Ripen fruits are eaten fresh (*Magar* and *Majhi*).

SAXIFRAGACEAE

Astilbe rivularis Buch.-Ham. ex D. Don., Prodr. Fl. Nep. 211 (1825). Hara & Williams, Enum. Fl. Pl. Nep. 2: 149 (1979). Polunin & Stainton, Fl. Hima. 129 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 286 (2000). A shrub about 1–2 m tall, erect rhizomatous, growing under the forest cover. Leaves petiolate, pinnate, 15–30 cm long, leaflets elliptical to ovate, base rounded or cordate, 2.5–10 cm long. Flowers small, greenish-yellow in terminal branched pyramidal clusters. Fruits ovoid capsules. Seeds ellipsoidal, tapering into tail. Propagated by rootstocks.

Vernacular (Nepali) and Local Name: '*Thulo okhati*' (N, G), '*Pabale*' (M); **Voucher**

specimen: BM 0379, Bhuktangle, 3117 m asl., (Photo Plate 9C); **Fls.–Frts.:** July–

November; **Distrib.:** Nepal to about 3600 m, India, Bhutan and China; **Ecology:** Mostly found in slopy and rocky hillsides.

Medicinal use: The rhizome powdered, about 3–4 teaspoonfuls twice a day for 10–15 consecutive days, is prescribed with equal amount of honey during post pregnancy to women as tonic (*Magar*). Juice of the rhizomes, about 6–8 teaspoonfuls thrice a day for a week, is also a remedy taken during excess blood flow during menstruation (*Gurung* and *Magar*). Roots extract, in dosages about 6 teaspoonfuls thrice a day for three days, is taken to cure diarrhoea and dysentery (*Gurung*). Paste of the plant is applied to relieve sprains and muscular swellings (*Magar*). **Other use:** It is also used for fodder to goats (*Magar*).

Bergenia ciliata (Haw.) Sternb., Rav. Saxifr. Suppl. 2: 2 (1831). Hara & Williams, Enum. Fl. Pl. Nep. 2: 150 (1979). Polunin & Stainton, Fl. Hima. 130 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 286 (2000). Herb with thick rootstocks and leathery leaf, rhizomatous creeping, growing on rock ledges. Leaves petiolate, 3.5-16.5 cm long, 3-12 cm wide, suborbiculate. Flowers, white, pinkish or purple, in spreading or dense clusters on stout leafless stem. Fruits capsule, 2 mm long. Propagated by root offshoots or rhizome.

Vernacular (Nepali) and Local Name: 'Pakhanbed' (N), 'Padambet' (G), 'Silparo' (M); **Voucher specimen:** BM 0254, Lespar-Kyang, 2820 m asl., (Photo Plate 9D); **Fls.–Frts.:** June-October; **Distrib.:** Throughout Nepal at 1300-3500 m, Afghanistan, India, Bhutan and China; **Ecology:** Mostly found in open, moist and rocky places.

Medicinal use: Juice of the rhizomes is applied externally to cure piles tumor. Juice of the leaves and rhizomes, in dosages about 5-7 teaspoonsfuls thrice a day for a week, is recommended to get rid of urinary trouble, kidney stone, heart disease, asthma and lungs problem (*Gurung* and *Magar*). The rhizomes powdered, about 3-4 teaspoonfuls once a day for 5 days, is given with water to treat cough and cold. Dried rhizomes powdered, about 1-2 teaspoonfuls twice a day with 2-3 teaspoonfuls of honey for a week, is taken by post-partum women (*Magar*). Latex is applied externally to get rid of the gum disease. **Other use:** The flowers are boiled and pickled (*Magar*).

PARNASSIACEAE

Parnassia wightiana Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 35 (1834). Hara & Williams, Enum. Fl. Pl. Nep. 2: 156 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 232 (2000). Small herbs. Leaves radical, broadly ovate-cordate, with five basal veins. Flowering stems 12-20 cm or more long with a bract half-way up nearly as large as the leaves, and similar to them, clasping the stem. Capsule three-angled or rounded, obcordate, seeds all near its base, ellipsoid with wrinkled coat.

Vernacular (Nepali) and Local Name: 'Sunakharai' (N), 'Nirmashi' (N, M); **Voucher specimen:** BM 0412, Behulibans, 1397 m asl.; **Fls.–Frts.:** June-September; **Distrib.:** Nepal at 600-2000 m, Bhutan, India, China and Thailand; **Ecology:** Open valley forests, valleys, grassy areas, roadsides.

Medicinal use: Juice of the leaves, about 2 teaspoonfuls thrice a day for a week, is recommended to cure constipation and ulcer. It is also used to relieve sprains and cuts (*Magar*). **Other use:** The plant is used for fodder to goats.

CRASSULACEAE

Bryophyllum pinnatum (Lam.) Oken., Allgem. Naturgesch. **3** (3): 1966 (1841). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 159 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. **76** (2000). A perennial succulent herb up to 2 m tall. Stem is hollow four-angled and usually branched. Leaves lower usually simple, upper usually 3-7 foliate, decussate, long stalked, petiole united by a ridge round the stem. Flowers reddish purple in large spreading terminal panicles. Fruit follicles enclosed in the persistent papery calyx and corolla.

Vernacular (Nepali) and Local Name: '*Ajambare*' (N, M), '*Ajammari*' (Ma); **Voucher specimen:** BM 0333, Pang, 1440m asl., (Photo Plate 9E); **Fls.–Frts.:** November–April; **Distrib.:** Central Nepal at 800 to 1500 m and through tropical America to India, China, Africa and Australia; **Ecology:** Succulent and comely, an excellent house plant which likes moist, warm conditions and shade.

Medicinal use: Ash of the burnt leaves is externally applied in wounds, boils, snake bite and also useful in skin burns scalds. The ash, in dosages about 3-4 teaspoonfuls twice a day for a week, is prescribed with hot water to cure diarrhoea and dysentery (*Majhi*). Juice of the leaves, about 2-3 drops once a day for 5 days, is recommended to relieve earache and dysentery (*Magar*). It is also used to treat antibacterial activities and skin diseases (*Majhi*). Leaves paste is applied to fresh cuts and wounds and on forehead to reduce headache. **Other use:** It is also used to make green manure.

Kalanchoe spathulata DC., Pl. Hist. Succ. **2**: t. 65 (1801). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 159 (1979). Polunin & Stainton, Fl. Hima. 141 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. **76** (2000). Herb about 40-150 cm tall, glabrous. Stems usually branched. Leaf blade pinnately compound with 3-5 leaflets, leaflet blades oblong to elliptic, margin crenate, apex obtuse. Inflorescences terminal, paniculate, many flowered. Flowers pendulous. Corolla reddish to purple, to 5 cm, base sparsely ciliate; lobes ovate-lanceolate. Stamens inserted basally on corolla. Nectar scales oblong. Follicles included in calyx and corolla tube. Seeds striate. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Ajambari*', '*Hattikane*' (N, Ma, M); **Voucher specimen:** BM 0131, Shivalaya, 870 m asl.; **Fls.–Frts.:** February–May; **Distrib.:** Nepal about 900 m, India and Madagascar; **Ecology:** Usually found in dry and disturbed areas. **Medicinal use:** Leaves extract juice, about 2-3 teaspoonfuls twice a day for a week, is prescribed to cure dysuria, diarrhoea, dysentery and tuberculosis (*Magar*). Same juice is

useful to cure burns, boils and bites of insects (*Majhi*). The leaves powdered is mixed with equal amount of *Piper longum*, in dosages about 5 teaspoonfuls once a day for a week, is recommended to cure inflammation, burning in urination and leprosy (*Magar*). *Magar* healer recommended paste of the leaves to treat tumorous cancer of the human body. **Other use:** This plant is useful to make green manure (*Majhi*).

COMBRETACEAE

Terminalia bellirica (Gaertn.) Roxb., Pl. Coromandel **2**: 54, t. 198 (1805). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 168 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 47 (2000). A deciduous tree about 30 m tall. Leaves petiolate, 10-14 cm long, oblong, ovate or obtuse, somewhat cordate at base. Cream flowers in lax spiked panicles. Fruits winged. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Barro' (N, G, M); **Voucher specimen:** BM 0074, Shankar Pokhari, 1157 m asl., (Photo Plate 9F); **Fls.–Frts.:** April-December; **Distrib.:** Throughout Nepal at 800-1200 m, India, Sri-Lanka, Bhutan and China; **Ecology:** Usually found in *Shorea robusta* forests.

Medicinal use: Fruits juice, about 3 teaspoonfuls twice a day for 4-5 consecutive days, is given to treat stomach disorder (*Magar*). Roasted seeds are chewed to get rid of cough and cold (*Gurung*). Powder of the dry fruits mixed with powder of *Centella asiatica* in equal proportion is made into tablets/pills. 2 tablets twice a day is given in case of malarial fever and tonsillitis (*Magar*). A glass of infusion obtained from fresh fruits (overnight in water) is taken every morning to maintain blood pressure (*Magar*). It is also use to wash eyes to get relieve from eye problems. **Other use:** Wood is used to make furniture and as a fuelwood. Fruits are edible and pickled (*Gurung* and *Magar*).

Terminalia chebula Retz., Obs. Bot. **5**: 31 (1789). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 168 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 47 (2000). A deciduous tree about 30 m tall. Leaves simple, petiolate, 6-17 cm long, 4-12 cm wide, oblong to ovate, acute, rounded or cordate at base. Flowers yellowish white, sessile in terminal spikes. Fruit ellipsoidal, thick hardened nut. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Harro' (N, M, Ma); **Voucher specimen:** BM 0383, Shivalaya, 861 m asl.; **Fls.–Frts.:** April-March; **Distrib.:** Throughout Nepal at 800-1100 m, India, Sri Lanka, Myanmar and Malaysia; **Ecology:** Open places or mixed in '*Shorea robusta*' forest.

Medicinal use: Dried stem bark is chewed to treat kidney problems and inflammation of tonsils. Paste of the roasted fruits is recommended as the remedy of piles (*Majhi*). Dried fruits powdered is mixed with equal amount of *Centella asiatica* and *Swertia chirayita* powder and made tablets (pills). About 2-3 tablets, once a day is recommended for a week, to cure fever, headache and tonsillitis (*Majhi* and *Magar*). The infusions of the fresh fruits (overnight in water) and infusion water is use to wash eyes to get relieve from eye problems (*Majhi*). **Other use:** Wood is used to make furniture and as a fuelwood. Fruits are edible and pickled.

MYRTACEAE

Cleistocalyx operculatus (Robx.) Merr. & Perry, J. Arnold Arbor. **18:** 337, t. 215, f. 41-48 (1937). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 168 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 202 (2000). A tree about 6-15 m tall. Leaves simple, opposite, pedtiolate, 5-18 cm long, 2-10 cm broad, broadly elliptic, obtusely acuminate, entire, glabrous. Flowers creamy white in cymes in axils of lower and fallen leaves. Fruits green, cup shaped.

Vernacular (Nepali) and Local Name: 'Kyamuno' (N), 'Kyamuna' (M, Ma), 'Kemna' (G); **Voucher specimen:** BM 0041, Pakhapani-Sarthan, 1245 m asl., (Photo Plate 9 G & H); **Fls.–Frts.:** May-August; **Distrib.:** Throughout Nepal at 800-1500m, Sri Lanka, India, Bangladesh and Malaysia; **Ecology:** Usually found in open places.

Medicinal use: Juice of young leaves, about 4 teaspoonfuls thrice a day for 5-7 consecutive days, is prescribed to cure bronchitis (*Majhi*). Stem bark juice is applied to treat muscular swelling of cattle caused by external injury. The dry leaves powdered is smoked to relieve sinusitis and cold (*Majhi* and *Magar*). **Other use:** Ripen fruits are eaten fresh. The stem bark, young leaves and fruits are used to make alcoholic beverage (all tribe).

Syzygium cumini (L.) Skeels., U.S. Dept. Agr., Bur. Pl. Industr., Bull. **248:** 25 (1912). Hara & Williams, Enum. Fl. Pl. Nep. **2:** 169 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 203 (2000). A tree about 20-30 m tall. Leaves simple, petiolate, 7.5-15 cm long, 3.8-8 cm wide, lanceolate, elliptic to oblong. Flowers creamy white in long trichotomous panicles. Fruit, juicy, one seeded, ovoid berry, dark purple in color. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Jamun' (N), 'Jamuna' (G), 'Jamunu' (M), 'Phandil' (Ma); **Voucher specimen:** BM 0371, Nagliwang, 1456 m asl.; **Fls.–Frts.:**

April-July; **Distrib.:** Throughout Nepal at 600-1500 m in open places, India, Bangladesh, Bhutan, Myanmar and Malaysia; **Ecology:** Commonly found in the mixed forest.

Medicinal use: Juice of the stem barks, about 3-5 teaspoonfuls twice a day for a week, is recommended to treat sore throat and asthma (*Magar* and *Majhi*). Same amount of juice, in dosages about 5 teaspoonfuls once a day for 15 days, is prescribed in bronchitis and ulcer (*Gurung*). **Other use:** The ripen fruits are eaten fresh and pickled. It is also used to make alcoholic beverage (*Magar* and *Majhi*). Leaves are lopped for fodder. Wood is used for construction of house and fuelwood purpose.

MELASTOMATACEAE

Melastoma normale D. Don., Prodr. Fl. Nepal. 220 (1825), as 'normalis'. Hara & Williams, Enum. Fl. Pl. Nep. 2: 170 (1979). Polunin & Stainton, Fl. Hima. 146 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 195 (2000). A shrub with branches densely shaggy. Leaves are subsessile, lanceolate, entire, acuminate, villous on both surfaces, three-veined. Flowers pinkish, clustered. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: 'Chulesi' (N), 'Kali angeri' (M); **Voucher specimen:** BM 0231, Banou, 1700 m asl.; **Fls.–Frts.:** June-December; **Distrib.:** Eastern and central Nepal at 900-1800 m, India, Bangladesh and Bhutan; **Ecology:** Occurs on shady places.

Medicinal use: Paste of the plant, about 2-3 teaspoonfuls with water, is given twice a day for a week to cure diarrhoea, dysentery as well as cough and cold (*Magar*). **Other use:** Ripe fruits are eaten fresh. The plant is used for fodder to goats and as firewood.

Osbeckia nepalensis Hook., Exot. Fl. 1(2): t. 31 (1822). Hara & Williams, Enum. Fl. Pl. Nep. 2: 170 (1979). Polunin & Stainton, Fl. Hima. 146 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 195 (2000). A shrub about 2 m tall. Leaves simple, sub-sessile, 2.8-12 cm long, oblanceolate. Flowers mauve-purple or white in dense branched clusters, corymb. Fruits capsule, with persistent scales. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Angaru' (N), 'Anger' (G), 'Kaliangeri' (M), 'Seto chulesi' (Ma); **Voucher specimen:** BM 0238, Bachchha, 1462 m asl.; **Fls.–Frts.:** April-December; **Distrib.:** Nepal at 500-2300 m, India, Bangladesh and Bhutan; **Ecology:** In damp places.

Medicinal use: Juice of young leaves, in dosages about 2-3 teaspoonfuls twice a day, is prescribed for a week to treat stomach problem (*Magar*). It is also applied externally to heal cuts and wounds (*Gurung*). **Other use:** Ripe fruits are eaten fresh. Leaves are lopped for fodder to goats (all tribes).

Osbeckia stellata Buch.-Ham. ex D. Don., Bot. Reg. **8**: t. 674 (1822). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 171 (1979). Polunin & Stainton, Fl. Hima. 146 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 195 (2000). A hairy shrub about 2 m tall. Leaves are stalked, lanceolate, five-veined, with short hairs on both surfaces. Flowers pink-purple. Fruit ovoid, the outside felted. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Angaru*' (N), '*Paglya jhar*' (G), '*Thulo chulesi*' (Ma); **Voucher specimen:** BM 0425, Pang, 1640 m asl., (Photo Plate 10A); **Fls.–Frts.:** July-December; **Distrib.:** Throughout Nepal at 800-2600 m, Pakistan, India, Bhutan and Bangladesh; **Ecology:** Commonly weed on dry and also in moist places.

Medicinal use: Roots juice, about 3-5 teaspoonfuls twice a day for a week, is prescribed to treat diarrhoea and dysentery (*Majhi*). A decoction of the leaves and bark is also given to domestic animals when they eat poisonous plants. Leaves juice is applied to treat scabies (*Gurung*). **Other use:** Ripe fruits are eaten fresh. The plant is looped as fodder to goats and sheep (*Gurung* and *Majhi*).

Oxyspora paniculata (D. Don) DC., Prodr. **3**: 123 (1828). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 171 (1979). Polunin & Stainton, Fl. Hima. 146 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 195 (2000). A shrub about 3 m tall. Leaves stalked, ovate, acute, crenate, base, round. Flowers small, deep pink. Fruit a capsule, elliptic with truncate end. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Angerig*' (N), '*Bakhra kane*' (M); **Voucher specimen:** BM 0245, Salija, 1679 m asl., (Photo Plate 10B); **Fls.–Frts.:** September-December; **Distrib.:** Eastern to Central Nepal at 1200-2000 m, India, Bhutan, Bangladesh and Myanmar; **Ecology:** Found in moist places.

Medicinal use: Young leaves juice, in dosages about 4-5 teaspoonfuls twice a day for 5 days, is recommended to cure diarrhoea and dysentery (*Magar*). **Other use:** Ripe fruits are eaten fresh. Soft stem after removing barks is eaten. Leaves are lopped for fodder.

LYTHRACEAE

Lagerstroemia indica L., Syst. Nat. ed. 10, 2:1076 (1759). Hara & Williams, Enum. Fl. Pl. Nep. 2:172 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep.191 (2000). Shrub, deciduous. Leaves petiolate, 2.5-5 cm long, 1-2 cm wide, oblong. Flowers white or pinkish purple in terminal apex. Fruit, capsule. Propagated by cuttings.

Vernacular (Nepali) and Local Name: '*Asare phul*' (N, G, M, Ma); **Voucher specimen:** BM 0274, Bhoksing, 1457 m asl.; **Fls.-Frts.:** March-September; **Distrib.:** Nepal to about 1500 m, India, Pakistan, Bangladesh and Burma; **Ecology:** Usually planted in gardens and lawns.

Medicinal use: Paste of the flowers is applied on cuts and wounds (*Gurung*). **Other use:** Women use fresh flowers as ornaments to decorate their head (all tribes).

Woodfordia fruticosa (L.) Kurz., J. As. S. Bengal 40 (2): 56 (1871). Hara & Williams, Enum. Fl. Pl. Nep. 2: 173 (1979). Polunin & Stainton, Fl. Hima.147 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.191 (2000). Shrub, straggling, spreading, around 1-3 m tall with drooping branches. Leaves simple, sessile, 5-12 cm long, 1.5-4 cm wide, oblong to lanceolate, apex acuminate. Flowers short stalked scarlet or brilliant red in axillary cymes. Fruit capsules, ovoid, included in persistent calyx, many seeded. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Dhairo*' (N), '*Dhanyar*' (G), '*Dhainra*' (M), '*Dhauri*' (Ma); **Voucher specimen:** BM 0399, Pakhapani-Sarthan, 1250 m asl., (Photo Plate 10C); **Fls.-Frts.:** March-September; **Distrib.:** Throughout Nepal at 800-2000 m, India and Bhutan; **Ecology:** Occurs in open and dry places.

Medicinal use: Dried powder of flowers, in dosages about 3-4 teaspoonsfuls twice a day for 5 days, is recommended with water to cure dysentery and diarrhoea (*Majhi* and *Magar*). A decoction of the flowers is applied to treat swelling. Juice of the flowers, about 5 teaspoonfuls thrice a day for 3 days, is administered to cure fever. Bark of the stem is chewed to treat cysts on the tongue (*Gurung* and *Magar*). **Other use:** The dried flowers are mixed with '*Marcha*' yeast and boiled it to make homemade alcoholic beverage. Leaves are lopped for fodder to cattle (all tribes).

SONNERATIACEAE

Duabanga grandiflora (Roxb. ex DC.) Walp., Repert. 2: 114 (1843). Hara & Williams,

Enum. Fl. Pl. Nep.2: 173 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 304 (2000). Tree about 35 m tall. Leaves stalked, 8.5-24.5 cm long, 4-11.5 cm wide, broadly lanceolate, entire, glabrous, tip rounded, base cordate. Flowers white. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kadam', 'Lampate', 'Madane' (N, G), 'Panisaj' (Ma); **Voucher specimen:** BM 0261, Deupurkot, 921m asl., (Photo Plate 10D); **Fls.–Frts.:** December-August; **Distrib.:** Nepal at 1000 m, Bhutan, India, Tibet, China and Southeast Asia; **Ecology:** Found on slopes of river banks.

Medicinal use: An infusion of the leaves, 5-6 teaspoonfuls twice a day is prescribed, to stop regular passing of urine and used to prevent fever (*Gurung*). Juice of the fruits is spread on ponds and swampy places as a larvicide (*Majhi*). Paste of the stem barks is applied on skin diseases and eczema. **Other use:** The plant is grown as a hedgerow (biofencing). The plant is also used as firewood and timber.

CUCURBITACEAE

Benincasa hispida (Thunb.) Cogn., Monogr. Phan. 3:513 (1881). Herb, large trailing climber, bifid tendrils. Leaves simple, petiolate, 10-15 cm wide, 5-7 lobed, base cordate. Flowers yellow, unsexual, male peduncle 7.5-10 cm long, female peduncle shorter in comparison. Fruit large with waxy bloom, broadly cylindrical, 30-45 cm long. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kubhindo' (N), 'Bomosyo' (M), 'Unsyne' (G), 'Kuminda' (Ma); **Voucher specimen:** BM 0446, Bihadi Ranipani, 1190 m asl.; **Fls.–Frts.:** July-November; **Distrib.:** Nepal to about 1400 m, India, Pakistan, Bangladesh and Burma; **Ecology:** Occurs on sandy soils.

Medicinal use: Fruits are used as tonic and also promotes secretion of urine. Fruits juice is antidote in alcohol poisoning. It is also useful in case of epilepsy and nervous diseases. Ashes of the burnt rind of fruits is applied on external painful wounds (*Majhi*). A decoction of seeds, in dosages about 7-8 teaspoonfuls twice a day for a week, is administered as expectorant in the expulsion of lung discharge and cough (*Magar*). The seeds are effective as worm expellant from human intestine (*Magar* and *Majhi*). Leaves juice, in dosages about 5-10 teaspoonfuls for a week, is administered in case of heart diseases, tuberculosis and colic pain. **Other use:** Tender fruits are eaten raw or cooked as a vegetable and used in preparation of various curries. It is also pickled and preserved which has a juicy texture with a mild flavor. Young leaves and buds are steamed and

eaten as vegetables or added to give flavour to soups. Seeds are known to be rich in oil, protein and are cooked (all tribe).

Coccinia grandis (L.) Voigt, Hort. Suburb. Calcutt. 59 (1845). Hara & Williams, Enum. Fl. Pl. Nep. 2: 177 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 84 (2000). A climbing herb. Leaves stalked, alternate, 4-4.5 cm long, 5-5.5 cm wide, generally five-lobed, glandular, margin irregular, base cordate. Flowers stalked, axillary, white. Fruit oblong, red when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Golkankri' (N, M, G), 'Tilkot, Tilkuti' (Ma); **Voucher specimen:** BM, 0135, Kurgu, 1321 m asl., (Photo Plate 10E); **Fls.–Frts.:** July–December; **Distrib.:** Throughout Nepal at 500-2000 m, India, Bhutan and Pakistan; **Ecology:** Usually found in moist and neglected places, especially on hedges.

Medicinal use: A decoction of the plant juice, in dosages about 5 teaspoonfuls twice a day for 15 days, is prescribed to treat diabetes. Plant juice, 2-3 drops is dripped in the eye for a week, to cure eye diseases (*Gurung and Magar*). **Other use:** Tender leaves are used as fodder. Ripe fruits are eaten fresh (all tribes).

Herpetospermum pedunculatum (Ser.) Baill., Hist. Pl. 8: 445 (1886). Hara & Williams, Enum. Fl. Pl. Nep. 2: 179 (1979). Polunin & Stainton, Fl. Hima. 151 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 85 (2000). Weak climber with bifid tendrils. Leaves ovate to cordate, acuminate, caudate, and crenulate to dentate, sparsely pilose. Flowers yellow, the calyx hairy. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kurkure jungalee karelo', 'Kankro' (N, M); **Voucher specimen:** BM 0453, Saliya, 1850 m asl., (Photo Plate 10F,G); **Fls.–Frts.:** July–October; **Distrib.:** Throughout the Nepal at 1000-3000 m, Afghanistan, India, Ceylon, Burma, Indo-China and Malasia; **Ecology:** Commonly found in shady and cool place. **Medicinal use:** Pounded roots, in dosages about 6-7 teaspoonfuls thrice a day, is recommended to treat the troubles of the bile duct (*Magar*). **Other use:** Fried seeds are edible and pickled.

Solena amplexicaulis (Lam.) Gandhi., Fl. Hassan Dist. 179 (1976). A climbing herb with simple tendrils leaves variable, cordate at base, lobed scabrid with minute glands. Leaves 5-6 cm long, oval but of variable shapes. Flowers tiny may be less than 1 cm. An axillary often in a

cluster of 3-4 flowers. Tendrils present, flowers small white or yellowish in colour. Fruit oblong or ovoid, 20-25 mm long. Propagated by seeds and vines.

Vernacular (Nepali) and Local Name: 'Ban kankro' (N), 'Bankankari' (M); **Voucher specimen:** BM 0320, Pangrang, 1745 m asl.; **Fls.-Frts.:** August-October; **Distrib.:** Nepal at 2100 m, India and tropical Asia; **Ecology:** Found in shady and moist places.

Medicinal use: A decoction of the roots, in dosages about 4 teaspoonfuls thrice a day for five consecutive days, is given to administer menstrual disorder. 2-3 drops of roots extract poured in ear to cure earache (*Magar*). **Other use:** Fruits are eaten fresh. The whole plant is used for fodder to cattle.

Trichosanthes tricuspidata Lour., Fl. Cochinch. 589 (1970). Hara & Williams, Enum. Fl. Pl. Nep. 2: 180 (1979). Polunin & Stainton, Fl. Hima. 151 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 86 (2000). A herbaceous, invasive annual climber with branched tendrils. Leaves are stalked, 5-20 cm long, deeply 3-7 lobed, cordate. Flowers white, petals conspicuously long fringed. Fruit globose, orange striped. Seeds embedded in dark green pulp.

Vernacular (Nepali) and Local Name: 'Yameri', 'Indreni' (N, M); **Voucher specimen:** BM 0048, Lekhfant, 1800 m asl., (Photo Plate 11A); **Fls.-Frts.:** July-December; **Distrib.:** Throughout Nepal at 1000-2000 m, India, Sri Lanka and Bhutan; **Ecology:** Found mixed with *Alnus* forest.

Medicinal use: Roots juice, in dosages about 3-4 teaspoonfuls twice a day for a week, is prescribed to treat cough and cold. A decoction of the plant, about 5 teaspoonfuls once a day, is given to relieve chest pain. Sap of the fruits is applied to cure swelling, cuts and boils. Fruits are eaten raw to cure constipation (*Magar*). **Other use:** Ripen fruits are eaten fresh. Plant is used for fodder.

BEGONIACEAE

Begonia picta Smith., Exot. Bot. 2: 81, t. 101 (1805). Hara & Williams, Enum. Fl. Pl. Nep. 2: 182 (1979). Polunin & Stainton, Fl. Hima. 152 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 25 (2000). A herb 10-32 cm tall. Stem slender, weak, nearly erect, pubescent. Leaves alternate, petiole, 4-12 cm long. Flowers pedicellate, pedicel 2-3 cm long, pubescent, bracts up to 2 cm long, oblong-lanceolate, persistent, hairy, laciniate, unisexual monoecious, 2.5-3.5 cm in diameter, pink.

Vernacular (Nepali) and Local Name: 'Magarkanche' (N), 'Magarkanchuli' (M), 'Kyuro' (G); **Voucher specimen:** BM 0286, Lespar, 2290 m asl., (Photo Plate 11B); **Fls.–Frts.:** April-December; **Distrib.:** Eastern and central Himalaya of Nepal at 1000-2700 m, Bhutan and India; **Ecology:** Occurs on moist and shady rocky slope.

Medicinal use: Plant juice, about 4 teaspoonfuls thrice a day, is given to relive headache. Leaves are crushed and paste is applied to cure sore nipples (*Magar*). Juice of the roots, in dosages about 6 teaspoonfuls thrice a day for a week, is administered to cure peptic ulcer (*Gurung*). Same juice, about 2 drops twice a day for a week is dripped to treat conjunctivitis (*Magar*). **Other use:** The plant is also squeezed and mixed with vegetable for its colors and flavor (*Gurung* and *Magar*).

APIACEAE

Angelica archangelica L., Sp. Pl. 250 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 184 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 311 (2000). A biennial plant, leaves are composed of numerous small leaflets, divided into three principal groups, each of which is again subdivided into three lesser groups. The edges of the leaflets are finely toothed or serrated. Flowers small and numerous, yellowish or greenish in colour, are grouped into large, globular umbels, which bear pale yellow, oblong fruits.

Vernacular (Nepali) and Local Name: 'Gundang' (N, M); **Voucher specimen:** BM 0384, Sirpu-Lespar, 2830 m asl.; **Fls.–Frts.:** July-September; **Distrib.:** Nepal at 2850 m, India, China and Bhutan; **Ecology:** Growing in shady edge, damp soil, preferably near rivers or deposits of water.

Medicinal use: A decoction of the leaves, in dosages about 5-6 teaspoonful thrice a day for 7-10 consecutive days, is recommended to cure abdominal pain, indigestion and hypertension (*Magar*). **Other use:** The plant is used in preparation of manure.

Centella asiatica (L.) Urb., Fl. Bras. (Martius) 11: 287, t. 78 (1879). Hara & Williams, Enum. Fl. Pl. Nep. 2: 185 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 312 (2000). A prostrate herb with trailing stem, roots arising from nodes, leaves simple, petiolate, 1-1.5 cm long, 1-3 cm wide, reniform or orbicular. Flowers minute, pinkish red in umbel. Fruit oblong, curved, brownish. Propagated by nodal rootings of prostrate stem.

Vernacular (Nepali) and Local Name: 'Ghortapre' (N, M), 'Tapre jhar' (M), 'Jasundo', 'Lemsyu' (G), 'Topre Jhar' (Ma); **Voucher specimen:** BM 0396, Banou,

1900 m asl., (Photo Plate 11C); **Fls.–Frts.:** March–October; **Distrib.:** Throughout Nepal at 1000–2500 m, Pakistan, India, Bhutan, Bangladesh and Sri Lanka; **Ecology:** Mostly found on sunny or slightly shaded damp localities, also along the stream banks.

Medicinal use: The juice obtained from crushing the whole plant, in dosages about 4–6 teaspoonfuls thrice a day for a week, is given to cure fever, indigestion, uric acid and dysentery (all tribes). It is also recommended for the children to enhance memory power. The same leaves juice is useful to cure skin diseases, hypertension and jaundice (*Magar*). Paste of the plant is applied to relieve muscular swelling and joint pains. **Other use:** The whole plant is cooked as vegetables and made pickle (all tribes).

Eryngium foetidum L., Sp. Pl. 232 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 186 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 313 (2000). Herb with all basal leaves, 2–16 cm long, 1–3.5 cm wide, lanceolate, serrate, glabrous, tips rounded, each ending in a spine. Flowers yellowish. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Bandhaniya*’, ‘*Brahmdhaniya*’ (N, M, G, Ma); **Voucher specimen:** BM 0033, Pakhapani–Sarthan, 1275 m asl., (Photo Plate 11D); **Fls.–Frts.:** April–December; **Distrib.:** Nepal at 700–1300 m, India and China; **Ecology:** In open rocky places and also widespread in the tropics.

Medicinal use: Leaves juice, in dosages about 5–6 teaspoonsfuls twice a day for a month, is administered (women) during infertility complication (*Majhi* and *Magar*). Same juice, about 1–2 drops for a week, is applied to relieve earache. It is also use to get rid of inflammation and burns (*Gurung* and *Magar*). **Other use:** Leaves are used to make ‘*chutney*’ and used as a spice to flavour the meat (all tribes).

Hydrocotyle nepalensis Hook., Exot. Fl. 1: t. 30 (1823). Hara & Williams, Enum. Fl. Pl. Nep. 2: 186 (1979). Prostrate herb with leaves stalked, 1.5–3 cm long, 2.5–6.5 cm wide, lobed, cordate, crenate. Flowers greenish in many-flowered umbels. Fruit an achene, compressed. Propagated by nodal rootings.

Vernacular (Nepali) and Local Name: ‘*Kukur paille*’, ‘*Jhar timur*’ (N, M), ‘*Pelnti*’ (G); **Voucher specimen:** BM 0530, Lespar, 2020 m asl.; **Fls.–Frts.:** July–November; **Distrib.:** Nepal at 1000–2700 m, India, Bhutan, Tibet and Myanmar; **Ecology:** Throughout Nepal in shady places.

Medicinal use: Juice of the leaves, in dosages about 4–5 teaspoonfuls twice a day for a week, is administered in case of fever, cough, cold and boils (*Magar*). This juice is added

in water to bath children suffering from fever (*Gurung* and *Magar*). **Other use:** The plant is used for fodder to cattle.

ADOXACEAE

Sambucus adnata Wall. ex DC., Prodr. 4: 322 (1830). Hara & Williams, Enum. Fl. Pl. Nep. 2: 197 (1979). Polunin & Stainton, Fl. Hima. 169 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 284 (2000). Shurb about 3 m tall. Leaves stalked odd-pinnate, leaflets short-stalked, oblong to lanceolate, acuminate, serrate and puberulent. Flowers white in spreading terminal corymbus. Propagated by cuttings.

Vernacular (Nepali) and Local Name: 'Mayakot', 'Moti phul' (N, G); **Voucher specimen:** BM 0434, Bihadi Ranipani, 1910 m asl., (Photo Plate 11E); **Fls.–Frts.:** May–September; **Distrib.:** Nepal 1500–3700 m, Northern India, Bhutan, southern Tibet and Western China; **Ecology:** In open places.

Medicinal use: Leaves and fruits juice, in dosages about 5–6 teaspoonfuls twice a day for a week, is recommended to relieve fever (*Gurung*). **Other use:** Young shoots and leaves are cooked as vegetables. Ripen fruits are eaten fresh.

Sambucus canadensis L., Sp. Pl. 269 (1753), sensu lato. Hara in Fl. E. Him. 319 (166). Polunin & Stainton, Fl. Hima. 170 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 284 (2000). A shrub about 4m height with smooth young branches and with leaves usually with 7 oval slender-pointed, sharply-toothed, bright green leaflets which are slightly downy beneath. Leaflets, 5–15 cm, the lowest leaflets often lobed. Flowers white, in a domed cluster 10–20 cm across. Fruit black-purple.

Vernacular (Nepali) and Local Name: 'Kanike phool' (N, M); **Voucher specimen:** BM 0067, Kyang, 1890 m asl.; **Fls.–Frts.:** May–September; **Distrib.:** Nepal at 1000–2050 m, India and America; **Ecology:** Very commonly cultivated areas in the Himalaya.

Medicinal use: Fruits and flowers juice, in dosages about 5 teaspoonfuls thrice a day, is recommended for a week to treat fever and measles (*Magar*). **Other use:** The plant is used in green manure (*Magar*). It is also used in biofencing.

Sambucus hookeri Rehder in Sarg., Pl. Wilson 1: 308 (1913). Hara & Williams, Enum. Fl. Pl. Nep. 2: 197 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 284 (2000). A small seized tree or shrub around 2–4 m tall. Leaves imparipinnate, upto 15 cm long, leaflets 5–7 cm long, 1.5–2.5

cm wide, oblong-lanceolate, apex acuminate. Flowers numerous, minute, pedicellate, white in large corymb. Fruit drupe, small globose, 0.3 cm in diameter, black. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Kanikephool*' (N, M, Ma); **Voucher specimen:** BM 0247, Shivalaya, 789 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Nepal at 500-1600 m, India, Bhutan and China; **Ecology:** Grows on moist and open places.

Medicinal use: Flowers juice, about 4-6 teaspoonfuls twice a day for five days, is prescribed to treat fever, cold and sore throat (*Majhi*). Bark juice is given to cure epilepsy (*Magar*). **Other use:** Flowers are used in ceremonies (*Magar & Majhi*). Leaves are used as fodder to goats and rabbits.

Viburnum erubescens var. erubescens Wall. ex DC., Prodr. 4: 329 (1830). Hara & Williams, Enum. Fl. Pl. Nep. 2: 98 (1979). Polunin & Stainton, Fl. Hima. 170 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 284 (2000). A Shrub or small trees, deciduous to 6 m tall. Bark light brown. Branchlets of current year stellate-pubescent or glabrous. Flowers white or pinkish. Fruits a drup, ellipsoidal, red. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: '*Ashaare*', '*ganmane*' (N), '*Nageko*' (G), '*Chhyonde*', '*Nhaargaa*' (M); **Voucher specimen:** BM 0031, Saliya, 1928 m asl., (Photo Plate 11F); **Fls.-Frts.:** April-July; **Distrib.:** Nepal Himalaya at 1500-3200 m India, Bhutan, Myanmar and China; **Ecology:** Forests and shrubberies.

Medicinal use: A decoction of the stem barks, about 3-4 teaspoonfuls once a day for a week, is recommended to cure respiratory diseases (*Gurung* and *Magar*). **Other use:** Ripen fruits are edible and sold in the local market. Leaves are lopped for fodder to cattle (*Magar*).

RUBIACEAE

Anthocephalus cadamba (Roxb.) Miq., Fl. Ind. Bat. 2:135 (1856). Hara & Williams, Enum. Fl. Pl. Nep. 2: 199 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 272 (2000). Tree, around 15-20 m tall. Leaves simple, petiolate, 7-15 cm long, 5-9 cm wide, elliptical to oblong. Flowers condensed in terminal, solitary heads, creamish. Propagated by seeds or shoot cuttings.

Vernacular (Nepali) and Local Name: '*Kadam*' (N, G, M, Ma); **Voucher specimen:** BM 0195, Saligram, 900 m asl.; **Fls.-Frts.:** June-October; **Distrib.:** Nepal to about 1000 m, India, Sri Lanka and China; **Ecology:** Along banks of rivers and streams in evergreen forests, also in the plains.

Medicinal use: Pounded bark, in dosages about 5-6 teaspoonfuls twice a day for a week, is administered in preventing exudation of wounds and used as antipyretic. Same juice is used as a tonic (*Majhi*). A decoction of the leaves can be used in gargling during throat infection. A decoction drained from boiled flower heads, in dosages about 4 teaspoonfuls twice a day, is used in the treatment of diarrhoea and dysentery (*Gurung* and *Magar*). **Other use:** Fruits are edible. Flower heads are eaten raw or pickled. Timber is used as ceiling beams in houses and for light constructions. It is also the religious plants use to worship, especially for *Hindus* (all tribes). The fresh leaves are fed to cattle.

Galium aparine L., Sp. Pl. 108 (1753) var. **aparine**. Hara & Williams, Enum. Fl. Pl. Nep. 2: 200 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 273 (2000). A climbing herb. Stem scabrid with reflexed hairs, otherwise glabrous. Leaves 6-8 in whorl, sessile, 1-1.5 cm long, linear obovate-oblong, mucronate, gradually narrowed at base, scabrid on margins and midrib beneath. Flowers dirty white in axillary and terminal leafy panicles. Fruit clothed with hooked bristles.

Vernacular (Nepali) and Local Name: '*Kangre jhar*' (N, M); **Voucher specimen:** BM 0198, Majhphant Mallaj, 1871 m asl.; **Fls.–Frts.:** March–November; **Distrib.:** Central and west of Nepal about 2500 m, Europe and Central Asia; **Ecology:** Occurs on shady places.

Medicinal use: Plant juice is applied to cuts and wounds. This juice, in dosages about 4-5 teaspoonfuls once a day for 5 days, is given in case of indigestion (*Magar*). **Other use:** The plant is used to make manure.

Galium mollugo L., Sp. Pl. 1: 107 (1753). A perennial herb is 2-5 cm long, unbranched, except near the inflorescence, lower stem is often decumbent along the ground, upper stem and inflorescence are more or less erect. In the absence of support from adjacent vegetation, this plant has a tendency to sprawl. The central stem is glabrous, 4-angled, and often furrowed; it becomes slightly swollen where the whorls of leaves occur. Each whorl has 6-8 leaves. It is oblong or oblanceolate, glabrous, and smooth along its margin; sometimes this margin is slightly ciliate.

Vernacular (Nepali) and Local Name: '*Kangre jhar*', '*Lute jhar*' (N, M); **Voucher specimen:** BM 0126, Lekhphant, 1698 m asl.; **Fls.–Frts.:** January–November; **Distrib.:** Nepal at 1700 m, Europe, North Africa, Temperate Asia; **Ecology:** Areas along roadsides, thickets, woodland borders, and various waste places.

Medicinal use: A decoction of plant, in dosages about 5-7 teaspoonfuls twice a day, is administered as a nerve relaxant. The same decoction, in dosages about 3 teaspoonfuls once a day for a week, is given to the children and adults to cure scurvy which is caused by a lack of vitamin 'C' (ascorbic acid). Same decoction is used to get rid of skin complaints (*Magar*). **Other use:** The plant is used as fodder to goats and sheep.

Luculia gratissima (Wall.) Sweet., Br. Fl. 2: t. 145 (1826). Hara & Williams, Enum. Fl. Pl. Nep. 2: 204 (1979). Polunin & Stainton, Fl. Hima. 172 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 276 (2000). A beautiful semi-evergreen shrub about 2-5 m tall. Leaves stalked, 5-18 cm long, 1.5 cm wide, elliptic to lanceolate, acuminate, glabrous, pubescent beneath on the veins, narrowed towards the base of the petiole. Flowers short-stalked, pink in many-flowered terminal corymbs. Fruit a capsule, narrowly obovoid, pubescent. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Bankangiyo*' (N), '*Kyonsin*' (G); **Voucher specimen:** BM 0255, Bhangara, 1543 m asl., (Photo Plate 11G); **Fls.-Frts.:** September-December; **Distrib.:** Central Nepal at 1000-1800 m, India, Bhutan, Tibet, Bangladesh and Sri Lanka; **Ecology:** On dry as well as on shady places.

Medicinal use: Roots juice, about 3-4 teaspoonfuls twice a day for three days, is administered to treat headache. Leaves juice is applied to cure fresh cuts and wounds. Fruits juice, in dosages about 3-5 teaspoonfuls thrice a day, is recommended to cure human digestive disorder (*Gurung*). **Other use:** Flowers are used to worship in the temple (*Gurung*).

Mussaenda frondosa L., Sp. Pl. 177 (1753). Hara & Williams, Enum. Fl. Pl. Nep. 2: 204 (1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 276 (2000). Straggling shrub about 3 m tall. Leaves stalked, 7-13 cm long, broadly elliptic, cuspidate, more or less pubescent above, pubescent on veins beneath. Flowers orange or yellowish in terminal cymes. Fruit a berry, subglobose.

Vernacular (Nepali) and Local Name: '*Asari*' (N, M); **Voucher specimen:** BM 0282, Bajung, 1154 m asl.; **Fls.-Frts.:** June-December; **Distrib.:** Nepal at 1200 m altitude, India and Sri Lanka; **Ecology:** Found on shady places.

Medicinal use: Juice of the roots is applied to treat blemishes on the tongue. 5 teaspoonfuls of the same juice mixed with half teaspoonful of cow's urine is given thrice a day for a week to treat jaundice. Barks juice, about 5-6 teaspoonfuls twice a day for five days, is given in case of body ache, diarrhoea, and dysentery. Flowers are diuretic

and its juice is given in case of cough (*Magar*). **Other use:** Cultivated in gardens for ornamental purpose.

Neanotis ingrata (Wall. ex Hook. f.) W.H. Lewis., Ann. Miss. Bot. Gard. **53**: 39 (1966). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 205(1979). Press *et al.*, Ann. Check. Fl. Pl. Nep. 277 (2000). A glabrous herb or pubescent at the nodes. Leaves 1.5-3.5 cm long and 0.7-1.5 cm broad, short-petioled, ovate-lanceolate, acuminate, entire, sparsely hairy on both surfaces, stipules long, bristly, petioles 0.2-0.5 cm long. Flowers white in terminal and sub-terminal cymes. Flowers heads 0.5 cm in diameter.

Vernacular (Nepali) and Local Name: '*Pani ghans*' (N, Ma); **Voucher specimen:** BM 0292, Nagliwang, 1978 m asl.; **Fls.–Frts.:** September-November; **Distrib.:** East and central Nepal at 1500-2700 m, India, Tibet and Western China; **Ecology:** Grows on shady places and in water.

Medicinal use: Dried powder of the plant mixed with leaves powder of *Ziziphus mauritiana* is heated in water, and the liquid is applied for 15 days daily to cure toothache, scorpion and insect bites (*Majhi*). **Other use:** It is believed that if it is kept in house, it protects from witch and devils (*Majhi*).

Neohymenopogon parasiticus (Wall.) Bennet., Indian Forester **107(7)**: 436 (1981). Deciduous tree about 5 m tall. Leaves stalked, crowded towards the ends of branches, 4.5-21 cm long, 2-8 cm wide, ovate or elliptic, acute, pubescent on both surfaces. Flowers white in terminal trichotomous corymbs. Fruit capsule, turbinate. Propagated by seeds or by planting stump.

Vernacular (Nepali) and Local Name: '*Banbiri*', '*Bangaja*' (N, M); **Voucher specimen:** BM 0486, Salija, 1827 m asl.; **Fls.–Frts.:** May-October; **Distrib.:** Nepal at the height of 1600-2500 m, India, Bhutan and Western China; **Ecology:** Found on mossy rocks.

Medicinal use: Paste of the fruits is applied to treat toothache (*Magar*). **Other use:** Wood is used to make agricultural tools and for domestic purpose.

Rubia manjith Roxb. ex Flem., Asiat. Res. **11**: 177 (1810). Hara & Williams, Enum. Fl. Pl. Nep. **2**: 207 (1979). Polunin & Stainton, Fl. Hima. 176 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 278 (2000). A trailing herb, stems and branches four angled, minutely prickly. Leaves

stalked, ovate to cordate, long-pointed, basal veins prominent. Flowers dark red. Fruit globose, succulent. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Majitho*' (N, M, Ma), '*Tiro lahara*' (G);

Voucher specimen: BM 0402, Deupurkot, 1781 m asl., (Photo Plate 11H); **Fls.-Frts.:**

June-December; **Disrtib.:** Throughout Nepal at 1000-2300 m, Bhutan, Sri Lanka, Bangladesh and India; **Ecology:** Commonly found in sunny as well as on shady places.

Medicinal use: Leaves juice, in dosages about 5 teaspoonfuls thrice a day for a week, is given to treat urinary problem and especially to remove stone from the kidney (all tribes).

Paste of the stem is applied to cure scorpion bites (*Majhi*). **Other use:** The roots and stems are used to make reddish dye. It is also used as clambing haged plant in the nearby cattle house (all tribes).

VALERIANACEAE

Valeriana hardwickii Wall., Fl. Ind. (Roxb.) 1: 166 (1820). Hara & Williams, Enum. Fl. Pl. Nep. 2: 209 (1979). Polunin & Stainton, Fl. Hima. 177 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 323 (2000). Herb about 1.5 cm tall. Basal leaves long-stalked, cauline leaves opposite, odd-pinnate, leaflets 1-10 cm long, 0.3-4.5 cm wide, oblong to lanceolate, terminal segment largest. Flowers small, white, in compound corymbs. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Nakkali jatamansi*' (N), '*Jaatamai*' (M);

Voucher specimen: BM 0289, Kyang, 1977 m asl.; **Fls.-Frts.:** June-November;

Distrib.: Throughout Nepal at 1000-3500 m, Northern India, Bhutan, China and Myanmar; **Ecology:** In moist and shady places.

Medicinal use: A decoction of the roots, in dosages about 4-5 teaspoonfuls thrice a day for two weeks, is used to cure rheumatism and low blood pressure. A same dose is administered as nerve tonic, and to cure epilepsy and hysteria (*Magar*). **Other use:** The plant contains essential oils.

Valeriana jatamansii Jones, Asiat. Res. 2: 405, f. & 416 (1790). Hara & Williams, Enum. Fl. Pl. Nep. 2: 209 (1979). Polunin & Stainton, Fl. Hima. 177 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 323 (2000). A herb about 50 cm tall. Root stock is thick, horizontal, aromatic and nodular. Basal leaves ovate-heart shaped acute blade, 3-8 cm and toothed or wavy margined, long stalked; stem leaves few, small entire or pinnate lobed. Flowers whitish, pink tinged, in

terminal clusters, brone on erect nearly leafless stem. Fruits small with persistent pappus like calyx.

Vernacular (Nepali) and Local Name: ‘*Sugandhawal*’ (N), ‘*Poti*’ (G), ‘*Samaya*’ (M);

Voucher specimen: BM 0241, Sirpu, 2998 m asl., (Photo Plate 11I); **Fls.–Frts.:** March-September; **Distrib.:** Nepal at 1300-3300 m, Northern India, Bhutan, China and Myanmar; **Ecology:** In shady places.

Medicinal use: Paste of the plant is applied to treat boils. Paste of the roots is used to treat pimples and rheumatism. Juice of the roots, about two drops daily for a week, is applied to relieve headache and is dripped in the eye to cure eye trouble (*Magar*). **Other use:** The plant is used in the preparation of traditional ink (*Gurung* and *Magar*).

ASTERACEAE

***Ageratum conyzoides* L.,** Sp. Pl. 839 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 9 (1982). Polunin & Stainton, Fl. Hima. 181 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 49 (2000). An annual erect herb about 80 cm tall. Leaves, simple, petiolate, 2-6 cm long, 1-3 cm wide, ovate, coarsely round, toothed, obtuse, base truncate. Flower heads pale bluish or white in terminal corymbs. Fruit angled black achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Ganaune ghans*’ (N), ‘*Angale no*’, ‘*Dalidare*’ (G), ‘*Gande*’ (M), ‘*Namche Jhar*’ (Ma); **Voucher specimen:** BM 0355, Bihadi Ranipani, 1230 m asl., (Photo Plate 12A); **Fls.–Frts.:** March-December; **Distrib.:** Nepal at 800-2200 m, India, Bhutan and Bangladesh; **Ecology:** Usually found in damp places.

Medicinal use: Paste of the roots, mixed with bark of ‘*Schima wallichii*’ is applied to treat dislocated bones (*Majhi*). Juice of the leaves is applied to stop the bleeding from nose, cuts, boils and wounds (all tribes). Paste of the leaves is used to remove thorns lodged from the feet. **Other use:** Plants are harvested for the fodder to cattle. The whole plant is grounded with the tender leaves of *Sapium insigne* and used to cure fish poisoning (*Majhi* and *Gurung*).

***Ageratum houstonianum* Miller,** Gard. Dict. ed. 8 (1768). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 9 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 49 (2000). An annual herb about 1.2 m tall. Leaves petioled, 4-9 cm long, 2-4 cm wide, ovate to oblongate, apex acute, base cordate or truncate. Floral heads bluish purple, in dense terminal corymbs. Fruit, black or brown achene, slightly hairy. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Ganaune ghans', 'Nilogandhe' (N, M, Ma);

Voucher specimen: BM 0328, Bhorle, 1271 m asl., (Photo Plate 12B); **Fls.-Frts.:** Most of the year; **Distrib.:** Eastern and central Nepal at 900-2000 m, India, Bhutan and Bangladesh; **Ecology:** Usually found in moist places.

Medicinal use: Juice of the plant is applied to treat fresh cuts and wounds. It is also used to stop the nose bleeding (*Magar* and *Majhi*). **Other use:** Whole plant is a source of fodder to the cattle. It is also used to make manure with cattle dung.

Anaphalis busua (Buch.-Ham. ex D. Don) DC., Prodr. **6:** 275 (1838). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 10 (1982). Polunin & Stainton, Fl. Hima. 187 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 49 (2000). Erect herb about 60 cm tall. Leaves sessile, crowded, 2-9 cm long, 0.2-0.8 cm wide, linear, one veined, cottony beneath, margin recurved, base decurrent. Flower heads white, numerous in terminal corymbs. Fruit an achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Buki phool' (N, M); **Voucher specimen:** BM 0324, Lekhfant, 1600 m asl.; **Fls.-Frts.:** August-September; **Distrib.:** Throughout Nepal at 1500-2900 m, also in northern India, Bhutan and Myanmar; **Ecology:** Found in open areas.

Medicinal use: Juice of the plant is applied to cure cuts and wounds. **Other use:** The flower heads is offered to gods and goddess (*Magar*).

Anaphalis contorta (D. Don) Hook. f., Fl. Brit. India **3(8):** 284 (1881) var. **contorta**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 10 (1982). Polunin & Stainton, Fl. Hima. 187 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 50 (2000). A herb about 30 cm tall. Leaves sessile, crowded, linear to oblong, acute, single veined. Flower heads white in a terminal corymb. Fruit an achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Buki phul' (N, M), 'Taptap', 'Napta' (G);

Voucher specimen: BM 0493, Kyang, 1790 m asl., (Photo Plate 12C); **Fls.-Frts.:** February-November; **Distrib.:** Nepal at 800-3000 m, India, Bhutan, China and Afghanistan; **Ecology:** Occurs on open places.

Medicinal use: Paste of the plant, in dosages about 4-5 teaspoonfuls twice a day for a week, is prescribed with water to treat cough and cold. Paste of roots is applied to cure cuts, wounds and boils (*Gurung* and *Magar*). **Other use:** The plant is considered as

important fodder to goats and sheep. It is also hung on the ceiling of a house to prevent cockroaches. It is also used to make brooms (*Magar* and *Gurung*).

Anaphalis margaritacea (L.) Benth. & Hook f., Gen. Pl.(Bentham & Hooker) **2:** 303 (1873). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 10 (1982). Polunin & Stainton, Fl. Hima. 187(1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 50 (2000). An erect herb, stem leafy and covered with white wool. Leaves alternate, up to 7 cm long, narrowly lanceolate, acute, 3-nerved, margin recurved, upper surface dark green, lower grey-tomentose. Heads numerous, sub-globose, white, up to 1 cm diameter in the terminal corymbs. Involucral bracts epillitic-ovate, obtuse, white, erect in flower. Achenes small, oblong.

Vernacular (Nepali) and Local Name: '*Buki phool*' (N, G); **Voucher specimen:** BM 0353, Chitre, 1920 m asl., (Photo Plate 12D); **Fls.-Frts.:** January-November; **Distrib.:** Nepal at 2200 m, India, Thai, Indo-China, China & Japan; **Ecology:** On open as well as shady place.

Medicinal use: Roots juice, in dosages about 5-6 teaspoonfuls twice a day is taken for a week to cure diarrhoea, toothache and indigestion. Paste of the plant is taken to treat cough and cold. Paste of roots is applied to cure cuts, wounds and boils. It is also hung on the ceiling of a house to prevent cockroaches (*Gurung*). **Other use:** The leaves are used to smoke for pleasure. It is also used to make brooms (*Gurung*).

Anaphalis triplinervis (Sims.) C. B. Clarke., Comp. Ind. 105 (1876). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 11 (1982). Polunin & Stainton, Fl. Hima. 186 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 50 (2000). An erect herb about 50 cm tall. Leaves 3-11 cm long, 0.6-3.5 cm wide, ovate, oblong or elliptic, acute, clasping the stem at their base, three-or five-veined, tipped with a small black point. Flower heads whitening in terminal corymbs. Fruit an achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Buki phool*' (N, G, Ma), '*Phajar*' (M); **Voucher specimen:** BM 0481, Banou, 2550 m asl., (Photo Plate 12E); **Fls.-Frts.:** August-December; **Distrib.:** Throughout Nepal at 1800-3300 m, Afghanistan, Northwestern Pakistan, India, Bhutan, Southern Tibet, China and Taiwan; **Ecology:** Generally in open spaces.

Medicinal use: Paste of flower heads is applied to treat cuts and wounds (*Magar* and *Gurung*). **Other use:** Flower heads are offered to gods and goddesses (all tribes).

Artemisia indica Willd., Sp. Pl. ed. 4, 3: 1846 (1804). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 12 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 51 (2000). Aromatic perennial shrub, around 2 m tall. Lower leaves petiolate, pinnatisect, ovate, upper leaves smaller, sessile, lanceolate, trifid. Flower heads yellowish in spicate paniced racemes. Fruit, minute achene. Propagated by seeds or root splittings.

Vernacular (Nepali) and Local Name: 'Titepati', (N, Ma), 'Chyonre', 'Chyonthe' (G), 'Pati' (M); **Voucher specimen:** BM 0435, Falamkhani, 1905 m asl., (Photo Plate 12F); **Fls.–Frts.:** August-December; **Distrib.:** Nepal at 500-2500 m, India, Sri Lanka, Myanmar, Thailand, Indonesia and Philippines; **Ecology:** In open places.

Medicinal use: Leaves and young shoots are applied externally to cure bleeding from the nose and wounds. Fresh juice of leaves, in dosages about 2 teaspoonfuls once a day for three days, is used to treat asthma, fever, headache and diarrhoea (*Majhi* and *Magar*). Leaves are rubbed externally to cure skin diseases (all tribes). **Other use:** Plant is used in various rituals. The whole plants are used as litter for animals to lie on, and to make manure (all tribes).

Aster diplostefioides (DC.) C.B. Clarke., Comp. Ind. 45 (1876). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 14 (1982). Polunin & Stainton, Fl. Hima. 183 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 52 (2000). An erect haired perennial herb. Leaves simple, alternate, oblanceolate to linear-lanceolate, narrowed to the base, 5-8 cm long. Flowers large solitary head, bluish in colour. It is propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kankhephool' (N, M); **Voucher specimen:** BM 0253, Majhphant Mallaj, 2300 m asl., (Photo Plate 12G); **Fls.–Frts.:** July-December; **Distrib.:** Nepal at 1700- 4200 m, India; **Ecology:** In open places.

Medicinal use: Juice of the flowers is used to treat back pain, chest pain, paralysis and wounds. Chapped leaves are applied as poultice on blisters caused by chickenpox (*Magar*). **Other use:** Plants are used as cattle fodder.

Bidens pilosa L., Sp. Pl. 832(1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 15 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 52 (2000). Herb around 1 m tall. Leaves petiolate, 3.5-10.5 cm long, trifoliate, leaflets lanceolate, acute. Flower heads, yellow or white. Fruit black achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kalokuro' (N, M), 'Borsotene', 'Lungepucha' (G), 'Lwange jhar' (Ma); **Voucher specimen:** BM 0087, Thulipokhari, 1300 m asl.;

Fls.–Frts.: April–November; **Distrib.:** Nepal at 600–1900 m, India; **Ecology:** Found in moist places.

Medicinal use: Plant juice is applied to cure fresh cuts and wounds (all tribes). **Other use:** Tender shoots are cooked as vegetables. The whole plants are given for fodder to goats and cattle (*Gurung* and *Magar*). The whole plant is also used to make manure (*Majhi*).

Cirsium verutum (D. Don) Spreng., Syst. Veg. **3:** 370 (1826). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 20 (1982). Polunin & Stainton, Fl. Hima. 209 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 55 (2000). A herb about 1 m tall. Basal leaves stalked, deeply lobed, teeth strongly spiny, glabrous, above, cotoy beneath, cauline leaves sessile, clasping the stem at their base, broader. Flowers heads pinkish.

Vernacular (Nepali) and Local Name: ‘*Dhode kanda*’, ‘*Thakailo*’ (N, G, Ma), ‘*Thakalkanda*’ (M); **Voucher specimen:** BM 0256, Bhuktangle, 1781 m asl., (Photo Plate 12H); **Fls.–Frts.:** July–December; **Distrib.:** Nepal at 750– 2250 m, Afghanistan, Pakistan, India, Bhutan and Myanmar; **Ecology:** Found in cultivated areas mostly in paddy fields, forest clearings and slopy forest margins.

Medicinal use: Juice of the roots, about 4–5 teaspoonfuls thrice a day for a week, is prescribed to relieve fever (*Majhi*). Fresh roots is chewed in case of nose bleeding. A paste of the roots, about 6–7 teaspoonfuls once a day for 3–4 days, is prescribed with water to cure stomach disorder. It is also applied externally to relieve abdominal pain (*Gurung*). **Other use:** Tender roots and stem are eaten fresh to cool the body. Whole plant is used to make green manure (all tribes).

Eupatorium adenophorum Spreng., Syst. Veg. **3:** 420 (1826). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 27 (1982). Polunin & Stainton, Fl. Hima. 181 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 59 (2000). An erect shrub. Leaves petiolate, 2–2.5 cm long, 1.5–4.5 cm wide, ovate, base narrowed. Flower heads whitish in terminal corymbs. Fruit, five angled, black achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Banmara*’ (N, M), ‘*Banmasa*’ (G), ‘*Sano banmara*’ (Ma); **Voucher specimen:** BM 0064, Pangrang, 1390 m asl.; **Fls.–Frts.:** March–October; **Distrib.:** Nepal at 500–2400 m, India, Bangladesh and Bhutan; **Ecology:** Occurs in open places.

Medicinal use: Roots juice, in dosages about 3-5 teaspoonfuls twice a day for three days, is given to cure fever (*Majhi*). A paste of the young leaves, is applied to cuts, wounds and boils (*Gurung* and *Magar*). **Other use:** Whole plant is used to make green manure and bio-briquette. It is also used for fodder to goats (all tribes).

Eupatorium odoratum L., Syst. Nat. ed. 10, 2: 1205 (1759). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 28 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 59 (2000). A shrub, pubescent, around 1.6 m tall. Leaves petiolate, 2-7.5 cm long, 0.5-2.8 cm wide, ovate to lanceolate. Purplish violet flowers in spreading panicles. Propagated by seeds.

VernacularName: 'Banmara', 'Banmasuwa' (N), 'Thulo Manmara' (Ma), 'Besibanmara' (M, G); **Voucher specimen:** BM 0361, Chitre, 1555 m asl., (Photo Plate 12I); **Fls.-Frts.:** July-December; **Distrib.:** Nepal at about 500-1700 m, India, Bhutan and Bangladesh; **Ecology:** Open and moist deforested places.

Medicinal use: Juice of the plant is used to treat cuts and wounds. Juice of roots, about 3 teaspoonfuls twice a day for a week, is administered to treat fever. Paste of the leaves is applied to cure boils (*Majhi*). **Other use:** Whole plant is used to make green manure and bio-briquette. It is also used for fodder to goats and cattle. The plant is grounded with the barks of *Schima wallichii* and used in fish poisoning (*Magar* and *Majhi*). It is also used as litter for animals to lie on (*Gurung*).

Galinsoga parviflora Cav., Icones. Descr. Pl. 3: 41, t. 281 (1795). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 28 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 59 (2000). An erect, glabrescent herb. Leaves simple, petiolate, 1.5-3.5 cm long, 0.5-1.5 cm wide, ovate to ovate-lanceolate, apex acuminate, base tapering. Flower heads 0.3-0.4 cm in diameter radiate on slender stalks, yellow. Fruit an achene, black, turbinate. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Gandhe jhar' (N, M); **Voucher specimen:** BM 0310, Nagliwang, 1600 m asl.; **Fls.-Frts:** May-October; **Distrib.:** Nepal upto 850-3000 m, India, Bhutan, Bangladesh, Sri Lanka and China; **Ecology:** Weedy on moist and wet places.

Medicinal use: Plant extract, in dosages about 5 teaspoonfuls twice a day for a week, is administered effectively as coagulant of blood. It is also applied externally on fresh cuts and wounds (*Magar*). **Other uses:** The whole plant is used to make green manure.

Gnaphalium affine D. Don, Prodr. Fl. Nep. 173 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 27 (1982). Polunin & Stainton, Fl. Hima. 185 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 60 (2000). A weedy herb with wooly stem. Leaves simple, lower leaves sessile, oblong-spathulate, apex obtuse, upper leaves lanceolate, apex acuminate. Flower heads golden yellow in dense corymbs. Fruit an achene, brown. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Buke phul*', '*Kairo Jhar*' (N, M, G); **Voucher specimen:** BM 0151, Majhphant Mallaj, 1587 m asl.; **Fls.-Frts:** February-November; **Distrib.:** Nepal to about 600-3600 m, India, Tibet, Bhutan, China, Japan, Thailand and Philippines; **Ecology:** On open place.

Medicinal use: Juice obtained by crushing the whole plant, in dosages about 5-6 teaspoonfuls twice a day for 5-6 consecutive days, is administered orally to the infants suffering from diarrhoea (*Magar* and *Gurung*). **Other uses:** Dried leaves are used as tinder to kindle fire (*Magar* and *Gurung*).

Gnaphalium luteo-album var. **multiceps** (Wall. ex DC.) Hook. f., Fl. Br. Ind. 3:288 (1881). Hara, Cater & Williams, Enum. Fl. Pl. Nep. **3**: 29 (1982). Polunin & Stainton, Fl. Hima. 185 (1984). A common herbaceous weed about 10-30 cm tall. Leaves simple, alternate, sessile, entire, upper leaves lanceolate, acute. Flowers small, whitish, yellow or brown shiny heads in terminal or axillary corymbs.

Vernacular (Nepali) and Local Name: '*Kairo jhar*' (N, M); **Voucher specimen:** BM 059, Bhuktangle, 1700 m asl.; **Fls.-Frts.:** February-November; **Distrib.:** Nepal at 600 - 3500 m, India, China, Thailand and Japan; **Ecology:** Occurs on open and dry place.

Medicinal use: A paste of the plant is applied externally for a week to treat backache (*Magar*). **Other use:** Whole plant is used as fodder to cattle and also used in fish poisoning.

Launaea aspleniifolia (Willd.) Hook. f., Fl. Brit. India **3(8)**: 415 (1881). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 33 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 62 (2000). A perennial herb about 40 cm tall. Sinuately lobed or pinnatifid basal leaves. Yellowish flower heads. Fruit an achene, angled, ribbed. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Dudhejhar*' (N, M, G); **Voucher specimen:** BM 0509, Ramja Deurali, 1471 m asl.; **Fls.-Frts.:** October-March; **Distrib.:** Nepal at 1000-1500 m, India and Bhutan; **Ecology:** Frequently in open places.

Medicinal use: Paste of the plant is applied to treat skin diseases. Latex is used to treat cuts and boils (*Gurung*). **Other use:** The tender leaves are cooked as vegetables. It is also useful fodder to cattle (*Magar*).

Rhynchospermum verticillatum Reinw., Syll. Pl. Nov. Ratisbon. 2: 8 (1826). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 36 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 64 (2000). A puberrulous herb with slender branches. Leaves 3-8 cm long and 0.8-1.5 cm broad, alternate, shortly stalked, lanceolate, acuminate, distantly toothed. Head 0.3-0.7 cm in diameter, axillary, shortly stalked, often one in every axil along the branches, peduncles bracteates, 0.5-1 cm long, pubescent. Flowers white or those of disc yellowish green, 4-5 lobed corolla. Achenes flat, beaked, crowned with 3 slender pappus bristles.

Vernacular (Nepali) and Local Name: '*Ghode gava*' (N, M); **Voucher specimen:** BM 0350, Kyang, 1800 m asl.; **Fls.-Frts.:** August-October; **Distrib.:** Nepal about 2000 m, India, Burma, Malay Islands, China and Japan; **Ecology:** Occurs on shady places.

Medicinal use: A decoction of the plant, in dosages about 5 teaspoonfuls twice a day in a week, is prescribed to cure cold pain in knee (*Magar*). **Other use:** The plant is used for fodder to cattle.

Senecio scandens Buch.-Ham. ex D. Don., Prodr. Fl. Nep. 178 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 42 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 67 (2000). A climber with terete and glabrous branches. Leaves 4-12 cm long and 0.7-3.5 cm broad, petioled, hastate or ovate-hastate, acuminate, crenate or toothed, glabrous, usually membranous. Heads many in lax corymbs. Involucre-bracts 12-14, linear-oblong, acute with thin margins a few smaller ones at the base. Ray flowers few, ligules long, entire, yellow and 4-nerved. Disc-flowers many with strongly 5-fid tubular corollas. Achenes slender, ribbed, ribs hairy. Pappus hairs white, smooth or sometimes barbellate.

Vernacular (Nepali) and Local Name: '*Bakhre Kane*', '*Paheli laharo*' (N, M); **Voucher specimen:** BM 0478, Pang, 1950 m asl.; **Fls.-Frts.:** All the year round; **Distrib.:** Nepal at 2100 m, India, Philipines, China and Japan; **Ecology:** Found in open as well as in shady places.

Medicinal use: Juice of the leaves, in dosages about 6 teaspoonfuls once a day, is recommended to treat asthma, gastritis and skin diseases (*Magar*). **Other use:** The plant is used as fodder to cattle.

Spilanthes paniculata Wall. ex DC., Prodr. **5**: 625 (1836). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 45 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 69 (2000). An annual herb. Leaves simple, petiolate, ovate to lanceolate, apex acuminate. Flowers yellow in head. Fruit an achene, flattened. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bhuin timur', 'Maretho' (N, Ma), 'Khursani jhar' (G), 'Maratui' (M); **Voucher specimen:** BM 0265, Bachchha, 1178 m asl., (Photo Plate 13A); **Fls.-Frts.:** July-November; **Distrib.:** Nepal to about 800-1800 m, India, Bhutan and China; **Ecology:** Frequently found in wet ground, margins of ponds and cultivated fields.

Medicinal use: Juice of inflorescence, about 4 teaspoonfuls twice a day for two days, is given to cure stomach pain. The flowers are chewed raw in case of toothache (*Magar*). A paste of the plant is applied to administer snakebite (*Majhi*); **Other use:** Fruits are used to make pickle. The plant is also used in fish poisoning (all tribes).

Taraxacum officinale Wigg., Fl. Brit. India **3(8)**: 401 (1881). Hara, Chater & Williams, Enum. Fl. Pl. Nep.**3**: 46 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.70 (2000). A perennial herb with milky sap, around 10-30 cm tall. Leaves simple, radical, sessile, oblanceolate, 5-20 cm long, irregularly pinnatifid. Flowers yellow in terminal head. Solitary on a hollow leafless stalk. Fruit an achene. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Tuki Phool', 'Phulijhar' (N, M), 'Netadha' (G); **Voucher specimen:** BM 0097, Majhphant Mallaj, 1456 m asl.; **Fls.-Frts.:** March-August; **Distrib.:** Nepal at 1000-4000 m in moist places, India, Bhutan and Bangladesh; **Ecology:** Found in open, dry as well as in moist places.

Medicinal use: Juice of the roots, in dosages about 2-3 teaspoonfuls thrice a day for 4-5 consecutive days, is given to treat stomach disorder (*Magar*). **Other use:** Yellow dyes is obtained from the flowers (*Gurung* and *Magar*).

CAMPANULACEAE

Campanula pallida Wall., Asiat. Res. **13**: 375(1820). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 50 (1982). Polunin & Stainton, Fl. Hima. 220 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 33 (2000). A hispid herb about 50 cm tall. Leaves short-stalked, alternate, oblong to elliptic, acute, serrate. Flowers bluish or purplish, solitary, axillary, in terminal panicles. Fruit a capsule, hemispheric, hairy. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Ganobuti' (N), 'Kati' (G); **Voucher specimen:** BM 0023, Behulibans, 1750 m asl.; **Fls.-Frts.:** March-November; **Distrib.:** Throughout Nepal at 700-4500 m, Afghanistan, Southern Tibet, India and Western China; **Ecology:** Generally in moist rock crevices or on walls.

Medicinal use: A decoction of the roots, about 5-7 teaspoonfuls once a day in a week, is recommended to treat diarrhoea and dysentery (*Gurung*). **Other use:** The whole plant is used as fodder to goats and to make manure.

ERICACEAE

Gaultheria fragrantissima Wall., *Asiat. Res.* **13:** 397, t. (1820). Hara, Chater & Williams, *Enum. Fl. Pl. Nep.* **3:** 55 (1982). Polunin & Stainton, *Fl. Hima.* 235 (1984). Press *et al.*, *Ann. Check. Fl. Pl. Nep.* 102 (2000). Shrub about 3 m tall. Leaves stalked, 3-14 cm long, 2-5 cm wide, oblong to lanceolate, acuminate, serrate, leathery, bright green. Flowers whitish, fragrant and fruit are purplish blue when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Dhansingare' (N), 'Machino' (M); **Voucher specimen:** BM 0258, Chuwa, 1010 m asl., (Photo Plate 13B); **Fls.-Frts.:** March-December; **Distrib.:** Nepal at 1000-2600 m, Northern India, Bhutan, Sri Lanka and Northern Myanmar; **Ecology:** Commonly found in open, dry slopes as well as on shady places.

Medicinal use: Juice of the leaves, about 4-5 teaspoonfuls is administered once a day in a week, to relieve cough and cold. Same juice is used externally to treat pain and muscular swelling. Immature fruits are chewed to get rid of stomach trouble (*Magar*).

Other use: Ripen fruits are eaten fresh by childrens.

Lyonia ovalifolia (Wall.) Drude., *Pflanzem.* **4 (1):** 44 (1889). Hara, Chater & Williams, *Enum. Fl. Pl. Nep.* **3:** 55 (1982). Polunin & Stainton, *Fl. Hima.* 233 (1984). Press *et al.*, *Ann. Check. Fl. Pl. Nep.* 102 (2000). A deciduous tree about 5 m tall. Leaves with short-stalked, ovate or elliptic, acuminate, entire. Flowers white in simple, axillary, terminal racemes.

Vernacular (Nepali) and Local Name: 'Angeri', 'Thaune' (N), 'Chyaryo chesin' (G), 'Pakasing' (M); **Voucher specimen:** BM 0276, Pang, 1600 m asl., (Photo Plate 13C); **Fls.-Frts.:** March-August; **Distrib.:** Nepal at 1000-3300 m, northern India, Bhutan, China, Myanmar, Malaysia and Indonesia; **Ecology:** Commonly found on sunny and shady places.

Medicinal use: Juice of the leaves is applied externally to treat scabies and itching (*Gurung*). **Other use:** Ripen fruits are eaten fresh. Wood is used to make musical instrument, *Madal*. It is also used as fuelwood. Young leaves are used in fish poisoning (*Gurung* and *Magar*).

Rhododendron arboreum Sm., Exot. Bot. 1: 9, t. 6 (1805) var. **aboretum**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3:56 (1982). Polunin & Stainton, Fl. Hima. 228 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 102 (2000). A medium sized tree about 15-20 m tall. Leaves petioled, crowded at ends of branches, 5-16 cm long, 2-6 cm wide, oblong to lanceolate, narrowed at both ends. Flowers reddish white or pinkish, large, crowded in rounded corymbs. Fruit, capsule, cylindrical, longitudinally ribbed. Propagated by seed.

Vernacular (Nepali) and Local Name: '*Lali gurans*' (N, Ma), '*Porota*', '*Pota*' (G), '*Lalisar*' (M); **Voucher specimen:** BM 0432, Chitre, 1820 m asl., (Photo Plate 13D); **Fls.-Frts.:** March-June; **Distrib.:** Nepal at 1000-3300 m, India and Bhutan; **Ecology:** Found in mixed oak forest.

Medicinal use: Juice of stem barks, in dosages about 3-4 teaspoonfuls twice a day, is prescribed to treat cough and cold, dysentery and diarrhoea (*Majhi*). The petals are eaten raw to get relieve from menstrual disorder and are chewed if fish bone is stuck up in the oesophagus (*Magar* and *Gurung*). **Other use:** Wood is used during house construction. Petal juice is used as a source of vitamin C and also used to make alcoholic beverage (all tribes).

MYRSINACEAE

Maesa chisia Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 148 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3:76 (1982). Polunin & Stainton, Fl. Hima. 253 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 202 (2000). Shurb about 7 m tall. Leaves stalked, 3-15 cm long, 1-5 m wide, elliptic to lanceolate, acuminate, crenate, glabrous. Flowers white in simple axillary racemes. Fruit globose. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Bilauni*' (N, M), '*Chhotne*' (G); **Voucher specimen:** BM 0440, Bhangara, 1561 m asl., (Photo Plate 13E); **Fls.-Frts.:** March-January; **Distrib.:** Throughout Nepal at 900-1900 m, Northern India, Bhutan and Northern Myanmar; **Ecology:** Specially occurs in disturbed forest edges.

Medicinal use: Bark is boiled in water and filtered (infusions), 4-5 teaspoonfuls twice a day for a week, is administered to treat human intestinal parasite (*Magar*). Juice of the barks is applied to treat ringworm. A paste of the ripe fruits is applied to treat scabies (*Gurung*). **Other use:** The plant is lopped for fodder and is important when other species are scarce, especially during winter. Roots and barks are used in fish poisoning. Leaves are used to cover pots, in which locally made alcohol are kept, with the belief that they add good taste to the beverage (*Gurung* and *Magar*).

SAPOTACEAE

Diploknema butyracea (Roxb.) H. J. Lam., Bull. Jard. Bot. Buitenzorg ser. 3, **7**: 186 (1925). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 77 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 285 (2000). An evergreen deciduous tree with 20 m tall. Leaves stalked, 14-30 cm long, 8-16 cm wide, generally crowded near the ends of branches, oblong to ovate, entire, acuminate, hairy beneath, glabrous above. Flowers yellowish crowded at the end of branches. Fruit with one or two seeds; a berry pear shaped. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Chyauree*' (N), '*Chyuri*' (M, G, Ma); **Voucher specimen:** BM 0363, Bihadi Barachaur, 1270 m asl., (Photo Plate 13F); **Fls.–Frts.:** May–August; **Distrib:** Nepal at 300-1500 m, northern India and Bhutan; **Ecology:** Usually found on open hillsides.

Medicinal use: Juice of the barks, in dosages about 4-5 teaspoonfuls twice a day for a week, is prescribed to cure indigestion (*Magar* and *Majhi*). A fat obtained from seeds is used as ointment in rheumatism, emollient to treat cracked hands and feet in winter (all tribes). **Other use:** The ripen fruits are eaten fresh. The fruits are also used to make alcoholic beverage. Leaves are looped as fodder (all tribes).

EBENACEAE

Diospyros lancifolia Roxb., Fl. Ind. Ed. 2, **2**: 537(1832). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 77 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 99 (2000). A tree grows at the height of 20-25 m tall. Leaves simple, oblong-elliptical to lanceolate, with a base-pointed apex acuminate. The midrib is sunken above. It has up to nine pairs of secondary nerves. The petiole is 1 cm long. The male inflorescence is a 3 cm long cyme. The male flowers are 4-merous very small and salver-shaped. The female flowers are solitary, small and urseolate. The fruits are

globose with a short apical beak, subglabrous, 2 cm in diameter, and seated on a shallow 3-5-lobed calyx.

Vernacular (Nepali) and Local Name: 'Khallu' (N), 'Teju' (N, M, Ma); **Voucher specimen:** BM 0260, Durlung, 827 m asl., (Photo Plate 13G); **Fls.-Frts.:** May-August; **Distrib.:** Nepal at 800-1500 m, Philippines, Malaysia and India; **Ecology:** Found in lowland and hill rain forests.

Medicinal use: A decoction of the leaves, in dosages about 4 teaspoonfuls twice a day for two week, is administered to cure ill waist. Roasted fruits are eaten to treat sore throat (*Majhi* and *Magar*). **Other use:** Ripen fruits are eaten fresh. Fruits are also used to make local alcoholic beverage. Seeds are used to extract ghee. Wood is used to make poles and agricultural tools popularly known as 'Juwa' and 'Anau' in Nepali (*Magar*).

OLEACEAE

Fraxinus floribunda Wall. in Roxb., Fl. Ind. 1: 150 (1820). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 79 (1982). Polunin & Stainton, Fl. Hima. 256 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 204 (2000). A deciduous tree. Leaves pinnately compound, petioled, leaflets 7-9, elliptical to lanceolate, apex acuminate. Flowers whitish, numerous in terminal large clustered panicles. Fruit narrow, winged, one-seeded. Propagated by seed.

Vernacular (Nepali) and Local Name: 'Lankuri' (N, M), 'Raunle' (G); **Voucher specimen:** BM 0376, Ramja Deurali, 1797 m asl., (Photo Plate 13H); **Fls.-Frts.:** March-November; **Distrib.:** Nepal at 1000-2000 m, Northern India, Bhutan and China; **Ecology:** Generally occurs on sunny or shady places and also planted around villages.

Medicinal use: Stem barks juice, in dosages about 7 teaspoonfuls once a day, is given to treat stomach disorder (*Magar*). The same juice is given to sheep and goats if they eat poisonous plants (*Gurung*). Paste of the stem barks is applied to treat fracture arms (human) and legs of livestock (*Magar*). **Other use:** Leaves and tender twigs are lopped for fodder. Wood is used to make poles, agricultural tools 'Juwa' in Nepali, and as fuelwood. It is also used to make musical instruments, *Madal* and *Dhol* (*Gurung* and *Magar*).

Jasminum officinale L., Sp. Pl. 7 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 81 (1982). Polunin & Stainton, Fl. Hima. 257 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 205

(2000). A shrub, climber. Leaves pinnately compound, petiolate, leaflets 5-7, ovate or lanceolate. Flowers white in axillary or terminal cymes. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Lahare jai*' (N, M, G); **Voucher specimen:** BM 0428, Karkineta, 1450 m asl.; **Fls.-Frts:** June-August; **Distrib:** Nepal from 900-2700 m, India, Bhutan, Tibet, Burma and China; **Ecology:** Oftenly cultivated, found in sunny places.

Medicinal use: Paste of the roots is applied thickly on ringworm and skin infections. Tender leaves are chewed to get rid of mouth ulcers in oral cavity (*Magar* and *Gurung*). Paste of the flowers, in dosages about 3-4 teaspoonfuls twice a day for a month with water, is prescribed to control blood sugar level in diabetic patients (*Magar*). **Other use:** The plant is used for fodder to cattle. The flowers are used in ceremonies (*Magar* and *Gurung*).

Nyctanthes arbor-tristis L., Sp. Pl. 6 (1753). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3: 81 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 205 (2000). A tree, small sized, around 5-10 m tall, with quadrangular stem. Leaves simple, petiolate, 6.5-15 cm long, 3-8.5 cm wide, ovate, apex acute or acuminate. Flowers whitish with bright orange corolla tube, fragrant in axillary or terminal clusters. Fruit compressed two-seeded capsule. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Parijat*' (N), '*Kharso*' (M); **Voucher specimen:** BM 0243, Shivalaya, 810 m asl., (Photo Plate 13I); **Fls.-Frts.:** June-December; **Distrib.:** Nepal at 800-3000 m, India, Bhutan and Bangladesh; **Ecology:** Generally cultivated in garden and temple compounds.

Medicinal use: Dried powder of flowers, in dosages about 2-3 teaspoonfuls twice a day for 12-15 consecutive days with hot water, is prescribed to cure diabetes (*Magar*). **Other use:** The plant is used as ornamental purpose and planted in home garden.

APOCYNACEAE

Chonemorpha fragrans (Moon) Alston., Ann. Roy. Bot. Gard. Perad. 11: 203 (1929). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3: 83 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 11 (2000). Robust climber. Leaves stalked, 10-33 cm long, 9.5-20 cm wide, ovate or orbiculate, entire, tip acute or rounded, glabrous above, slightly hairy beneath. Flowers white, fragrant. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Gothala phul', 'Ghurilo' (N, M, Ma), 'Ghibinduri' (G); **Voucher specimen:** BM 0372, Chitre, 1370m asl., (Photo Plate 14A); **Fls.-Frts.:** May-November; **Distrib.:** Throughout Nepal at 400-1800 m, Northern India, Sri Lanka, Myanmar, Malaysia and Indonesia; **Ecology:** Found in open places.

Medicinal use: Leaves juice, in dosages about 5 teaspoonfuls twice a day for a week, is useful to treat diabetes and jaundice (*Magar*). A decoction of the roots, about 3-4 teaspoonfuls in a week for 5-6 consecutive days, is recommended to cure ulcers, fever, constipation and to remove worms (*Gurung*). The same decoction is used to treat wounds. Leaves are orally rubbed to relieve skin disease (*Majhi*). **Other use:** Fiber from the bark is used to make fish-nets (*Majhi*).

Rauvolfia serpentina (L.) Benth. ex Kurz., Forest Fl. Burma **2:** 171 (1877). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 84 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. **12** (2000). An erect shrub about 50 cm tall. Leaves simple, petiolate, three-four whorled, oblong, tapering base, 10 cm long, 5 cm wide. Flowers pinkish white, in many flowered terminal cymes. Fruit drupe, globular, dark purplish, 0.5 cm in diameter. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Sarpagandhaa' (N, M, G); **Voucher specimen:** BM 0002, Hosrangdi, 980 m asl., (Photo Plate 14B); **Fls.-Frts.:** November-June; **Distrib.:** Nepal at 800-1000 m, India, Sri Lanka and Myanmar; **Ecology:** Moist deciduous forests, also found in the plains.

Medicinal use: Juice of the roots, in dosages about 3-4 teaspoonfuls twice a day for a week, is prescribed in reducing blood pressure and to cure dysentery and fever (*Gurung*). The same juice, about 2 teaspoonfuls twice a day for a week, is given to children with gastric trouble (*Magar*). **Other use:** Tender leaves are used to make pickle (*Gurung* and *Magar*).

ASCLEPIADACEAE

Calotropis gigantea (L.) Dryand., Hort. Kew. ed. **2:** 78 (1811). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 85 (1982). Polunin & Stainton, Fl. Hima. **262** (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. **18** (2000). Shrub much branched about 3 m tall, young parts white tomentose. Leaves sessile, 6-18.5cm long, 2.3-11.5cm wide, obovate or oblong, acuminate, leathery, cottony beneath. Flowers light purple in axillary umbels. Fruit a follicle. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Aank' (N, M, G), 'Aanak' (Ma); **Voucher specimen:** BM 0280, Tribeni, 890 m asl., (Photo Plate 14C); **Fls.-Frts.:** Most of the year; **Distrib.:** Throughout Nepal to about 1000 m, India, Western and central China, Malaysia and Phillipines; **Ecology:** In open, dry and sandy places.

Medicinal use: Milky latex of the plant is applied as a remedy to get rid of sprains, body pains, boils, and pimples (*Magar*). It is also applied to wounds or affected areas caused by leprosy. Latex is used to treat skin irritation of childrens. Paste of the roots is applied to pimples, and other skin diseases (*Majhi*). Juice of the barks, about 3-5 teaspoonfuls twice a day for a week, is recommended to relieve diarrhoea, dynstery and chest inflammation. Heated leaves are applied on abdomen to relive pain (*Majhi*). Juice of the buds, about 2 drops is dripped in the ear to relieve earache. Dried powder of the flower, about 3-4 trasponfuls once a day in a week, is valued in treating cough and cold, and asthma (all tribes). **Other use:** Wood is burned to make charcoal for gun powder. Fiber obtained from the bark is used to make twine thread. Seed hairs are used for stuffing pillows (*Magar* and *Majhi*).

Calotropis procera (Aiton) Dryand., Hort. Kew. ed. 2, 2: 78 (1811). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 85 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.18 (2000). Shrub or small tree with a rough corky bark, stems producing copious latex when broken. Leaves glaucous, sessile, inflorescence terminal. Flowers purplish-pink and white. Fruits inflated seeds with pappus of silky hairs.

Vernacular (Nepali) and Local Name: 'Aank' (N, M, G); **Voucher specimen:** BM 0275, Saligram, 987 m asl.; **Fls.-Frts.:** May-December; **Distrib.:** Nepal to about 600-1000 m, India, Pakistan, Bangaladesh and Afghanistan; **Ecology:** Sandy desert plains, alluvial soils, close to cultivation.

Medicinal use: A decoction of the barks and leaves, about 4-6 teaspoonfuls once a day for 10-15 days, is prescribed to treat leprosy and asthma (*Magar* and *Gurung*). **Other use:** Wood is burned to make charcoal for gun powder. Fiber obtained from the barks is valued to make twine thread. Seed hairs are used for stuffing pillows (*Magar*).

Ceropegia pubescens Wall., Pl. Asiat. Rar. 2(8):81, t. 187 (1831). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 85 (1982). Polunin & Stainton, Fl. Hima. 263 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.18 (2000). A climber, leaves stalked, 3-15.5 cm long, 1.7-6.5 cm wide,

lanceolate, acuminate, entire, membranous, pubescent. Flowers yellowish in axillary cymes. Propagated by seeds or root tubers.

Vernacular (Nepali) and Local Name: '*Ban semi*' (N), '*Mirke lahara*' (M, Ma); **Voucher specimen:** BM 0447, Kyang, 2025 m asl., (Photo Plate 14D); **Fls.-Frts.:** July-August; **Distrib.:** Central and eastern Nepal at 900-2700 m, India, Bhutan, Southeastern Tibet, Western China and Myanmar; **Ecology:** Mostly in shady places. **Medicinal use:** Paste of the barks is applied to cure boils, pimples, cuts and wounds (*Magar*). **Other use:** The plant is used as fodder to cattle (*Majhi*).

Cryptolepis buchananii Roem. & Schult., Syst. Veg. **4:** 409 (1819). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 86 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. **18** (2000). A large climber with milky juice. Leaves stalked, oblong to elliptic, acuminate, leathery, glabrous and shiny above, glabrous beneath. Flowers stalked, yellowish, in dichotomous cymes. Fruit a follicle, compressed. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Dudhe*', '*Gaisinge*' (N, M, G); **Voucher specimen:** BM 0263, Behulibans, 1005 m asl.; **Fls.-Frts.:** May-November; **Distrib.:** Throughout Nepal to about 1500 m, India, Sri Lanka, Western and southern China and Myanmar; **Ecology:** Found in moist slopes sub-tropical forests. **Medicinal use:** Ash of the plant is applied to treat scabies. Milky latex is applied externally to get rid of backaches (*Magar*). **Other use:** The plant is lopped for fodder. Bark is used to make ropes. Silky fiber from the seeds is used to prepare garlands (*Gurung*).

LOGANIACEAE

Buddleja asiatica Lour., Fl. Cochinch. **72** (1790). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 89 (1982). Polunin & Stainton, Fl. Hima. **265** (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. **189** (2000). An evergreen shrub around 3-4 m tall. Leaves simple, petiolate, 11.5-14.5 cm long, 1.5-5 cm wide, lanceolate, apex acute, base tapering. Flowers white, sessile, fragrant in long dense cylindrical terminal and axillary panicles. Fruit an ellipsoidal two-valved capsule. Propagated by seeds or cuttings of branch.

Vernacular (Nepali) and Local Name: '*Bhimsenpati*' (N, Ma), '*Randursar*' (G), '*Phultit*' (M); **Voucher specimen:** BM 0007, Shankar Pokhari, 1300 m asl.; **Fls.-Frts.:** March-November; **Distrib.:** Central and western Nepal at 300-2000 m, Bhutan,

India and China; **Ecology:** In open places.

Medicinal use: Tender leaves juice mixed with equal amount of honey, about 4-5 teaspoonfuls once a day for three consecutive days, is given in abortification (*Magar*). Plant juice is applied externally for a week to treat skin diseases (*Majhi*). Roots paste is used to cure boils and apply to forehead in case of headache (all tribes). **Other use:** The leaves and flowers are used for religious purpose (*Majhi*). The young leaves extract is used in fish poisoning (*Magar* and *Majhi*).

GENTIANACEAE

Gentiana ornata (G.Don) Griseb., Gen. Sp. Gent. 277 (1838). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 93 (1982). Polunin & Stainton, Fl. Hima. 271 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 115 (2000). A bi-annual, perennials herb about 4-7 cm tall. Stems ascending, simple, glabrous. Basal rosette leaves developed. Stem leaves larger, more crowded toward apex, uppermost surrounding calyx, leaf blade base obtuse and connate for 1.5-2 mm, margin scabrous, apex acute to obtuse, midvein distinct. Flowers terminal, solitary, sessile. Fruit a capsule ovoid-ellipsoid. Seeds light brown.

Vernacular (Nepali) and Local Name: 'Karu' (N, M); **Voucher specimen:** BM 0267, Bhuktangle, 3400 m asl.; **Fls.-Frts.:** June-August; **Distrib.:** Nepal at 3300-5000 m, India, China and Bhutan; **Ecology:** Stony pastures, grassland slopes.

Medicinal use: Juice of the plant, about 3 teaspoonfuls twice a day for four days, is prescribed in case of cough and cold (*Magar*). **Other use:** Tender parts of the plant are cooked as vegetables.

Halenia elliptica D. Don., London Edinb. Philos. Mag. J. Sci. 8: 77 (1836). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 95 (1982). Polunin & Stainton, Fl. Hima. 266 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 116 (2000). Erect herb about 60 cm tall. Lower leaves stalked, opposite, 2.5-5 cm long, ovate, entire, upper leaves sessile. Flowers bluish. Fruit a capsule, ovoid. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Gorul tito' (N), 'Baba tite' (M); **Voucher specimen:** BM 0469, Lespar- Kyang, 2500 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Throughout Nepal at 1700-4000 m, Northern India, Bhutan, Southern Tibet, Northern and western China and Myanmar; **Ecology:** In forest openings.

Medicinal use: Juice of the leaves, about 3-5 teaspoonfuls twice a day for a month, is useful in liver and bile disease. A decoction of the stem, in dosages 4-5 teaspoonfuls once a day in a week, is prescribed to treat high fever, headache, cough and cold (*Magar*).

Other use: The plant is consumed as fodder to cattle.

Swertia angustifolia Buch.-Ham. ex D. Don., Prodr. Fl. Nepal. 127 (1825) var. **angustifolia**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 96 (1982). Polunin & Stainton, Fl. Hima. 268 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 117 (2000). An erect herb about 60 cm tall, stem four angled. Leaves short-stalked, 4-8 cm long, opposite, 1-2.5 cm wide, narrowly lanceolate, entire, base narrowed. Flowers yellowish with deep purple dots. Fruit a capsule, oblong, propagated by seeds.

Vernacular (Nepali) and Local Name: 'Chiraito' (N), 'Tite' (G), 'Gorutite' (M);

Voucher specimen: BM 0036, Lespar, 2421 m asl.; **Fls.-Frts.:** May-December;

Distrib.: Throughout Nepal at 1300-2500 m, Northern India, Southern China and Myanmar; **Ecology:** On open fields and grasslands.

Medicinal use: Roots juice, in dosages about 4 teaspoonfuls twice a day for three days, is given to treat fever (*Gurung*). A decoction of the plant, about 5-7 teaspoonfuls once a day for a month, is prescribed to control blood pressure and as a blood purifier (*Magar*).

Other use: Whole plant is used as fodder (*Gurung* and *Magar*).

Swertia chirayita (Roxb. ex Fleming) Karsten, Deut. Fl. (Karsten) 1025 (1883). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 96 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 118 (2000). An erect bi-annual herb, 60-125 cm tall with robust branching. Leaves simple, opposite, subsessile, about 10 cm long, 3 nerved, broadly lanceolate. Flowers pale green tinged with purple in large panicles, each petal lobe having a pair of green glands. Fruits capsules 6 mm, ovoid.

Vernacular (Nepali) and Local Name: 'Chiraito' (N), 'Tento' (G), 'Ranka' (M);

Voucher specimen: BM 0408, Chitre, 2157 m asl., (Photo Plate 14E); **Fls.-Frts.:** July-November; **Distrib.:** Nepal at 500-2500 m in moist areas, India and Bhutan; **Ecology:** Found in moist shady places.

Medicinal use: Stems are boiled in water, filtered it, and in dosages about 4 teaspoonfuls thrice a day for a week, is useful in case of high fever and headache (*Magar*). It is also prescribed, about 5-7 teaspoonfuls for a month to control blood pressure and blood purification (*Gurung* and *Magar*). A paste of the plant is applied to treat skin diseases

such as eczema and pimples. **Other use:** Leaves are fed to cattle. The plant leaves is rubbed in legs to remove the lice (*Gurung* and *Magar*).

Swertia nervosa (Wall. ex G. Don) C. B. Clarke, Fl. Br. Ind. 4:125 (1883). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 97 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 118 (2000). An erect herb about 1 m tall with a four-angled stem. Leaves short-stalked, 4-8 cm long, 1.5-2.2 cm wide, elliptic to lanceolate, base narrow. Flowers yellowish, purple veined, in may-flowered panicles. Fruit a capsule, ovoid. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Tite' (N, G), 'Vale Chiraito', 'Ranka' (M); **Voucher specimen:** BM 0362, Lespar- Kyang, 2190 m asl., (Photo Plate 14F); **Fls.-Frts.:** October-November; **Distrib.:** Throughout Nepal at 700-3000 m, also in northern India and western China; **Ecology:** Mostly found on open, moist ground.

Medicinal use: The infusions, about 5 teaspoonfuls twice a day for 5-6 consecutive days, is given to cure fever (*Gurung* and *Magar*). **Other use:** Plant is used as fodder to cattle. The plant leaves is rubbed in legs to remove the lice (*Magar*).

BORAGINACEAE

Cynoglossum amabile Stapf. & Drumm., Kew Bull. 1906: 202 (1906). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 99 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 29 (2000). A perennial herb 15-60 cm tall. Stem single or several and cespitose, densely spreading pubescent. Basal leaves long petiolate, gray-green, oblong to lanceolate, 5-20 cm, densely pubescent, stem leaves sessile, gray-green, oblong to lanceolate. Inflorescences paniculate and ebracteate.

Vernacular (Nepali) and Local Name: 'Kuro' (N, G, M, Ma); **Voucher specimen:** BM 0318, Bhuktangle, 2700 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Eastern Himalayas of Nepal at 2600-3700 m, Bhutan, East Tibet and West China; **Ecology:** Usually on hillside meadows, forests, roadsides and river banks.

Medicinal use: A decoction of the plant, in dosages about 3-4 teaspoonfuls twice a day for three days, is administered in case of cold, fever, bloody cough, vomiting blood and beriberi (all tribes). **Other use:** The plant is used for fodder to goats and sheep (all tribes).

Cynoglossum zeylanicum (Vahl ex Hornem.) Thunb. ex Lehm., Neue Schriften Naturf. Ges. Halle **3(2)**: 20 (1817). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 100 (1982). Polunin & Stainton, Fl. Hima. 279 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 29 (2000). An erect herb about 50 cm tall. Leaves cauline, sessile, 5-16 cm long, 2-5 cm wide, lanceolate, acute apex, bulbous base. Flowers bluish in long racemes. Fruit nutlets, four with barbed bristles on one side. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kanikekuro' (N, M), 'Arkale', 'Khir' (G); **Voucher specimen:** BM 0545, Bhuka Deurali, 2100 m asl., (Photo Plate 14G); **Fls.-Frts.:** April-November; **Distrib.:** Nepal at 900-3500 m, India, Bhutan, Sri Lank, China, Thailand, Japan and Malaysia; **Ecology:** Found in open places.

Medicinal use: A decoction of the plant is applied externally to get rid of ringworm (skin diseases). Juice of the roots, about 5 teaspoonfuls twice a day for a week, is prescribed to treat indigestion (*Gurung*). Same juice is applied to cure cuts and wounds. A paste of the roots is applied in the boils to let the pus out, which helps the boil to heal faster. It is also applied to the boils on the tongue. The infusion of leaves, about 2-3 drops once a day in a week, is used as eyedrops to treat conjunctivitis (*Magar*). **Other use:** Plant is used as fodder to goats (*Magar*).

CONVOLVULACEAE

Ipomoea cairica (L.) Sweet., Hort. Brit. 287 (1827). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 106 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 73 (2000). Perennial herb, growing from a tuberous rootstock. A prostrate creeper or twining into other vegetation. Leaves palmate with 5 to 7 lobes. Herbs perennial, twining, with a tuberous root; axial parts glabrous. Inflorescences 1 or several flowered. It can be propagated by seeds and stem cuttings.

Vernacular (Nepali) and Local Name: 'Behaya', 'Thechar' (N, M, Ma); **Voucher specimen:** BM 0125, Tribeni, 700 m asl., (Photo Plate 14H); **Fls.-Frts.:** June-October; **Distrib.:** Nepal about 200-1000 m, India, Japan and tropical Africa; **Ecology:** Degraded moist deciduous forests.

Medicinal use: A decoction of the whole plant, about 3-4 teaspoonfuls twice a day for 5-7 successive days, is prescribed to treat rheumatism and inflammation of the heart (*Magar* and *Majhi*). **Other use:** The plant is used as fodder to cattle (*Magar* and *Majhi*).

Ipomoea carnea Jacq., Enum. Pl. Carib. 13 (1760). Hara, Chater & Williams, Enum. Fl. Pl.

Nep. 3: 106 (1982). Polunin & Stainton, Fl. Hima. 285 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.73 (2000). A non climbing shrub about 2 m tall. Leaves long-stalked, elliptic, long-pointed, base cordate. Flowers pink or white. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: '*Ajamari*', '*Behaya*', (N, M, Ma); **Voucher specimen:** BM 0343, Bihadi-Ranipani, 1200 m asl., (Photo Plate 14I); **Fls.-Frts.:** May-June; **Distrib.:** Throughout Nepal to about 1400 m, also in most tropical regions of the world, India; **Ecology:** Oftenly gregarious.

Medicinal use: Juice of the plant is applied to wounds between the toes caused by prolonged walking by barefoot in the muddy water (*Magar*). The milky latex is applied to treat cuts and wounds. The milky juice of the plant is used to cure leucoderma and other related skin diseases (*Magar*). Paste of the plant is also applied to relieve joint pains (*Majhi*). **Other use:** The plant is cultivated as a hedge (*Magar* and *Majhi*).

***Ipomoea nil* (L.) Roth., Cat. Bot. 1: 36 (1797). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 107 (1982). Polunin & Stainton, Fl. Hima. 285 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.74 (2000).** An annual twiner herbaceous climber leaves stalked, broadly ovate to cordate, three-lobed, rarely entire. Flowers pinkish on axillary peduncles. Fruit a capsule, ovoid. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Siundelaharo*' (N), '*Siyunri*' (Ma); **Voucher specimen:** BM 0153, Bhoksing, 1476 m asl., (Photo Plate 15A); **Fls.-Frts.:** July-November; **Distrib.:** Central and western Nepal at 760-2000 m, also pantropical; **Ecology:** In moist places.

Medicinal use: Juice of the plant, in dosages about 3-4 teaspoonfuls thrice a day for 5-6 consecutive days, is recommended to cure vomiting of blood (*Majhi*). A decoction of the leaves, about 2 teaspoonfuls twice a day for a week, is given to cure bronchitis, jaundice, diarrhoea and hemorrhoids. **Other use:** The plant is used as fodder to cattle and to make manure.

***Ipomoea purpurea* (L.) Roth., B. Abh. 27 (1787). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 107 (1982). Polunin & Stainton, Fl. Hima. 285 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.74 (2000).** An annual climbers, leaves simple, alternate, ovate-cardate, 3-foliate, exstipulate, long-petiolate, entire, pubescent and acute. Flowers in axillary cyme, shortly pedicellate, hermaphrodite, with bud. Calyx-lobes 5, gamoseplous, equal or unequal, imbricate, lanceolate, acuminate, and hairy at the base. Corolla funnel-shaped, slightly up to 4 cm in

diameter, much longer than calyx-tube and deep purple on the corolla mouth. Style slender, straight and tapering at the apex. Stigma capitate.

Vernacular (Nepali) and Local Name: 'Syudelaharo' (N, Ma); **Voucher specimen:** BM 0502, Deupurkot, 1537 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Nepal about 2800 m, Pakistan, Philippines, Sri Lanka, North and South America; **Ecology:** Found in waysides, hedges, fields, cultivated or escaped areas.

Medicinal use: A decoction of the leaves, about 2-3 teaspoonfuls twice a day for a week, is recommended to treat bronchitis, jaundice and diarrhoea. Flowers paste is used in the treatment of syphilis (*Majhi*). **Other use:** The whole plant is used for fodder to cattle. It is also used to make green manure.

CUSCUTACEAE

Cuscuta reflexa Roxb., Pl. Coromandel 2: 3, t. 104 (1798) var. **reflexa**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 105 (1982). Polunin & Stainton, Fl. Hima. 284 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 73 (2000). A twiners ectoparasitic herb with leafless creamy-yellow, thick and fleshy stem. Stem yellowish with fleshy bracts. Flowers very fragrant white to pink with cream in racemes, sessile, in axillary clusters, campanulate, 6-8 m long, pinkish white, fragrant. Seeds 2-4 large, black and globose. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Akasebeli' (N, M, Ma), 'Dyodyoali', 'Kebara' (G); **Voucher specimen:** BM 0405, Behulibans, 1500 m asl., (Photo Plate 15B); **Fls.-Frts.:** September-November; **Distrib.:** Throughout Nepal about 500-3000 m, India, China, Myanmar, Thailand, Malaysia and Indonesia; **Ecology:** Parasitic twining herb on shrubs.

Medicinal use: Juice of the plant, in dosages about 4 teaspoonfuls twice a day for a week, is administered to treat jaundice (all tribes). Paste of the plant is prescribed to treat stomachache, headache and rheumatism (*Gurung*). The same paste is applied to relieve body pains and itches. It is also used to cure foot and mouth disease of cattle. An infusion is used to wash the sores. Ash of the plant is applied to cuts and wounds. An extract from the plant is applied on head before bed time daily for a month to induce follicular proliferation or prevent hair fall (*Magar* and *Majhi*). **Other use:** The whole plant is used to make compost manure.

SOLANACEAE

Cestrum nocturnum L., Sp. Pl. 191 (1753). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3:108 (1982). Polunin & Stainton, Fl. Hima. 287 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 302 (2000). A diffuse shrub about 4 m tall. Leaves short-stalked, lanceolate, acuminate and entire. Flowers greenish yellow in axillary or terminal more or less leafy panicles, fragrant at night. Propagated by stem cuttings.

Vernacular (Nepali) and Local Name: 'Basana', 'Basina' (N), 'Ratko rani' (M, Ma);

Voucher specimen: BM 0525, Bihadi Barachaur, 1290 m asl., (Photo Plate 15C); **Fls.-**

Frts.: July-September; **Distrib.:** Throughout Nepal about 1500 m, India, Pakistan, West Indies and Central America; **Ecology:** Occurs on shady places.

Medicinal use: Leaves juice, in dosages about 5-6 teaspoonfuls twice a day, is prescribed to treat epilepsy, seizure disorders and headache. The plant is used to get rid of young girls' hysteria with the belief that its fragrance cures nervous imbalances (*Magar*). **Other use:** Plants are used for ornamental purpose (*Magar* and *Majhi*). It is believed that keeping the plant in home garden attracts the evil at night (*Magar*).

Datura stramonium L., Sp. Pl. 179 (1753). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3:109 (1982). Polunin & Stainton, Fl. Hima. 289 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 302 (2000). An erect shrub around 3 m tall. Leaves petiolate, pale green, triangular ovate, apex acuminate. Flowers whitish, large, funnel shaped. Fruit capsule, ovoid, greenish, covered with spines. Seeds numerous, densely packed, brown. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Dhaturo' (N, Ma), 'Dhataur' (M); **Voucher specimen:** BM 0148, Bhuka Deurali, 1765 m asl., (Photo Plate 15D); **Fls.-Frts.:** May-December; **Distrib.:** Nepal about 2500 m, Pakistan, India, Bhutan and Bangladesh; **Ecology:** Occurs on open sunny places.

Medicinal use: Paste of the roots is applied externally in the treatment of dog bites (Rabies). Dry powder of the leaves and seeds are applied to cure boils and sores. Extract of flowers, about 3-4 drops once a day for 3 days, is dripped in ear to treat earaches. Smoke from fried seeds is inhaled to treat dental caries (*Majhi* and *Magar*). **Other use:** Crushed leaves are used to stupefy fishes. Seeds covered by muslin cloth and stitched up, known as amulet, is worn around the waist of pregnant women to prevent abortion (*Majhi*).

Nicandra physalodes (L.) Gaertn., Fruct. Sem. Pl. **2(2)**: 237, T. 131, f. 2 (1791). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. **3**: 110 (1982). Polunin & Stainton, Fl. Hima. 288 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 303 (2000). A herb about 1.5 m tall. Leaves stalked, alternate, ovate to lanceolate, acuminate, sinuately lobed. Flowers solitary, axillary, bluish or violet bell shaped with white center. Fruit a berry, globose, encircled by the papery.

Vernacular (Nepali) and Local Name: 'Isamgoli' (N, M); **Voucher specimen:** BM 0279, Lunkhu Deurali, 2100 m asl., (Photo Plate 15E); **Fls.-Frts.:** June-November; **Distrib.:** Nepal to 750-2600 m, India, Bhutan and Bangladesh; **Ecology:** Found on open fields.

Medicinal use: A decoction of the fruits, in dosages about 2-3 teaspoonfuls twice a day for 6-7 consecutive days, is prescribed to cure fever (*Magar*). **Other use:** Fruits are eaten fresh by children (*Magar*).

Solanum aculeatissimum Jacq., Coll. **1**:100 (1787). Hara & Williams, Enum. Fl. Pl. Nep. **3**: 111 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 303 (2000). It is a shrubby perennial weedy up to 1.5 m tall, bears small, 2-3 cm pale yellow fruit following white flowers. All parts abundantly armed with spines. Leaves broadly ovate to almost round in outline, coarsely toothed to deeply lobed, simple hairs, numerous spines. Flowers in lateral clusters. Fruit 2-3 cm in diameter, spherical, striped, turning dirty yellow when ripe. Propagated from seeds or stem cuttings.

Vernacular (Nepali) and Local Name: 'Kantakaari' (N), 'Kantageri', 'Kanthakumari' (M), 'Golbherapuju' (Ma); **Voucher specimen:** BM 0339, Bachchha, 1707 m asl., (Photo Plate 15F); **Fls.-Frts.:** Throughout the year; **Distrib.:** Nepal at 1400-2200 m, India China, South and North America; **Ecology:** Occurs in open vegetation, roadsides, forest clearings and agricultural lands.

Medicinal use: Juice of pounded roots is applied to treat swelling of the gums and toothache (*Magar*). Powder of dried fruits, is smoked twice a day for a week to treat intestinal diseases (*Majhi*). Fruits are grounded and paste is made which is applied to forehead to relieve headache. Roasted seeds are also chewed to treat toothache (*Magar*).

Other use: Plant leaves are used for fodder to goats. It is also used to make manure.

Solanum nigrum L., Sp. Pl. 186 (1753). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. **3**: 111 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 304 (2000). An erect branched herb around 50 cm tall. Leaves simple, petiolate, 2.5-9 cm long, 0.5-6 cm wide, ovate-lanceolate, tapering to the

petiole. Flowers white in an umbel, in clusters of 3-8 flowers, drooping. Fruit, globose berry, purplish violet when ripen. Propagated by seeds.

Vernacular(Nepali) and Local Name: 'Behi' (N), 'Ninaura', 'Petimgan' (M), 'Khursani jhar', 'Pimnendo' (G), 'Kaligedi' (Ma); **Voucher specimen:** BM 0034, Durlung, 1390 m asl.; **Fls.-Frts.:** July-November; **Distrib.:** Nepal to about 500-2900 m, India, Bhutan and Afghanistan; **Ecology:** On open places.

Medicinal use: Paste of the plant is applied to forehead to relieve pain (*Majhi*). A decoction of the roots, in dosages about 3-4 teaspoonfuls thrice a day for 5-6 consecutive days, is prescribed to treat liver problem, fever and dysentery (*Magar* and *Gurung*).

Other use: Ripen berries are eaten fresh. Tender shoots are cooked as vegetables (all tribes).

SCROPHULARIACEAE

Hemiphragma heterophyllum Wall., Tr. Linn. S. 13: 612 (1822). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 114 (1982). Polunin & Stainton, Fl. Hima. 294 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 292 (2000). Creeping perennial hairy prostrate herb carpeting on the ground with the small solitary axillary, frequently rooting at the nodes. Leaves dimorphic, short-stalked, opposite, ovate to orbiculate, obtuse, branchlets fascicled, needle shaped. Usually satalkless pink flowers, hermaphrodite. About 8 mm across with a corolla with 5 broad sperating lobes. Fruit a berry turning red at maturity.

Vernacular (Nepali) and Local Name: 'Lahure phul', 'Rato geri' (N), 'Nash jhar' (M); **Voucher specimen:** BM 0511, Lespar- Kyang, 2530 m asl.; **Fls.-Frts.:** March-July; **Distrib.:** Throughout Nepal at 1500-4000 m, Northern India, Bhutan, Western and central China, Myanmar, Taiwan and Philipines; **Ecology:** On dry slopes and moist soil. **Medicinal use:** Juice of the plant, twice a day is applied to cure cuts and wounds. The same juice, dosages about about 4 teaspoonfuls twice a day for 5 days, is administered as folk medicine to treat inflammation of gallbladder, rheumatism, abnormal menstruation and toothache (*Magar*). **Other use:** Ripe fruits are eaten fresh.

Mazus surculosus D. Don, Prodr. Fl. Nep. 87 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 118 (1982). Polunin & Stainton, Fl. Hima. 293 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 295 (2000). A trailing herb, basal leaves spatulate, rosette and long slender runners. Corolla 2 lipped, upper lip short triangular lobes, the lower lip much larger, with pale rounded

lobes, calyx, triangular blunt, ovate, crenate, sparsely hairy, apex rounded upper leaves sessile, slightly crenate. Flowers pale blue or white, tubular 6-12 mm long, in short terminal stalked clusters arising direct from the rootstock, purple in terminal racemes. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Khasre buti*' (N, M), '*Buti jhar*' (Ma);

Voucher specimen: BM 0464, Pang, 1892 m asl.; **Fls.-Frts.:** February-August; **Distrib.:** Throughout Nepal at 900-3000 m, India, Tibet and Western China; **Ecology:** In moist places.

Medicinal use: A decoction of the plant, about 3 teaspoonfuls twice a day for a week, is prescribed to treat stomach acidity (*Magar*). This decoction is also applied externally to cure cuts and wounds (*Majhi*). Dried paste of the plant wrapped in muslin cloth, amulet, is tied around the arm of the children as '*buti*' to cure fever and cold (*Majhi*). **Other use:** Plant is used to make compost manure (*Magar*).

Neopicrorhiza scrophulariiflora (Pennell) D.Y. Hong, Opera Bot. **75**: 56 (1984). Hara & Williams, Enum. Fl. Pl. Nep. **3**: 126 (1979). Polunin & Stainton, Fl. Hima. 295 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 295 (2000). A perennial herb about 10-40 cm tall. Leaves subsessile, oblanceolate, aggregated at the base, 1.5-5 cm long, 0.5-1.2 cm wide, acuminate, serrate, stalk winged. Flowers are dark blue purple. Corolla 1.5 cm with long 3 lobed upper lip and short lower lip. Calyx hairy, nearly as long as corolla tube. Propagated by seeds or rhizome.

Vernacular (Nepali) and Local Name: '*Kutaki*' (N, M, G); **Voucher specimen:** BM 0508, Bhuktangle, 3600 m asl.; **Fls.-Frts.:** July-November; **Distrib.:** Throughout Nepal at 3500-4800 m, India, Bhutan, Tibet, Myanmar and China; **Ecology:** Open, rocky pastureland, alpine grassland.

Medicinal use: Juice of the rhizomes, about 2-3 teaspoonfuls thrice a day for 4-5 consecutive days, is given to get rid of fever, stomachache and dropsy. A paste of the rhizomes, dosages about 5-6 teaspoonfuls once in a day, is given to cure cough and cold (*Magar* and *Gurung*). A decoction of the plant, in dosages about 5 teaspoonfuls once a day for a week, is recommended to cure bile diseases, intestinal pain and blood pressure (*Magar*). **Other use:** None

Pedicularis gracilis Wall. ex Benth., Cat. 13, n. 413 (1829). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. **3**: 123 (1982). Polunin & Stainton, Fl. Hima. 303 (1984). Press *et al.*, Ann. Check.

Fl. Pl. Nep. 296 (2000). An erect, cylindrical branched herbs around 15-80 cm tall, stem slender, branched, generally hollow, lightly pubescent below forming two rows of dense white hairs above, branched near the root in whorls, opposite above, internodes 1.8-5 cm. Leaves 1-5 cm, opposite or whorled, linear, lanceolate or ovate, glabrous.

Vernacular (Nepali) and Local Name: '*Chijpa*' (N, M). **Voucher specimen:** BM 0474, Saliya, 1990 m asl.; **Fls.-Frts.:** July-November; **Distrib.:** Central to eastern Nepal at 1900-4300 m, Bhutan, Southern Tibet, India, Afghanistan and China; **Ecology:** Occurs in open steep dry slopy places.

Medicinal use: The extract of roots (juice), about 5 teaspoonfuls twice a day for three days, is given to relieve stomach ache (*Magar*). **Other use:** Plant is considered as fodder to sheep and goats.

Pedicularis scullyana Prain ex Maxim., in Bull. Acad. Sci. St.- Pet. **32:** 529, t. 1, f. 6 (1888). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 125 (1982). Polunin & Stainton, Fl. Hima. 299 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 298 (2000). A hemiparasitic herb with dense terminal cluster of numerous pale yellow or white flowers, but corolla tube about as long as the calyx and flowers larger 3.5-4 cm across, mid lobe of flower lip much smaller than the lateral lobes, beaks are curved, calyx 2 cm with unequal ovate lobes. Leaves linear-lanceolate, with numerous paired oblong coarsely toothed lobes.

Vernacular (Nepali) and Local Name: '*Chijpa*' (N, M); **Voucher specimen:** BM 0442, Bhuktangle, 3522 m asl.; **Fls.-Frts.:** July-August; **Distrib.:** Nepal to Sikkim at 3300-4800 m; **Ecology:** On open gravelly grasslands, on mossy rocks, among herbage on overgrown morains, at edge of a stream, among shrubs along a stream

Medicinal use: Paste of the whole plant is applied to cure skin diseases and to remove pimples. **Other use:** Plant is considered as fodder to sheep and goats (*Magar*).

GESNERIACEAE

Aeschynanthus sikkimensis (C.B. Clarke) Stapf., B. Mag. **148:** t. 8938 (1922). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 133 (1982). Polunin & Stainton, Fl. Hima. 307 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 120 (2000). A glabrous stems herb. Leaves opposite, lanceolate to narrowly elliptic, leathery glabrous, base attenuate, margin entire, apex caudate to caudate-acuminate and lateral veins invisible. Cymes pseudoterminal flowered, peduncle absent, bracts

persistent, green and lanceolate. Calyx green tinged purple-red, lobed from above middle tube 5 mm, lobes triangular, outside glabrous. Corolla red-orange, slightly oblique, indistinctly lipped lips nearly equal. Seeds with 2 hairlike appendages.

Vernacular (Nepali) and Local Name: 'Ilipile' (N, G), 'Khagija' (Ma); **Voucher specimen:** BM 0462, Durlung, 1563 m asl.; **Fls.-Frts.:** May-June; **Distrib.:** Nepal at 1500-2500 m, Bhutan, India and China; **Ecology:** On trees in forests epiphyte.

Medicinal use: Juice of the crushed leaves, about 4-5 teaspoonfuls twice a day for a week, is administered to treat fever and body pain. It is also applied to administer inflammatory glands (*Gurung*). Infusion of the flowers, in dosages about 2-3 teaspoonfuls once a day for 5-7 consecutive days, is given against tonsillitis (*Majhi*).

Other use: The plant is considered as fodder to goats and sheep (*Gurung*).

Chirita urticifolia Buch.-Ham.ex D.Don., Prodr. Fl. Nep. 90 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 134 (1982). Polunin & Stainton, Fl. Hima. 308 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 120 (2000). An annual herbaceous plant about 20-30 cm tall. Flowers red-purple streaked with yellow, funnel-shaped, 2 lipped, drooping, to 5 cm long, one or several borne on sparingly hairy stalks, with ovate bracts. Corolla-tube inflated above, sparingly hairy, lobes rounded, lanceolate pointed, bristly-haired. Leaves elliptic long-pointed, saw-toothed, stalked. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Aankhle' (N) 'Aankhle jhar' (G, Ma); **Voucher specimen:** BM 0437, Chitre, 2019 m asl.; **Fls.-Frts.:** August-September; **Distrib.:** Throughout Nepal at 1000-3400 m, Northern India, Bhutan, China and Myanmar; **Ecology:** Found on moist ground under trees.

Medicinal use: A decoction of the plant, about 4-5 teaspoonfuls three times a day for two days, is recommended to treat stomach ache (*Gurung* and *Majhi*). **Other use:** The plant is gathered for fodder (*Gurung*).

BIGNONIACEAE

Oroxylum indicum (L.) Kurz., Forest Fl. Burma 2: 237 (1877). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 137 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 28 (2000). A deciduous tree about 10 m tall. Leaves petiolate, 6-16 cm long, 4-7 cm wide, broadly ovate. Flowers numerous in long 30-60 cm racemes, pinkish and purple in colour. Fruit flat, large, sword-shaped capsule. Seeds containing papery wings. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Talelo*' (N, Ma), '*Krimtata*' (G), '*Tatal*' (M); **Voucher specimen:** BM 0003, Bhorle, 970 m asl., (Photo Plate 15G); **Fls.-Frts.:** May-October; **Distrib.:** Nepal to about 800-1300 m, India and China; **Ecology:** Found in moist deciduous forests, also in the plains.

Medicinal use: Juice of the stem barks is applied externally to get rid of body pain, especially during fever, and also applied to cure burns and wounds (*Magar*). A decoction of the barks, about 5-6 teaspoonfuls twice a day for five days, is prescribed to treat diarrhoea, jaundice and dysentery (*Gurung* and *Majhi*). Paste of the seeds is used to cure wounds (*Magar*). **Other use:** The papery seeds are offered to gods and goddesses, especially by Buddhists (*Gurung*). It is also believed that using this plant will prevent snakes near the house (*Majhi*).

ACANTHACEAE

Asystasia macrocarpa Nees, in Wall., Pl. As. Rar. 3: 89 (1832). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 139 (1982). Polunin & Stainton, Fl. Hima. 312 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 1 (2000). A shrub about 1.5 m tall with usually short clusters of large pink-purple cylindrical flowers netted with purple within, usually appearing on leafless branches. Flowers, long corolla-tube narrow below and abruptly enlarged to a longer upper part, sepals linear acute, finely hairy. Leaves entire oblong to elliptic, lateral veins. Capsule cylindrical, broader. Peduncle densely pubescent. Ovary densely hairy. Style glabrous hairy at the base. Stigma slightly swollen.

Vernacular (Nepali) and Local Name: '*Jhakri phul*' (M, Ma); **Voucher specimen:** BM 0170, Tribeni, 1321 m asl.; **Fls.-Frts.:** March-April; **Distrib.:** In Nepal central and east himalayas about 300-2100 m, India and Bhutan; **Ecology:** Occurs in the warm subtropical valleys and foothills.

Medicinal use: Juice of the leaves, in dosages about 4-5 teaspoonfuls twice a day for five successive days, is prescribed to stop convulsion in children (*Magar*). It is believed that the use of this plant twigs to cover the surrounding of the house keeps away the evil spirit (*Magar* and *Majhi*). **Other use:** Plant is used in fish poisoning. The young twigs are cooked as vegetables (*Majhi*).

Justicia adhatoda L., Sp. Pl. 15 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 141 (1982). Polunin & Stainton, Fl. Hima. 314 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 2

(2000). An evergreen shrub much branched, diffusely spread on substratum. Leaves petiolate, 0.8-4 cm long, 0.4-3 cm wide, elliptical or ovate, purplish violet. Flowers small, pinkish in colour. Fruit elliptical capsule. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Asuro' (N, G, M, Ma); **Voucher specimen:** BM 0369, Pakhapani, 1300 m asl., (Photo Plate 15H); **Fls.-Frts.:** February-August; **Distrib.:** Nepal at 1000-2500 m, India, Bhutan and Bangladesh; **Ecology:** Found in open areas.

Medicinal use: A decoction of the leaves, in dosages about 4 teaspoonfuls twice a day in a week, is prescribed to cure fever, cough, and asthma (*Magar* and *Gurung*). Fresh leaves are pounded and juice, about 5 teaspoonfuls twice a day for 5-7 consecutive days, is drunk to treat bronchitis and malarial fever. It is also applied externally to relieve joint pain (*Majhi* and *Gurung*). **Other use:** Flowers are sucked by childrens (*Magar*). Leaves are used to make green manure. It is also cultivated for the biofencing (all tribes).

Justicia procumbens L., Sp. Pl. 15 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 142 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 2 (2000). A branched herb. Leaves stalked, 0.8-4 cm long, 0.4-3 cm wide, elliptic or ovate, acute, entire, hairy on both surfaces. Flowers pinkish. Fruit a capsule, elliptic. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bisaune jhar', 'Phuli jhar' (N), 'Kyubo' (G); **Voucher specimen:** BM 0301, Balakot, 1568 m asl.; **Fls.-Frts.:** April-November; **Distrib.:** Throughout Nepal at 700-2500 m, Bhutan, Sri Lanka, Myanmar, Thailand, Malaysia and East Africa; **Ecology:** In moist and open places.

Medicinal use: Juice of the plant, about 5 teaspoonfuls twice a day for 5 days, is administered to relieve cough and cold. It is also valued as an ophthalmic medicine. A paste of the plant is applied to treat rheumatism, backache, flatulence, cuts and wounds. A decoction of the roots, in dosages 3-4 teaspoonfuls once a day for a week, is administered to treat cough mixed with blood and typhoid fever (*Gurung*). **Other use:** The plant is palatable fodder to cattle.

VERBENACEAE

Callicarpa arborea Roxb., Fl. Ind. (Roxb.) 1: 405 (1820). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 145 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 323 (2000). Tree around 15 m tall. Leaves simple, petiolate, 9-30 cm long, 4-14 cm wide, elliptic to lanceolate, base rounded

or cuneate. Flowers in axillary dichotomous corymbose cymes, pale purple, fragrant. Fruit purplish black drupe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Mas gedi' (N), 'Guyela' (M); **Voucher specimen:** BM 0341, Bachchha, 1250 m asl., (Photo Plate 15I); **Fls.-Frts:** April-December; **Distrib.:** Nepal to about 1500 m, India, China, Indonesia, Malaysia and Thailand; **Ecology:** On the margins of forestlands.

Medicinal use: Root pieces are chewed to treat mouth ulcers on tongue, palate and boils on the tongue. Juice of the barks, in dosages about 5-7 teaspoonfuls twice a day in a week, is considered as tonic in expelling gas from stomach. Same juice in equal amount is mixed with bark juice of *Cordia dichotoma*, in dosages 2-3 teaspoonfuls thrice a day for 2-3 days, is prescribed as remedy to cure gastric disorder, indigestion and in fever. The leaves are burnt to produce ash which is applied on boils to dry it up (*Magar*). **Other use:** Wood is used to make utensils. Leaves are lopped for fodder. Ripen fruits are eaten fresh (*Magar*).

Callicarpa macrophylla Vahl., Symb. B. 3: 13, t. 53 (1794). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 145 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 323 (2000). Shurb about 3 m high with straggling branches. Leaves stalked, 10-25 cm long, 3.5-10 cm wide, oblong to lanceolate, acuminate, crenate, soft pubescent above, thickly cottony tomentose beneath. Flowers small, pinkish, in a dense compound cyme. Fruit a drupe, white, spongy, succulent when fully ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Daheechaunle' (N), 'Malaburu' (M), 'Kurli' (G); **Voucher specimen:** BM 0460, Bajung, 1300 m asl., (Photo Plate 16A); **Fls.-Frts.:** May-January; **Distrib.:** Throughout Nepal to about 1500 m, Northern India, Bhutan and Southern China; **Ecology:** Found in moist places.

Medicinal use: Roots are chewed to treat rashes on the tongue. Juice of the roots, in dosages about 3-4 teaspoonfuls once a day with water, is administered to alleviate fever and indigestion (*Magar*). The inner stem barks, is pounded and applied to treat cuts and wounds. A heated leaf is pressed on affected area to relieve rheumatic pain. A decoction of the young leaves, in dosages about 5 teaspoonfuls once a day for 5-7 consecutive days, is given in case of diarrhoea and dysentery (*Gurung* and *Magar*). **Other use:** Ripen berries are eaten fresh. Woods are served as fuel. Leaves are gathered for fodder (*Gurung* and *Magar*).

Caryopteris nepalensis Moldenke., Phytologia 7:77 (1959). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 145 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 323 (2000). Small shrubs growing to 1-4 m tall. The leaves are opposite, simple ovate to lanceolate, with an entire or crenate margin, blue flowers with stamens curled back looking like the head, often aromatic. The fruit is a four-valved capsule containing four seeds.

Vernacular (Nepali) and Local Name: '*Hedera*' (N, G); **Voucher specimen:** BM 0394, Bihadi Ranipani, 1525 m asl.; **Fls.-Frts.:** March-May; **Distrib.:** Himalaya Nepal at 900-2100 m; **Ecology:** Open moist places.

Medicinal use: Paste of the leaves is applied to cure mouth blister (*Gurung*). **Other use:** The plant is used as fodder to cattle.

Duranta repens L., Sp. Pl. 637 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 147 (1982). Polunin & Stainton, Fl. Hima. 318 (1984). An erect shrub about 4 m tall, branches generally drooping. Leaves petiolate, 1-4.5 cm long, 1.0-2.5 cm wide, elliptical to ovate, apex rounded, base cuneate. Flowers in axillary or terminal racemes, purplish blue. Fruits ovoid, fleshy berry, orange. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: '*Nilkanda*' (N, M, Ma); **Voucher specimen:** BM 0519, Pangrang, 1390 m asl., (Photo Plate 16B); **Fls.-Frts.:** June-December; **Distrib.:** Nepal at 500-1600 m, India, China Bhutan and Central and South America; **Ecology:** Dry areas and moist fertile soils.

Medicinal use: Juice of the fruits, in dosages 5-6 teaspoonfuls twice a day for 5 days, is administered in case of fever, cough and cold (*Magar*). Tender twigs are used as toothbrush to clean their teeth and make it strong (*Magar* and *Majhi*). **Other use:** Leaves are lopped for fodder to goats. The plants are grown for the purpose of hedge (*Magar* and *Majhi*).

Lantana camara L., Sp. Pl. 627 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 147 (1982). Polunin & Stainton, Fl. Hima. 316 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 325 (2000). A straggling, shrub around 2-3 m tall. Leaves simple, petiolate, 1.5-8.5 cm long, 0.8-6 cm wide, ovate to oblong, apex acuminate, base more or less cordate. Flowers in capitates head, pedicellate, orange crimson and purple. Fruit a drupe, black when ripe, one-seeded. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Masino kanda*' (N), '*Sitaji phul*' (M); **Voucher specimen:** BM 0283, Hosrangdi, 1130 m asl., (Photo Plate 16C); **Fls.-Frts.:** March-

October; **Distrib.:** Nepal at 400-1500 m, India, China, Myanmar and Philippines;

Ecology: Found on exposed areas and tracks, also planted as hedge.

Medicinal use: A decoction of the roots, 3-4 teaspoonfuls twice a day for a week, is good to get rid of influenza, cough and mumps. Juice of the leaves is used as an external wash to cure eczema. Flowers juice, about 5 teaspoonfuls once a day for 5-6 consecutive days, is prescribed to treat rheumatism and jaundice (*Magar*). **Other use:** Ripen fruits are eaten fresh. The plants are used for biofencing.

Vitex negundo L., Sp. Pl. 638 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 148 (1982). Polunin & Stainton, Fl. Hima. 316 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 325 (2000). A deciduous shrub about 3 m tall. Leaves petiolate, trifoliate, leaflets 3-5, leaflets lanceolate, longest leaflet 5-10 cm. Flowers in branched clusters, forming pyramidal terminal panicle inflorescence, bluish. Propagated by seeds and stem cuttings.

Vernacular (Nepali) and Local Name: '*Simali*' (N), '*Tara*' (M); **Voucher specimen:** BM 0035, Falebas Devasthan, 850 m asl., (Photo Plate 16D); **Fls.-Frts.:** August-December; **Distrib.:** Nepal at 500-1600 m, India, Bhutan, Sri Lanka and China; **Ecology:** In open places.

Medicinal use: A decoction of the leaves, in dosages about 4 teaspoonfuls twice a day for 5-7 consecutive days, is referred to treat cough, cold, fever and gastric troubles. It is also inhaled to treat sinusitis. Dry powder leaves is smoked to relieve headache. Juice of the leaves is applied externally to cure rheumatic pain and swelling of the joints (*Magar*). Seeds are grounded and given with water to cure cough and cold. **Other use:** The twigs are used to make baskets and brooms and it is also used as toothbrush and for biofencing (*Magar*).

LAMIACEAE

Calamintha umbrosa (M. Bieb.) Fisch. & Mey., Ind. Sem. H. Petrop. 6: 6 (1840). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 151 (1982). Polunin & Stainton, Fl. Hima. 334 (1984). A small prostrate or ascending, hairy herb. Leaves short-petioled, 1.5-3 cm long, 0.7-1.5 cm broad, ovate, serrate, base rounded or truncate. Flowers purplish in axillary and terminal whorls; bracts few, linear, ciliate. Corolla 0.6-1 cm long, hairy. Nettlelets subglobose, pale brown, smooth.

Vernacular (Nepali) and Local Name: 'Suparnasa', (N) 'Sarshang' (G); **Voucher specimen:** BM 0206, Bhuka Deurali, 2028 m asl.; **Fls.-Frts.:** June-September; **Distrib.:** Nepal central and west Himalaya at 1800-3400 m, Bhutan, India and Burma; **Ecology:** Occurs on moist, shady as well as open places.

Medicinal use: Leaves juice, in dosages 5 teaspoonfuls twice a day for 15 days, is administered to reduce high blood pressure, chest pain, and inflammation of the human body (*Gurung*). **Other use:** The whole plant is used for fodder.

Colebrookea oppositifolia Sm., Exot. Bot. **2:** 111, t. 115 (1805). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 151 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 152 (2000). A shrub about 3 m tall. Leaves simple, petiolate, crowded at end of branches, 6-23 cm long, 2-10 cm wide, oblong to lanceolate. Flowers whitish, whorled in dense axillary or terminal branched spike-like clusters. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Dhursul' (N), 'Dhursule', 'Hogatani' (G), 'Bhutra', 'Dhulsu' (M); **Voucher specimen:** BM 0236, Kurgu, 1500 m asl., (Photo Plate 16E); **Fls.-Frts.:** December-April; **Distrib.:** Nepal at 500-1800 m, India, Bhutan, Bangladesh and China; **Ecology:** Occurs in open places, thickets in hot, dry regions.

Medicinal use: Young leaves juice, about 2-3 teaspoonfuls twice a day for a week, is given to relieve fever and headache (*Gurung* and *Magar*). Same juice is recommended twice a day for 10 days to treat epilepsy (*Gurung*). Juice of the young inflorescence, about 3-4 teaspoonfuls twice a day for 4-5 consecutive days, is prescribed to remove gastric problem (*Gurung* and *Magar*). **Other use:** The plant is lopped for fodder to cattle and dried branches are used as fuelwood. It is also used for green manure (*Gurung* and *Magar*).

Elsholtzia blanda (Benth.) Benth., Labiat. Gen. Spec. **2(3):** 162 (1833). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 152 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 152 (2000). A herb about 1 m tall. Leaves stalked, 2-12 cm long, 0.8-3.4 cm wide, elliptic to lanceolate, acuminate, serrate, glabrous, gland-dotted beneath. Flowers yellowish, propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bansilam' (N), 'Tana' (G); **Voucher specimen:** BM 0281, Thulipokhari, 1350 m asl., (Photo Plate 16F); **Fls.-Frts.:** August-November; **Distrib.:** Nepal at 500-2500 m, Northern India, Bhutan and China; **Ecology:** In moist and open places.

Medicinal use: Juice of the plant, about 3-5 teaspoonfuls twice a day for five days, is

recommended to cure headache and fever. It is also applied externally to treat cuts and wounds. Leaf juice, in dosages about 5 teaspoonfuls once a day for a week is good to relieve cough and cold. **Other use:** Leaves are used as fragrant agent in a curry. Seeds are pickled (*Gurung*).

Isodon coetsa (Buch.-Ham. ex D. Don) Kudo., Mem. Fac. Sci. Taihoku Imp. Univ. **2:** 131 (1929). Shrub about 1 m tall. Leaves stalked, 1.5-6 cm long, 1-3 cm wide, ovate to lanceolate, acuminate, serrate, pubescent. Flowers bluish in axillary and terminal panicles. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Jwahane jhar*', '*Mirre*' (N, M); **Voucher specimen:** BM 0477, Banou, 1809 m asl.; **Fls.-Frts.:** July-December; **Distrib.:** Throughout Nepal at 600-3400 m, Northern India, Bhutan, Sri Lanka and Western China; **Ecology:** Along trails, in hedges or in wet places.

Medicinal use: Juice of the plant is applied to cure boils. Juice of the roots, about 2 drops twice a day is dripped in the eye as ophthalmic medicine. Juice of the leaves, about 6 teaspoonfuls thrice a day for five days, is given to treat fever. Besides, the plant is boiled and soup is considered as tonic (*Magar*). **Other use:** The plant is used for fodder to cattle.

Mentha arvensis L., Sp. Pl. 577 (1753). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. **3:** 158 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 155 (2000). A trailing herb about 60 cm tall. Leaves opposite, short stalked, simple, oblong, 3-5 cm long, obtusely or scutely serrated. Flowers small, lilac in axillary whorls. Fruits nutlets smooth.

Vernacular (Nepali) and Local Name: '*Pudina*' (N, M, Ma); **Voucher specimen:** BM 0004, Tilahar, 1200 m asl.; **Fls.-Frts.:** June-August; **Distrib.:** Nepal about at 1000-2000 m, Pakistan and India; **Ecology:** Found in low areas along rivers, damp weedy meadows, roadside ditches and vacant lots.

Medicinal use: To cure diarrhoea, vomiting and gastric disorder, plant juice about 5 teaspoonfuls twice a day for 5-6 consecutive days, is prescribed. Fresh leaves are pounded and juice, about 8-10 teaspoonfuls daily for a week, is recommended to cure blood pressure and inflammation of the body (*Majhi* and *Magar*). **Other use:** Whole plant parts are used as flavouring agent and is pickled (*Majhi* and *Magar*).

Mentha spicata L., Sp. Pl. 576 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 158 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 156 (2000). A herb about 60 cm tall. Leaves simple, short petioled, 2-3.5 cm long, 1.5-2.5 cm wide, ovate, apex rounded, aromatic. Flowers small, white in whorl of many flowered spikes. Propagated by seeds or suckers.

Vernacular (Nepali) and Local Name: 'Pudina' (N), 'Daunne' (M), 'Bawari' (G);

Voucher specimen: BM 0152, Karkineta, 1640 m asl., (Photo Plate 16G); **Fls.-Frts.:**

June-August; **Distrib.:** Nepal at 1000-2700 m, Pakistan and India; **Ecology:** Occurs along rivers, damp weedy meadows, often cultivated in gardens.

Medicinal use: Leaves juice, in dosages about 5 teaspoonfuls twice a day for a week, is given to treat nausea, diarrhoea, dysentery and vomiting (*Magar*). Leaves are also chewed to remove cysts on the tongue (*Magar* and *Gurung*). Fresh leaves are pounded and juice, about 8-10 teaspoonfuls daily for a week, is prescribed to cure blood pressure and inflammation of the body (*Gurung* and *Magar*). **Other use:** Leaves are used as flavoring agent and pickled (*Gurung* and *Magar*).

Nepeta lamiopsis Benth. ex Hook. f., Fl. Br. Ind. **4**: 659 (1885). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 159 (1982). Polunin & Stainton, Fl. Hima. 330 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 156 (2000). A perennial herb about 25 cm tall. Stem ascending few branched, flaccid, and puberulent. Stem leaf blade broadly ovate-cordate, gray puberulent, base cordate, margin coarsely crenate, apex obtuse. Lower verticillasters axillary, upper, bracts leaflike, circular, margin crenate, ciliate; bracteoles linear, to 7 mm, ciliate. Calyx 8.5 mm, puberulent, throat oblique, subulate, posterior teeth longer, ciliate. Corolla violet, 1.2 cm, puberulent; tube slender, 8 mm. Nutlets broadly oblong.

Vernacular (Nepali) and Local Name: 'Kankarne' (N, M); **Voucher specimen:** BM 0436, Lespar- Kyang, 2717 m asl.; **Fls.-Frts.:** June-August; **Distrib.:** Nepal at 2600-4500 m, Bhutan and Tibet; **Ecology:** Found on open slopes in the drier areas.

Medicinal use: Juice of the leaves, about 4-5 teaspoonfuls thrice a day for a week, is prescribed to relieve stomach problem and painful urination (*Magar*). **Other use:** The plant is used as fodder to cattle.

Notochaete hamosa Benth., B. Reg. **15**: sub t. 1289 (1829). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 159 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 156 (2000). Stems 1-2.5 m tall, to 6 mm, at base, branches and stems striate, glabrescent. Leaf blade ovate, 5-8 cm, densely hirtellous, adaxially, sparsely stellate abaxially, base broadly cuneate to rounded, margin

densely serrulate-crenulate near base, apex acuminate. Verticillasters fruit, shorter than petiole, bracts, stellate abaxially. Calyx 5-7 mm, stellate on basal half outside, glabrous inside 4 mm including spine to 6 mm with subterminal hooked spine abaxially. Corolla reddish or yellow in colour. Fruit with nutlets and it can be propagated by seeds.

Vernacular (Nepali) and Local Name: '*Kuro*' (N), '*Golo kuro*' (M); **Voucher specimen:** BM 0488, Kyang, 1890 m asl., (Photo Plate 16H); **Fls.-Frts.:** August-October; **Distrib.:** Nepal Himalaya at 1200-2500 m, India, Burma, Myanmar and Bhutan; **Ecology:** Mostly margins of subtropical evergreen forests, valleys.

Medicinal use: Juice of the leaves, in dosages about 5-7 teaspoonfuls twice a day for 10-15 days, is used as antidote to cure snakebite and indigestion (*Magar*). **Other use:** The plant is used as fodder to cattle. It is also used for manure.

Ocimum basilicum L., Sp. Pl. 597 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 160 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 157 (2000). An erect annual herb about 70-95 cm tall. Leaves are simple, opposite, stalked, ovate, acuminate, toothed, gland dotted beneath. Flowers purplish white in racemes. Fruits nutlets light brown.

Vernacular (Nepali) and Local Name: '*Babariphool*' (N, M, G); **Voucher specimen:** BM 0015, Dhairing, 1479 m asl., (Photo Plate 16I); **Fls.-Frts.:** August-November; **Distrib.:** Eastern to Central Nepal at 500-1500 m, India, Bhutan, China, Taiwan and Malaysia; **Ecology:** Mostly found in moist and open places.

Medicinal use: Leaves juice, in dosages about 4-5 teaspoonfuls with honey twice a day for a week, is recommended in the treatment of cough (*Gurung*). A decoction of the seeds, 7 teaspoonfuls once a day for 8-10 consecutive days, is useful to treat gonorrhoea, dysentery and chronic diarrhoea (*Magar* and *Gurung*). **Other use:** Plant is used for religious purpose (*Magar* and *Gurung*).

Ocimum scantum L., Sp. Pl. 597 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 160 (1982). A biannual herb, much branched upto 30-60 cm in tall. Leaves simple, opposite, stalked, opposite, oblong or elliptic-oblong, obtuse or acute, entire, or sub-entire. Pubescent on both the sides. Flowers are purplish in elongate racemes in close whorls. Fruits nutlets, smooth. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Tulsipat*', '*Tulsi*' (N, M); **Voucher specimen:** BM 0381, Bihadi Ranipani, 1326 m asl.; **Fls.-Frts.:** August-December; **Distrib.:**

Throughout the Nepal at 500-1700 m, India and Bhutan; **Ecology:** Generally planted around houses, sacred open places.

Medicinal use: Juice of the leaves, about 4 teaspoonfuls twice a day for about 5-6 consecutive days, is given after meal to cure fever, bronchitis and earache. The same juice is useful in gastric disorder of children (*Magar*). It is also used during snakebite and scorpion sting. Leaves juice, in dosages about 8-10 teaspoonfuls once a day for a week, is recommended in abortification (*Magar*). **Other use:** Plant is useful for religious purpose.

Pogostemon benghalensis (Burm.f.) Kuntze., Rev. Gen. Pl. **2:** 529 (1891). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 162 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.158 (2000). An erect aromatic shrub about 1.5 m tall. Leaves simple, petiolate, 1.5-16 cm long, 1-8 cm wide, ovate, acute, rounded base. Flowers crowded in cylindrical spike, pale violet. Fruit, dark brown nutlet. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Kalo Rudilo*’ (N, M, G); **Voucher specimen:** BM 0357, Durlung, 1350 m asl.; **Fls.-Frts.:** October-April; **Distrib.:** Nepal at 600-1500 m, India, Bhutan and Bangladesh; **Ecology:** In moist places.

Medicinal use: A decoction of the leaves, about 5-6 teaspoonfuls twice a day for 5-6 consecutive days, is recommended to relieve cough and cold. The same juice is also used in treating diarrhoea of the cattle (*Gurung*). Juice of the roots is mixed in water and used in bathing children to relieve fever (*Magar*). **Other use:** The plant is used as fodder to cattle. Green leaves are used for manure (*Gurung*).

Pogostemon glaber Benth., in wall. [Cat. 41, n. 1533 (1829), nom. Nud.] Pl. As. Rar. **1:** 31 (1830). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 162 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.158 (2000). An erect herb about 1-2 m tall. Stem villous, glabrescent. Petiole to 6 cm, obsolete in uppermost leaves, leaf blade ovate, base broadly cuneate to rounded or subcordate, margin double serrate, apex acuminate, verticillasters many flowered. Propagated by seeds.

Vernacular (Nepali) and Local Name: ‘*Rudilo*’ (N), ‘*Khole dhyak*’ (M); **Voucher specimen:** BM 0356, Banou, 1350 m asl., (Photo Plate 17A); **Fls.-Frts.:** November-March; **Distrib.:** Nepal Himalaya at 300-1900 m, India (Sikkim, Assam), China and indo-China; **Ecology:** Mostly found in forest margins, hillsides and valleys.

Medicinal use: Paste of the leaves is applied to forehead to relieve headache. Juice of the leaves, about 2-3 teaspoonfuls thrice a day for 4-5 consecutive days, is given to relieve

fever (*Magar*). Juice of the roots is given in case of indigestion. **Other use:** The plant is used for fodder to cattle.

Salvia campanulata Wall. ex Benth., in Wall., Pl. As. Rar. **1:** 67(1831). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 164 (1982). Polunin & Stainton, Fl. Hima. 337 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 158 (2000). An erect perennial herb about 50-80 cm tall. Leaves cordate to ovate-truncate, abaxially pilose to pubescent and densely pilose along veins, base cordate, margin incised-crenate, apex acuminate. Inflorescences densely villous, glandular pilose, verticillasters 2-6 flowered, widely spaced. Corolla yellow 2.7 cm, subglabrous except upper lip villous, obliquely spreading, middle lobe obcordate, slightly constricted at base, lateral lobes triangular-ovate, 3 mm wide. Stamens slightly exserted or nearly included. Style slightly exserted. Nutlets brown, narrowly obovoid.

Vernacular (Nepali) and Local Name: 'Bethejhar' (N), 'Bethe' (M), 'Bethe saag' (Ma); **Voucher specimen:** BM 0455, Lespar-Kyang, 1920 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Nepal at 800-3800 m, Bhutan, India and Myanmar; **Ecology:** Mostly found in forest margins, hillsides and valleys.

Medicinal use: Juice of the leaves, in dosages about 2-3 teaspoonfuls twice a day for 5-7 consecutive days, is recommended to cure asthma and nose bleeding (*Magar*). **Other use:** Young twigs are cooked as vegetables (*Majhi*).

Salvia plebeia R. Br., Prodr. Fl. Nov. Holland. **1:** 501 (1810). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 165 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 159 (2000). An annual herb about 50 cm high. Leaves hairy pubescent or glabrous, simple, opposite, stalked, oblong-lanceolate or ovate, 2-8 cm long, 0.8-4 cm broad, crenate-serrate. Flowers white to lilac or bluish in terminal often spicate racemes; calyx hairy, enlarged in fruits. Fruits nutlets, minute, ovoid.

Vernacular (Nepali) and Local Name: 'Banbawari' (N), 'Kalo pati' (M, G); **Voucher specimen:** BM 0457, Durlung, 1538 m asl.; **Fls.-Frts.:** December-January; **Distrib.:** Nepal at 500-1700 m, Afghanistan, Pakistan, India, Bhutan, China, Japan and Malaysia; **Ecology:** On open and moist places.

Medicinal use: Paste of the plant is applied to wounds between the toes caused by prolonged walking on muddy water. Leaves are rubbed externally on feet to remove lice (*Gurung* and *Magar*). Dried powder of flowers, in dosages about 3-4 teaspoonfuls twice a day is prescribed to cure urine problem and thread worm infection (*Magar*). Paste of the

barks is used to cure piles (*Magar* and *Gurung*). **Other use:** Plants are fed to goats as fodder. It is also used to make green manure (*Magar* and *Gurung*).

Thymus linearis Benth., in Wall., [Cat. 42, n. 1567 (1829), nom. nud.] Pl. As. Rar. **1:** 31 (1830); Lab. Gen. Sp. 346 (1834). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 166 (1982). Polunin & Stainton, Fl. Hima. 335 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 152 (2000). An aromatic herb with procumbent stem, twigs clothed with short hairs. Leaves short stalked, opposite 1.5-1.5 cm long, 0.2-0.5 cm wide, ovate to oblong, gland-dotted. Flowers purple in colour, globose terminal spikes, 6 mm, weakly 2 lipped, calyx 2 lipped with ciliate lobes. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Ghoda marcha*' (N, M), '*Ban jawan*' (G);

Voucher specimen: BM 0323, Bhuktangle, 1790 m asl.; **Fls.-Frts.:** April-September;

Distrib.: Western and central China at 1500-4500 m, Afghanistan, Pakistan, Northern India, China and Japan; **Ecology:** Open and rocky slopes.

Medicinal use: Juice of the plant, in dosages about 4-5 teaspoonfuls twice a day for a week, is prescribed to treat stomach and liver disorder. It is also mixed with warm water and applied to get relieve from the body pain (*Gurung*). A decoction of the plants, about 4-5 teaspoonfuls twice a day for a week, is recommended to destroy intestinal parasitic worm (*Magar*). Juice of the leaves and flowers, in dosages about 5-7 teaspoonfuls twice a day for a week, is recommended as an appetizer, aphrodisiac, blood purifier agent. The same juice is used to cure gum and toothache (*Magar*). **Other use:** The plant contains essential oils and used for incense. Leaves and flowers are pickled (*Magar*).

PLANTAGINACEAE

Plantago major L., Sp. Pl. 112 (1753). Hara, Cater & Williams, Enum. Fl. Pl. Nep. **3:** 167 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 235 (2000). A glabrous annual or perennial, almost stemless or short stemmed herb. Leaves rosette, simple, ovate or oblong-ovate, 10-25 cm long, very narrow, acuminate, 3-nerved. Flowers small white coloured in cylindrical or ovoid spike. Fruits ellipsoid obtuse capsules. Seeds yellowish brown, minute, ovoid or boat-shaped.

Vernacular (Nepali) and Local Name: '*Isabgol*' (N, G); **Voucher specimen:** BM 0527, Bhangara, 1700 m asl.; **Fls.-Frts.:** January-May; **Distrib.:** Nepal about 2800 m, India, Sri Lanka, Bhutan, China and Afghanistan; **Ecology:** Occurs on open and moist places.

Medicinal use: A decoction of the plant, about 4-5 teaspoonfuls twice a day for a week, is referred to treat malarial fever. Paste of the leaves is applied externally to cure boils (*Gurung*). **Other use:** The whole plant is used as fodder to cattle and used in green manure.

NYCTAGINACEAE

Mirabilis jalapa L., Sp. Pl. 177 (1753). Hara, Cater & Williams, Enum. Fl. Pl. Nep. 3: 167 (1982). Polunin & Stainton, Fl. Hima. 339 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 203 (2000). A perennial herb about 1 m tall with tuberous roots. Leaves simple, petiolate, 3.7-7.5 cm long, 1.5-5 cm wide, narrowly ovate, apex, acuminate, base sub-truncate. Flowers usually purple or pinkish white, corolla tube elongated. Fruit narrowly ovoid, black, finely ribbed. Propagated by seeds or splitting of roots.

Vernacular (Nepali) and Local Name: '*Lankaphul*' (N), '*Maritidha*' (G); **Voucher specimen:** BM 0027, Ramja Deurali, 1550 m asl., (Photo Plate 17B); **Fls.-Frts.:** July-November; **Distrib.:** Nepal up to 1800 m, India, Bhutan and Pakistan; **Ecology:** Cultivated in the garden, also escape from cultivation.

Medicinal use: Paste of the roots is applied to treat scabies and muscular swellings. Juice of the roots, about 5 teaspoonfuls twice a day for 5 consecutive days, is administered to cure fever. Leaves paste is applied to ripen the boils (*Gurung*). **Other use:** The plant is used in ornamental purpose at home garden. It is also used as fodder to cattle. Sometimes tender leaves are cooked as vegetables.

AMARANTHACEAE

Achyranthes aspera L., Sp. Pl. 204 (1753) var. **asera**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 168 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 7 (2000). An erect herb about 1 m tall. Leaves simple, short petioled, 2-13 cm long, 1.5-7 cm wide, elliptic to ovate, rounded at apex. Flowers greenish white in terminal spikes. Fruits oblong urticel, enclosed in hardened perianth. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Utekuro*' (N), '*Tine*', '*Ulte puju*' (G), '*Jamjite*' (M), '*Bipyu kanda*', '*Chorato*' (Ma); **Voucher specimen:** BM 0550, Bhoksing, 1400 m asl.; **Fls.-Frts.:** June-December; **Distrib.:** Throughout Nepal at 500-2000 m, Pakistan, India, Sri Lanka and China; **Ecology:** In open and dry places.

Medicinal use: Roots juice, in dosages about 4-5 teaspoonfuls twice a day for 5 consecutive days, is prescribed to treat diarrhoea and dysentery (*Majhi* and *Magar*). Leaves juice is applied to cure piles, cuts and boils (*Gurung*). The plant juice is used to treat the skin diseases of children (all tribes). **Other use:** Whole plant is fed to goats and sheep as fodder (all tribes). Twigs are used as a toothbrush in the festival of 'Teej' (*Magar* and *Majhi*). The plant is also used as manure (*Magar*).

Achyranthes bidentata Blume., Bijdr. Fl. Ned. Ind. **11**: 545 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 168 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 7 (2000). An erect, pubescent herb around 1 m tall. Leaves simple, petiolate, 3.5-18.5 cm long, 1.5-9 cm wide, broadly elliptic, base obtuse or acute. Flowers greenish in axillary or terminal spikes. Fruits oblong urticle, enclosed in hardened perianth. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Datiwan' (N, M, Ma); **Voucher specimen:** BM 0368, Lunkhu Deurali, 2300 m asl.; **Fls.-Frts.:** June-December; **Distrib.:** Nepal to about 3000 m, India, China and Malaysia; **Ecology:** Occurs in shady places.

Medicinal use: Powdered roots, in dosages about 3-4 teaspoonfuls, once a day for 5-6 consecutive days with water, is administered in the treatment of sore throat, boils and hypertension (*Magar*). Extract of roots is applied to relieve toothache. This extract, in dosages about 6-7 teaspoonfuls thrice a day for a week, is effective to cure indigestion (*Majhi*). Twigs are known to counter pyorrhoea (bleeding of gums). Paste of the seeds is considered good in the treatment of piles (*Magar* and *Majhi*). **Other use:** Leaves and twig are lopped as quality fodder (*Magar* and *Majhi*). Twigs are used as toothbrush. The plant is ascribed with religious value during the 'Teej' festival, and used by Hindu women (*Magar* and *Majhi*).

Amaranthus caudatus L., Sp. Pl. 990 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 168 (1982). Polunin & Stainton, Fl. Hima. 339 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 7 (2000). An annual erect herb about 1.5 m tall. Commonly reddish or purplish throughout. Leaves glabrous or sparingly pilose, long-petiolate, lamina broadly ovate to rhomboid-ovate or ovate-elliptic, shortly cuneate to attenuate below. Flowers in axillary and terminal spikes, approximated cymose clusters, the terminal inflorescence varying from a single, elongate, tail-like, pendulous spike, male and female flowers intermixed throughout the spikes. Bracts and bracteoles deltoid-ovate, acuminate and with a long, pale or reddish, yellow-green or reddish stout, the longest up to twice as long as the perianth.

Vernacular (Nepali) and Local Name: 'Lunde' (N, M), 'Gandri' (Ma); **Voucher specimen:** BM 0009, Banou, 1250 m asl.; **Fls.-Frts.:** September-December; **Distrib.:** Nepal in 500-1500 m, India, Pakistan and South America; **Ecology:** Unknown in the wild except as an escape hills.

Medicinal use: Paste of the leaves is use to treat skin diseases (*Majhi*). Roots juice, about 4 teaspoonfuls twice a day for 3 days, is prescribed to cure fever and urinary problems (*Magar*). Same juice, 4-5 teaspoonfuls twice a day for a week, is laxative to children and also used to cure diarrhoea (*Majhi* and *Magar*). **Other use:** Tender twigs are cooked as vegetables. The plant is used for ornamental purpose (*Magar*).

Amaranthus spinosus L., Sp. Pl. 991 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 168 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 7 (2000). An annual erect spiny herb about 40-60 cm tall. Leaves simple, alternate, stalked, ovate or lanceolate or oblong, 4-6 cm long, 2-4 cm broad, entire, glabrous. Flowers small yellowish white or pale green, in dense axillary and terminal cylindric spikes. Fruits ovoid 2 cm long capsule.

Vernacular (Nepali) and Local Name: 'Lunde kanda' (N), 'Lunde' (M), 'Gandri' (Ma), 'Chikli', 'Lode' (G); **Voucher specimen:** BM 0380, Lunkhu Deurali, 1795 m asl., (Photo Plate 17C); **Fls.-Frts.:** May-December; **Distrib.:** Throughout Nepal at 1000-1800 m, India, Pakistan, Bhutan and Bangladesh; **Ecology:** Commonly occurs on open and sunny places.

Medicinal use: Juice of the roots, about 4 teaspoonfuls twice a day for 5-7 consecutive days, is administered to cure fever and urinary trouble (all tribes). **Other use:** Tender shoots and leaves are cooked as vegetables (all tribes).

Amaranthus viridis L., Sp. Pl. ed. 2, 1405 (1763). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 169 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 7 (2000). A prostrate annual herb around 30 cm tall. Leaves petioled, 3-10 cm long, 2-4.5 cm wide, ovate to lanceolate, apex acuminate, base rounded or cuneate. Flowers, sessile, unisexual, greenish in long condensed inflorescence. Propagated by seed.

Vernacular (Nepali) and Local Name: 'Banlunde' (N, M), 'Chikli' (G), 'Gandri' (Ma); **Voucher specimen:** BM 0296, Karkineta, 1900 m asl.; **Fls.-Frts.:** April-December; **Distrib.:** Central and western Nepal at 1000-2000 m, India, Bhutan, Bangladesh and Sri Lanka; **Ecology:** Occurs in open moist places.

Medicinal use: Juice of the roots extract, about 4 teaspoonfuls twice a day for three days, is prescribed to relieve diarrhoea, dysentery and headache (all tribes). **Other use:** Tender leaves and shoots are cooked as vegetables (*Magar* and *Gurung*).

Cyathula tomentosa (Roth) Moq., Prod. **13(2)**: 327 (1849). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**:169 (1982). A shrub or subshrub up to 10 cm long with densely grey-tomentose stems. Leaves opposite, elliptic, densely tomentose on both surfaces, petiolate. Flowers creamish-white in cymose clusters forming dense spikes; bracts shining, apex spiny, straight or hooked; tepals lanceolate; pseudostaminodes hairy along margin, apex fimbriate; utricle yellow.

Vernacular (Nepali) and Local Name: '*Aankhle kuro*' (N, G, M); **Voucher specimen:** BM 0230, Bhuka Deurali, 2190 m asl.; **Fls.-Frts.:** January-April; **Distrib.:** Nepal at 1800-2300 m, Bhutan, India and Myanmar; **Ecology:** Occurs on waste places.

Medicinal use: Juice of the roots, about 6 teaspoonfuls thrice a day for 5-6 consecutive days, is recommended to cure indigestion and peptic ulcer (*Gurung* and *Magar*). **Other use:** The plant is used for fodder and manure (*Gurung* and *Magar*).

CHENOPODIACEAE

Chenopodium album L., Sp. Pl. 219 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 170 (1982). Polunin & Stainton, Fl. Hima. 340 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 46 (2000). An erect herb. Leaves simple, petiolate, 0.5-15 cm long, 0.3-10 cm wide, elliptic to ovate, oblong, apex acute, fleshy. Flowers small, greenish pink in clustered panicles. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Bethe*' (N, G, Ma), '*Bethe gan*' (M); **Voucher specimen:** BM 0290, Bachchha, 1273 m asl.; **Fls.-Frts.:** March-August; **Distrib.:** Throughout Nepal at 1000-3000 m, India, Pakistan, Bangladesh, Sri Lanka, China, Korea, Japan, Thailand and Malaysia; **Ecology:** Found in moist open places.

Medicinal use: Roots juice, about 5-6 teaspoonfuls thrice a day for a week, is prescribed to cure diarrhoea and dysentery (*Gurung*). Seeds are chewed to treat urinary trouble (*Majhi* and *Magar*). **Other use:** Tender leaves and shoots are cooked as vegetables (all tribes).

Chenopodium ambrosioides L., Sp. Pl. 1: 219 (1753). Hara, Cater & Williams, Enum. Fl. Pl. Nep. 3: 170 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 46 (2000). An annual herb about 1 m tall. Leaves are oblong or lanceolate to short stalked. Flowers small green in axillary and terminal panicked spikes. Seeds small, black, shining.

Vernacular (Nepali) and Local Name: 'Ratolatte', 'Banlatte' (N, M, G), 'Pasare bethe' (Ma); **Voucher specimen:** BM 0599, Falebas Devasthan, 1020 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Nepal about at 500-3000 m, India; **Ecology:** Usually occurs along roadsides.

Medicinal use: Paste of the seeds is used to treat peptic ulcer (all tribes). **Other use:** Tender shoots with twigs are cooked as vegetables. Whole plant is grounded and used in fish poisoning. Seeds are roasted and pickled (all tribes).

POLYGONACEAE

Aconogonum molle (D. Don), Hara, Fl. E. Himalaya 68 (1966) var. **molle**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 172 (1982). Polunin & Stainton, Fl. Hima. 342 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 236 (2000). A perennial shrub about 2.5 m tall. Leaves simple, alternate, short stalked, lanceolate, elliptic, 10-20 cm long, sheathed stipule, silky hairy. Flowers white, small and numerous in terminal and much branched panicles. Fruits black, rounded 3 mm in diameter.

Vernacular (Nepali) and Local Name: 'Thotne' (N, M); **Voucher specimen:** BM 0287, Pang, 1376 m asl.; **Fls.-Frts.:** May-October; **Distrib.:** Throughout Nepal at 1200-1400 m, India, Bangladesh and Bhutan; **Ecology:** Found in moist places.

Medicinal use: A decoction of the tender shoots, about 4 teaspoonfuls twice a day for 5-6 consecutive days, is administered to cure diarrhoea and dysentery (*Magar*). **Other use:** Plant is considered as best fodder for milking animals and it is also stored for winter use.

Bistorta amplexicaulis (D. Don) Greene., Leaf. 1: 21 (1904). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 173 (1982). Polunin & Stainton, Fl. Hima. 344 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 237 (2000). A slender erect perennial herb about 60 cm tall. Leaves long-stalked, alternate, ovate, acuminate, crenulate, base cordate. Flowers pink, deep-red in long-penduncled racemes, spike usually solitary, sometimes branched. Fruit a nut, three-angled. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Ratnyaulo' (N, M, Ma); **Voucher specimen:** BM 0483, Sirpu-Lespar, 2716 m asl.; **Fls.-Frts.:** June-November; **Distrib.:** Throughout Nepal at 2100-4800 m, Afghanistan, India, Bhutan and Western China; **Ecology:** Found in moist places.

Medicinal use: Paste of the leaves is applied externally to cuts and wounds (*Magar* and *Majhi*). **Other use:** The plant is used for fodder to cattle (*Magar*).

Bistorta macrophylla (D. Don) Sojak., *Preslia* **46**: 152 (1974). Hara, Chater & Williams, *Enum. Fl. Pl. Nep.* **3**: 173 (1982). Polunin & Stainton, *Fl. Hima.* 345 (1984). Press *et al.*, *Ann. Check. Fl. Pl. Nep.* 237 (2000). Herb about 30 cm high with fibrous rootstocks. Basal leaves stalked, ovate to lanceolate, acuminate, margin often strongly rolled in, marginal veins prominent, pubescent beneath, base rounded or cordate, upper leaves sessile, linear or lanceolate, acuminate, entire. Flowers pink in racemes. Fruit an achene, brown. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Maakuri phul' (N, M); **Voucher specimen:** BM 0472, Sirpu-Lespar, 2746 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Throughout Nepal at 2600-4500 m, Northern India, Bhutan, Western and central China; **Ecology:** On damp ground and in alpine meadows.

Medicinal use: To cure diarrhoea and dysentery, a decoction of the plant about 4-6 teaspoonfuls thrice a day for 5-7 consecutive days, is administered. In 'Shrawan Sakranti', the plant is used to perform a ritual with the belief that it removes the evil spirits as well as scabies from the human body. **Other use:** Tender roots are eaten fresh by children (*Magar*).

Fagopyrum dibotrys (D. Don) Hara., *Fl. E. Him.* 69 (1966); **2**: 22 (1971). Hara, Chater & Williams, *Enum. Fl. Pl. Nep.* **3**: 174 (1982). Polunin & Stainton, *Fl. Hima.* 346 (1984). Press *et al.*, *Ann. Check. Fl. Pl. Nep.* 238 (2000). An erect pubescent herb about 1 m high. Leaves stalked, 5-11 cm long, 4.5-13 cm wide, triangular, acuminate, entire, veins pubescent, base cordate. Flowers white in axillary and terminal paniced cymes. Fruit a nut, three-angled. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Barbande' (N), 'Muran' (M), 'Tautha' (G); **Voucher specimen:** BM 0448, Bhuktangle, 1750 m asl., (Photo Plate 17D); **Fls.-Frts.:** June-September; **Distrib.:** Throughout Nepal at 1500-3000 m, Northern India, Tibet and Eastward to China; **Ecology:** Occurs in shady places.

Medicinal use: A decoction of the leaves is used to treat muscular swellings (*Gurung*).

Other use: Tender leaves and shoots are cooked as vegetables. The whole plant is used for fodder to cattle (*Magar*).

Fagopyrum esculentum Moench., Meth. 290 (1794). Hara, Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 174 (1982). Polunin & Stainton, Fl. Hima. 347 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 238 (2000). A annual herb about 60 cm tall. Leaves simple, lower leaves sessile, upper leaves long petioled, triangular cordate, apex acute, 0.5-9 cm wide. Flowers pin in axillary and terminal many flowered cymes. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Fapar' (N), 'Bre', 'Ghyabre' (G), 'Phaphar' (M); **Voucher specimen:** BM 0522, Deupurkot, 1720 m asl.; **Fls.-Frts.:** August-February; **Distrib.:** Central and eastern Nepal at 1000-2500 m, India and Pakistan; **Ecology:** Occurs in moist places.

Medicinal use: Paste of the grains flour is applied externally for a week to treat rheumatic pain (*Gurung* and *Magar*). **Other use:** Tender shoots are cooked as vegetables. Grains are cooked and mixed with 'Marcha' and distill alcoholic beverage. Grains flour is an important food item (*Gurung* and *Magar*).

Persicaria perfoliata (L.) H. Gross., Bot. Jahrb. **49**: 275 & 281 (1913). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 177 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 239 (2000). A trailing annual herb. Leaves petioled, obtuse with recurved prickles. Flowers yellowish in terminal racemes. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bakhre aankhla' (N, M, G); **Voucher specimen:** BM 0461, Bajung, 1300 m asl., (Photo Plate 17E); **Fls.-Frts.:** June-October; **Distrib.:** Central to eastern Nepal at 900-1400 m, India, Eastern China, Malaysia and Japan; **Ecology:** Occurs on moist open uncultivated land.

Medicinal use: Juice of the leaves is applied externally to relief backache (*Gurung*). **Other use:** Plant is used as fodder to animals. Tender leaves and shoots are cooked as vegetables. Fruits are eaten by children (*Magar*).

Persicaria runcinata (Buch.-Ham. ex D. Don) H. Gross., B. Jahrb. **49**: 277 (1913). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 178 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 240 (2000). A trailing herb. Leaves stalked, 2-18.5cm long, 1.7-7.5cm wide, runcinate,

glabrous or bristly hairy on the midvein above, terminal lobe triangular ovate, acuminate, ciliate. Flowers white or pink in few-headed terminal panicles. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kapre sag' (N), 'Kapree saag' (Ma); **Voucher specimen:** BM 0463, Pangrang, 1516 m asl.; **Fls.-Frts.:** May-November; **Distrib.:** Eastern and central Nepal at 1500-3600 m, Northern India, Bhutan, Tibet, Eastern China and Malaysia; **Ecology:** In moist, shady places.

Medicinal use: Young shoots and leaves are cooked and taken as tonic to treat cardiac problems (*Majhi*). **Other use:** The plant is cooked as vegetables.

Rheum australe D. Don, Prodr. Fl. Nep. 75 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 179 (1982). Polunin & Stainton, Fl. Hima. 348 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 240 (2000). An annual herb about 1.5 m tall. Leaves stalked, orbiculate, cordate, entire, glabrous above, sparsely hairy on the veins beneath, the basal leaves up to 60 cm across, rootstock very stout. Flowers dark purple, 3mm across. Fruit oblong ovoid, purple in colour, notched at the apex. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Padamchaal', 'Akase chuk' (N, M), 'Khaghyun' (G); **Voucher specimen:** BM 0444, Bhuktangle, 3112 m asl., (Photo Plate 17F); **Distrib.:** Nepal at 3000-4200 m, Northern India and China; **Fls.-Frts.:** June-September; **Ecology:** Open and rocky grounds.

Medicinal use: Juice of the rhizomes, in dosages about 4-6 teaspoonfuls twice a day for a week, is administered to cure stomachache and considered as tonic and laxative effect (*Magar* and *Gurung*). Juice of the rootstocks, in dosages about 3-5 teaspoonfuls once a day for a week, is given in sprain and menstrual disorder. **Other use:** Rhizomes are used as yellow dye. It is also eaten raw and pickled (*Magar*). Rootstocks are used for colouring wool and as adhesive. The whole plant is used to distill local alcohol. It is also used to make tea (*Magar*).

Rheum moorcroftianum Royle, Ill. B. Him. 315 & 318 (1836). Hara & Williams, Enum. Fl. Pl. Nep. 3: 179 (1979). Polunin & Stainton, Fl. Hima. 347 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 240 (2000). A perennial gregarious herb up to 60 cm tall. Stem reddish in colour. Leaves simple, alternate, long stalked, cordate, 2-28cm across, glabrous, tip rounded or sub acute. Flowers pinkish white in colour. Fruits with three papery wings, turns red when ripe. Nutlets ovoid, with narrow strings. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Padamchaal' (N, M), 'Kesa', 'Keje' (G); **Voucher specimen:** BM 0449, Sirpu-Lespar, 3300 m asl.; **Distrib.:** Nepal at 3000-4700 m, Northern India and China; **Fls.-Frts.:** June-July; **Ecology:** Rocky hillsides above streams.

Medicinal use: Leaves are smoked in a pipe to treat sinusitis (*Magar*). Juice of the roots, in dosages about 5-6 teaspoonfuls twice a day for a week, is recommended in treatment of constipation and is also used as antiseptic (*Magar* and *Gurung*). The plant juice, in dosages about 5 teaspoonfuls thrice a day for 4-5 successive days, is prescribed to cure stomachache, expel intestinal worm and to stimulate blood circulation (*Magar*). **Other use:** Plant is used to make pickle and to distill local alcohol (*Magar*).

Rumex nepalensis Spreng., Syst. Veg. 2:159 (1825). Hara, Chater & Williams, Enum.nFl. Pl. Nep. 3: 179 (1982). Polunin & Stainton, Fl. Hima. 349 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 241 (2000). Herb, annual or perennial, with spreading branches, stout rootstock, around 1 m tall. Leaves petiolate, 3.5-14 cm long, 1-9 cm wide, upper leaves sessile, elliptic to ovate. Flowers in whorls of long racemes, reddish. Fruit a nut, broad winged, brown, fringed with comb-like hooked teeth. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Halhale sag' (N, G), 'Kelai' (M); **Voucher specimen:** BM 0025, Durlung, 1561 m asl., (Photo Plate 17G); **Fls.-Frts.:** March-October; **Distrib.:** Nepal to about 1200-3000 m, India, Pakistan, Bhutan, Bangladesh, China and Africa; **Ecology:** Commonly found in open and moist places.

Medicinal use: Juice of the roots, about 4-5 teaspoonfuls for a week, is given to stimulate or facilitate excretion of the bowels, cough and cold (*Gurung*). It is also used as antidote to cure food poisoning in cattle. The roots are boiled continuously to obtain a concentrated fluid which is applied on dislocated joints, bone to heal and held by bamboo splints (*Magar*). Paste of the roots is applied on swollen gums. Leaves are rubbed over muscular swellings and boils (*Magar* and *Gurung*). Juice of the leaves is applied to relieve headache. The plant is boiled in water about 10 minutes and the filtered water is used to wash the body to alleviate body pain. Extract of the roots is given to the animals to expel worms. **Other use:** Tender leaves and shoots are cooked as vegetables. It is also used to make fermented 'Gundruk' (*Gurung* and *Magar*).

PIPERACEAE

Piper chaba (Hunter)., *Asiat. Res.* **9**: 391 1809. It is a creeper plant that spreads on the ground. It may also grow around large trees. The leaves are oval-shaped, about 2 to 3 inches long, flowers are monoceous and blossom during the monsoon, fruit looks similar to other varieties of long pepper with an elongated shape that can grow up to 3 inches long.

Vernacular (Nepali) and Local Name: '*Chabo*' (N, M, Ma); **Voucher specimen:** BM 0387, Pakhapani-Sarthan, 1135 m asl., (Photo Plate 17H); **Fls.-Frts.:** September-November; **Distrib.:** Throughout Nepal to about 1200 m, Northern India, Bhutan, Sri Lanka and Malaysia; **Ecology:** Found in shady places.

Medicinal use: The roots and fruits are chewed to relieve asthma, bronchitis, constipation and inflammation (*Majhi* and *Magar*). Juice of the stem, about 4 teaspoonfuls twice a day for 5-6 consecutive days, is administered to cure rheumatic pains and diarrhoea (*Magar*). **Other use:** Whole plant is used to make '*Marcha*' for local alcohol fermentation. The plant is used during fish poisoning (*Majhi*).

Piper longum L., *Sp. Pl.* 29 (1753). Hara, Chatter & Williams, *Enum. Fl. Pl. Nep.* **3**: 181 (1982). Press *et al.*, *Ann. Check. Fl. Pl. Nep.* 234 (2000). A creeping herb and rooting below often minutely tomentose. Leaves stalked, 3-8 cm long, 2-8 cm wide, broadly ovate to cordate, shortly acuminate, glabrous, lower leaves long-stalked, upper leaves sessile, clasping the stem at their base, usually five-veined at the base. Flowers greenish in spikes. Fruit a berry, crowded in cylindrical spikes. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Pipla*' (N), '*Ban mircha*' (M); **Voucher specimen:** BM 0389, Pakhapani-Sarthan, 1165 m asl., (Photo Plate 17I); **Fls.-Frts.:** September-December; **Distrib.:** Throughout Nepal to about 1200 m, Northern India, Bhutan, Sri Lanka and Malaysia; **Ecology:** Found in shady places.

Medicinal use: Dried fruits powder, about 4 teaspoonfuls thrice a day for a week, is recommended to overcome the constipation. Same juice is given to relieve cough and asthma (*Magar*). **Other use:** Fruits are used as condiments. Whole plant is used as fodder to cattle. Fruits are used during fish poisoning.

LAURACEAE

Cinnamomum camphora (L.) J. Presl., Prir. Rostlin 2: 36, 47 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 183 (1982). Polunin & Stainton, Fl. Hima. 352 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 160 (2000). An evergreen tree about 10 m tall. Leaves simple, petiolate, 3.5-11.5 cm long, 1.5-5.5 cm wide, ovate to lanceolate. Flowers greenish yellow in axillary and terminal panicles. Fruits globular, with thickened club shaped base. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kapur' (N, G, M, Ma); **Voucher specimen:** BM 0277, Tribeni, 1123 m asl.; **Fls.-Frts.:** March-July; **Distrib.:** Central Nepal at 1000-1500 m, China, Taiwan, Japan and India; **Ecology:** Mostly in open places.

Medicinal use: Leaves are boiled in water and vapours (infusions) are used to treat cough and cold (*Majhi*). **Other use:** The plant is a source of camphor. Wood is used in fuelwood and to make furniture (all tribes).

Cinnamomum tamala (Buch.-Ham.) Nees & Eberm., Handb. Med. Pharma. Bot. 2: 426 (1831). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 183 (1982). Polunin & Stainton, Fl. Hima. 351 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 161 (2000). An evergreen medium sized tree about 15 m tall. Leaves simple, short petioled, 7.5-20 cm long, 3.5-6.5 cm wide, ovate to oblong, pinkish when tender, aromatic when crushed. Flowers pale yellow, in terminal and axillary branched clusters. Fruit a drupe, ovoid, black, succulent. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Tejpat' (N, M), 'Lepe' (G); **Voucher specimen:** BM 0083, Pakhapani-Sarthan, 1253 m asl.; **Fls.-Frts.:** April-February; **Distrib.:** Throughout Nepal at 500-2000 m, India; **Ecology:** On moist forest land.

Medicinal use: Juice of the bark, about 3-4 teaspoonfuls twice a day for 5-6 consecutive days, is useful to treat diarrhoea and nausea (*Magar* and *Gurung*). **Other use:** Leaves are used for flavour in tea and meat as spices. Leaves and barks are sold to the local market (*Magar*).

Lindera neesiana (Wall. ex Nees) Kurz., Prelim. Rep. Forest Pegur. 103 (1875). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 184 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 161 (2000). A deciduous tree about 4 m tall. Leaves simple, petiolate, 2.5-15 cm long, 1.5-9 cm wide, ovate, cordate or cuneate at base. Flowers minute, yellowish in 5-7 flowered umbel, fruit globose on persistent perianth. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Siltimur' (N, M), 'Katu', 'Kutung' (G); **Voucher specimen:** BM 0418, Chitre, 1622 m asl.; **Fls.-Frts.:** October-June; **Distrib.:** Nepal at 700-2600 m, Northeastern India and Bhutan; **Ecology:** Occurs in openings along ravines in forests.

Medicinal use: Powder of the roots bark, in dosages about 1-2 teaspoonfuls twice a day for a week, is prescribed to relieve body pain (*Magar*). The fruits are chewed in case of diarrhoea and toothache. Fruits powder mixed with sugar candy is a good remedy to treat chronic cough (*Gurung*). Leaves and fruits are used to cure skin diseases. If the cattle eat poisonous plants, fruits juice are given to treat stomach disorder (*Gurung* and *Magar*). **Other use:** Dry wood is used as fuelwood. Barks are used in fish poisoning (*Gurung* and *Magar*).

Litsea cubeba (Lour.) Pres., Syn. Pl. 2, 1: 4 (1806). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3: 185 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 162 (2000). A tree without perulate buds. Young shoot and leaves glabrous. Leaves spirally arranged, petiole, oblong-lanceolate or lanceolate, acute, entire, 11-19 cm long and 2-5 cm broad, pinninerved, 11-15 pairs, distinct, bright green above, pale glaucous beneath. Flower large, yellow. Female flower small.

Vernacular (Nepali) and Local Name: 'Siltimur' (N, M), 'Siltimuur' (Ma); **Voucher specimen:** BM 0272, Pangrang, 1750 m asl., (Photo Plate 18A); **Fls.-Frts.:** May-June; **Distrib.:** Eastern and central Himalayas in Nepal at 1000-2700 m, India, Burma and China; **Ecology:** Found in sub tropical forests.

Medicinal use: Bark of the roots and leaves are grounded to make a paste, which is applied to relieve athlete's foot pain and other skin diseases (*Magar*). To treat stomach disorder, fruits juice about half glass once a day, is given if the cattle eat poisonous plants (*Majhi* and *Magar*). **Other use:** The ripen fruits are used during fish poisoning and also pickled (*Majhi* and *Magar*).

Litsea monopetala (Roxb.) Pers., Syn. Pl. 2: 4 (1807). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3: 185 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 162 (2000). A tree about 15 m tall. Leaves elliptic-oblong, ovate or obovate, simple and alternate. Flowers white or pale, greenish yellow in umbels or corymbs. Fruits drupe, globose-ellipsoid, black when ripen.

Vernacular (Nepali) and Local Name: 'Kutmero' (N, M), 'Kuturke' (G); **Voucher specimen:** BM 0140, Hosrangdi, 1200 m asl., (Photo Plate 18B); **Fls.-Frts.:** April-

November; **Distrib.:** Eastern to Central Nepal at 500-2500 m, Northern India, Bhutan and Bangladesh; **Ecology:** Mostly in shady places.

Medicinal use: To cure diarrhoea and dysentery, barks juice about 5-6 teaspoonfuls twice a day for a week, is administered (*Gurung*). Paste of the barks is used externally to relieve pain (*Magar*). **Other use:** Leaves are lopped for fodder. Wood is used as fuelwood (*Gurung* and *Magar*).

Neolitsea pallens (D. Don) Momiy. & H. Hara ex H. Hara., J. Jap. B. **47**: 269 (1972). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 186 (1982). Polunin & Stainton, Fl. Hima. 353 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 162 (2000). Small tree with branchlets slender, densely, sub-adpressed tomentellous. Leaves aggregate, narrowly oblong to sub lanceolate, attenuately acuminate, base shortly acute to rounded, both surfaces minutely areolate-reticulate. Male flower with pedicels villous, tepals oblong, glabrous, stamens 4 mm, strongly exerted. Female flower oblong, style 1.5 mm, stigma minute and peltate. Fruit ellipsoid-globose, pedicel slightly obconical, slender, 7-10 mm, mature cup flat, disc-like, 2-3 mm in diameter, thin, the margin of 6 broad lobes.

Vernacular (Nepali) and Local Name: 'Simalte', 'Pyapya' (N), 'Khane phul' (M); **Voucher specimen:** BM 0532, Banou, 2000 m asl.; **Fls.-Frts.:** March-May; **Distrib.:** Nepal at 2000-3000 m, China, Pakistan and Northern India; **Ecology:** In moist pine woods.

Medicinal use: Juice of the fruits is applied to treat scabies and eczema. Seeds oil is used as antidote in snake bites (*Magar*). **Other use:** The plant is used for fodder to cattle.

THYMELAEACEAE

Daphne bholua Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 68 (1825) var. **bholua**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 188 (1982). Polunin & Stainton, Fl. Hima. 354 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 308 (2000). An evergreen shrub about 2 m tall. Leaves stalked long, 1-4 cm wide, oblong, entire, leathery. Flowers sessile, white or purplish, fragrant. Fruit an ovoid berry, deep red or rusty when fully ripe, succulent. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Lokta' (N, Ma), 'Setabaduwa', 'Syugu mhendo' (G), 'Logoto' (M); **Voucher specimen:** BM 0066, Durlung, 1678 m asl., (Photo Plate 18C); **Fls.-Frts.:** November-May; **Distrib.:** Nepal at 1000-3200 m, India and Bhutan; **Ecology:** In moist places.

Medicinal use: A decoction of the stem barks, about 5 teaspoonfuls twice a day for 5-6 consecutive days, is recommended to relieve fever (*Gurung*). Juice of the roots and barks, 3-4 teaspoonfuls once a day for a week, is given in case of gastric disorder (all tribes). **Other use:** The plant leaves is used in stimulating buffaloes for intercourse (*Magar*). Nepalese paper (hand made) is prepared from the barks. Ropes used in carrying loads is also twined from bark. Squeezed barks and leaves are used in fish poisoning (all tribes).

Wikstroemia canescens Wall. ex Meisn., Denkschr. B.Ges. Regensb. **3**: 288 (1841). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 188 (1982). Polunin & Stainton, Fl. Hima. 356 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 309 (2000). Shrub with a few slender branches. Leaves stalked, 1.5-8 cm long, 0.5-2.5 cm wide, oblong to lanceolate, acuminate, entire, membranous, often pubescent. Flowers subsessile, yellow, in few-flowered cymes. Fruit narrowly ovoid, silky. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: 'Kalo logte', 'Phurke pati' (N, M); **Voucher specimen:** BM 0242, Banou, 1581 m asl.; **Fls.-Frts.:** April-November; **Distrib.:** Throughout Nepal at 1500-3200 m, Afghanistan, Northern India, Sri Lanka and China; **Ecology:** Occurs in open places.

Medicinal use: Juice of the leaves, about 3-4 drops thrice a day for 4-5 consecutive days, is dripped into nose to stop bleeding. **Other use:** Fiber from barks of the stem is used to prepare handmade Nepalese paper (*Magar*).

LORANTHACEAE

Taxillus umbellifer (Schult.) Danser., Bull. Jard. B. Buitenzorg ser. 3, **11**: 455 (1931). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 191 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 190 (2000). Shrub about 2 m tall. Young stems tomentose, glabrous, hairs dark brown, branched, grayish in colour. Leaves opposite or subopposite, leaf blade oblong-ovate, leathery, abaxial surface persistently tomentose, lateral veins 5-7 pairs, prominent on surfaces, base cuneate, apex shortly acuminate. Umbels 2-3 fascicled, peduncle 3-4 mm, stellate hairy, bracts ovate. Calyx ellipsoid, minutely 4-toothed. Mature bud ellipsoid. Corolla red, slightly curved, lobes lanceolate. Stigma capitate. Young berry ellipsoid, pilose.

Vernacular (Nepali) and Local Name: 'Hagero' (N, M); **Voucher specimen:** BM 0487, Lespar-Kyang, 2620 m asl.; **Fls.-Frts.:** August-November; **Distrib.:** Nepal at 1500-2800, Burma, Bhutan, India and China; **Ecology:** In forests, mountain slopes.

Medicinal use: Powder of the leaves is applied to treat malaria, skin infection, cold pain in wrist and knee. Pills made from the leaves paste, about 3-4 pieces twice a day in 5 consecutive days, is given to cure malarial fever (*Magar*). **Other use:** Plant is used for fodder to cattle.

EUPHORBIACEAE

Bridelia retusa (L.) Spreng., Syst. Veg. **3:** 48 (1829). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 194 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.106 (2000). A deciduous tree about 6 m tall. Leaves simple petiolate, 6-15 cm long, 3.5-8 cm wide, ovate to elliptic, tapering apex, slightly tapering or rounded base. Flowers sub-sessile, yellowish, in axillary or terminal clustered panicles. Fruit a purplish black, globose drupe, persistent calyx. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Gayo' (N, M); **Voucher specimen:** BM 0165, Bhorle, 1234 m asl., (Photo Plate 18D); **Fls.-Frts.:** May-December; **Distrib.:** Nepal at 500-1500 m, India, Sri Lanka, China, Malaysia and Indonesia; **Ecology:** In open places.

Medicinal use: Stem barks juice, in dosages about 5 teaspoonfuls thrice a day for a week, is prescribed to treat diarrhoea, dysentery and peptic ulcer (*Magar*). **Other use:** Wood is used to make furniture and musical instrument, *Madal*. Ripen fruits are eaten fresh. Leaves are lopped for fodder.

Euphorbia heterophylla L., Sp. Pl. 453 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 195(1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.107 (2000). A herb about 75 cm tall. Leaves stalked, alternate, crowded at the apex, entire or sinuate and dentate. Flowers yellowish with pink tip. Fruit a capsule, sub-globose. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Maitula jhar' (N, M); **Voucher specimen:** BM 0246, Deupurkot, 1520 m asl.; **Fls.-Frts.:** April-November; **Distrib.:** Throughout Nepal to about 1800 m and India; **Ecology:** Found in open, moist places, pantropical weed.

Medicinal use: Latex is applied to treat boils. Juice of the plant is applied to cure cuts and wounds (*Magar*). **Other use:** The plant is used to make manure.

Euphorbia hirta L., Sp. Pl. 454 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:**195 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.107 (2000). A prostrate herb about 50 cm tall. Leaves shortly stalked, opposite, 2-4 cm long, ovate to oblong, acute, dentate, dark green or

reddish above, white or villous beneath. Inflorescence greenish or purplish in axillary cymes. Fruit a capsule, breaking into three cocci, appressed pubescent. Flowers and fruits most of the year. Propagated by nodal rooting of the stem or by seeds.

Vernacular (Nepali) and Local Name: 'Dudhejhar' (N), 'Dudhi jhar' (M), 'Dudhe aainar' (Ma), 'Chimphar jhar' (G); **Voucher specimen:** BM 0424, Thulipokhari, 1397 m asl., (Photo Plate 18E); **Fls.-Frts.:** Most part of the year; **Distrib.:** Throughout Nepal at 400-1800 m, India and Bhutan; **Ecology:** In open and moist places.

Medicinal use: Plant juice, about 4 teaspoonfuls twice a day for 5-7 consecutive days, is administered to cure cough, fever, asthma and bronchitis (*Majhi* and *Gurung*). The same juice is dripped about 1-2 drops in a day for a week in the infected ear. Paste of the roots is used to treat cuts and wounds (*Magar*). **Other use:** Plants are fed as fodder to cows and buffalos for the increment of milk (all tribes).

Euphorbia pulcherrima Willd. ex Klotzsch, in Otto & Dietr., Allg. Gartenz. **2:** 27 (1834). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 196 (1982). Polunin & Stainton, Fl. Hima. 360 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.108 (2000). Shrub, around 4 m tall. Leaves simple, petiolate, elliptic to ovate, apex acute, bracteates leaves colored reddish or yellowish red. Flowers bright red, involucre bearing large yellow glands. Propagated by stem cuttings.

Vernacular (Nepali) and Local Name: 'Lalupate' (N), 'Olat' (G), 'Lalpote' (M); **Voucher specimen:** BM 0185, Thulipokhari, 1320 m asl.; **Fls.-Frts.:** Throughout the year; **Distrib.:** Nepal to about 1400 m, India, Pakistan, Bhutan and Burma; **Ecology:** Found in open places.

Medical use: Latex from plant is externally applied on boils to dry it up. Paste of the leaves is applied on different skin ailments (*Gurung*). Infusion of the flowers head is taken to increase the secretion of milk of breast feeding mothers (*Magar* and *Gurung*).

Other use: Plant is grown in courtyards for ornamental purpose. It is also used in biofencing (*Magar* and *Gurung*).

Euphorbia royleana Boiss in DC., Prodr. **15(2):** 83 (1862). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 196 (1982). Polunin & Stainton, Fl. Hima. 360 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.108 (2000). An erect, spiny, fleshy, succulent shrub around 5 m tall. Leaves simple, short pedicled, fleshy, rounded apex, narrowed towards base, 10-15 cm long, spatulate. Flowers sessile, yellowish in axillary clusters. Propagated by stem cuttings.

Vernacular (Nepali) and Local Name: 'Siundee' (N), 'Syuri' (G), 'Dha', 'Mete' (M), 'Kanpate' (Ma); **Voucher specimen:** BM 0360, Chuwa, 954 m asl., (Photo Plate 18F); **Fls.-Frts.:** June-October; **Distrib.:** Throughout Nepal at 500-2400 m, India and Bhutan; **Ecology:** Generally found in open and dry places.

Medicinal use: The milky latex, about 2-3 teaspoonfuls once a day for a week, is given with water to cure fever. The latex is applied externally to relieve mumps, pimples and cuts (*Gurung*). Same latex is warmed over a fire and applied to wounds between the toes especially during rainy season because of walking on muddy water (*Magar* and *Majhi*).

Other use: The plant is cut into pieces and spread in the water for fish poisoning. The stem is used to make musical instruments such as *Sarangi* and *Madal* (*Magar* and *Gurung*). It is also planted for biofencing (all tribes).

Euphorbia thymifolia L., Sp. Pl. 454 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 196 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 108 (2000). A small annual prostrate herb. Leaves are simple, oblong, opposite, petiole very short. Flowers in axillary involucre, gland green, narrowly bordered with a white rounded limb.

Vernacular (Nepali) and Local Name: 'Dudheejhar' (N, M, G); **Voucher specimen:** BM 0065, Shankar Pokhari, 1090 m asl.; **Fls.-Frts.:** May-August; **Distrib.:** Throughout Nepal at 750-1100 m, India, Bhutan and Bangladesh; **Ecology:** In open places.

Medicinal use: Latex of the plant is used to treat ringworm and skin disease (*Gurung*).

Other use: Latex is used during fish poisoning (*Gurung* and *Magar*).

Jatropha curcas L., Sp. Pl. 1006 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 197 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 109 (2000). A soft-wooded tree about 4 m tall. Leaves simple, petiolate, 4-13 cm long, 3.5-13 cm wide, broadly ovate or orbiculate, cordate base. Flowers yellowish in loose panicles of cymes. Fruit oblong three-lobed capsule, yellowish when ripe. Seeds, oily, smooth, oblong, dark brown. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Sajiwan' (N), 'Aren', 'Aril' (Ma), 'Rajani giri' (G), 'Ratyun' (M); **Voucher specimen:** BM 0536, Bihadi Ranipani, 990 m asl., (Photo Plate 18G); **Fls.-Frts.:** April-January; **Distrib.:** Throughout Nepal at 300-1300 m, Pakistan, India, Bhutan and Sri Lanka; **Ecology:** On open places.

Medicinal use: To treat syphilis and pneumonia, a decoction of the plant, dosages about 3-4 teaspoonfuls twice a day for 5-6 consecutive days, is prescribed (*Magar*). Juice of the barks is applied externally twice a day to cure rheumatism (*Majhi* and *Gurung*). Sap

of stem is applied to relieve wounds between the toes caused by prolonged walking on muddy water (*Magar*). A decoction of the fruits, in dosages about 5-7 teaspoonfuls once a day for 4-5 consecutive days, is prescribed in abortification (*Magar* and *Majhi*). **Other use:** A young shoot is used as toothbrush (all tribes). The plants are also used as hedge. Oil from the seeds is used as fuel in vehicles as an alternative to petrol.

Phyllanthus amarus Schum. & Thonn., Kongl. Danske Vid. Selsk, Skr. **4**: 195 (1829). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 198 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 109 (2000). An erect annual herb about 60 cm tall. Leaves simple, alternate, sub-sessile, small, arranged like leaflets on lateral branches, membranous, elliptic-obovate, tip rounded. Flowers numerous, female flowers solitary, axillary, near the base of leaves; male flowers in groups in 1-3. Fruits ovoid or globose tri-gonous capsules, underneath the branches. Plant is bitter.

Vernacular (Nepali) and Local Name: 'Bhuinamala', 'Amalajhar' (N, Ma, G);

Voucher specimen: BM 0266, Bihadi Barachaur, 1200 m asl.; **Fls.-Frts.:** June-November; **Distrib.:** Throughout Nepal at 300-1200 m, India, Bhutan and Bangladesh;

Ecology: Weedy in cultivated fields also in pantropical.

Medicinal use: A decoction of the plant, about 4-5 teaspoonfuls twice a day for a week, is administered to treat stomachache and fever. Juice of leaves is applied to cure pimples, cuts and wounds (*Gurung* and *Majhi*). **Other use:** Fresh tubers are eaten raw (*Majhi*).

Phyllanthus emblica L., Sp. Pl. 982 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 198 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 110 (2000). A deciduous tree about 15 m tall. Leaves small, simple, sub-sessile, 1-1.5 cm long, 0.2-0.3 cm wide, oblong, acute, rounded base. Flowers small, greenish yellow, densely clustered on branches, raceme, male flowers numerous, female flowers few. Fruits globose, smooth with six obscure longitudinal lines. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Amala' (N, Ma), 'Kyun', 'Titi' (G), 'Aaunlesa', 'Ghwarbhet' (M); **Voucher specimen:** BM 0385, Bihadi Ranipani, 1300 m asl., (Photo Plate 18H); **Fls.-Frts.:** March-February; **Distrib.:** Throughout Nepal at 500-1600 m, India, Bhutan, Sri Lanka and Southern China; **Ecology:** Mostly occurs in sub tropical forests.

Medicinal use: Fruits juice, 5-7 teaspoonfuls thrice a day for 5-6 consecutive days, is useful to cure diarrhoea, dysentery, sore throat and jaundice (*Magar* and *Gurung*). Juice

of the roots and barks is applied to treat cuts and wounds. Leaves juice, about 2-3 teaspoonfuls twice a day for a week is administered to get rid of constipation and bronchitis (all tribes). **Other use:** Fruits are chewed fresh for Vitamin C. It is also used to prepare pickle. Dried fruits are used to wash hair in some places of Nepal (all tribes). It is also sold to the local market (*Majhi* and *Magar*).

Phyllanthus parvifolius Buch.-Ham ex D. Don., Prodr. Fl. Nepal. 63 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 198 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 110 (2000). A shrub straggling, around 1.5 m tall. Leaves simple, distichous, short petioled, 0.4-1.5 cm long, 0.2-0.6 cm wide, elliptic or oblong, rounded apex. Flowers small, solitary, axillary, purplish brown. Fruit globose capsule, pale black when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Khareto', 'Paitei' (N), 'Khargaja' (Ma), 'Nabhaya' (G); **Voucher specimen:** BM 0300, Pangrang, 1740 m asl.; **Fls.-Frts.:** September-December; **Distrib.:** Central and eastern Nepal at 1000-2000 m, India and Bhutan; **Ecology:** Often found in open places.

Medicinal use: Leaves paste of the plant is applied to cure cuts, boils and pimples. Dried powder of leaves is used to remove dandruff and lice from head (*Majhi* and *Gurung*). Powder of the plant is put on chronic wounds to encourage fast healing. **Other use:** Plant is used to make brooms. Fresh leaves are fed to goats as fodder (*Majhi* and *Gurung*).

Ricinus communis L., Sp. Pl. 1007 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 199 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 110 (2000). A glabrous, soft wooded shrub around 5 m tall. Leaves long petioled, palmately lobed, 7-8 lobes, lobes oblong to lanceolate. Flowers yellowish, male flowers dense in upper portion of inflorescence, female flowers below. Fruit ovoid capsule, covered with fleshy spines. Seeds, elliptical, glossy black. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Ander' (N, G), 'Madhishe aril' (M); **Voucher specimen:** BM 0576, Falebas Devasthan, 1250 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Nepal at about 800-2400 m, Pakistan, India, Bhutan, Myanmar, Thailand and Malaysia; **Ecology:** Weedy on open uncultivated land around villages.

Medicinal use: Seeds oil is applied externally twice a day to treat rheumatic pain (*Gurung*). A warmed leaf is put on forehead to relieve fever and headache (*Magar*). Paste of the seeds is used to treat gout and swellings of the body (*Gurung* and *Magar*). **Other use:** Seeds oil is used for lighting (*Magar*).

Sapium insigne (Royle) Benth. ex Hook. f., in Fl. Br. Ind. **5**: 471 (1888). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 199 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 110 (2000). A deciduous, small tree around 6-10 m tall. Leaves simple, petiolate, 20-35 cm long, 6-13 cm wide, elliptic to oblong, base acute. Flowers yellowish in stout erect spikes. Fruit a capsule. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Khirro' (N, Ma), 'Khirra' (M); **Voucher specimen:** BM 0085, Falebas Devasthan, 1125 m asl., (Photo Plate 18D); **Fls.-Frts.:** February-March; **Distrib.:** Nepal to about 1800 m, India, Sri Lanka and China; **Ecology:** Among loose rocky ground and at the vicinity of the river bank.

Medicinal use: Milky latex, about 2-3 drops is added to water and about 5-6 teaspoonfuls twice a day for a week, is taken to relieve combat indigestion (*Majhi*). Roots extract is fed to cattle with gastric disorders. Stem barks extract, is dropped into wounds of domesticated animals to facilitate healing. Latex of the tender leaves, about 3-4 drops once a day in a week, is used orally to cure syphilis (*Magar* and *Majhi*). **Other use:** Barks, latex and young leaves are utilized as 'fish poison' to stupefy fish. Wood is used as a live post for biofencing in arable land. Green leaves are scattered in the fields as green manure before planting rice. The plant wood is used to make musical instruments called *Sarangi* and *Madal* (*Magar* and *Majhi*).

Trewia nudiflora L., Sp. Pl. 1193 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 199 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 111 (2000). A deciduous tree around 20 m tall. Leaves simple, petiolate, 15-22 cm long, 11-16 cm wide, broadly ovate to cordate. Flowers yellowish in axillary racemes. Fruit a globose berry. Four seeds, black, smooth. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Ranipha' (N), 'Belar', 'Gamari' (M); **Voucher specimen:** BM 0495, Banou, 1570 m asl.; **Fls.-Frts.:** February-December; **Distrib.:** Nepal to about 1800 m, India, Sri Lanka and China; **Ecology:** In damp places and ravines.

Medical use: A decoction of the roots, dosages about 3-4 teaspoonfuls twice a day in a week, is useful to treat gastric disorder like indigestion, diarrhoea, dysentery (*Magar*). Same decoction is externally applied on gout swellings (*Magar*). Whole plant is taken as a tonic. **Other use:** Wood is commonly used in carving artifacts, implements and planks.

DAPHNIPHYLLACEAE

Daphniphyllum himalense (Benth.) Mull.-Arg., Prodr. **16(1)**: 4 (1869). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 200 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 97 (2000). Small tree with a stout trunk. Leaves stalked, alternate, oblong to lanceolate, acuminate, entire, glabrous and shiny above, glaucous beneath. Flowers axillary, greenish. Fruit a drupe, oblong. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Rakta chandan*', '*Rachana*' (N), '*Olachi*' (M), '*Jhaibal*' (G); **Voucher specimen:** BM 0480, Chitre, 2200 m asl., (Photo Plate 19A); **Fls.-Frts.:** March-August; **Distrib.:** Throughout Nepal at 1600-2500 m, Northern India, Bhutan, Southern Tibet and Northern Myanmar; **Ecology:** On moist hillsides in association with other trees.

Medicinal use: Paste of the barks is applied to cure cuts and boils (*Gurung*). **Other use:** Wood is preferred for carving artifacts (*Magar*).

URTICACEAE

Boehmeria macrophylla D. Don., Prodr. Fl. Nep. 60 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 201 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 319 (2000). A large shrub about 3-4 m tall. Stem dark brown. Leaves simple, petiolate, 12-15 cm long, 4-6 cm wide, lanceolate, acute or rounded apex, three-veined at base. Flowers yellowish, in long drooping axillary spikes. Fruits ovate, compressed. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Kamle ghans*' (N), '*Pomla*' (G), '*Kamle kharchauti*' (M); **Voucher specimen:** BM 0430, Bajung, 1375 m asl.; **Fls.-Frts.:** August-January; **Distrib.:** Nepal from 500-1400 m, India, Bhutan and China; **Ecology:** In slopes of hillsides.

Medicinal use: If the cattle feed poisonous food, a decoction of the whole plant is given. Same decoction of the plant is prescribed to cattle for a week to treat diarrhoea and dysentery (*Gurung* and *Magar*). **Other use:** Fiber is extracted from the stem which is utilized in cordage and to make sacks, bags, rough coats, bhangra and fish nets (*Gurung* and *Magar*). Plant is used as nutritious fodder to cattle.

Boehmeria platyphylla D. Don, Prodr. Fl. Nep. 60 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 201 (1982). Polunin & Stainton, Fl. Hima. 364 (1984). Press *et al.*, Ann. Check.

Fl. Pl. Nep. 319 (2000). A shrub about 4-5 m tall. Leaves simple, petiolate, 12-23 cm long, 6-13 cm wide, oblong to ovate, rounded base. Flowers greenish red in axillary panicles. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: 'Kamle ghans' (N), 'Kamle kharchauti' (M), 'Pomla' (G); **Voucher specimen:** BM 0465, Pang, 1516 m asl., (Photo Plate 19B); **Fls.-Frts.:** April- December; **Distrib.:** Throughout Nepal at 500-2500 m, India, Sri Lanka and China; **Ecology:** On moist hillsides.

Medicinal use: A decoction of the leaves, about 250 ml (a glass) twice a day for 6-7 successive days, is given to cattle to administer diarrhoea, dysentery and urinary problems. Paste of the roots is applied to treat fresh cuts and wounds of livestock (*Gurung* and *Magar*). **Other use:** Barks yield white shiny and strong threads for various purposes like making, fishnet, rope, bhangra, sacks and rough clothes. The plant is used to make *Damphu*. Leaves are lopped for fodder to cattle (*Gurung* and *Magar*).

Boehmeria rugulosa Wedd., Monogr. Urtic. 378 (1856). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 201 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 319 (2000). A medium sized tree about 5-15 m tall. Leaves stalked, alternate, 6-18 cm long, 2-5 cm wide, elliptic to lanceolate, acuminate, crenulate, glabrous and dark green above, strongly three-veined. Flowers sessile, greenish, in a simple spike. Fruit an achene, acute at both ends. Propagated by seeds or branch cuttings.

Vernacular (Nepali) and Local Name: 'Daar' (N, M, G, Ma); **Voucher specimen:** BM 0173, Bachchha, 1348 m asl.; **Fls.-Frts.:** August-November; **Distrib.:** Nepal at 300-1700 m, India and Bhutan; **Ecology:** On open hillsides.

Medicinal use: Juice of the barks is applied to treat fresh cuts, wounds and body pain. Same juice is applied externally twice a day to relieve body pain and coagulate the blood in fresh cuts (*Gurung*). **Other use:** Dried powder of the barks is mixed with flour to make the bread soft and tasty. The wood is famous to make bowls called 'Theki' and other household materials. Leaves are lopped for fodder. Inner bark of the stem is used to extract fibers and wood is used to make musical instruments such as *Sarangi*, *Madal*, *Damphu* and *Khainchandi* (all tribes).

Boehmeria ternifolia D. Don, Prodr. Fl. Nep. 59 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 202 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 319 (2000). Shrub about 3 m tall. Leaves stalked, 5.5-16 cm long, 3.5-15 cm wide, orbiculate or suborbiculate, margin coarsely

crenate to serrate or dentate, densely appressed pubescent, apex rounded and abruptly cuspidate, base rounded. Flowers yellowish. Fruit an achene. Propagated by seeds or offshoots.

Vernacular (Nepali) and Local Name: 'Dhadale', 'Kamle' (N), 'Sapanla' (G);

Voucher specimen: BM 0145, Bhangara, 1539 m asl.; **Fls.-Frts.:** April-July; **Distrib.:** Throughout Nepal at 900-2300 m, Pakistan, Northern India and Bhutan; **Ecology:** On open hillsides.

Medicinal use: Juice of the leaves is applied externally to cuts and boils (*Gurung*).

Other use: The plant is lopped for fodder to cattle (*Gurung*).

Debregeasia longifolia (Burm. f.) Wedd. in DC., Prodr. **16** (1): 235 (1869). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 202 (1982). Polunin & Stainton, Fl. Hima. 365 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 319 (2000). A small sized tree. Leaves simple, petiolate, linear elliptic, apex acuminate, acute at base. Flowers whitish in small heads. Fruits with numerous minute embedded nutlets, yellow when ripe. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Tushare' (N), 'Chimsai' (M), 'Algudi' (G);

Voucher specimen: BM 0168, Deupurkot, 1670 m asl.; **Fls.-Frts.:** July-November;

Distrib.: Nepal to about 700-2200 m, India, Sri Lanka and China; **Ecology:** Among riverine vegetation along banks of rivers and streams.

Medicinal use: Extract of the leaves, is externally used as effective in the treatment of skin infection from scabies (*Gurung* and *Magar*). **Other use:** Wood is commonly used as source of fuelwood. Barks, which yield strong and coarse fiber, is ideal to make ropes and ethnic dress 'bhangra' (*Gurung*). Tender twigs and foliage are lopped for fodder. Ripen fruits are eaten fresh (*Gurung* and *Magar*).

Debregeasia salicifolia (D. Don) Rendle in Prain., Fl. Trop. Afr. **6**: 295 (1917). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 202 (1982). Polunin & Stainton, Fl. Hima. 364 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 319 (2000). A tree about 4 m tall with pubescent branches. Leaves stalked, alternate, acuminate, serrulate, three veined with rounded elevated dots above, thickly white felted beneath. The flowers reddish in sessile or subsessile axillary heads. An amber coloured fruit, studded with minute nutlets. Propagated by cuttings or seeds.

Vernacular (Nepali) and Local Name: 'Tusare' (N), 'Kalankugu', 'Kanakhuli' (G), 'Amilchhe' (M); **Voucher specimen:** BM 0297, Bajung, 1547 m asl.; **Fls.-Frts.:** July-December; **Distrib.:** Nepal at 1000-2400 m, Afghanistan, India and Bhutan; **Ecology:** Along the watercourse and banks of streams.

Medicinal use: Leaves juice, about 3-4 teaspoonfuls twice a day for 5-6 consecutive days, is useful to cure diarrhoea and dysentery (*Gurung* and *Magar*). **Other use:** Wood is used for fuelwood. Barks fiber is used to make *Gurung* dress ‘*bhangra*’ and it is also used to make rope. Branches are lopped for fodder to cattle (*Gurung* and *Magar*).

Girardinia diversifolia (Link) Friis., Kew Bull. **36**: 143 (1981). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 203 (1982). Polunin & Stainton, Fl. Hima. 365 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 320 (2000). A stout herb around 3 m tall, stinging hair throughout. Leaves simple, petiolate, 10-24 cm long, 7-18 cm wide, palmately divided, covered with stinging hairs. Flowers yellowish, clustered in panicles. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: ‘*Allo*’, ‘*Chanle sisno*’ (N, Ma), ‘*Ghyo*’ (M), ‘*Naipolo*’, ‘*Puwa*’ (G); **Voucher specimen:** BM 0433, Durlung, 1750 m asl., (Photo Plate 19C); **Fls.-Frts.:** July-September; **Distrib.:** Nepal from 1200-3000 m, India, Bhutan, Sri Lanka and Eastward to China; **Ecology:** In moist, shady forested areas.

Medicinal use: Ash from roasted plant is applied to heal ringworm and eczema (*Gurung*). A decoction, which is derived by boiling roots of the plant mixed with *Centella asiatica* for about 10-15 minutes, in dosages about 6 teaspoonfuls twice a day for three days, is therapeutic for constipation and gastric disorders (*Majhi*). Leaves extract, in dosages about 3-4 teaspoonful twice a day for 5-6 consecutive days, is effective as antipyretic. It is also applied on forehead to ease headache and joint aches (*Magar* and *Gurung*). **Other use:** Coarse fiber extracted from the barks of stem is used to make threads, weaving ropes, porter’s tumplines, mats, sacks, bags, coarse coats, fish nets and typical traditional clothing ‘*bhangra*’ (*Gurung* and *Magar*). Tender leaves and inflorescence are cooked as vegetables. Roasted seeds are pickled (*Gurung*).

Lecanthus peduncularis (Royle) Wedd., in DC., Prodr. **16** (1):164(1869). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 204 (1982). Polunin & Stainton, Fl. Hima. 367 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 321 (2000). A fleshy spreading weak herb with creeping rooting stems. Leaves ovate, stalked, opposite, 1.8-1.5 cm long, 1-6 cm wide, elliptic to ovate, acuminate, coarsely dentate, glabrous. Flowers greenish on a long stalk, axillary, the receptacle saucer shaped. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: ‘*Gaulato*’, ‘*Ganthe golia*’ (N), ‘*Gaulat*’, ‘*Til*’ (M); **Voucher specimen:** BM 0456, Salija, 2150 m asl., (Photo Plate 19D); **Fls.-Frts.:**

July-November; **Distrib.:** Throughout Nepal at 1200-3200 m, India, Western and central China, Taiwan and Java; **Ecology:** Commonly found in wet, shady places.

Medicinal use: Roots paste, twice a day for a week is applied to relieve sprains. To treat fever, juice the plant about 3-4 teaspoonfuls twice a day for 5-6 consecutive days, is useful (*Magar*). **Other use:** The plant is fed to cattle for yielding more milk (*Magar*).

Urtica dioica L., Sp. Pl. 984 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 207 (1982). Polunin & Stainton, Fl. Hima. 366 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 323 (2000). A stinging, erect shrub about 2 m tall. Leaves simple, petiolate, 4-15 cm long, 1-7 cm wide, ovate, cordate or lanceolate, surfaces covered with stiff hairs that produce burning sensation on contact. Flowers greenish, unisexual, sessile, on terminal part of stem. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: 'Sisnu' (N), 'Polo', 'Pulu' (G), 'Dhyo', 'Hyo' (M); **Voucher specimen:** BM 0378, Banou, 1950 m asl (Photo Plate 19E).; **Fls.-Frts.:** June-November; **Distrib.:** Nepal at 500-4200 m, India, Bhutan, Bangladesh and China; **Ecology:** In moist shady areas.

Medicinal use: Roots juice, in dosages about 3 teaspoonfuls twice a day for 10-15 consecutive days, is administered to treat blood pressure, cough and cold and diabetes (*Gurung* and *Magar*). A decoction of the roots, about 5-6 teaspoonfuls twice a day for a week, is useful to cure asthma (*Magar*). A decoction of plant is dripped about 1-2 drops in a week to treat bleeding from the nose (*Magar*). **Other use:** Tender leaves and inflorescences are cooked as vegetables and taken to lower hypertension (*Gurung* and *Magar*). The plant is considered good for binding soil. Thread yielded from barks is used especially to make 'bhangra' (*Gurung* and *Magar*).

ULMACEAE

Celtis australis L., Sp. Pl. 1043 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 207 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 318 (2000). A deciduous, large tree about 20-30 m tall. Leaves simple, short petioled, ovate or elliptic, 7-12 cm long, 5-7 cm wide, apex acute, base acute or rounded, sometimes oblique. Flowers yellowish green, unisexual, in axillary tufts or short racemes, female flower larger than male. Fruit ellipsoidal drupe, purplish black when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Khari' (N, G, M); **Voucher specimen:** BM 0054, Ramja Deurali, 1646 m asl.; **Fls.-Frts.:** March-September; **Distrib.:** Central Nepal at 1000-2000 m, India, Bhutan and Bangladesh; **Ecology:** Generally cultivated tree in the valley.

Medicinal use: Fruits juice, in dosages about 5-7 teaspoonfuls once a day for a week, is recommended to cure stomach disorder and pain (*Gurung*). **Other use:** The plant is lopped for fodder. Wood is used to make agricultural tools (*Magar*).

CANNABACEAE

Cannabis sativa L., Taxon **25:** 426, t. 9 (1976). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 208 (1982). Polunin & Stainton, Fl. Hima. 368 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 36 (2000). An annual erect, aromatic, resinous shrub around 2 m tall. Leaves simple, petiolate, leaflets 3-7 foliate, leaflets linear lanceolate, 3-10 cm long. Flowers pedicellate or sessile, yellowish, male and female flowers on separate plants, male flowers clustered in axillary panicles, female flowers sessile, in crowded spike, axillary. Fruit, an achene enclosed in persistent perianth, glandular, hairy. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Bhang', 'Gaanja' (N, G), 'Bhangho' (M, Ma); **Voucher specimen:** BM 0500, Bachchha, 1027 m asl., (Photo Plate 20A); **Fls.-Frts.:** May-December; **Distrib.:** Nepal about 300-2700 m, India, Bhutan, Pakistan, Bangladesh and China; **Ecology:** Commonly occurs as weed.

Medicinal use: The dried powder of the flowers, about half-teaspoonful once a day for a week, is given with milk to the children in the treatment of cold, cough and asthma (*Majhi*). Besides, old man and women smoked the dried inflorescence twice a day to relieve from severe body pain and is useful as an appetizer (*Majhi*). Dried inflorescences, in dosages about 3 teaspoonfuls once a day for a week, is given with milk at bed time to stimulate sexual desire (*Gurung* and *Magar*). **Other use:** Most of the elders mixed *Cannabis sativa* with tobacco and used for smoking (*Gurung* and *Magar*). Seeds are roasted and pickled. It is also used for religious purpose (all tribes).

MORACEAE

Artocarpus lakoocha Wall. ex Roxb., Fl. Ind. ed 1832 (Roxb.) ed. 2, **3:** 542 (1832). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 209 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 198

(2000). A large deciduous tree around 15-50 m tall. Leaves simple, petiolate, 10-27 cm long, 2-16 cm wide, oblong. Male flower head receptacle, yellowish. Female heads in separate axils. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Badahar' (N, M, Ma), 'Baral', 'Batal' (G);

Voucher specimen: BM 0388, Pakhapani-Sarthan, 1235 m asl.; **Fls.-Frts.:** March-September; **Distrib.:** Nepal at 500-1300 m, India, Bhutan, Sri Lanka and Malaysia;

Ecology: Generally planted on private land around villages.

Medicinal use: Juice of stem barks is applied to administer fresh cuts and wounds. Sap of the bark is applied to cure pimples and cracked skin (*Majhi* and *Magar*). **Other use:** Ripen fruits are eaten fresh and sometimes immature ones are cooked as vegetables. The plant is important source of fodder to cattle for lactation. Wood is used as timber and fuelwood (all tribes).

Ficus auriculata Lour., Fl. Cochinch. 666 (1790). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 209 (1982). Polunin & Stainton, Fl. Hima. 370 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 198 (2000). A medium sized tree with warty gray bark, young shoots hollow. Leaves stalked, alternate, 10-25 cm long, 7-23 cm wide, broadly ovate or rounded, acute or mucronate, entire, glabrous or glabrescent above, softly pubescent beneath, base generally deeply cordate. Figs turbinate, depressed, tubercled, longitudinally ribbed, purplish when ripe, propagated by seeds.

Vernacular (Nepali) and Local Name: 'Newaro' (N), 'Paingi' (G), 'Ghopa' (M);

Voucher specimen: BM 0571, Lekhfant, 1470 m asl., (Photo Plate 20B); **Fls.-Frts.:** April-October; **Distrib.:** Nepal at 600- 2000 m, Northern Pakistan, Northern India and China; **Ecology:** Found on open grounds.

Medicinal use: Latex is used to treat cuts and wounds. Roasted fruits are eaten to cure diarrhoea (*Gurung* and *Magar*). **Other use:** Ripen fruits are eaten fresh. It is also used to distill local alcoholic beverage. Leaves are lopped for fodder. It is also used as plate in festivals and ceremonies (*Gurung* and *Magar*).

Ficus benghalensis L., Sp. Pl. 1059 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 209 (1982). Polunin & Stainton, Fl. Hima. 369 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 198 (2000). An evergreen, large sized tree about 35 m tall with spreading canopy, bears aerial roots. Leaves simple, petiolate, 10-25 cm long, 5-12 cm wide, broadly elliptic to ovate, apex mucronate, rounded at base. Flowers unisexual, male flowers at the apex and female

flowers with shorter perianth. Fruit figs, in axils, globose, paired, scarlet when ripe. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Bar' (N, M, G, Ma); **Voucher specimen:** BM 0057, Falebas Devasthan, 1043 m asl.; **Fls.-Frts.:** April-August; **Distrib.:** Nepal at 500-1400 m, Pakistan, India and Bhutan; **Ecology:** Found in the valley.

Medicinal use: The milky latex is externally applied to treat pains and bruise due to rheumatism. It is also used as remedy to toothache. The leaves are heated and applied as poultice to treat abscesses (*Majhi*). A decoction of the barks, about 3-4 teaspoonfuls twice a day for a week, is useful to cure dysentery, diarrhoea and diabetes (*Gurung* and *Magar*). **Other use:** The plant is used in religious purpose. Ripen fruits are eaten fresh. Leaves are used to produce onomatopoeic sound, popularly known as 'pipiya'(all tribes).

Ficus benjamina L., Mant. Pl. 1: 129 (1767) var. **benjamina**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 209 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.198 (2000). A large evergreen tree with drooping branches. Leaves petiolate, 5-12 cm long, 2.5-12 cm wide, broadly ovate or elliptical, apex suddenly tapering into a point, base rounded. Fruits fig, obovate, reddish when ripe. Propagated by seeds or stem cuttings.

Vernacular (Nepali) and Local Name: 'Swami' (N, G, M, Ma); **Voucher specimen:** BM 0308, Falebas Devasthan, 1121 m asl.; **Fls.-Frts.:** May-October; **Distrib.:** Nepal at 500-1500 m, Pakistan, India, Bangladesh and Malaysia; **Ecology:** Generally found in village areas.

Medicinal use: The latex is used to treat fresh cuts, wounds and boils (*Majhi* and *Magar*). **Other use:** The plant is used for religious purpose. Leaves are used to produce onomatopoeic sound, popularly known as 'pipiya'(all tribes).

Ficus glaberrima Blume., Bijdr. Fl. Ned. Ind. 9: 451 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 209 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep.199 (2000). A tree about 20-30 m tall. Leaves stalked, alternate, 8-22 cm long, 3-7.5 cm wide, ovate to lanceolate or elliptic, blunt to shortly acuminate, leathery, shiny above, glabrescent beneath, with three main veins, lateral veins in 8-10 pairs, base slightly rounded. Fruits figs, globose, smooth and orange when ripe.

Vernacular (Nepali) and Local Name: 'Pakhuri' (N, M, G); **Voucher specimen:** BM 0055, Bhorle, 1385 m asl.; **Fls.-Frts.:** February-August; **Distrib.:** Nepal at 600-2000 m, India, Bhutan and Bangladesh; **Ecology:** In shady places.

Medicinal use: Juice of the young leaves, about 2 teaspoonfuls twice a day for 5-6 successive days, is prescribed to treat diarrhoea and dysentery (*Magar*). **Other use:** Ripen fruits are eaten fresh. A fiber from the inner bark is used to prepare ropes. Leaves and tender shoots are lopped for fodder in winter season (*Gurung*).

Ficus hirta Vahl., Enum. Pl. 2: 201 (1806). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 210 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 199 (2000). Tree about 4-5 m tall. Leaves stalked, 12-40 cm long, 8-35 cm wide, broadly ovate, often three or five lobed, acuminate, serrulate, some what roughly textured above, densely hirsute beneath, base cordate or rounded.

Vernacular (Nepali) and Local Name: 'Khoksa' (M, G); **Voucher specimen:** BM 0303, Behulibans, 970 m asl.; **Fls.-Frts.:** July-November; **Distrib.:** Nepal at 400-1000 m, India, Bhutan, Bangladesh and Southern China; **Ecology:** Occurs in the subtropical forests in openings.

Medicinal use: Barks of the stem is boiled in water and filtered liquor, about 3-4 teaspoonfuls thrice a day for a week, is recommended to cure fever. The milky latex is applied as a remedy in cuts and wounds (*Magar*). **Other use:** Ripen fruits are eaten fresh. Leaves are lopped for fodder (*Gurung* and *Magar*).

Ficus hispida L. f., Suppl. Pl. 442 (1781). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 210 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 199 (2000). An evergreen tree about 6 m tall. Bark smooth, pale ash coloured, horizontally wrinkled. Leaves stalked, opposite, 2.5-25 cm long, 2-12.5 cm wide, variable in size, ovate to oblong, short acuminate, dentate, somewhat rough in texture, hairy on both surfaces, dark green above, pale beneath, base more or less cordate. Fruit figs, turbinate or ovoid, clustered on stout leafless branches, yellow when ripe. Propagated by seeds or root suckers.

Vernacular (Nepali) and Local Name: 'Khasreto', 'Tote' (N), 'Khasre', 'Thotne' (G); **Voucher specimen:** BM 0306, Bhorle, 1054 asl.; **Fls.-Frts.:** June-August; **Distrib.:** Nepal at 500-1100 m, India, Sri Lanka, Bangladesh and Pakistan; **Ecology:** Commonly found in open places.

Medicinal use: Juice of the roots, about 4-6 teaspoonfuls twice a day for a week, is useful to cure fever. Juice of the fruits, about 6-7 teaspoonfuls once a day for 10-15 days, is considered as a liver tonic. Latex of plant is applied to cure fresh cuts and wounds (*Gurung*). **Other use:** Young fruits are cooked as vegetables and ripen fruits are eaten

fresh. The inner barks yield fiber that is used to make ropes. The plant is lopped for fodder.

Ficus lacor Buch.-Ham., in Tr. Linn. Soc. London **15**: 150 (1826). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 210 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 199 (2000). A semi-evergreen tree with drooping branches. Leaves simple, 3-5 cm petiolate, 8-13 cm long, elliptic to ovate. Flowers axillary, male flowers few, sessile near the apex of receptacle, female flowers long. Fruits fig, globose, in axillary pairs, whitish when ripe. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Kabhro' (N, G), 'Kapara' (M); **Voucher specimen:** BM 0354, Falamkhani, 1674 m asl., (Photo Plate 20C); **Fls.-Frts.:** May-October; **Distrib.:** Nepal at 500-1700 m, India, Bhutan and China; **Ecology:** On open hill sides.

Medicinal use: Stem barks juice, about 3 teaspoonfuls thrice a day for a week, is given to treat ulcer. Seeds are useful to cure scabies and boils. The young flowers are chewed raw to administer diarrhoea and dysentery (*Magar and Gurung*). **Other use:** The flowers are pickled. The barks give fiber that is used to make rope. The leaves are lopped as fodder. It is also used to make traditional plate 'tapari' and 'duna' for the ceremonies and festivals (*Magar and Gurung*).

Ficus neriifolia Sm., in Rees, Cyclop. **14**: Ficus n. 21. (1810). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 210 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 199 (2000). Tree, small. Leaves simple, petiolate, 13-15 cm long, 3-6.5 cm wide, lanceolate to elliptic, acute base. Fruits figs, sub-globose, reddish when ripe. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Dudhilo' (N), 'Tauchi', 'Gnara' (M,G); **Voucher specimen:** BM 0315, Salija, 1741 m asl., (Photo Plate 20D); **Fls.-Frts.:** October-November; **Distrib.:** Nepal to about 2200 m, India, Bhutan, Tibet and China; **Ecology:** Found on open exposed places.

Medicinal use: Milky latex is applied on ulcers and boils on tongue (*Magar and Gurung*). **Other uses:** Leaves are considered as nutrient-rich fodder. Ripen fruits are edible. Bark is used to make rope (*Magar and Gurung*).

Ficus religiosa L., Sp. Pl. 1059 (1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3**: 211 (1982). Polunin & Stainton, Fl. Hima. 369 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 200 (2000). A deciduous tree about 35 m tall. Leaves simple, petiolate, orbiculate to ovate, cordate at base, rounded, reddish green when young. Flowers unisexual, male flowers few, at tip of

receptacles, female flowers sessile. Fruits fig, sub-globose, dark purple when ripe. Propagated by seeds and cuttings.

Vernacular (Nepali) and Local Name: 'Peepal' (N, Ma), 'Pipal' (G, M); **Voucher specimen:** BM 0045, Saligram, 890 m asl.; **Fls.-Frts.:** April-August; **Distrib.:** Nepal at 200-1500 m, India, Bhutan, Bangladesh, Pakistan and China; **Ecology:** Commonly found in valley.

Medicinal use: A decoction of the barks, about 5-6 teaspoonfuls thrice a day in a week, is recommended to cure gonorrhoea. Latex of the plant is applied to treat toothache and gumache. A paste of the leaves is used to treat the skin disease (*Gurung* and *Magar*). Juice of the barks is applied to cure snakebite (*Majhi*). **Other use:** The plant is held sacred by the Hindus and Buddhists, and is planted abundantly near temples. Ripen fruits are eaten fresh, and leaves are lopped for fodder. Leaves are used to produce onomatopoeic sound, popularly known as 'pipiya' (all tribes).

Ficus roxburghii Wall. ex Miq., in Ann. Mus. B. Lugd.- Bat. **3:** 296 (1867). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 209 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 198 (2000). A medium sized tree. Leaves petiolate, 10-25 cm long, 7-23 cm wide, broadly ovate or rounded, acute, base deeply cordate. Fruits fig, depressed, tuberculed, longitudinally ribbed, purplish when ripe. Propagated by seeds and cuttings.

Vernacular (Nepali) and Local Name: 'Newaro' (N, M, Ma), 'Mako' (G); **Voucher specimen:** BM 0137, Tribeni, 980 m asl.; **Fls.-Frts.:** February-June; **Distrib.:** Nepal to about 2000 m, India; **Ecology:** Open dry places.

Medicinal use: Latex is applied on cuts and wounds. Roasted fruits are chewed as remedy to cure diarrhoea and dysentery (all tribes). **Other use:** Ripen fruits are eaten fresh by children due to its jelly-substances. It is also used to distill local alcoholic beverage (*Gurung* and *Magar*). Leaves, broad and ovate in texture, are sewn together with thin strips of bamboo splints to make traditional plates 'tapari'; it is used in rituals and ceremonies (*Magar* and *Gurung*). Leaves are lopped for fodder. Immature fruits are crushed and strewn in water to stupefy fishes (*Majhi*).

Ficus semicordata Buch.-Ham. ex Sm., in Rees, Cyclop. **14:** Ficus n. 71 (1810). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 211 (1982). Polunin & Stainton, Fl. Hima. 370 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 200 (2000). A tree, moderate sized around 10 m tall. Leaves simple, petiolate, 10-25 cm long, 4-12 cm wide, oblanceolate, unequally bilobed base. Flowers

unisexual in receptacle. Fruits fig, short stalked, pairs usually clustered on leafless drooping scaly branches, pear shaped, slightly flattened, reddish brown when ripe. Propagated by seeds or cuttings.

Vernacular (Nepali) and Local Name: 'Khanyu' (N), 'Aarkhot' (M), 'Khajare', 'Kharne' (G); **Voucher specimen:** BM 0040, Bhoksing, 1540 m asl., (Photo Plate 20E); **Fls.-Frts.:** May-October; **Distrib.:** Throughout Nepal at 500-1800 m, India, Bhutan, Bangladesh and China; **Ecology:** In open places.

Medicinal use: Stem barks juice, about 5-6 teaspoonfuls twice a day for 15 successive days, is prescribed to cure leprosy. Roots juice, about 2-3 teaspoonfuls once a day for a week, is given in the treatment of headache and menstrual disorder. Sap of the fruits is used in treating ulcer of mouth and tongue (*Magar*). **Other use:** Ripen fruits are eaten fresh. Bark yields fiber which is used to make ropes. Leaves are the important source of fodder to the cattle. Wood is used as fuel wood (*Gurung* and *Magar*).

Ficus subincisa Buch.-Ham. ex Sm. in Rees, Cycl. **14:** Ficus n. 91 (1810) var. **subincisa**. Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 211 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 200 (2000). A small tree about 5-6 m tall. Leaves stalked, alternate, 5-10 cm long, 3-5 cm wide, elliptic to lanceolate, acuminate, margin with coarse teeth near the apex, glabrous but rough on both surfaces, base narrowed. Fruit figs, ovoid, more or less wrinkled and warted, yellowish when ripen, propagated by seeds.

Vernacular (Nepali) and Local Name: 'Berulo' (N), 'Birula', 'Lekho' (M), 'Kane chhi' (G); **Voucher specimen:** BM 0307, Bhangara, 1547 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Nepal at 500-1800 m, India, Bhutan and China; **Ecology:** In open places. **Medicinal use:** Milky latex is used to cure fresh cuts and wounds (*Magar*). **Other use:** Ripen fruits are eaten fresh. Leaves are lopped for high quality fodder (*Gurung* and *Magar*).

Morus australis Poir. Lam., Encycl. Meth. B. **4:** 380 (1797). Hara, Chater & Williams, Enum. Fl. Pl. Nep. **3:** 212 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 200 (2000). Medium sized deciduous tree. Leaves stalked, ovate to lanceolate, acuminate, dentate or serrate, glabrous above, slightly pubescent on veins and midribs beneath, base rounded or truncate. Flowers unisexual, yellowish. Fruit slender, white or dark purple. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: 'Kimbu' (N, M); **Voucher specimen:** BM 0106, Nagliwang, 1765 m asl., (Photo Plate 20F); **Fls.-Frts.:** March-June; **Distrib.:** Throughout Nepal at 900-2400 m, Northern India, Bhutan, Western China and Myanmar; **Ecology:** Found in limestone areas, forest margins, mountain slopes, fallow land, scrub in valleys. **Medicinal use:** Roots are boiled in water about 15 minutes and filtered, about 2 teaspoonfuls twice a day for a week, is given to destroy parasitic worms. Paste of the barks is applied to treat gingivitis (inflammation of the gums). **Other use:** Ripen fruits are edible. The plant is lopped as fodder to cattle (*Magar*).

JUGLANDACEAE

Engelhardia spicata Blume., Bijdr. 528 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 212 (1982). Polunin & Stainton, Fl. Hima. 372 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 148 (2000). A deciduous tree about 15-20 m tall. Leaves simple, petiolate, pinnate, leaflets 5.5-20 cm long, 2.5-8 cm wide, oblong to lanceolate. Inflorescence greenish, flowers clustered. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Mahuwa' (N, Ma), 'Kane mauwa' (M), 'Kal', 'Pli' (G); **Voucher specimen:** BM 0365, Bhorle, 1190 m asl., (Photo Plate 20G); **Fls.-Frts.:** February-August; **Distrib.:** Nepal at 400-1300 m, India, Bhutan and Sri Lanka; **Ecology:** Commonly found in subtropical Himalayas.

Medicinal use: A decoction of the barks, about 3-5 teaspoonfuls twice a day for 10 successive days, is useful to administer diabetes (*Gurung*). A decoction of the flowers, about 4 teaspoonfuls thrice a day for a week, is prescribed to treat cough and cold. The gum from tree trunk is used to cure boils (*Magar*). **Other use:** Young leaves mixed with barks of *Schima wallichii* and tender twigs of *Sapium insigne* are used in fish poisoning. Wood is used in construction purpose and for fuelwood. Barks give fiber that is used to make rope. Leaves are used for green manure (all tribes).

Juglans regia L., Sp. Pl. 997(1753). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 213 (1982). Polunin & Stainton, Fl. Hima. 372 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 148 (2000). A deciduous, large tree around 30 m tall. Leaves pinnately compound, petiolate, imparipinnate, leaflets 11-13, sub-sessile, 10-25 cm long, 3-10 cm wide, elliptic to ovate, lanceolate. Flowers unisexual, male catkins pendulous, greenish, female flowers minute, in

short spike, on leafless branches. Fruit, ellipsoidal nut, thick shelled, brownish green, distinctively two-valved. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Okhar' (N, M), 'Akhori', 'Katu' (G); **Voucher specimen:** BM 0420, Lunkhu Deurali, 1786 m asl., (Photo Plate 20H); **Fls.-Frts.:** February-September; **Distrib.:** Nepal at 800-3000 m, Afghanistan, Northern India, Pakistan and Bhutan; **Ecology:** Occurs on open hillsides.

Medicinal use: To cure sore throat, leaves juice about 2-3 teaspoonfuls twice a day for 5-6 successive days, is administered (*Magar*). Same juice is used to remove lice from human and livestock's feet. Young fruits juice, about 5 teaspoonfuls once a day for a week, is given to the patient at early morning to relieve rheumatism (*Gurung*). Paste of the immature seeds coat is applied to wounds between the toes caused by prolonged walking on muddy water (*Magar*). **Other use:** Wood is used to make furniture, wooden utensils and gun stocks. Fruits are used in rituals. Fruits are sold to the local markets. Immature seed barks is also used in fish poisoning (*Gurung* and *Magar*).

MYRICACEAE

Myrica esculenta Buch.- Ham. ex D. Don., Prodr. Fl. Nepal. 56 (1825). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. 3: 213 (1982). Polunin & Stainton, Fl. Hima. 373 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 201 (2000). An evergreen, moderate sized tree around 12 m tall. Leaves simple, petiolate, 3-15 cm long, 1-5 cm wide, lanceolate, oblong-obovate, apex acute or obtuse, base acute. Flowers small, unisexual, in axillary spikes, greenish red, male spikes 7.5 cm long, female spikes 2.5 cm long. Fruits ellipsoidal, fleshy, red when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Kaphal' (N, G, M); **Voucher specimen:** BM 0501, Lunkhu Deurali, 1800 m asl.; **Fls.-Frts.:** October-March; **Distrib.:** Nepal at 1000-2100 m, India, Bhutan and China; **Ecology:** In both primary and secondary forest.

Medicinal use: A decoction of stem barks, about 5-7 teaspoonfuls twice a day for 10-15 successive days, is given orally to cure asthma, lungs infection, chronic bronchitis, diarrhoea and gastric trouble (*Gurung* and *Magar*). **Other use:** Ripen fruits are eaten fresh and pickled (*Gurung* and *Magar*). It is also sold to the local market. Wood is used as fuelwood. Leaves are lopped for fodder to cattle (*Magar*).

BETULACEAE

Alnus nepalensis D. Don, Prodr. Fl. Nepal. 58 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 213 (1982). Polunin & Stainton, Fl. Hima. 373 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 27 (2000). A tree about 15-20 m tall. Leaves simple, petiolate, elliptic to ovate, 4-17 cm long, 2-9 cm wide, apex acute. Flowers unisexual, male flowers spike, long, slender, drooping, in terminal panicles, yellowish, female flowers cone like spike, shorter, in clusters. Fruit cylindrical nut with membranous wing. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Uttis' (N), 'Dhunsi', 'Myunsi' (G); **Voucher specimen:** BM 0121, Bhorle, 1230 m asl., (Photo Plate 20I); **Fls.-Frts.:** October-February; **Distrib.:** Nepal at 800-2200 m, Northern India and China; **Ecology:** Occurs on moist sloppy places.

Medicinal use: A decoction of roots, in dosages about 3-4 teaspoonfuls thrice a day for 5-6 consecutive days, is prescribed in the treatment of diarrhoea and dysentery. It is also applied to cure burns (*Gurung*). **Other use:** It grows naturally or is planted in the area where landslides occur frequently; it helps to control erosion. Wood is used to make furniture, construction purpose and in fuelwood. It is also used to make musical instruments such as *Madal*, *Sarangi*, *Damaru*, *Khainchandi*, *Damphu* and *Dhol*.

Betula alnoides Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 58 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 213 (1982). Polunin & Stainton, Fl. Hima. 374 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 27 (2000). Deciduous tree about 23-30 m tall. Leaves simple, petiolate, 3-12 cm long, 2-6.5 cm wide, ovate to lanceolate. Inflorescence yellowish in axil of leaf, fascicled with long slender spikes, flowers unisexual, male spikes slender, pendulous, female in clusters. Fruit nutlets with wings. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Saur' (N), 'Chyarbi' (G); **Voucher specimen:** BM 0154, Pakhapani, 1390 m asl.; **Fls.-Frts.:** March-August; **Distrib.:** Nepal at 1200-2600 m, India, Bhutan and China; **Ecology:** Mostly on the hillsides mixed with forest.

Medicinal use: Juice from stem barks, about 5 teaspoonfuls twice a day for a week, is prescribed to control gastric problems (*Gurung*). **Other use:** Wood is used to make furniture, other construction purpose and in fuelwood. Leaves are lopped for fodder. Powder of the barks is used to add flavor in tea.

Betula utilis D. Don, Prodr. Fl. Nep. 58 (1825). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 214 (1982). Polunin & Stainton, Fl. Hima. 374 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep.

27 (2000). A moderate sized tree of about 30m high distinguished by its white to brownish bark. Leaves stalked, 3-12cm long, 2-7 cm wide, ovate, acute, irregularly serrate, base broadly cuneate or rounded. Male catkins mostly 5-10 cm, reddish, appearing on bare branches, or with the young leaves.

Vernacular (Nepali) and Local Name: '*Bhojapatra*', '*Bhuj*' (N), '*Bhuspat*', '*Kella*' (G); **Voucher specimen:** BM 0110, Lekhfant, 2297 m asl.; **Fls.-Frts.:** Apr-May; **Distrib.:** Throughout Nepal at 2000-4000m, Afganistan, India, Bhutan, Tibet and Western China; **Ecology:** Found at high altitude temperate forest.

Medicinal use: To cure hysteria, infusion of the barks in dosages about 10 teaspoonfuls once a day in 15 days, is recommended due to its carminative and antiseptic properties. Paste of the barks is applied to cuts, wounds and burns. A decoction of the barks, in dosages about 4-5 teaspoonfuls once a day in a week, is prescribed in cases of jaundice. Same decoction, about 2 drops is dripped into ear to relieve earache. Resin is applied to boils (*Gurung*). **Other use:** The plant is used as fodder. Wood is used in construction. It is also used as incense. The papery bark is used for water proofing and roofing of the houses.

FAGACEAE

Castanopsis indica (Roxb.) Miq. in Ann. Mus. B. Lugd.-Bat. 1: 119 (1863). Hara, Cater & Williams, Enum. Fl. Pl. Nep. 3: 214 (1982). Polunin & Stainton, Fl. Hima. 376 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 111 (2000). An evergreen, moderate sized, tree about 15 m tall. Leaves simple, petiolate, 7-18 cm long, 3.5-8 cm wide, oblanceolate, base tapering or rounded. Flowers yellowish, sessile, with dense soft hairs. Fruit, nut covered with involucre, surrounded by thick spines. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Katus*' (N), '*Jhiru*', '*Kataujo*' (M), '*Kasintu*', '*Khansi*' (G); **Voucher specimen:** BM 0127, Majhphant Mallaj, 1871 m asl.; **Fls.-Frts.:** August-November; **Distrib.:** Nepal at 1000-2500 m, Northeastern India, Bhutan, Pakistan and Western China; **Ecology:** In mixed forests.

Medicinal use: A decoction of the leaves, about 4 teaspoonfuls twice a day for a week, is prescribed to treat stomach disorder and skin diseases. Juice of the barks, about 5-6 teaspoonfuls twice a day for 5 days, is given to cure indigestion. Paste of leaves is applied in case of headache (*Magar* and *Gurung*). **Other use:** Wood is used as fuelwood and for construction purpose. The leaves are lopped for fodder. Leaves are used to make

traditional plates '*tapari*' and '*duna*' for rituals and ceremonies (*Magar* and *Gurung*). Fruit nuts are eaten fresh and have the cultural value. It is also sold to the local market (*Magar*).

Castanopsis tribuloides (Sm.) A. DC., J. B. 1: 182 (1863). Hara, Chater & Williams, Enum. Fl. Pl. Nep. 3: 215 (1982). Polunin & Stainton, Fl. Hima. 377 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 111 (2000). A tree around 20 m tall. Leaves simple, petiolate, 4.5-19 cm long, 1.5-7 cm wide, lanceolate, apex acuminate. Flowers white, sessile. Fruit a nut, enclosed in a spiny involucre. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Musure katus*' (N), '*Katus*', '*Kataujo*' (M);

Voucher specimen: BM 0115, Majhphant Mallaj, 1654 m asl.; **Fls.-Frts:** March-

November; **Distrib.:** Nepal at 700-2200 m, India, Bhutan, Burma and China; **Ecology:** Occurs in subtropical forests.

Medicinal use: Tender leaves are grounded and juice is made, in dosages about 3-5 teaspoonfuls twice a day for 5 days, is good to administer indigestion (*Magar*). **Other use:** Wood is moderately hard and sliced into planks used for construction of floors, panels. Plant is lopped for fodder to cattle. Seeds are eaten raw or roasted.

Quercus glauca Thunb., Fl. Jap. 175 (1784). Hara, Cater & Williams, Enum. Fl. Pl. Nep. 3: 216 (1982). Polunin & Stainton, Fl. Hima. 378 (1984). A large handsome evergreen tree, distinguished by its conical nuts 1.5cm, with a distinctive involucre cups of 5-8 concentric velvety belts of scales, covering less than half the nut when mature. Male catkins solitary, in lax cluster, Female spikes 204 flowered. Leaves oblong to oblong-lanceolate, long-pointed, 8-15 cm, saw toothed leathery and shining above, becoming glaucous beneath. The bark rough fissured.

Vernacular (Nepali) and Local Name: '*Phalat*' (N, G, M); **Voucher specimen:** BM 0191, Kyang, 2500 m asl.; **Fls.-Frts.:** March-May; **Distrib.:** Throughout Nepal 460-2600. India, China, Korea, Japan; **Ecology:** Large evergreen tree.

Medicinal use: Juice of the root barks, in dosages about 4-5 teaspoonfuls twice a day for a week, is prescribed in the treatment of haemorrhage, chronic diarrhoea and dysentery (*Gurung* and *Magar*). **Other use:** The whole plant is lopped for fodder. Wood is mainly used for fuel. (*Gurung* and *Magar*).

Quercus semecarpifolia Sm., in Rees, Cyclop. 29: n. 20 (1814). Hara, Cater & Williams,

Enum. Fl. Pl. Nep. **3**: 216 (1982). Polunin & Stainton, Fl. Hima. 379 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 112 (2000). A large evergreen tree distinguished by its globular nuts and its thin concave involucre cups which only cover the extreme base of the nuts. Leaves elliptic to oblong, mostly 5-10 cm, usually with spiny marginal teeth on young trees, but often with entire margins on old trees, dark green glossy above and generally with rust-colored hairs beneath, but often nearly hairless on old leaves. Nut solitary to 2.5 cm across, black when ripe; involucre/ involucre with narrow overlapping bracts.

Vernacular (Nepali) and Local Name: ‘*Khasru*’ (N, M), ‘*Bheno*’ (G); **Voucher specimen:** BM 0118, Kyang, 2700 m asl.; **Fls.-Frts.:** May-June; **Distrib.:** Nepal at 2100-3800 m, India, China and Afghanistan; **Ecology:** Occurs in temperate forest.

Medicinal use: Juice of the barks is applied to relieve muscular pain (*Magar*). **Other use:** Wood is used in fuelwood and for construction purpose. The leaves are lopped for fodder. The bark contains much tannin (*Gurung* and *Magar*).

SALICACEAE

Salix babylonica L., Sp. Pl. 1017 (1753). Hara, Chatter & Williams, Enum. Fl. Pl. Nep. **3**: 217 (1982). Press *et al.*, Ann. Check. Fl. Pl. Nep. 282 (2000). A deciduous tree with many branches about 15m tall. Leaves simple, alternate, stalked, lanceolate, finely toothed, glabrous, midrib prominent. Flowers catkins, appearing with the leaves; male catkins 2-3 cm long, pale yellowish; Female catkins 3 cm long. Fruits capsules, glabrous, sessile, greenish.

Vernacular (Nepali) and Local Name: ‘*Bains*’ (N, M, G); **Voucher specimen:** BM 0193, Shankar Pokhari, 1412 m asl.; **Fls.-Frts.:** February-July; **Distrib.:** Nepal at 1000-3000 m, India, Bhutan, Bangladesh and Pakistan; **Ecology:** Usually along the river banks.

Medicinal use: Juice of the leaves and barks, about 5-6 teaspoonfuls once a day for a week, is administered to cure intermittent fever (*Gurung*). **Other use:** The plant has a soil binding capacity and is used for preventing soil erosion. It is also used for religious purpose. Wood is used to make hockey bats (*Magar*).

ORCHIDACEAE

Acampe papillosa (Lindl.) Lindl., Fol. Orchid., Acampe 2 (1853). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 30 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 208 (2000). An

epiphytic herb about 40-70 cm tall. Stem woody robust sheathed. Leaves distichous, oblong, 7-14.5 x 1.4-2.3 cm, thick, fleshy, apex obtuse, about 30 cm long. Inflorescence tall, axillary, compact. Flowers 1.5 cm across, creamy yellow with dark brownish stipes, lip white with purple spots. Petals oblong, apex spatulate.

Vernacular (Nepali) and Local Name: '*Sungava phul*' (N, M, Ma); **Voucher specimen:** BM 0317, Chitre, 1575 m asl., (Photo Plate 21A); **Fls.-Frts.:** September-November; **Distrib.:** Nepal at 500-1700 m, Bangladesh, Bhutan, India, Laos, Myanmar, Thailand and Vietnam; **Ecology:** Epiphytic on tree trunks in forests and likes bright lights.

Medicinal use: A decoction of the roots, about 5-6 teaspoonfuls twice a day for a week, is administered against rheumatism, backache and neuralgia. A juice of leaves, about 2-3 drop is dripped on the ear to relieve earache (*Magar* and *Majhi*). **Other use:** The plant is harvested for ornamental purpose (*Magar* and *Majhi*).

Arundina graminifolia (D. Don) Hochr., Bull. New York Bot. Gard. **6:** 270 (1910). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 32 (1978). Polunin & Stainton, Fl. Hima. 393 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 209 (2000). An erect stout terrestrial with stem upto 2 m tall. Stem robust, noded and sheathed. Leaves distichous, linear-lanceolate, persistent, apex acuminate. Inflorescence terminal, branched, bearing 2-10 flowers. Flowers about 4-6 cm across, fragrant, pinkish purple in colour, short panicles. Sepals free, ovate-lanceolate. Petals, elliptic lip trumpet shaped, bilobed at apex, margin crenulate, midlobe with lamellae, purple with white shades at base.

Vernacular (Nepali) and Local Name: '*Bamboo orchid*' (N, M); **Voucher specimen:** BM 0186, Chitre, 2300 m asl., (Photo Plate 21B); **Fls.-Frts.:** July-November; **Distrib.:** Central Nepal at 400-2300 m, Bhutan, India, Burma, Thailand, S. China, Vietnam and Malaysia; **Ecology:** Among rocks in grasslands, likes bright light and occurs in subtropical to temperate open forest.

Medicinal use: Paste of the flowers is applied to treat scabies. Same paste is also used in cosmetic purpose (*Magar*). **Other use:** The plant is used as fodder and ornamental purpose.

Chrysoglossum ornatum Blume., Bijdr. Fl. Ned. Ind. **7:** 338 (1825). A rhizomatous creeping herb, about 1 cm thick, pseudobulbs ovoid with a node. Leaves short sheathing at intervals of 1-1.5 cm, lanceolate, elliptic, shortly tipped, with 5 main veins, pedicels 10-15 cm long.

Inflorescence basal, raceme with sparsely few flowers, hairless, purplish. Petals wide, spreading, a little curved away from the upper sepal. Lip long, white or pale yellow with purple spots, hinged to the column-foot, with cross-folds on either side at the base, 3-lobed, side-lobes erect, rounded, midlobe concave with raised sides. Column 7 mm long, with 2 short wings in the middle of the front edges and 2 ridges towards the base.

Vernacular (Nepali) and Local Name: '*Hastate lip orchid*' (N, M); **Voucher specimen:** BM 0161, Chitre, 1500 m asl.; **Fls.-Frts.:** June-January; **Distrib.:** Central Nepal at 1400-1550 m, India, Sri Lanka, China, Taiwan, Thailand, Vietnam, Malaysia, Philippines, Indonesia, Cambodia and Bhutan; **Ecology:** Terrestrial on litter covered humus rich slope, warm growing and likes full shade.

Medicinal use: None. **Other use:** The plant is used for ornamental purpose (*Magar*).

Coelogyne corymbosa Lindl., Fol. Orchid., Coelogyne: 7 (1854). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 36 (1978). Polunin & Stainton, Fl. Hima. 403 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 211 (2000). An epiphytic orchid with a short pseudobulb ovoid in shape and apax with 2 leaves. Leaves oblong-lanceolate, sessile, paired, 4.5-15 x 1-3 cm, apex acute. Inflorescence arising from the base of pseudobulbs, raceme with 2-5 flowers. Flowers white, fragrant 7 cm across with white lip 4 yellow spots. Sepals subequal lanceolate, apex acute. Petals lanceolate, column curved. Propagated by rhizome cuttings.

Vernacular (Nepali) and Local Name: '*Jibanti*' (N, M), '*Sunakhari*', '*Chadi gava*' (G); **Voucher specimen:** BM 0244, Salija, 2100 m asl., (Photo Plate 21C); **Fls.-Frts.:** March-May; **Distrib.:** In eastern Nepal at 1800-2900 m, India, Bhutan, Southeastern Tibet and Western China; **Ecology:** Epiphyte on main branches of tree and likes partial shade.

Medicinal use: Paste of the pseudobulb is applied on forehead to relieve headache. It is also eaten raw to cool the body and applied to cure boils (*Magar* and *Gurung*). **Other use:** Fresh pseudobulbs are cooked as vegetables. It is also use for ornamental purpose (*Magar* and *Gurung*).

Dactylorhiza hatagirea (D. Don) Soo., Nom. Nov. Gen. Dactylorhiza: 4 (1962). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 38 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 213 (2000). It is a terrestrial herb about 45 cm tall. Stem sheathed at base. Roots tuberous, palmately lobed, slightly flattened and divided into three or five or more fingers-like lobes. Leaves 6-12 cm long, oblanceolate, base sheathing, apex acuminate, lowers purple and narrow lanceolate. Inflorescence terminal, raceme with densly many flowers. Flowers purplish red, 2

cm across, narrowly lanceolate. Sepal ovate-oblong, oblique, apex obtuse, petal ovate-lanceolate. Lip spatulate, base spurred, lobeless. Column short. Propagated by seeds or tuberous roots.

Vernacular (Nepali) and Local Name: '*Panchaunle*' (N, M), '*Lob*', '*Panchaule*' (G);

Voucher specimen: BM 0105, Jaljala-Sirpu (Lespar), 3400 m asl., (Photo Plate 21 D & E); **Fls.-Frts.:** June-August; **Distrib.:** Nepal Himalaya at 2800-3900 m India, Pakistan, Myanmar and China; **Ecology:** Moist places, open areas, shrub land and open meadows.

Medicinal use: Dried powder of tubers, about 1 teaspoonful once a day for a week with a glass of milk, is prescribed to stimulate sexual desire (aphrodisiac) (*Magar*). Same dried powder, about half-teaspoonful twice a day for 7-10 consecutive days with milk, is given to children as a nerve tonic (*Magar* and *Gurung*). Roots powder is spread over wounds to control bleeding. A decoction of the roots, about 5-6 teaspoonfuls twice a day for a week, is given in case of stomach trouble especially to treat colic pain, urinary problems, seminal weakness, diabetes and hemiplegia (paralysis on one side of the body) (*Magar* and *Gurung*). **Other use:** Young leaves and shoots are cooked as vegetables (*Magar* and *Gurung*).

Dendrobium aphyllum (Roxb.) G.E.C. Fisch., in Gamble., Fl. Presid. Madras **3**: 1416 (1928). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 38 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 213 (2000). An epiphytic orchid with stem 40-60 cm long, pendent, slender with many nodes. Leaves lanceolate, 5-12 x 2-3 cm, apex acuminate. Raceme arising from leafless stem. Flowers 2 from each node, light creamy purpish to mauve or white, spurred. Sepals oblanceolate, apex sub acute; lateral sepals oblanceolate, base oblique. Petals oblong-elliptic apex obtuse. Columns short. Propagated by stem cuttings and seeds. Labellum suborbicular, base shortly claw, margin ciliated.

Vernacular (Nepali) and Local Name: '*Sugandhe phul*' (N, M); **Voucher specimen:**

BM 0133, Kyang, 1750 m asl., (Photo Plate 21F); **Fls.-Frts.:** March-April; **Distrib.:** Nepal at 800-2000 m, Bhutan, Burma, Thailand, India, Western China and Malaysia; **Ecology:** Semi-evergreen and moist deciduous forests, also in the plains, likes bright light.

Medicinal use: Paste of the leaves is applied to affected areas in the treatment of deformed head structure of children (*Magar*). **Other use:** The plant is used for cosmetics, perfumes and ornamental purpose.

Dendrobium moschatum (Buch.-Ham.) Swartz., in Schrader, Neu. J. Bot. **1** (1): 94 (1805). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 40 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 214 (2000). An erect, cylindric herb around 1 m tall. Stem terete with many nodes. Leaves alternate along upper part of stem, 8-15 x 2-5 cm, elliptic-oblong to oval-lanceolate, leathery, base with clasping papery sheaths, apex acuminate or unequally bilobed. Flowers deep yellow or pink or white with rose tips, disk with a pale purplish brown blotch on either-side, column yellow, anther cap purple, fragrant, 7cm across. Propagated by stem cuttings and seeds. Labellum orbicular, margin incurved. Column short.

Vernacular (Nepali) and Local Name: '*Sugandha*' (N, M); **Voucher specimen:** BM 0293, Banou, 1400 m asl., (Photo Plate 21G); **Fls.-Frts.:** May-July; **Distrib.:** Nepal at 600-1500 m, Burma, Bhutan, India, Laos, Thailand, Vietnam and China; **Ecology:** Epiphytic on tree trunks in open forests, hot to warm growing, likes bright light.

Medicinal use: Juice of the leaves, about 3-4 drops twice a day for a week, is administered to relieve earache (*Magar*). **Other use:** The plant is used for cosmetics, perfumes and ornamental purpose.

Herminium lanceum (Thunb. ex Sw.) J. Vuijk., Vuijk in Blumea **11**: 228 (1961). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 46 (1978). Polunin & Stainton, Fl. Hima. 398 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 218 (2000). A terrestrial plants slender, 15-60 cm tall. Stem sheathed leafy. Leaves linear lanceolate up to 20 x 1.5 cm, apex acute. Inflorescence very long and narrow up to 25 cm long, 0.7-1 cm broad. Flowers numerous, green, bracts linear-lanceolate. Dorsal sepal elliptic-oblong, one-nerved petals, lateral oblong apex. Petals linear apex sub-acute. Labellum pendulous, oblong, 3-lobed. Ovary sessile, apex with a knee-like bent.

Vernacular (Nepali) and Local Name: '*Kath Jhakri*' (N, M); **Voucher specimen:** BM 0504, Lespar-Kyang, 2922 m asl., (Photo Plate 21H); **Fls.-Frts.:** June-August; **Distrib.:** Nepal at 1500-3500 m, Burma, India, Japan, Philippines, Malaysia, South Korea, Thailand, Taiwan, Vietnam and China; **Ecology:** Occurs in mixed forests, coniferous forests, likes partial shade.

Medicinal use: A decoction of the leaves and stem, about 5 teaspoonfuls twice a day for 10 days, is prescribed to cure diabetes, fever and bleeding (*Magar*). **Other use:** The plant is used as fodder to goats and sheep.

Oberonia ensiformis (Smith) Lindl., Fol. Orchid., Oberonia: 4 (1859). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 50 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 221 (2000). Epiphytic plants mostly on tree trunk with a short stem. Leaves subbasal, laterally compressed, slightly falcate, base articulate, apex acuminate or long acuminate. Peduncle subterete, with several sterile bracts and sometimes a large, foliaceous bract. Flowers green, sepal oblong to ovate, apex obtuse, lateral sepals broadly ovate. Petals ovate-lanceolate, apex acuminate, lip broadly ovate-oblong, 3-lobed, mid-lobe broadly obovate, bilobed, margin slightly erose. Labellum oblong-ovate, 3-lobed; lateral lobes orbicular, midlobe obovate, apex 2-lobed. Column short and stout. Capsule obovoid to ellipsoid.

Vernacular (Nepali) and Local Name: 'Sunakhari' (N, G, M); **Voucher specimen:** BM 0521, Chitre, 1570 m asl.; **Fls.-Frts.:** September-November; **Distrib.:** Nepal at 1000-1700 m, Burma, Laos, India, China, Thailand and Vietnam; **Ecology:** Epiphyte on major branches of tree, likes partial shade.

Medicinal use: A decoction of the plant is applied externally against scorpion bites, in boils and also used as an analgesic drug to relieving pain (*Gurung* and *Magar*). **Other use:** The plant is used for ornamental purpose.

Otochilus lancilabius Seidenf., Opera Bot. 89: 94 1986. Press *et al.*, Ann. Check. Fl. Pl. Nep. 222 (2000). Pseudobulbs cylindrical, tapering at both ends, apex with 2 leaves. Leaves elliptic-lanceolate, apex acuminate. Flower scape emerging from apex of pseudobulb, careme aparsely several flowers; floral bracts linear, acute. Flowers white, 2.5 cm across. Abaxial sepal oblong; lateral sepals nearly oblique. Petals linear, acute. Labellum 3-lobed, base funnel shaped, lateral lobes small, obtuse, midlobe oblong-lanceolate, apex acuminate. Column subclavate.

Vernacular (Nepali) and Local Name: 'Aankhle laharo' (N, G, M); **Voucher specimen:** BM 0141, Chitre-Panchase, 2300 m asl., (Photo Plate 21I); **Fls.-Frts.:** October-December; **Distrib.:** Central and Western Nepal about 1400-2500 m, Bhutan, India and China; **Ecology:** Found on tree trunks, form colonies, likes partial shade.

Medicinal use: Paste of the plant is applied to fractured and dislocated bones (*Gurung*).

Other use: The plant is used for ornamental purpose (*Gurung* and *Magars*).

Platanthera latilabris Lindl., Gen. Sp. Orchid. Pl. (Lindley) 4: 289 (1835). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 54 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 22 (2000). Plant about 20-60cm tall. Stem with 3-6 leaves and bractlike leaflets. Leaves ovate or oblong, 5-13 x 2-5cm, apex acuminate. Spike cylindrical, rachis with loosely many flowers; floral

bracts lanceolate, acuminate. Flowers yellowish green, 1.5 cm long, in a moderately dense narrowly cylindrical. Sepals erect, broadly ovate, apex obtuse; lateral sepals reflexed, ovate, apex obtuse. Petals erect, triangular at base, fleshy; lip linear or lanceolate, apex sub-acute, entire with recurved margin. Labellum lanceolate, fleshy, apex obtuse, spur pendulous. Column erect, short.

Vernacular (Nepali) and Local Name: '*Bhui-sungava*' (N, M); **Voucher specimen:** BM 0184, Bhuktangle, 2130 m asl., (Photo Plate 22A); **Fls.-Frts.:** July-August; **Distrib.:** About 2000-3500 m, Eastern and Central Nepal, Bhutan, China, India and Pakistan; **Ecology:** Terrestrial in humus rich slopes, cool to cold growing, likes partial shade, occurs in the temperate to alpine zone.

Medicinal use: None. **Other use:** The plant is used as ornamental purposes (*Magar*).

Pleione humilis (Sm.) D. Don, Prodr. Fl. Nep. 37 (1825). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 55 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 224 (2000). A terrestrial epiphytic orchid, pseudobulbs cone-shaped, apex with single leaf. Leaves narrowly elliptic, 10-15 x 3-4 cm, long apex acute. Flower white, lip spotted and blotched with brown, 6 cm across. Dorsal sepals linear-lanceolate; lateral sepals obliquely linear-lanceolate. Labellum sub-orbicular, concave, disc with fringed lamellae. Column winged.

Vernacular (Nepali) and Local Name: '*Shaktigumba*' (N, G, M); **Voucher specimen:** BM 0196, Lespar-Jaljala, 3100 m asl., (Photo Plate 22B); **Fls.-Frts.:** March-May; **Distrib.:** Central Nepal about 2400-3500 m, Bhutan, India, China and Myanmar; **Ecology:** Epiphyte on tree trunks usually embedded in moss and loose bark of tree trunks.

Medicinal use: Paste of the pseudobulb is applied to cuts and wounds (*Gurung* and *Magar*). **Other use:** The sap of the pseudobulb is used as glue. Flowers are used to make cosmetic, perfume and in ornamental purposes (*Gurung* and *Magar*).

Pleione praecox (Sm.) D. Don, Prodr. Fl. Nepal. 37 (1825). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 55 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 224 (2000). A terrestrial orchid, pseudobulbs depressed, conical, greenish. Leaves are elliptic-oblongate to elliptic, 9-20 cm long and 1.7-6.7 cm wide, papery, base attenuate into something that looks like a petiole. The inflorescences arising from base of the leafless pseudobulb, appears after the leaves. Flowers usually one or two sometimes, pink to purplish red, with a yellow callus and sometimes with

purple spots on the lip. Labellum obovate-elliptic, 3-lobed; lateral lobes rounded, midlobe bilobulate, margin dentate, disc with fimbriate lamellae. Column apex toothed.

Vernacular (Nepali) and Local Name: '*Lasun pate*' (N, M); **Voucher specimen:** BM 0130, Lekhfant, 1950 m asl., (Photo Plate 22C); **Fls.-Frts.:** September-November; **Distrib.:** Central Nepal to Himalayas about 1800-2500 m, Northern India, Northern Burma, Thailand and China (Yunnan); **Ecology:** Forest epiphyte, also growing on rocks, steep mossy banks, likes partial shade.

Medicinal use: Paste of the pseudobulb is applied externally to cure fresh cuts and wounds (*Magar*). **Other use:** The plant is used to make cosmetic, perfume and in ornamental purpose.

Rhynchostylis retusa (L.) Blume, Bijdr., Fl. Nederl. Ind. 7: 286, t. 49 (1825). Hook. F., Fl. Brit. Ind. 6: 32 (1890). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 55 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 224 (2000). The orchid has a bunch consisting more than 100 pink-spotted flowers. Leaves alternate, curved, fleshy, channeled, keeled, retuse apically and blooms on an axillary pendant to 60 cm long, racemose, densely flowered. Inflorescence cylindrical occurs in the winter and early spring. Sepal elliptic, obtuse, lateral sepal oblong-subovate, apical margins minutely ciliate. Petals elliptical, obtuse. Fruit brightly coloured, seeds often enriched, distinctive red aril. Propagated by seeds.

Vernacular (Nepali) and Local Name: '*Ghoge*', '*Gava*' (N), '*Gam*' (M, G); **Voucher specimen:** BM 0257, Chuwa, 950 m asl., (Photo Plate 22D); **Fls.-Frts.:** May-June; **Distrib.:** Nepal at 800-1500 m, India (Sikkim), Bhutan, Sri Lanka, Myanmar, and Burma; **Ecology:** Moist and fertile places, also in trees, terrestrial on grassland, cool to cold growing.

Medicinal use: Juice of the roots is applied to cure cuts and wounds (*Magar* and *Gurung*). **Other use:** This orchid is regarded as symbol of love specially in *Magar* community. Inflorescence is used in the marriage ceremonies and festivals (*Magar* and *Gurung*).

Satyrium nepalense D. Don, Prodr. Fl. Nepal. 26 (1825). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 56 (1978). Polunin & Stainton, Fl. Hima. 400 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 225 (2000). A terrestrial orchid. Leaves elliptic-oblong, 7-10 x 3.5-5.5 cm, apex acute, base sheathing. Flowers pink or white, 7mm across, fragrant. Propagated by seeds or pseudobulbs. Petals elliptic, obtuse. Lip hooded, 3-lobed, spurs pendulous, longer than the

ovary.

Vernacular (Nepali) and Local Name: 'Thamni' (N), 'Gamdol' (M); **Voucher specimen:** BM 0517, Sirpu-Lespar, 2790 m asl., (Photo Plate 22E); **Fls.-Frts.:** September-October; **Distrib.:** Throughout Nepal at 600-4600 m, Northern India, Eastern Tibet, Sri Lanka, Western China and Northern Myanmar; **Ecology:** Mostly in moist places, terrestrial on grassland.

Medicinal use: A decoction of the dried tubers, in dosages about 4-5 teaspoonfuls twice a day for 10 days, is recommended as tonic against dysentery. Same juice is consumed against fever and also applied on cuts and wounds (*Magar*). Roasted pseudo-bulbs are eaten raw to treat throat problems. **Other use:** Tender leaves are cooked as vegetables. Pseudobulbs are boiled and eaten fresh.

Spiranthes sinensis (Pers.) Ames, *Orchid.* **2:** 53 (1908). Hara, Stearn & Williams, *Enum. Fl. Pl. Nep.* **1:** 56 (1978). Polunin & Stainton, *Fl. Hima.* 401 (1984). Terrestrial with stout or slender stem. Leaves basal, linear-lanceolate, 3-10 x 0.5-1 cm, clustered near the base for the stem, 2.9-6 cm long, 0.4-1 cm broad. Inflorescence erect, rachis with many spirally arranged flowers; floral bracts ovate-lanceolate. Flowers small, 3 cm, pink, crowded on a secundspiral spike, rachis glandular-pubescent, floral bracts ovate-lanceolate, acimnate.

Vernacular (Nepali) and Local Name: 'Sunakhari' (N), 'Sungava' (M); **Voucher specimen:** BM 0515, Sirpu-Lespar, 2672 m asl., (Photo Plate 22F); **Fls.-Frts.:** July-September; **Distrib.:** Nepal at 2000-2500 m, Bhutan, India, and south Asia; **Ecology:** Temperate and sub-tropical Himalaya, as well as shady and open places.

Medicinal use: Powder of dried tubers, about 3 teaspoonfuls twice a day for 4-5 successive days, is consumed with water against headaches. The same powder, about 3-4 teaspoonfuls once a day for a week, is consumed with milk as tonic and energizer (*Magar*). Roasted rhizomes are chewed to treat sore throat. Paste of the flowers, is applied to cure boils. **Other use:** The plant is harvested for an ornamental purpose.

Thunia alba (Lindl.) Rchb. f., *Bot. Zeitung (Berlin)* **10:** 764 (1852). Hara, Stearn & Williams, *Enum. Fl. Pl. Nep.* **1:** 57 (1978). Press *et al.*, *Ann. Check. Fl. Pl. Nep.* 225 (2000). An epiphyte and sometime in terrestrial plant without pseudobulbs. Leaves sessile, elliptic-lanceolate, apex acuminate. Inflorescence terminal, drooping, 5-10 flowers, floral bracts oblong. Flowers white, lip yellow with purple stripes, 6 cm across. Sepals oblong, upper margin crisped, irregularly

fimbriate, disc with fimbriate lamellae. Column slightly winged. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Chande Phul*', '*Golaino*' (N, M); **Voucher specimen:** BM 0523, Ramja Deurali, 1470 m asl., (Photo Plate 22G); **Fls.-Frts.:** July-August; **Distrib.:** 600-1600 m Central Nepal, India and Bhutan; **Ecology:** On mossy rocks, warm to cool growing, like partial shade, occurs in the subtropical forest, epiphyte on tree trunk.

Medicinal use: Paste of the stem is applied to join the dislocated bone of cattle (*Magar*).

Other use: Stem extract is used as glue. The plant is also used for cosmetics and for the ornamental purpose.

ZINGIBERACEAE

Cautleya spicata (Smith) Baker in Hook. f., Fl. Brit. Ind. **6:** 209 (1890). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 59 (1978). Polunin & Stainton, Fl. Hima. 409 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 329 (2000). Herb about 50 cm high. Leaves short-stalked, elliptic, acuminate. Flowers yellow in short-stalked spikes. Propagated by bulbs.

Vernacular (Nepali) and Local Name: '*Ban besar*' (N), '*Tyauda*' (G); **Voucher specimen:** BM 0520, Karkinata, 1670 m asl., (Photo Plate 23A); **Fls.-Frts.:** August-September; **Distrib.:** In central and eastern Nepal at 1000-2600 m, Northern India; **Ecology:** Commonly in temperate Himalayas on shady places.

Medicinal use: Juice of the rhizomes, about 3-4 teaspoonfuls twice a day for a week, is prescribed to relieve stomach disorder. **Other use:** The plant is used for green manure (*Gurung*).

Curcuma angustifolia Roxb., Asiat. Res. **11:** 338, t. 3 (1810). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 59 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 329 (2000). A herb about 1.5-2 m tall, with small globose rootstock. Leaves short petioled, 18-35 cm long, 5.5-12.5 cm wide, lanceolate, arise laterally from rootstock. Flowers pinkish. Propagated by rhizomes.

Vernacular (Nepali) and Local Name: '*Bakhre saro*' (N), '*Kalo Besar*' (G), '*Kachur*' (M); **Voucher specimen:** BM 0319, Kurgha, 1368 m asl.; **Fls.-Frts.:** April-September; **Distrib.:** Nepal at 1000-1500 m, Northern India and Bhutan; **Ecology:** Found in shade under trees or bamboo.

Medicinal use: Paste of the roots/rhizomes is applied to dislocated bones (*Gurung* and *Magar*). **Other use:** Rhizomes are used to add flavour to vegetables (*Gurung* and *Magar*).

Hedychium coccineum Buch.-Ham. ex Sm., in Rees, Cyclop. 17: Hedychium n. 5 (1811). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 60 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 329 (2000). A herb about 1-2 m high with pseudostems. Leaves sessile, leaf blade narrowly linear, glabrous, base subrounded or attenuate, apex caudate-acuminate. Flowers red, sparsely pubescent especially at 3-toothed apex. Capsule globose 2 cm, seeds red.

Vernacular (Nepali) and Local Name: ‘*Panisaro*’ (N, G, M); **Voucher specimen:** BM 0336, Karkinata, 1390 m asl., (Photo Plate 23B); **Fls.-Frts.:** June-October; **Distrib.:** Nepal at 150-1400 m, Bhutan, China, North East India, Myanmar, Sikkim, Sri Lanka and Thailand; **Ecology:** Forests also cultivated as an ornamental.

Medicinal use: None. **Other use:** The plant is used in ornamental purpose (*Gurung* and *Magar*).

Hedychium ellipticum Buch.-Ham. ex Sm., Stearn & Williams, Enum. Fl. Pl. Nep. 1: 60 (1978). Polunin & Stainton, Fl. Hima. 409 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 330 (2000). Glabrous herb. Leaves elliptic to oblong. Flowers yellow, fragrant, in short, dense, corymbose spikes. Fruit a capsule. Propagated by seeds or rhizomes.

Vernacular (Nepali) and Local Name: ‘*Ban besar*’ (N, M, Ma); **Voucher specimen:** BM 0250, Pang, 1820 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Throughout Nepal at 500-3000 m, Northern India and Bhutan; **Ecology:** Forests in warm temperate and shady places.

Medicinal use: Juice of the rhizomes, in dosages about 5 teaspoonfuls twice a day for 5 days, is administered to relieve the fever (*Majhi* and *Magar*). **Other use:** Plant is used as fodder to cattle and it is also used for manure (*Majhi* and *Magar*).

Hedychium spicatum Sm., in Rees, Cyclop. 17: Hedychium n. 3 (1811). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 61 (1978). Polunin & Stainton, Fl. Hima. 410 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 330 (2000). A herb about 1 m high. Leaves oblong to lanceolate, acuminate, glabrous. Flowers white, fragrant, in dense spikes. Fruit a capsule, globose. Propagated by seeds or rhizomes.

Vernacular (Nepali) and Local Name: 'Saisya' (M), 'Kyaro' (N, Ma); **Voucher specimen:** BM 0499, Salija, 1700 m asl., (Photo Plate 23C); **Fls.-Frts.:** July-November; **Distrib.:** Throughout Nepal at 1600-2400 m, Northwestern India; **Ecology:** In warm temperate Himalayas.

Medicinal use: A decoction of the rhizomes, in dosages about 3 teaspoonfuls twice a day for a week, is given to cure indigestion and high fever (*Majhi* and *Magar*). **Other use:** It is also used as fodder to cattle (*Majhi* and *Magar*).

Roscoea capitata Sm., Linn. Soc. London **13:** 461 (1822). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 61 (1978). Polunin & Stainton, Fl. Hima. 408 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 330 (2000). A herb about 30-50 cm tall. Leaves several, leaf blade linear, rarely lanceolate, strongly keeled, base narrowed, apex acuminate. Flowers blue, strongly pubescent especially along veins, split on 1 side, apex 2-toothed. Capsule clavate 2.5 cm.

Vernacular (Nepali) and Local Name: 'Bhuisaro' (N), 'Kyaro' (M); **Voucher specimen:** BM 0359, Banou, 2300 m asl., (Photo Plate 23D); **Fls.-Frts.:** July-August; **Distrib.:** About 2000-2400 m in forests of Nepal and China; **Ecology:** Found in mountainous moist places.

Medicinal use: A decoction of the rhizomes, in dosages about 3 teaspoonfuls thrice a day for a week, is recommended to treat fever, cough and cold (*Magar*). **Other use:** The plant is used as fodder and to make green manure.

IRIDACEAE

Iris clarkei Baker ex. Hook. f., Polunin & Stainton, Fl. Hima. 411 (1984). A herb with a stout, creeping rhizome. Leaves variable, linear, long-pointed, glossy above, glaucous beneath. Flowers bright lilac with yellow throat. Fruit cylindrical. Propagated by seeds or root tubers.

Vernacular (Nepali) and Local Name: 'Bojho Jhar' (N, M); **Voucher specimen:** BM 0374, Bachchha, 1490 m asl.; **Fls.-Frts.:** June-July; **Distrib.:** In eastern and central Nepal at 1300-3500 m, Northern India and Bhutan; **Ecology:** Occurs in wet meadows.

Medicinal use: A decoction of the plant, about 1 teaspoonful for a week, is given in case of vomiting of blood. A paste of the leaves is applied to treat hemorrhoids (*Magar*). A paste of roots is applied to cure fresh cuts and wounds. **Other use:** The whole plant is used to make green manure (*Magar*).

AGAVACEAE

Agave americana L., in Hook. f., Fl. Brit. Ind. **6**: 277 (1892). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 67 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. **6** (2000). A stout shrubby plant, leaves arising from subterranean rhizome. Leaves very large, fleshy, succulent, 1.5 m long, spiny margin, rosette at base, narrow lanceolate. Flowers borne on long axis. Fruit capsules. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: ‘Ketukee’ (N, M, Ma); **Voucher specimen:** BM 0313, Dhairing, 1650 m asl., (Photo Plate 23F); **Fls.-Frts.:** September-December; **Distrib.:** Nepal at 500-3500 m, India, Bhutan and Bangladesh; **Ecology:** Dry and open places.

Medicinal use: To treat syphilis, roots of the plant are grounded and made a juice which is taken about 4-5 teaspoonfuls twice a day for a week (*Magar*). **Other use:** Cultivated as hedge plant. Leaves are used to furnish a strong ropes and durable fibers. It is also used in fish poisoning (*Majhi*).

Agave sisalana Perrine, U. S. Senate Document **300**: 36 (1838). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 67 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. **6** (2000). A thorny shrub about 3-6 m tall. Leaves form a rosette with stems that are 1 m long, straight and stiff, narrow lanceolate, up to 50 cm long and 7 cm wide, gray green to green, with a black brown terminal spine. Branched inflorescences up to 6 m with green flowers.

Vernacular (Nepali) and Local Name: ‘Ketukee’ (N, M, Ma); **Voucher specimen:** BM 0316, Falabas Devasthan, 995 m asl., (Photo Plate 23G); **Fls.-Frts.:** August-December; **Distrib.:** Nepal at 500-3500 m, India, Bangladesh, Bhutan and China; **Ecology:** Occurs in sandy places along roadsides and in hammocks.

Medicinal use: Juice of the roots, about 3 teaspoonfuls twice a day for 10 days, is recommended to cure syphilis (*Magar*). **Other use:** Cultivated as hedge plant as well as in garden. Leaves are used to furnish a strong ropes and durable fibers. It is also used in fish poisoning (*Majhi*).

HYPOXIDACEAE

Curculigo crassifolia (Baker) Hook. f., Fl. Brit. Ind. **6(18)**: 279 (1892). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 66 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. **228** (2000). A

rhizomatous herb, rootstock stout, with fleshy root fibers. Leaves linear, sessile or petiolate, 10-20 cm long and 2 cm broad, lanceolate, membranous, plicate, hairy with base sheathing. Flowers yellow, bisexual upper male. Perianth segments elliptic-oblong, acute, hairy on the back. Stamens small, filaments, ovary lanceolate stigma 3 cleft, carpel oblong. Propagated by rootstocks and seeds.

Vernacular (Nepali) and Local Name: 'Dhoti saro' (N), 'Museli' (N, M); **Voucher specimen:** BM 0537, Dhairing, 2100 m asl.; **Fls.-Frts.:** June-August; **Distrib.:** Nepal Himalaya at 2000-2900 m, India, Bhutan and China; **Ecology:** Grown in open and moist places.

Medicinal use: Rhizomes juice, in dosages about 4-5 teaspoonfuls twice a day for a week, is recommended as aphrodisiac and tonic. The same juice, in dosages about 2 teaspoonfuls twice a day for 7-10 consecutive days, is taken to care child pneumonitis (inflammation of lungs problems) (Magar). **Other use:** The whole plant is used as forage to cattle.

DIOSCOREACEAE

Dioscorea alata L., Sp. Pl. 1033 (1753). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 67 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 98 (2000). A glabrous herb with stem twining right, winged lacking prickles. Leaves opposite, ovate or triangular-ovate, cuspidate, base cordate, Male spikes with zigzag winged rachis. Female spikes axillary solitary. Seeds are orbicular surrounded by equal circular wing.

Vernacular (Nepali) and Local Name: 'Kukur tarul' (N, G, M); **Voucher specimen:** BM 0180, Nagliwang, 1130 m asl., (Photo Plate 23H); **Fls.-Frts.:** April-November; **Distrib.:** Throughout Central Nepal, 600-1200 m; **Ecology:** Found in tropical region.

Medicinal use: Juice of the plant, in dosages about 4-5 reaspoonfuls twice a day for a week, is used in constipation. Tubers are useful in the treatment of leprosy, piles, fever and gonorrhoea. It is also very effective for the labour pain. Leaves are used in rashes and itches (Gurung and Magar). **Other use:** It is used as edible food (Gurung and Magar).

Dioscorea bulbifera L., Sp. Pl. 1033 (1753). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 67 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 98 (2000). A perennial climbing herb. Stems twining to the ternate, ovate, acuminate, entire, palmately veined, more or less deeply cordate

at the base. Male flowers sessile, bracteates, greenish, drooping, clustered in the leaf axils, female flowers simple, fascicled in the leaf axils. Fruit a capsule, oblong, deeply three-ridged.

Vernacular (Nepali) and Local Name: 'Githa' (N), 'Kamlo', 'Kisi' (M), 'Tarul', 'Mithe-japcha' (Ma); **Voucher specimen:** BM 0413, Salija, 1620 m asl., (Photo Plate 23D); **Fls.-Frts.:** June-December; **Distrib.:** Nepal at 500-2100 m, India, Bhutan and Bangladesh; **Ecology:** Occurs in tropical and subtropical, warm temperate forests.

Medicinal use: Juice of the roots is dripped into wounds to expel worms, germs and threadworms. Juice of the tubers, about 5-6 teaspoonfuls twice a day for 7-10 consecutive days, is used to treat piles, dysentery, syphilis and ulcer (*Magar*). Leaves juice is applied to cure skin disease and wounds to expel worms (*Majhi*). **Other use:** The roots tuber are boiled and eaten as vegetables. It is also pickled (*Magar* and *Majhi*).

Dioscorea deltoidea Wall. ex Griseb. in Mart., Fl. Bras. **3 (1):** 43 (1842), in nota. Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 67 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 98 (2000). A glabrous climbing herb. Leaves simple, sub-deltoidly cordate, caudate acuminate, 7-9 nerved, membranous, petiole very slender and long. Flowers unisexual, male flowers very small in 8-27 cm long axillary spikes, female spikes 15 cm long. Fruits tri-winged.

Vernacular (Nepali) and Local Name: 'Bhayaakur' (N), 'Name' (M), 'Kondro', 'Tentur' (G); **Voucher specimen:** BM 0022, Balakot, 1621 m asl.; **Fls.-Frts.:** April-November; **Distrib.:** Throughout Nepal at 500-3000 m, India, Bhutan and Western China; **Ecology:** Commonly in subtropical and temperate forests.

Medicinal use: Tubers juice, about 5-7 teaspoonfuls twice a day for 5-6 consecutive days, is given to treat roundworm and constipation (*Magar* and *Gurung*). **Other use:** Rhizomes are boiled with wood ash and eaten fresh. Rhizomes are also used in fish poisoning, to remove cattle lice and wash clothes in rural areas (*Magar* and *Gurung*).

Dioscorea esculanta (Lour.) Burkill., Gard. Bull. Singapore **1:** 396 (1917). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 67 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 98 (2000). A twining annual herbs, tubers oblong, stem twining to the right. Leaves simple, opposite, glabrous. Male inflorescence of spikes, axillary. Female inflorescence of spike ascending.

Vernacular (Nepali) and Local Name: 'Geetha' (N, G, M, Ma); **Voucher specimen:** BM 0322, Kurgha, 1400 m asl.; **Fls.-Frts.:** April-December; **Distrib.:** Throughout Nepal at 500-3200 m, India and Western China; **Ecology:** Mostly found in moist places.

Medicinal use: Juice of the rhizomes is recommended to treat roundworms (from animal intestine). Paste of rhizomes is used to remove lice from the cattle and wash hands (*Gurung* and *Magar*). **Other use:** It is also used to cure fish poisoning. Slice pieces of tubers is boiled with ash and eaten as food (*Magar* and *Majhi*). Boiled tubers are cooked as vegetables (*Magar* and *Majhi*).

***Dioscorea pentaphylla* L., Sp. Pl. 1032 (1753). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 68 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 98 (2000).** A climbing herb with spinny stem. Leaves stalked, alternate, 3-5 foliate, leaflets elliptic-lanceolate, ovate or obovate, 5-15 cm long, 2-11 cm broad, entire glabrous. Flowers in spikes, male flowers pale greenish.

Vernacular(Nepali) and Local Name: '*Jagatebhyakur*', '*Bhyakur*' (N), '*Temen*', '*Timi*' (G), '*Lauka*', '*Mangai*' (M); **Voucher specimen:** BM 0111, Bhorle, 1300 m asl., (Photo Plate 24A); **Fls.-Frts.:** July-August; **Distrib.:** Nepal at 600-1500 m, India, Bhutan and China; **Ecology:** In moist open and rocky places.

Medicinal use: Juice of the leaves is applied to treat boils and fresh cuts. It is also used to cure scabis (*Magar*). Rhizomes are boiled and consumed orally to relieve stomach pain (*Gurung*). **Other use:** Tubers are boiled and eaten fresh. It is also cooked as vegetables (*Gurung* and *Magar*).

ASPARAGACEAE

***Asparagus racemosus* Willd., Sp. Pl. 2: 152 (1799). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 71 (1978). Polunin & Stainton, Fl. Hima. 419 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 184 (2000).** A woody, much branched and slender shrub about 1.5 m tall, shoots covered with curved spines. Leaves slender curved cladodes, 1-2 cm long. Flowers small, pedicellate, in axillary racemes, fragrant. Fruit globose berry, 4-7 mm. Propagated by seeds or root cuttings.

Vernacular (Nepali) and Local Name: '*Kurilo*', '*Satawari*' (N) '*Kurilo*' (M), '*Kurila*' (Ma); **Voucher specimen:** BM 0270, Lunkhu Deurali, 1791 m asl., (Photo Plate 24B); **Fls.-Frts.:** June-November; **Distrib.:** Nepal at 500-2200 m, Pakistan, India and China; **Ecology:** Generally in dry places.

Medicinal use: The roots powder, about 4-5 teaspoonfuls is considered as a tonic. Tender shoots are consumed in the post-pregnancy period of woman (*Magar*). Juice of the roots is used to treat worms in the stomach of animals. It is also helpful in expelling

the placenta of animals after delivery. The cooked tuber is used to administer the kidney and liver troubles, sorethroat, epilepsy and rheumatism (*Magar* and *Majhi*). **Other use:** The tender shoots are cooked as a vegetable and pickled (*Magar* and *Majhi*).

LILIACEAE

Aloe vera (L.) Burm. f., Fl. Indica 83 (1768). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 70 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 183 (2000). A perennial, stoloniferous herb about 50 cm tall. Leaves arise as rosette from rhizome, fleshy, succulent, oblongate or lanceolate, 45-60 cm long, 5-8 cm wide, tapering to a blunt edge. Flowers yellow or orange, in a raceme. Fruit a capsule with angular seeds. Propagated by root-offshoots.

Vernacular (Nepali) and Local Name: ‘*Ghyukumari*’ (N, M, Ma), ‘*Chhigu*’ (G);

Voucher specimen: BM 0358, Pakhapani-Sarthan, 1250 m asl.; **Fls.-Frts.:** June-September; **Distrib.:** Nepal at 300-1400 m, India, Bhutan, Bangladesh and Pakistan; **Ecology:** Commonly on open, rocky grounds.

Medicinal use: Juice of the leaves, about 4-5 teaspoonfuls twice a day for a week, is prescribed to treat rheumatic pain, jaundice and kidney pain (*Magar*). Same amount of juice once a day for 15-20 consecutive days, is useful in blood pressure (*Magar*). Gel of the leaves is used to relieve burning sensation and applied to treat skin disease (all tribes).

Other use: Plant is cultivated for house decoration (all tribes).

Campylandra aurantiaca Baker., J. Linn. Soc. Bot. 14: 582, t. 20 (1875). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 71 (1978). Polunin & Stainton, Fl. Hima. 420 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 184 (2000). A scapose herb. Rootstock thick, 1 cm, roots long and stout. Leaves radical, 10-60 cm long, 1-3 cm broad, sessile, narrowly oblanceolate, flaccidly coriaceous, midrib distinct, side nerves many. Berry globose, 1-1.5 cm, red.

Vernacular (Nepali) and Local Name: ‘*Tamurke*’ (N, M); **Voucher specimen:** BM 0304, Nagliwang, 1875 m asl.; **Fls.-Frts.:** March-February; **Distrib.:** Nepal at 1800-2900 m, India, Bhutan and China; **Ecology:** Shady floor of the forests.

Medicinal use: A decoction of rhizomes, in dosages about 3-4 teaspoonfuls twice a day for a week, is administered to cure diarrhoea, dysentery, malarial fever and stomachic (*Magar*). **Other use:** The plant is used for fodder to goats.

Chlorophytum nepalense (Lindl.) Baker, J. Linn. Soc. Bot. **15**: 330 (1876). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 71 (1978). Polunin & Stainton, Fl. Hima. 420 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 184 (2000). Herb, gregarious, around 60 cm tall. Leaves simple, basal, linear, acuminate, narrowed towards base. Flowers white in long, erect racemes. Propagated by seeds or bulbs.

Vernacular (Nepali) and Local Name: 'Ban pyaj' (N, M, Ma); Voucher specimen: BM 0510, Pang, 1780 m asl., (Photo Plate 24C); **Fls.-Frts:** July-September; **Distrib.:** Nepal to about 2500 m, India, Burma, Bhutan and China; **Ecology:** Occurs in moist shady places.

Medicinal use: Paste of the roots is mixed with mustard oil and externally applied on infections of gout (*Majhi*). **Other use:** Tender leaves are cooked as vegetables (*Magar*).

Paris polyphylla Sm., Cycl. **26**: Paris n. 2 (1813) subsp. **polyphylla**. Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 76 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 186 (2000). A glabrous, erect, perennial herb, 30-40 cm high with creeping root stock. Leaves 4-9cm arranged in whorl; leaflets oblong-lanceolate or elliptic short stalked, to 10 cm long. Flowers solitary, terminal, short stalked, with 4-6 lanceolate, long-pointed green leaf like perianth-segments 5-10 cm, and with an inner whorl of thread like yellow or purple segments, as longer or shorter than the outer. Fruits capsule globose with yellowish brown numerous scarlet seeds.

Vernacular (Nepali) and Local Name: 'Satuwa' (N), 'Bajuro' (M); **Voucher specimen:** BM 0407, Lespar, 2470 m asl., (Photo Plate 24D); **Fls.-Frts.:** April-August; **Distrib.:** Throughout the Nepal at 2000-3000 m; **Ecology:** Commonly found in humid forests.

Medicinal use: The rhizomes are used as athelmintic and also as tonic. Juice of the rhizomes, about 5 teaspoonfuls twice a day for 4-5 consecutive days, is given to cure gastric and menstruation pain. Paste of the rhizome is used to treat cuts, wounds and remove worms (*Magar*). Dried powder of the rhizome is mixed with water and given to domestic animals if they eat the poisonous plants (*Magar*). A decoction of the rhizomes is used as antidote to treat scorpion and insect bites. **Other use:** The boiled rhizomes are eaten fresh.

ALLIACEAE

Allium hypsistum Stearn, Bull. Brit. Mus. Nat. Hist. (Bot.) **2**: 188, t. 12 (1960). Hara, Stearn

& Williams, Enum. Fl. Pl. Nep. 1: 65 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 8 (2000). A sweet scented gregarious herb upto 40cm tall. A layer of dry leaves present at the base. Leaves 3-6, round in section, hollow, 1mm broad. Flowers lilac in a dense umbel with papery spathe-lobes, borne on a stem to 30 cm. Propagated by seeds or bulbs.

Vernacular (Nepali) and Local Name: 'Jimbu' (N, G), 'Jyammu' (M); **Voucher specimen:** BM 0534, Lekhfant, 2300 m asl.; **Fls.-Frts.:** July-November; **Distrib.:** Western and central Nepal at 2000-4500 m, India and China; **Ecology:** Open, moist and rocky places.

Medicinal use: A decoction of the leaves, in dosages about 5-7 teaspoonfuls thrice a day for a week, is administered to treat cough and cold (*Gurung*). Dried leaves are chewed to cure gastritis (*Magar*). **Other use:** Dried leaves are used for flavouring curry, meat and lentil soup. It is also sold in the local market (*Magar* and *Gurung*).

Allium wallichii Kunth., Enum. Pl. 4: 443 (1843). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 65 (1978). A bulbous herb about 65 cm tall with small bulbs, clustered, stem base covered with leaf sheath. Leaves linear, flat, longer than the main flower stalk, having a garlic like odor when squeezed. Flowers purple, stalked, in terminal clusters of cymes. Propagated by seeds or by bulbs.

Vernacular (Nepali) and Local Name: 'Banlasun' (N), 'Dond' (M), 'Nota' (G); **Voucher specimen:** BM 0072, Chitre-Panchase, 2400 m asl.; **Fls.-Frts.:** August-November; **Distrib.:** Nepal at 1500-4000 m, India, Bangladesh, Sri Lanka and Western China; **Ecology:** Usually occurs in moist places.

Medicinal use: Bulbs are boiled and eaten to cure cholera and diarrhoea. It is also chewed to treat cough and cold. The crushed leaves are applied externally on blisters caused by chickenpox (*Magar* and *Gurung*). **Other use:** Young leaves are cooked as vegetables. Dried leaves are used as a spice (*Magar* and *Gurung*).

SMILACACEAE

Smilax aspera L., Sp. Pl. 1028 (1753). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 78 (1978). Polunin & Stainton, Fl. Hima. 427 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 187 (2000). A twinning shrub with prickly stem. Leaves simple, short petioled, 5-9 cm long, 4-7 cm wide, ovate or lanceolate to cordate, apex mucronate with slender tendrils near base of leaf stalk. Flowers unisexual, male flowers small, greenish white, fragrant, in axillary umbels, female flowers in umbel. Fruit berries, reddish, blue-black when ripe. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Syal daino', 'Kukurdaino' (N, Ma), 'Naikhre', 'Nayukre' (G), 'Jogi dang' (M); **Voucher specimen:** BM 0309, Majhphant Mallaj, 1843 m asl., (Photo Plate 23E); **Fls.-Frts.:** September-April; **Distrib.:** Nepal at 1200-2900 m, India and Sri Lanka and Bhutan; **Ecology:** Commonly found in temperate forests on moist places.

Medicinal use: Ripen fruits are squeezed and applied externally in case of scabies (*Majhi*). **Other use:** Tender shoots and leaves are cooked as vegetables and pickled (all tribes).

Smilax ovalifolia Roxb. ex D. Don, Prodr. Fl. Nep. 49 (1825). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 79 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 188 (2000). A shrub armed with some prickles. Leaves simple, alternate, stalked, glossy, bi-cirriferous above the base. Flowers small, dioecious in umbels. Fruit globose berries.

Vernacular (Nepali) and Local Name: 'Kukurdaaino' (N, M, G); **Voucher specimen:** BM 0395, Tilahar, 1390 m asl.; **Fls.-Frts.:** September-April; **Distrib.:** Eastern and central Nepal at 700-1400 m, India and China; **Ecology:** Found in forest areas in moist places.

Medicinal use: Roots juice, about 5 teaspoonfuls in a day for 5 days, is recommended to treat rheumatism, dysentery and body pain (*Gurung* and *Magar*). **Other use:** Tender shoots are cooked as vegetables. Thin stems are used for temporary binding (*Gurung* and *Magar*).

COMMELINACEAE

Commelina maculata Edgew., Trans. Linn. Soc. Lond. 20: 89 (1846). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 82 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 48 (2000). A perennial herb. Stems procumbent or creeping, branched, elongate, glabrous or sparsely hispidulous throughout or in a line. Leaf sheaths brown, white, or yellow ciliate at mouth, glabrous elsewhere or hairy in a line, leaf blade ovate-lanceolate or lanceolate, villous on both surfaces. Involucral bracts, forming heads at apex of branches, sessile or glabrous or sparsely multicellular hispid, proximal margins connate, apex shortly acute. Flowers slightly exserted only at anthesis and included in fruit, pedicels membranous. Petals blue. Capsule globose, trigonous, valved. Seeds gray-black, ellipsoid, slightly flattened, subsmooth.

Vernacular (Nepali) and Local Name: 'Sinkauli' (N, Ma, G); **Voucher specimen:** BM 0451, Deupur, 1720 m asl.; **Fls.-Frts.:** December-February; **Distrib.:** Nepal at 2900 m, India, Ceylon, Burma, China, Taiwan and Malaysia; **Ecology:** Found in humid forest margins, grasslands, roadsides and ditches.

Medicinal use: Paste of the leaves is applied to relax tense muscles. Juice of the leaves, about 6 teaspoonfuls daily for a week, is used to increase appetite, stimulate, treat colic and gastritis (*Majhi*). **Other use:** The plant is used as fodder to goats and sheep (*Gurung*).

JUNCACEAE

Juncus concinnus D. Don, Prodr. Fl. Nepal. 44 (1825); in Trans. Linn. Soc. Lond. **18:** 321 (1840). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 84 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 149 (2000). A perennial tufted, 20-50 cm tall. Rhizome chestnut brown in colour. Stems terete, straight, striate. Basal leaves cauline with leaf blade linear-lanceolate, flat to slightly convolute, and apex obtuse. Inflorescences with involucre bract linear-lanceolate flowered; bracts ovate-lanceolate. Capsule (immature) yellowish, shiny, 1-loculed. Seeds (immature) appendaged at both ends.

Vernacular (Nepali) and Local Name: 'Gund', 'Kodo jhar' (N, Ma); **Voucher specimen:** BM 0518, Bhuktangle, 2210 m asl.; **Fls.-Frts.:** June-September; **Distrib.:** Nepal at 2100-5200 m, Bhutan, India and China; **Ecology:** Growing on upper temperate regions on shady rocks and mossy soils.

Medicinal use: A decoction of the fruits, in dosages about 3-4 teaspoonfuls twice a day in a week, is recommended orally to get rid of kidney problems and painful urination (*Majhi*). Juice of the plant is fed to cattle if they eat poisonous plants. **Other use:** Whole plant is used as manure.

PANDANACEAE

Pandanus nepalensis St. John, Bot. Mag. Tokyo **85:** 254, f. 7-8 (1972). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1:** 87 (1978). Polunin & Stainton, Fl. Hima. 432 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 228 (2000). A medium sized dioecious tree about 5-8 m tall. Stem stout trunk, ringed with many leaves scars, sparingly branched above, with branched aerial from the lower trunk. Leaves dark green, entire, 3-4 m long and 10 cm broad, with stout curved spines on margin and midrib. Spathes several, leathery, golden-yellow, the lowest up to 1m

long. Fruit of numerous drupes, cone-like, orange-red when ripen, 15-25 cm long, drupes fleshy, obconical 5-6 angled. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Tarika' (N, M, Ma); **Voucher specimen:** BM 0506, Shivalaya, 810 m asl., (Photo Plate 24E); **Fls.-Frts.:** June-September; **Distrib.:** Nepal at 700-1500 m, India, Bhutan and China; **Ecology:** Grown in mixed forest and moist places.

Medicinal use: Juice of the fruits, in dosages about 2-3 teaspoonfuls twice a day for a week, is administered to cure urinary problems. It is also applied externally to get rid of skin diseases (*Magar*). Leaves juice is used as an antidote in snake bites (*Majhi*). **Other use:** Ripen fruits are eaten fresh. It is also used to distill alcoholic beverage (*Magar* and *Majhi*).

ARACEAE

Acorus calamus L., Sp. Pl. 324 (1753). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 87 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep.13 (2000). A herb about 1 m tall with aromatic rhizome. Trunk broad with annular scars. Leaves pinnate with conspicuous sheath, 30-60 cm long, leaflets many, linear, tips pointed. Inflorescence much branched, compressed, yellowish male flowers, female flowers at base of branch and axils. Fruit, ovoid, smooth, orange nut, fibrous mesocarp, somewhat fleshy pericarp. Seed, the size of a corn, conical shaped, flattened base, internally mottled like a nutmeg. Propagated by seeds and rhizome.

Vernacular (Nepali) and Local Name: 'Bojho' (N, M, G); **Voucher specimen:** BM 0392, Pakhapani-Simle, 1300 m asl., (Photo Plate 24F); **Fls.-Frts.:** April-July; **Distrib.:** Nepal at 200-2300 m, India, Bhutan, Pakistan and Sri Lanka.; **Ecology:** Mostly found in marshy places, river banks and temporary ponds.

Medicinal use: A decoction of rhizomes, in dosages about 5-6 teaspoonfuls twice a day for a week, is prescribed to get relieve from fever and sore throat. Paste of the rhizomes is applied to remove lice of dogs (*Magar* and *Gurung*). **Other use:** Dried powder of rhizomes is put in a cup of tea for flavor (*Magar* and *Gurung*).

Arisaema concinnum Schott., Bonplandia 7: 27 (1859). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 89 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep.13 (2000). Paradioecious. Bulb depressed globose, 1.5 cm diam. Pseudostem short. Leaf 1, radiately 11-20 -foliolate; leaflets

lanceolate to linear-lanceolate, sessile, caudate-acuminate to filiform-caudate, dark green above, slightly glaucous beneath. Fruiting peduncle recurved.

Vernacular (Nepali) and Local Name: '*Banko*' (N), '*Kal*' (M); **Voucher specimen:** BM 0063, Lespar- Kyang, 2003 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Central and western Nepal, India, Bhutan, Southern Tibet, Northern Thailand, Western and central China and Formosa; **Ecology:** Occurs on shady and moist forest floor.

Medicinal use: A decoction of rhizomes, about 3-4 teaspoonfuls twice a day for a week, is good to cure painful menstrual disorder (*Magar*). **Other use:** The young shoots with leaves are dried and cooked as vegetables (*Magar*).

Arisaema costatum (Wall.) Mart. ex Schott., Melet. Bot. 17 (1832). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 89 (1978). Polunin & Stainton, Fl. Hima. 433 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 13 (2000). Paradioecious. Bulb depressed globose 3-4 cm in diam. Pseudostem short. Leaf solitary, trifoliate, leaflets elliptic or oblong, long acuminate at the tip, subsessile at the base, lateral leaflets unequal at the base, median leaflets 9-32 cm long and 6-16 cm broad dark green above, pale green beneath, lateral veins very numerous and running almost parallel depressed above, and distinctly elevated beneath; petiole elongate. Spadix unisexual, style short, stigma small, dark purple inflated toward the base with a disc-like thickening.

Vernacular (Nepali) and Local Name: '*Banko*' (N, M); **Voucher specimen:** BM 0200, Nagliwang, 2451 m asl., (Photo Plate 24G); **Fls.-Frts.:** June-September; **Distrib.:** Endemic to Nepal; Nepal east and central at 2500 m.; **Ecology:** Occurs on shady and moist forest floor.

Medicinal use: Paste of the tuber is applied to treat backaches. **Other use:** The whole plant is used as pesticide in the farmland (*Magar*).

Arisaema flavum (Forssk.) Schott., Prodr. Syst. Aroid. 40 (1860). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 89 (1978). Polunin & Stainton, Fl. Hima. 435 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 13 (2000). A herb about 35 cm high. Leaves stalked digitate, leaflets sessile, varying in size, glabrous, entire, acuminate. Spathe yellowish outside and purplish inside, covering the flowers inside. Flowers sessile, yellow.

Vernacular (Nepali) and Local Name: '*Chari Banko*', '*Timchu*' (N, M); **Voucher specimen:** BM 0061, Lespar- Kyang, 2130 m asl., (Photo Plate 24H); **Fls.-Frts.:** June-July; **Distrib.:** In western and central Nepal at 2000-3600 m, Afghanistan, India

(Kashmir), Bhutan, Southeastern Tibet and Western China; **Ecology:** In open and moist places.

Medicinal use: Rhizomes and red fruits are grounded together and made juice, about 2 drops in a day for a week, is dripped to cure earache. Rhizome is chewed raw to get rid of numbness of tongue. The same juice is applied to treat skin diseases. It is believed that taking plants along while hunting helps to trace bear (*Magar*). **Other use:** Young shoots are cooked as vegetables (*Magar*)

Arisaema griffithii Schott, Synops. Aroid. 26 (1856). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 90 (1978). Polunin & Stainton, Fl. Hima. 434 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 14 (2000). A small dioecious bulbous herb about 60 cm tall. Leaves usually two, trifoliate leaflets, sub-sessile, rhombic ovate, green or purple spotted. Spadix narrow to a purple tail like appendage about 20-80 cm long. Spathe blade large, 10-20 cm long dark, purple in colour, curved back on itself. Lateral lobes often developed, ear like, conspicuously netted with dark purple reticulation appendix with disc-like swelling at base. Propagated by rhizome, tuber and corn (bulbs).

Vernacular (Nepali) and Local Name: 'Dhokayo' (N), 'Dhoka banko' (M); **Voucher specimen:** BM 0084, Sirpu-kyang, 2790 m asl.; **Fls.-Frts.:** June-October; **Distrib.:** Nepal at 2300-3200 m, India, Bhutan, Burma, Tibet, China and Myanmar; **Ecology:** Open places.

Medicinal use: Corms are cooked and eaten to treat worm infection, chest pain, toothache and rheumatism. Paste of the corms is applied externally to treat wounds (*Magar*). **Other use:** The dry leaves are cooked as vegetables.

Arisaema tortuosum (Wall.) Schott., Melet. Bot. 17 (1832). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 90 (1978). Polunin & Stainton, Fl. Hima. 435 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 14 (2000). A tuberous herb, leaves one or two, leaflets 11-13, linear or lanceolate. Spathe greenish, the tube long, pointed tip. Fruit a berry. Seeds four or five, angular, yellowish brown. Propagated by corms.

Vernacular (Nepali) and Local Name: 'Bir banko', 'Sarpako Makai' (N), 'Puri makhan' (G); **Voucher specimen:** BM 0496, Chitre, 1523 m asl., (Photo Plate 24I); **Fls.-Frts.:** May-October; **Distrib.:** In western and central Nepal at 1500-2200 m, Northern India, Western China and Northern Myanmar; **Ecology:** Occurs in moist and shady places.

Medicinal use: Paste of the seeds is applied to treat wounds and is also given as antidote to snakebite (*Gurung*). Juice of the corms is applied to remove worms from the wounds of animals. Seeds are also given with salt to cure colic (sheep). **Other use:** Aerial parts of plant are cooked as vegetables. Corms are also deployed in insecticidal activities.

Colocasia esculenta (L.) Schott in Schott & Endl., Melet. Bot. **18** (1832). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 91 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. **14** (2000). A rhizomatous herb with rootstocks tuberous. Leaves long petioled and stout, triangularly ovate, around 60 cm wide, inflorescence short pedicelled, solitary. Spathe yellowish. Propagated by rhizome bulbils.

Vernacular (Nepali) and Local Name: '*Karkalo, Pindalu*' (N, G, M, Ma); **Voucher specimen:** BM 0075, Pangrang, 1341 m asl., (Photo Plate 25A); **Fls.-Frts:** August-September; **Distrib.:** Nepal to about 1500 m, India, Pakistan and Sri Lanka; **Ecology:** Occurs on moist ground.

Medicinal use: Corms are boiled and taken to combat diarrhoea (*Majhi*). **Other use:** Starchy tuberous rhizomes are valued for their nutritious delicacy, and leaves are cooked as vegetables (all tribes).

CYPERACEAE

Cyperus cyperoides (L.) Kuntze., Revis. Gen. Pl. **3** (2): 333 (1898). Rhizome short. Stem glabrous, erect, 10-48 cm high. Leaves as long as the stem or slightly shorter, 0.4 cm broad. Umbel simple; rays 5-12, up to 4.5 cm long, straight. Bracts 5-10, leaf-like, up to 18 cm long. Spikes solitary, cylindric, 1.5-2.5 cm long. Fruiting spikelet after falling consists of 2 subequal glumes, outer lanceolate-oblong, inner cymbiform with curved keel prolonged into an awn and with broad hyaline sides.

Vernacular (Nepali) and Local Name: '*Kode Jhar*' (N, Ma); **Voucher specimen:** BM 0070, Shivalaya, 890 m asl.; **Fls.-Frts.:** July-September; **Distrib.:** Cosmopolitan, in Nepal east, central and west about 2000 m; **Ecology:** Weedy on open, shady and also on rice field etc.

Medicinal use: None. **Other use:** The plant is used as fodder to cattle (*Majhi*).

POACEAE

Arundinaria falcata Nees., in Linnaea **9**: 478 (1834). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 122 (1978). Polunin & Stainton, Fl. Hima. 442 (1984). A gregarious shrub about 4 m tall, medium sized, culms arise from central rootstock, culms 1.5-2 m tall. Slender branchlets, flowering and leaf-bearing branches on different culms. Leaves 4-8.5 cm long, 0.6 cm wide, linear, short petioled. Spikelets many flowered in divaricate racemes. Propagated by culm cuttings, branch cuttings.

Vernacular (Nepali) and Local Name: '*Nigalo*' (N, G, M); **Voucher specimen:** BM 0103, Chuwa, 1043 m asl., (Photo Plate 25B); **Fls.-Frts.:** April-May; **Distrib.:** Nepal at 500-2000 m, India, Bhutan, Bangladesh and China; **Ecology:** Commonly found undergrowth in the forest.

Medicinal use: A decoction of the young shoots, about 5-6 teaspoonfuls thrice a day for 4-5 consecutive days, is administered to treat gastritis (*Gurung*). **Other use:** Plants are used for construction, weaving mats and baskets. Leaves are good source of fodder for cattle during scarcity of green fodder in winter. It is also used to produce onomatopoeic sound, popularly known as 'pipiya' (*Magar*). Young shoots are cooked as vegetables and pickled (*Gurung* and *Magar*).

Cymbopogon flexuosus (Nees ex steud.) W. Watson in Atkins., Gaz. N.W. Prov. Ind. 392 (1882). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 127 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 127 (2000). An erect, perennial grass around 3 m tall. Rhizome short and stout. Leaves long, linear lanceolate, 125 cm long, 1.7 cm wide. Inflorescence with greyish or greenish grey flowers in drooping panicles, sometimes purple tinged. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Lemon grass*' (N), '*Kagati ghans*' (M, Ma); **Voucher specimen:** BM 0278, Bachchha, 1215 m asl.; **Fls.-Frts.:** October-January; **Distrib.:** Nepal at about 900-1500 m, India, Burma, Java, Thailand and China; **Ecology:** Occurs on grassy slopes.

Medicinal use: Roots decoction, about 5 teaspoonfuls thrice a day for a week, is valued to cure diarrhoea, indigestion and jaundice (*Majhi* and *Magar*). A paste of the roots, is applied to treat toothache. **Other use:** Fresh leaves are used to make green tea (*Magar* and *Majhi*).

Cynodon dactylon (L.) Pers., Syn. Pl. 1: 85 (1805). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 128 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 128 (2000). A prostrate, perennial grass, culms slender with creeping rhizome, rooting at every node forming matted network. Leaves narrow, linear, upto 10 cm long, 0.2 cm wide, apex acuminate. Flowers terminal, 2-6 spikes radiating from purplish stalk, inflorescence green or purplish. Propagated by splitting of rooting nodes.

Vernacular (Nepali) and Local Name: 'Dubo' (N, M, Ma), 'No dubo' (G); **Voucher specimen:** BM 0375, Kyang 1680 m asl.; **Fls.-Frts.:** May-September; **Distrib.:** Throughout Nepal to 3000 m, India, Bhutan, Sri Lanka, Bangladesh, Pakistan and China; **Ecology:** Occurs in warm climate.

Medicinal use: Juice of the plant, about 4 teaspoonfuls twice a day for a week, is used to administer indigestion (*Magar*). Paste of the plant is used in the treatment of nose bleeding, fresh cuts and wounds. It is also useful to treat burning sensation and skin diseases (*Gurung* and *Majhi*). **Other use:** Plant is good fodder value. It is also used in many rituals (all tribes).

Dendrocalamus hamiltonii Nees & Arn. ex Munro, Trans. Linn. Soc. London 26:151 (1868). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 128 (1978). Polunin & Stainton, Fl. Hima. 441 (1984). Press *et al.*, Ann. Check. Fl. Pl. Nep. 128 (2000). A bamboo about 25 m tall, forming dense thickets, culm green, smooth, 7-12 cm in diameter, internodes 20-40 cm distant. Leaves narrowly lanceolate, long pointed, leaf sheaths with stiff hairs. Inflorescence ovoid, reddish brown or dark pink. Fruit a grain, ovoid, beaked. Propagated by seed or rhizome cuttings.

Vernacular (Nepali) and Local Name: 'Choyabans' (N, Ma), 'Tama bans' (G, M); **Voucher specimen:** BM 0414, Falebas Devasthan, 870 m asl., (Photo Plate 25C); **Fls.-Frts.:** October-July; **Distrib.:** Central and eastern Nepal at 500-2000 m, Northern India, Bhutan, Bangladesh, Pakistan and China; **Ecology:** Commonly cultivated in the valley. **Medicinal use:** Leaves are fed to freshly lactated cattle to drop placenta (*Magar*). **Other use:** Young shoots are cooked as vegetables. Shoots are also preserved as pickle. Mature bamboo is used to construct houses, to make baskets, mats, screens and fences. Leaves are lopped for fodder. It is also used to make musical instruments such as *Bansuri* and *Murali*, *Sarangi*, *Gajo*, and used in rituals (all tribes).

Desmostachya bipinnata (L.) Stapf, in Dyer, Fl. Cap. 7:632 (1900). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 128 (1978). Tufted perennial grass about 2 m tall. Leaves linear

lanceolate, rigid, tip filiform, margin hypid. Inflorescence reddish brown. Propagated by seeds or by splitting the roots.

Vernacular (Nepali) and Local Name: 'Kush' (N), 'Kura' (M, Ma); **Voucher specimen:** BM 0559, Falebas-Devasthan, 870 m asl.; **Fls.-Frts.:** June-October; **Distrib.:** Throughout Nepal to about 1000 m, Iran, Afghanistan, Pakistan, India and Arabia; **Ecology:** Occurs in fallow fields and on unused grounds.

Medicinal use: Juice of the roots and culms, in dosages 5-6 teaspoonfuls thrice a day for a week, is good in case of indigestion and dysentery (*Magar*). Paste of the roots is applied to treat dental caries (*Majhi*). **Other use:** Plants are used for thatching roof and making rope (*Majhi*). The plant is also used in religious ceremonies such as 'Shraddhya' i.e. rituals and offerings to the dead (*Magar* and *Majhi*).

Drepanostachyum falcatum (Nees) Keng f., J. Bamboo Res. **2** (1): 17 (1983). Press *et al.*, Ann. Check. Fl. Pl. Nep.130 (2000). A bamboo about 4 m tall. Much branched culms not straight about 2 cm in diameter, stem hollow, smooth, nodes much swollen, slightly hairy, internodes thin walled, branchlets from the nodes in clusters, culm sheaths papery straw coloured. Leaves stalked, linear, base sheathing round pointed tapering, slightly hairy. A separate leafless stem, greenish, condensed at the nodes. Propagated by splitting the rhizomes.

Vernacular (Nepali) and Local Name: 'Nigalo' (N), 'Kama' (G), 'Ghure chui' (M); **Voucher specimen:** BM 0139, Behulibans, 1227 m asl.; **Fls.-Frts.:** May-December; **Distrib.:** Western Nepal at 1000-2000 m, India, Bangladesh and Myanmar; **Ecology:** Generally found in moist, rocky places.

Medicinal use: Powder made from stem epidermis is mixed with an egg which is applied on broken legs of hens and cocks (*Gurung* and *Magar*). **Other use:** Young shoots are cooked as vegetables and pickled. It is also fermented (as tama). Stems are useful in making baskets, mats, fishing rods and line ceiling. Leaves are useful fodder for cattle during winter (*Magar* and *Gurung*).

Eleusine indica (L.) Gaertn., Fruct. Sem. Pl. **1**: 8 (1789). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**:131 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep.130 (2000). It is an annual grass about 60 cm high, culms glabrous, somewhat compressed. Leaves distichous, flat and folded. Spikes 1-10 present, digitate or with lowest raceme distant.

Vernacular (Nepali) and Local Name: 'Kodojhar', 'Dande' (N), 'Motho' (G); **Voucher specimen:** BM 0038, Falamkhani, 1541 m asl.; **Fls.-Frts.:** June-November;

Distrib.: Throughout Nepal, 600-2600 m, tropical and subtropical region; **Ecology:** Grows in moist as well as marshy area, shallow ponds, river and stream edges, ditches and canals.

Medicinal use: Roots juice of the whole plant, in dosages about 4-5 teaspoonfuls twice a day for a week, is recommended in the treatment of asthma, cough, fever, jaundice, wounds and urinary problems. The same is prescribed to cure liver disorders (*Gurung*).

Other use: Plant is used as fodder.

Eulaliopsis binata (Retz.) C. E. Hubb. in Hook., Icon. Pl. **33**: sub t. 3262 (1935). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 134 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 132 (2000). Grass, perennial with woody rootstock, around 1 m tall. Leaves linear, tapering towards the tip, base rounded. Inflorescence brown in racemes. Propagated by root offshoots.

Vernacular (Nepali) and Local Name: ‘*Babiyo*’ (N, G, M, Ma); **Voucher specimen:** BM 0099, Pang, 1441 m asl., (Photo Plate 25D); **Fls.-Frts.:** June-November; **Distrib.:** Nepal at 200-2600 m, Northern India, China, Bhutan, Pakistan and Philippines; **Ecology:** Oftenly found in open and sunny places.

Medicinal use: A decoction of roots, about 5-6 teaspoonfuls twice a day for a week, is administered to treat dysentery and ulcer (*Magar*). A paste of the roots is applied to cure piles (*Gurung*). Plant is burnt and the ash is mixed with mustard oil, which is applied to treat cuts and wounds of the livestock (all tribes). **Other use:** Plant is used to make ropes and also useful for thatching roof (*Majhi*). Plants are used as fodder to cattle. It is also used in rituals and manufacture of local paper (all tribes).

Imperata cylindrica (L.) P. Beauv., Ess. Agrost. 165 (1812) var. ***cylindrica***. Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 136 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 135 (2000). An erect perennial grass around 50 cm tall. Leaves simple, linear, flattened, apex acuminate, sheathing base. Inflorescence white in panicles. Propagated by splitting of roots.

Vernacular (Nepali) and Local Name: ‘*Siru*’ (N, M), ‘*Salame*’ (G); **Voucher specimen:** BM 0327, Bhoksing, 1473 m asl.; **Fls.-Frts.:** April-November; **Distrib.:** Throughout Nepal at 500-2400 m in open fields, Pakistan, India, Bhutan and China; **Ecology:** Commonly found in open grassy field as well as of the margin of the forest.

Medicinal use: A decoction of the roots, about 6 teaspoonfuls thrice a day for 5 days, is prescribed in case of diarrhoea and dysentery (*Magar*). Besides, same amount of juice is used to cure indigestion and gastric troubles. A paste of the inflorescence is applied to

treat cuts and wounds (*Gurung* and *Magar*). **Other use:** The plant is used for thatching roof and is gathered for fodder. The dried inflorescence is soaked in mustard oil and burned during religious performance (*Gurung* and *Magar*).

Narenga porphyrocoma (Hance ex Trin.) Bor, Indian Forester **66**: 267 (1940). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 138 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 136 (2000). A stout herb. Leaf blades dark green, to 2 cm wide, acute apex, sparsely hairy above glabrous beneath. Sheaths hairy above, margins, and rounded. Racemes trigonous, straight hairs borne on internodes pedicels and callus. Sessile, spikelets, golden brown in colour, oblong, apex rounded or bidentulate., oblong to lanceolate, glabrous, Pedicelled spikelet. Propagated by seeds.

Vernacular (Nepali) and Local Name: 'Urлу' (N, M); **Voucher specimen:** BM 0043, Dhairing, 1276 m asl.; **Fls.-Frts.:** October-December; **Distrib.:** Throughout Nepal, 300-1500m, tropical south east Asia; **Ecology:** Found in moist and open places.

Medicinal use: Juice of the roots/culms, in dosages about 5 teasponfuls thrice a day for a week, is useful in inflammation of the body (*Magar*). **Other use:** The culms and leaves are used for thatching roof. It is also used for fodder.

Phragmites karka (Retz.) Trin. ex Steud., Nom. Bot. ed. 2, **2**: 324 (1841). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 140 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 138 (2000). A grass about 2-3 m tall. Leaves broadly lanceolate. Inflorescence greenish in panicles, the involucral glumes subequal, hyaline. Propagated by seeds or by splitting the mother plant.

Vernacular (Nepali) and Local Name: 'Narakat' (N, M, G); **Voucher specimen:** BM 0415, Bajung, 1509 m asl.; **Fls.-Frts.:** September-November; **Distrib.:** Nepal at 1200-2500 m, India, Burma, Bhutan and Sri Lanka; **Ecology:** Warm swampy valleys and river banks.

Medicinal use: Paste of the roots is applied to treat skin diseases (*Magar*). **Other use:** The plant is used in biofencing, and used as fodder (*Gurung*).

Saccharum spontaneum L., Mant. Pl. **2**: 183 (1771). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. **1**: 145 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 141 (2000). A perennial grass about 3 m tall with erect culms. Leaves simple, linear to filiform. Inflorescence white, cottony, around 45 cm long. Propagated by seeds or root offshoots.

Vernacular (Nepali) and Local Name: '*Kans*' (N, M, G, Ma); **Voucher specimen:** BM 0302, Bihadi Barachaur, 1300 m asl.; **Fls.-Frts.:** September-November; **Distrib.:** Nepal at 500-1700 m, India, Bhutan, Pakistan, Sri Lanka and China; **Ecology:** Found in open grassy lands of terai.

Medicinal use: Juice of the roots is applied to cure fresh cuts and wounds (*Majhi*).

Other use: The plant is used for thatching roof and aslo used as fodder. It has religious significance (all tribes).

Thysanolaena maxima (Roxb.) Kuntze., Rev. Gen. Pl. 2: 794 (1891). Hara, Stearn & Williams, Enum. Fl. Pl. Nep. 1: 147 (1978). Press *et al.*, Ann. Check. Fl. Pl. Nep. 143 (2000). A perennial grass about 3 m tall, tufted, culms smooth and solid. Leaves simple, large, linear lanceolate, apex tapering to a point, cordate base. Inflorescence brownish, spikelets in panicles. Fruit, minute grain. Propagated by seeds or by vegetative fragmentation of mother plant.

Vernacular (Nepali) and Local Name: '*Amreso*' (N, Ma), '*Mro kucha*' (G), '*Huk*', '*Phurke*' (M); **Voucher specimen:** BM 0174, Salija, 1508 m asl., (Photo Plate 25E); **Fls.-Frts.:** November-February; **Distrib.:** Nepal at 300-2000 m, India, Bhutan, Pakistan and China; **Ecology:** Occurs on open and rocky hills.

Medicinal use: Paste of the roots is applied to cure boils (*Majhi*). **Other use:** A bundle of inflorescences is used to make brooms which are good source of income and sold it to the local market (*Majhi* and *Magar*). Tender portion of leaves base is eaten fresh. Plant is a good source of fodder to cattle (all tribes).

5.2 ETHNOMUSICOBOTANY

Nepalese musical instruments are strongly tied with Nepalese culture and religion. There are a lot of culture and religion based tunes and rhythms to share with the world. The ethnic communities included in this study have passed down immense plant lore and folklore practices in the form of songs and dances from generation to generation. Even various musicals instruments are made from plant parts and products which form an integral part of the rendition of these songs and dances. Samar (1957, 1979) in his study of musical instruments of the tribal people in India revealed a number of plant species used for indigenous instruments relating with the life or society of different ethnic groups.

Music, in an accompaniment with singing and dancing, plays an important role in the lives of ethnic communities in every festival, rituals and social ceremonies. Such songs and dances

evoke stories of the forefathers concerning how they lived life in harmony with nature. For instance, the ‘*Ghatu*’ dance among the *Gurungs* and ‘*Sorathi*’ dance among the *Magars* represent the evolution of mankind from hunters to agriculturalists. These songs and dances are complemented with the needed rhythm and melodious tunes by musical instruments which are designed by the ethnic communities themselves from locally available plant-based materials. Different ethnic communities use different musical instruments, of which the most common ones are *Madal*, *Sarangi*, *Basuri* and *Murali*, *Khajjadi*, *Dhol*, *Damphu* and *Panche baja* (Table 11).

Madal: Madal is highly common among the ethnic communities of Tibeto-Nepali origin. It is one of the folk instruments equally famous and used by almost all the Nepalese people. The instrument is made of wooden logs like *Alnus nepalensis*, *Michelia champaca*, *Toona ciliata*, *Euphorbia royleana*, *Schima wallichii* and *Bridelia retusa*. This instrument is barrel shaped, hollow cylindrical with narrowed ends. Its each end is covered with stretched leather parchment. To tighten the instrument, cords made of fibers parchment are stretched over to the ends. This instrument, is played by beating at each end with the hands, which produces a variety of sounds to provide the basic beats on which the melody is laid upon.

Sarangi: Sarangi is popular Nepali folk musical instrument played exclusively by *Gandarva*. The *Gandharvas* are known as messengers and news conveyer. They travel across the nation door to door to sing song of current affairs and earn some money for living. The sound of sarangi is believed to be closet to human voice. It is derived from the word ‘*Sau Rangi*’ which means ‘hundred colours’, having ability to convey large number of moods and emotion. It is mostly made up of a piece of very light wood such as *Sapium insigne*, *Toona ciliata*, *Alnus nepalensis* and *Michelia champaca*. Generally, the wood is cut into a length of about a foot with carved body into hollow frame of openings. The lowered opening is then covered up with dried skin. Four pieces of strings are fastened tightly with four wooden nails fixed on the top of it. The strings are generally prepared by intestine of sheep. Hair of horse tail is originally used as bow strings of the Sarangi.

Flute (Basuri and Murali): Flute, interchangingly used as basuri and murali, is a musical instrument from the ancient past in Hindu tradition. It is made of bamboo (*Dendrocalamus hamiltonii*) and generally have six holes at proportional distance at one end, and one hole at the other end. Both the varieties of flute are played by blowing air through mouth. Murali is played like trumpet holding downward slopes whereas basuri is kept parallel to the mouth and the air

is blown. The air that goes in from one end is given desired tuning with the movement of fingers. Sound produced by these instruments is similar.

Dhol: Dhol is a barrel shaped drum made by carving out a single block from a tree trunk. It resembles another musical instrument, madal, in shape but differs in size. At the ends of the barrel, leather parchment is used to cover the hole. The parchment is tightly stretched with the help of cords from the fiber of plants or leather cords. Metals rings are attached so that the cords can be adjusted for increasing or reducing the tautness of the skin. It is beaten by wooden or bamboo stick to produce sound. The two ethnic groups discussed in this study, *Magar* and *Majhi*, use this instrument. *Alnus nepalensis*, *Hymenodictyon excelsum*, *Michelia champaca*, *Toona ciliata* are common plants for making dhol.

Damaru: Damaru is another instrument having mythological significance. According to Hindu mythology, damaru was played by Lord Shiva. It is double sided hand drum having hollow at both ends with its curved and narrow middle. Leather cords containing beads at their end are tied in the narrow middle called wait. When the cords strike leather parchment, it produces sounds. The instrument is typically made up of *Alnus nepalensis*. The sound of Damaru is said to represent the primeval sound and the rhythm, from which the universe and all the living beings of the universe emerged.

Damphu: It is flat circular musical instrument made up of wood carved with hollow space inside. The covering is tightly parched with leather. It is held above shoulder with one hand and other hand is used for beating. *Alnus nepalensis* wood is used and the cord used to stretch the leather parchment is made up of *Boehmeria paltyphylla*.

Dhyangro: A type of drum made up of wood log carved with circular hollow. The opening in both the sides is covered by stretching leather; it is played with curved stick called 'Gajo'. It is specially used by the faith healers (Dhami/Jhakri) while worshipping or treating people. In the past, when modern means of communication were not available, this instrument was used to diffuse information.

Khainchandi: Khainchandi is made of wood carved with circular hollow insider. The opening is wrapped with leather and played with palm accompanying songs. It is also played during Bhajan-kirtan by the Hindus. *Alnus nepalensis* is used to make this instrument.

Murchunga: Murchunga is a musical instrument made with a metal frame and bamboo tongue or reed attached to the frame. The tongue/reed is placed in the performer's mouth and plucked

with the finger to produce a note. There are two forms of Murchunga, one from brass and the other from iron. The instrument is played as spiritual music while worshipping in both Buddhism and Hinduism.

Panchai baaja: The ‘five musical instruments’ is a set of five traditional Nepali musical instruments played during holy ceremonies like marriages. Panche baaja are played by a number of ethnic tribes, but traditionally they were prejoratives of Damai and Gaine, who are categorized as Dalits. Among these instruments, Sahanai, Jhyali/Jhyamta/Jhurma and Narasingha are made of metals only. Other two instruments, Nagara/Damaha and Tyamko need part of plant species to play them. So, these two plants are briefly described here.

i. Nagara/Damaha: Nagara/Damaha is made often of copper or of the pancha dhatu (five metals) alloy: brass, copper, silver, zink and gold. They are similar to damaha in shape, but are much larger. Their heads are made from buffalo hide, and they are played with two thick sticks.

ii. Tyamko: Tyamko is made of wood, copper, iron or earthenware. It resembles Nagara in shape but differs in size and the intensity of tune. The shape of its bowl varies considerably places-wise, and like the other drums its head is made of animal hide. It is played with two stick by holding it at waist level hung from a strap around the neck.

Table 11 Plants use to make musical instruments

S.N	Plants name	Family	Nepali name	Parts used	Musical instruments
1	<i>Alnus nepalensis</i>	Betulaceae	<i>Uttis</i>	Wood	Sarangi, Madal, Damaru, Damphu, Dhol, Khainchandi
2	<i>Arundinaria falcata</i>	Poaceae	<i>Nigalo</i>	Leaves	Pipiya
3	<i>Azadirachta indica</i>	Meliaceae	<i>Neem</i>	Wood	Madal, Dhol, Dholak
4	<i>Bauhinia vahlii</i>	Caesalpiniaceae	<i>Bhorla</i>	Stem & fiber	Damphu, Dhangro
5	<i>Bauhinia variegata</i>	Caesalpiniaceae	<i>Koiralo</i>	Wood	Madal
6	<i>Boehmeria platyphylla</i>	Urticaceae	<i>Kamle ghans</i>		Damphu
7	<i>Boehmeria rugulosa</i>	Urticaceae	<i>Daar</i>	Wood	Sarangi, Madal, Damphu, Khainchandi
8	<i>Bombax ceiba</i>	Bombacaceae	<i>Simal</i>	Wood	Madal, Dholak, Dhol
9	<i>Bridelia retusa</i>	Euphorbiaceae	<i>Gayo</i>	wood	Madal
10	<i>Dalbergia sissoo</i>	Fabaceae	<i>Sisau</i>	Wood	Madal, Dhol
11	<i>Dendrocalamus hamiltonii</i>	Poaceae	<i>Choyabans</i>	Wood	Sarangi, Gajo, Murali, Bansuri
12	<i>Euphorbia royleana</i>	Euphorbiaceae	<i>Siundee</i>	Wood	Sarangi, Madal
13	<i>Ficus benghalensis</i>	Moraceae	<i>Bar</i>	Leaves	Pipiya

14	<i>Ficus benjamina</i>	Moraceae	<i>Swami</i>	Leaves	Pipiya
15	<i>Ficus religiosa</i>	Moraceae	<i>Peepal</i>	Leaves	Pipiya
16	<i>Fraxinus floribunda</i>	Oleaceae	<i>Lankuri</i>	Wood	Madal, Dhol
17	<i>Garuga pinnata</i>	Burseraceae	<i>Ramsinghe</i>	Wood	Madal
18	<i>Lyonia ovalifolia</i>	Ericaceae	<i>Angeri</i>	Leaves	Pipiya
19	<i>Michelia champaca</i>	Magnoliaceae	<i>Champ</i>	Wood	Sarangi, Madal, Dhol
20	<i>Michelia kisopa</i>	Magnoliaceae	<i>Ban chaanp</i>	Wood	Madal
21	<i>Podocarpus neriifolius</i>	Podocarpaceae	<i>Gunsee</i>	Wood	Madal
22	<i>Sapium insigne</i>	Euphorbiaceae	<i>Khirro</i>	Wood	Sarangi, Madal
23	<i>Schima wallichii</i>	Theaceae	<i>Chilaune</i>	Wood & leaves	Madal, Pipiya
24	<i>Toona ciliata</i>	Meliaceae	<i>Tuni</i>	Wood	Madal, Dhol

5.3 PLANTS IN MAGICO-RELIGIOUS BELIEF

Magico-religious belief is defined as a system of good or evil faith and worship of supernatural beings (Hajra, 2004). The entities worshipped by people range from unseen forces to tangible entities. Of the material things, trees count as the most commonly worshipped physical entity. It has also been accepted that worshipping plants shows the symbiotic relation of human beings and nature. People believe that some plants are holy and thus essential in religious functions (Sharma & Pegu, 2011). Among the ethnic communities living in Nepal, plants are used for worshipping gods and goddesses as well as treating human ailments (Sharma & Joshi, 2010). Because of the belief that certain complicated ailments and other misfortunes are caused by supernatural power emanating from the loss of soul, the spells or curses cast by evil spirits, the displeasure of ancestral local deities, or the breaking of religious taboos (Joshi & Edington, 1990; Joshi & Joshi, 2000), ethnic people tend to offer plant species which are related to the specific power. Such a tradition prevails in many parts of the world and has been sustained through folklore and cultural practices. To understand the nature, types and characteristics of magico religious healing practice, practitioners are examined empirically through a cross-cultural study (Winkelman, 2009).

The people in the studied area have abundant belief in supernatural power. And, it is common among them to visit their shamans for the treatment of any diseases. A variety of plant species and their parts are used by ‘lama’ (priest), ‘jhakris’ and ‘healers’ shamans of the *Gurung*, *Magar* and *Majhi* communities. The healers believe that the plants possess hallucinogenic properties which have huge effect on human body and mind. This kind of effect is attributed to the spiritual powers which reside in plant species. An interesting attribution relates time of collection and the strength of plants species. It is believed that the collected plant species own

higher supernatural powers if they are collected on the specific days such as solar eclipse, lunar eclipse, and *Sankranti* (Kumar & Behera, 2007).

One of the most frequently used ways is contact therapy to prevent from evil spirits. Ethnic people in Parbat district have huge faith over this therapy and thus they practice widely. In this method of treatment, a whole plant or part of plant is brought to body contact or placed near the patient to make the patient feel better. To treat mind related specific cases like hysteria, the shamans chant ‘mantras’ putting the plant parts over the head of the patient, rotating clockwise, and also touching different parts of body. Among the *Magar* tribe, it is believed that a young girls’ hysteria can be cured by using *Cestrum nocturnum*. This method of treatment is suggested as more a magic than normal treatment (Jain, 1963). In the other mode of use, different parts of plants like roots, bark, stem, grains and flowers are covered by muslin cloth and stitched up to make an amulet; it is worn around the neck or tied around the arm or waist with the belief that it keeps the person safe from the evil spirits. A particular instance is an amulet made from dried paste of the *Mazus surculosus* and *Datura stramonium* is tied around the waist of pregnant women from *Majhi* tribe to prevent abortion. The use of amulet was observed to be very high among small children of the communities. Since they are regarded more vulnerable to evil eye, they are protected with various amulets from their birth to keep them healthy and safe.

Similarly, the womenfolk of the ethnic communities worship and revere *Ocimum sanctum*. Commonly known as ‘*Tulsi*’ and generally planted in the courtyard, the plant is associated with Lord Vishnu and used for many religious purposes. The beads of the plant are hung around the neck of priest/mystics to purify mind and control emotions of the body. The significance of this plant is found even on Vedas. The other plant, *Ficus religiosa* is closely associated the Lord Vishnu. It is also believed that the tree represents the ‘*Trimurti*’, i.e., the three gods; the roots stand for ‘Brahma’, the trunk for ‘Vishnu’, and the leaves for ‘Shiva’. According to another belief, Goddess ‘Lakshmi’ inhabits the tree. Women worship the tree on Saturdays by tying red thread or red cloth around its trunk to be blessed with son. Even ‘Lord Buddha’ is believed to have attained enlightenment under the same tree, and thus the tree is called ‘tree of enlightenment’. Similarly, *Ficus benghalensis* and *Ficus benjamina* have their religious significance. Young girls and women believe that worshiping the plants get them good bride, or grant prosperous and long life for their husbands. Further, *Azadirachta indica* is considered as a manifestation of ‘Goddess Durga’. Besides, its plant leaves are worshiped. Even the *Majhis* believe that the smoke from its leaves protect them from living as well as dead evil

spirits. *Cynodon dactylon*, which are planted within the courtyard or around settlements, are offered to the deities. Other plants of magico-religious significance include *Euphorbia pulcherrima*, *Phyllanthus emblica*, *Shorea robusta* and *Elaeocarpus sphaericus*. *Cannabis sativa* is a holy plant for all Hindus. It is believed that their guardians live in the leaves of this plant. Likewise, meeting someone carrying this plant is considered a sure sign of success. Lord Krishna is associated with Bansuri, which is actually a flute made up of *Dendrocalamus hamiltonii*.

Additionally, the Buddhists give special significance to the *Shorea robusta* which is associated with the Buddha's birth. The women of the *Gurung* community, who are predominantly Buddhists, prepare garland made from the winged seeds of *Oroxylum indicum* 'Tatelo'. It is also used as offering to the deities and used during auspicious ceremonies like weddings and birth. The *Gurung*, *Magar* and *Majhi* communities, during the celebration of their annual festivals 'Lhosar' (festival of new year) and 'Buddha Jayanti', 'Maghe' and 'Swane Sakranti', 'Teej', perform the 'Ghatu', 'Maruni' and 'Sorathi' dances as thanksgiving to the gods for the good harvest of the season. During the dances, the *Gurungs* encircle trees showing their evolution from hunters to farmers.

There are areas in the district where the forests have been preserved based on the religious beliefs of the ethnic communities. For instance, the *Magar* communities have maintained sacred groves in Horsangdi VDC to which they call 'Devithan'. The forest is covered by the *Prunus cerasoides* plant. Similarly, Panchase, Dahare, Gorlang, and Sirpu also have religious forest protected by the tribal communities. The forest at Sirpu holds significance for the Hindus and Buddhist because of the myth that the forest was an abode of Lord Ram, his wife and brother during their period of exile in this forest. Among others, there are some good examples of the conservation practices among the ethnic communities because of their myths, taboos, avoidances, and magico-religious beliefs (Table 12). The sacred groves are effectively out of bounds and left undisturbed due to the belief that anybody who damages them gets penalized with death by the spirits residing among the sacred groves. It might be because of this belief that the tree species are heavily loaded with epiphytic growth of piper, ferns, fern-allies and orchids in some of the sacred groves.

Different religious areas in Parbat like Saligram in Satibeni have maintained sacred groves of bamboo stands for centuries. People worship them by tying pieces of cloth around the stand for the posterity of mankind. The culture of tree worship is embedded in the history of mankind.

Studies have emphasized on the importance of two major types of artifacts to explain why people worship trees – material evidence and literary evidence. *Material evidence* include seals, coins, architectural evidences while *literary evidence* inculcate religious scriptures, epics, Vedas (Sane & Ghate, 2006).

Table 12 Magico-religious plants used by ethnic tribes in Parbat district

S. N.	Plants name	Family	Nepali name	Parts used	Myths/ Beliefs	Rituals and ceremonies
1	<i>Achyranthes bidentata</i>	Amaranthaceae	<i>Datiwan</i>	Whole Plant		Religious value (M & Ma)
2	<i>Anaphalis busua</i>	Asteraceae	<i>Buki phool</i>	Flower heads		Offered to gods and goddess (M)
3	<i>Anaphalis contorta</i>	Asteraceae	<i>Buki phool</i>	Whole Plant	Hung on the ceiling of house to prevent cockroaches (G & M)	
4	<i>Anaphalis margaritaceae</i>	Asteraceae	<i>Buki phool</i>	Whole Plant	Hung on the ceiling of house to prevent cockroaches (G)	
5	<i>Anaphalis triplinervis</i>	Asteraceae	<i>Buki phool</i>	Flower heads		Offered to gods and goddesses (all tribes)
6	<i>Anthocephalus cadamba</i>	Rubiaceae	<i>Kadam</i>	Whole plant		Worship especially for <i>Hindus</i> (all tribes)
7	<i>Arisaema flavum</i>	Araceae	<i>Chari banko</i>	Whole plant	Helps in tracing bear (M)	
8	<i>Artemisia indica</i>	Asteraceae	<i>Titepati</i>	Whole plant		Various rituals (all tribes)
9	<i>Asystasia macrocarpa</i>	Acanthaceae	<i>Jhakri phul</i>	Plant twigs	To keep away the evil spirit (M & Ma)	
10	<i>Bistorta macrophylla</i>	Polygonaceae	<i>Maakuri phul</i>	Whole Plant	Perform a ritual with belief to remove the evil spirit and scabies from the human body (M)	
11	<i>Buddleja asiatica</i>	Loganiaceae	<i>Bhimsepati</i>	Leaves and		Religious purpose

				flowers		(Ma)
12	<i>Cannabis sativa</i>	Cannabaceae	<i>Ganja</i>	Whole Plant		Religious purpose (all ethnic tribes)
13	<i>Castanopsis indica</i>	Fagaceae	<i>Katus</i>	Leaves		To make traditional plates ' <i>tapari</i> ' and ' <i>duna</i> ' for ceremonies and festivals (M & G)
14	<i>Cestrum nocturnum</i>	Solanaceae	<i>Ratko rani</i>	Whole plant	<i>Magar</i> healers/ jhakries use the plant to get rid of nervous imbalances (hysteria) of the young girls	
15	<i>Datura stramonium</i>	Solanaceae	<i>Dhaturo</i>	Seeds	an amulet tied around the waist of pregnant women to prevent abortion (M)	
16	<i>Ficus auriculata</i>	Moraceae	<i>Newaro</i>	Leaves		Festivals and ceremonies (G & M)
17	<i>Ficus benghalensis</i>	Moraceae	<i>Bar</i>	Leaves		Religious purpose (all tribes)
18	<i>Ficus benjamina</i>	Moraceae	<i>Swami</i>	Leaves		Religious purpose (all tribes)
19	<i>Ficus lacor</i>	Moraceae	<i>Kabhro</i>	Leaves		' <i>tapari</i> ' and ' <i>duna</i> ' for the ceremony and festivals (M & G)
20	<i>Ficus roxburghii</i>	Moraceae	<i>Newaro</i>	Leaves		To make traditional plates ' <i>tapari</i> ' which is used in rituals and ceremonies (M & G)
21	<i>Gossypium herbaceum</i>	Malvaceae	<i>Ban Kapas</i>	Cotton and fiber		Ceremony (M)
22	<i>Hypericum cordifolium</i>	Hypericaceae	<i>Areli</i>	Flowers		Rituals and ceremonies (all tribes)
23	<i>Imperata</i>	Poaceae	<i>Siru</i>	Dried		Soaked in

	<i>cylindrica</i>			inflorescence		mustard oil and burned during religious performance (G & M)
24	<i>Jasminum officinale</i>	Oleaceae	<i>Lahare jai</i>	Flowers		Ceremony (M & G)
25	<i>Luculia gratissima</i>	Rubiaceae	<i>Bankangiyo</i>	Flower		Worship in temple (G)
26	<i>Lycopodium cernuum</i>	Lycopodiaceae	<i>Sano nagbeli</i>	Whole plant		Different festival and ceremonies (M)
27	<i>Lycopodium clavatum</i>	Lycopodiaceae	<i>Thulo nagbeli jhar</i>	Whole plant		Different festivals and ceremonies (G & Ma)
28	<i>Lygodium japonicum</i>	Lycopodiaceae	<i>Lute jhar</i>	Whole plant	Keeping plant in house prevent scabis, itching problem of skin, religious purpose especially in 'Sawane sakranti'(M & Ma) as well as for religious purpose	
29	<i>Mazus surculosus</i>	Scrophulariaceae	<i>Khasre buti</i>	Dried paste of the plant	'buti' to cure fever and cold by <i>Majhi</i> .	
30	<i>Michelia champaca</i>	Magnoliaceae	<i>Champ</i>	Flowers		Religious purpose (G & M)
31	<i>Michelia doltsopa</i>	Magnoliaceae	<i>Rani chanp</i>	Flowers		Religious purpose (M)
32	<i>Neanotis ingrata</i>	Rubiaceae	<i>Pani ghans</i>	Whole plant	Keeping plant in house protects from witch and devils (Ma)	
33	<i>Ocimum basilicum</i>	Lamiaceae	<i>Babariphool</i>	Whole plant		Religious purpose (M & G)
34	<i>Ocimum scantum</i>	Lamiaceae	<i>Tulsi</i>	Whole plant		Religious purpose (M)
35	<i>Oroxylum indicum</i>	Bignoniaceae	<i>Talelo</i>	Seeds		Offered to gods and goddesses, especially by

						Buddhists (G)
36	<i>Prunus cerasoides</i>	Rosaceae	<i>Paiyau</i>	Whole plant		Ceremonies and festivals (all tribes)
37	<i>Rhus succedanea</i>	Anacardiaceae	<i>Kagbhalayo</i>	Whole plant	Keeping plant in home removes the blemish on the body (G & M)	
38	<i>Saccharum spontaneum</i>	Poaceae	<i>Kans</i>	Whole plant		Religious significance (all tribes)
39	<i>Salix babylonica</i>	Salicaceae	<i>Bains</i>	Flower		Religious purpose (M)
40	<i>Sambucus hookeri</i>	Adoxaceae	<i>Kanikephool</i>	Flower		Used in ceremonies (M & Ma)

5.4 PHYTOCHEMICAL ANALYSIS

After identifying and documenting the ethnobotanical plants in Parbat district in terms of their nutritional and medicinal importance, the present study carried out a) proximate analysis of 40 most prominent wild edible species that came to market after the local people collected from natural habitats (Table 13) and b) phytochemical screening of 61 plants (Table 14). Antioxidant activity of different medicinally important plants species was determined.

5.4.1 Proximate Analysis

In the present study, high diversity of wild edible plants was recorded consisting 159 species from 64 families under 115 genera. The various parts of wild edible species were consumed: fruits (75 species), leaves (50 species), stem/shoots (28 species), rhizomes/ tuber roots (16 species), flowers (14 species), whole plant (11 species), twigs (5 species), corm and pseudo bulb (2 species) and gum/pulp and tender fronds (1 species). They were either eaten raw (mainly fruits), or cooked as vegetables or flour, or distilled as beverages. Most of the wild edible species were flowering plants, a few other were non flowering. Low to mid hills (<2000 m elevation) had a higher diversity of wild edible plants than in the upper hills (>2000 m elevation). It was observed that the numbers of edible fruiting species decreased with increasing elevation. The proximate phytochemical details of the nutritive values were presented.

Protein

Protein content was estimated highest percentage in *Ficus semicordata* (14.35±1.7), followed by *Ficus lacor* (14.35±2.1), *Ficus subincisa* (14.35±1.7), *Ficus glaberrima* (13.95± 0.10). The

protein content was lowest in *Phyllanthus emblica* (1.2 ± 0.33) (Table 13). The ascending order of protein content (percentage) occurred as given: *Phyllanthus emblica* < *Syzygium cumini* < *Solena amplexicaulis* < *Berberis aristata* < *Dioscorea bulbifera* < *Dioscorea deltoidea* < *Colocasia esculenta* < *Dioscorea alata* < *Pyrus pashia* < *Rubus ellipticus* < *Diospyros lancifolia* < *Bombax ceiba* < *Diplokenma butyracea* < *Cleistocalyx operculatus* < *Mahonia napaulensis* < *Prunus cerasoides* < *Lindera neesiana* < *Begonia picta* < *Pandanus nepalensis* < *Rorippa nasturtium-aquaticum* < *Piper longum* < *Zanthoxylum armatum* < *Morus australis* < *Nephrolepis auriculata* < *Saurauia napaulensis* < *Asparagus racemosus* < *Smilax aspera* < *Castanopsis indica* < *Boehmeria rugulosa* < *Choerospondias axillaris* < *Zizyphus mauritiana* < *Ficus roxburghii* < *Bauhinia purpurea* < *Bauhinia variegata* < *Ficus auriculata* < *Dendrocalamus hamiltonii* < *Ficus subincisa* < *Ficus glaberrima* < *Ficus lacor* < *Ficus semicordata*.

Carbohydrate

The carbohydrate content varied from 2.2-22.35% (Table 13). It was calculated highest in *Dioscorea alata* (22.35 ± 2.1), followed by *Dioscorea deltoidea* (20.25 ± 0.98), *Colocasia esculenta* (19.67 ± 1.3), *Dioscorea bulbifera* (18.25 ± 0.12) and *Morus australis* (16.24 ± 2.3). Lowest percentage value of carbohydrate content was calculated in *Dendrocalamus hamiltonii* (2.2 ± 0.9) (Table 13).

Other species showed an intermediate range of carbohydrate content. The carbohydrate content in different plants in ascending order was *Dendrocalamus hamiltonii* < *Ficus auriculata* < *Ficus lacor* < *Ficus roxburghii* < *Bauhinia purpurea* < *Ficus glaberrima* < *Bauhinia variegata* < *Ficus subincisa* < *Ficus semicordata* < *Mahonia napaulensis* < *Castanopsis indica* < *Cleistocalyx operculatus* < *Saurauia napaulensis* < *Choerospondias axillaris* < *Pyrus pashia* < *Lindera neesiana* < *Solena amplexicaulis* < *Zizyphus mauritiana* < *Nephrolepis auriculata* < *Piper longum* < *Diplokenma butyracea* < *Diospyros lancifolia* < *Prunus cerasoides* < *Asparagus racemosus* < *Zanthoxylum armatum* < *Begonia picta* < *Rorippa nasturtium-aquaticum* < *Smilax aspera* < *Boehmeria rugulosa* < *Bombax ceiba* < *Rubus ellipticus* < *Syzygium cumini* < *Berberis aristata* < *Pandanus nepalensis* < *Phyllanthus emblica* < *Morus australis* < *Dioscorea bulbifera* < *Colocasia esculenta* < *Dioscorea deltoidea* < *Dioscorea alata*.

Starch

The starch content was observed highest in *Dioscorea alata* (11.25 ± 1.9), followed by *Dioscorea deltoidea* (9.75 ± 1.2), *Dioscorea bulbifera* (8.75 ± 1.2), *Phyllanthus emblica* (7.1

± 1.89), *Morus australis* (5.67 ± 1.2) whereas the lowest was observed in *Dendrocalamus hamiltonii* (1.1 ± 0.1). (Table 13). The percentage of starch content in different plants in ascending order: *Dendrocalamus hamiltonii* < *Ficus auriculata* < *Bauhinia purpurea* < *Ficus lacor* < *Choerospondias axillaris* < *Ficus roxburghii* < *Mahonia napaulensis* < *Castanopsis indica* < *Cleistocalyx operculatus* < *Smilax aspera* < *Lindera neesiana* < *Saurauia napaulensis* < *Solena amplexicaulis* < *Bauhinia variegata* < *Diplokenma butyracea* < *Ficus semicordata* < *Ficus glaberrima* < *Nephrolepis auriculata* < *Ficus subincisa* < *Pyrus pashia* < *Piper longum* < *Zizyphus mauritiana* < *Prunus cerasoides* < *Diospyros lancifolia* < *Pandanus nepalensis* < *Rorippa nasturtium-aquaticum* < *Zanthoxylum armatum* < *Asparagus racemosus* < *Begonia picta* < *Boehmeria rugulosa* < *Bombax ceiba* < *Rubus ellipticus* < *Syzygium cumini* < *Berberis aristata* < *Colocasia esculenta* < *Morus australis* < *Phyllanthus emblica* < *Dioscorea bulbifera* < *Dioscorea deltoidea* < *Dioscorea alata*.

Fat

The highest fat percentage was in *Diplokenma butyracea* (7.2 ± 0.2), followed by *Boehmeria rugulosa* (6.3 ± 0.9), *Bauhinia variegata* (5.5 ± 1.3), *Ficus subincisa* (5.21 ± 0.89) and the lowest was observed in *Dendrocalamus hamiltonii* (0.2 ± 0.11) (Table 13). The ascending order of fat percentage in different plants was: *Dendrocalamus hamiltonii* < *Phyllanthus emblica* < *Cleistocalyx operculatus* < *Solena amplexicaulis* < *Morus australis* < *Prunus cerasoides* < *Syzygium cumini* < *Dioscorea deltoidea* < *Choerospondias axillaris* < *Colocasia esculenta* < *Berberis aristata* < *Pyrus pashia* < *Dioscorea alata* < *Dioscorea bulbifera* < *Smilax aspera* < *Diospyros lancifolia* < *Nephrolepis auriculata* < *Lindera neesiana* < *Mahonia napaulensis* < *Rorippa nasturtium-aquaticum* < *Pandanus nepalensis* < *Saurauia napaulensis* < *Bombax ceiba* < *Zizyphus mauritiana* < *Asparagus racemosus* < *Rubus ellipticus* < *Bauhinia purpurea* < *Piper longum* < *Begonia picta* < *Castanopsis indica* < *Zanthoxylum armatum* < *Ficus roxburghii* < *Ficus lacor* < *Ficus semicordata* < *Ficus glaberrima* < *Ficus auriculata* < *Ficus subincisa* < *Bauhinia variegata* < *Boehmeria rugulosa* < *Litsea monopetala* < *Diplokenma butyracea*.

Crude fiber

The crude fiber content was found highest in *Nephrolepis auriculata* (19.5 ± 2.1) followed by *Zanthoxylum armatum* (16.2 ± 2.1), *Piper longum* (13.01 ± 2.3), *Castanopsis indica* (9.01 ± 1.1) and *Colocasia esculenta* (8.2 ± 0.91). The lowest crude fiber content was recorded in *Berberis aristata* (1.21 ± 5.1) (Table 13). The ascending order of crude fiber content was: *Berberis aristata* < *Choerospondias axillaris* < *Mahonia napaulensis* < *Bauhinia purpurea* < *Ficus auriculata* < *Ficus semicordata* < *Bombax ceiba* < *Rorippa nasturtium-aquaticum* < *Ficus*

lacor<*Bauhinia* *variegata*<*Cleistocalyx* *operculatus*<*Prunus* *cerasoides*<*Ficus*
subincisa<*Dendrocalamus* *hamiltonii*<*Solena* *amplexicaulis*<*Ficus* *glaberrima*<*Ficus*
roxburghii<*Syzygium* *cumini*<*Phyllanthus* *emblica*<*Smilax* *aspera*<*Saurauia*
napaulensis<*Asparagus* *racemosus*<*Dioscorea* *deltoidea*<*Morus* *australis*<*Boehmeria*
rugulosa<*Diplokenma* *butyracea*<*Lindera* *neesiana*<*Begonia* *picta*<*Pandanus*
nepalensis<*Dioscorea* *alata*<*Zizyphus* *mauritiana*<*Diospyros* *lancifolia*<*Rubus*
ellipticus<*Pyrus* *pashia*<*Dioscorea* *bulbifera*<*Colocasia* *esculenta*<*Castanopsis*
indica<*Piper longum*<*Zanthoxylum armatum* <*Nephrolepis auriculata*.

Moisture

The five plants with highest moisture content were *Dioscorea alata* (92.01±2.9), *Morus australis* (85.3±3.1), *Dioscorea deltoidea* (85 ±6.1), *Phyllanthus emblica* (84.4 ±4.5) and *Dioscorea bulbifera* (84 ±2.1). The fruits of other then the five species mentioned above contained relatively lower moisture. The lowest was reported in *Nephrolepis auriculata* (1.23 ±0.91) (Table 13).

The order of plants with moisture content in ascending order was as follows: *Nephrolepis auriculata*<*Piper longum*<*Zanthoxylum armatum*<*Saurauia napaulensis* <*Solena amplexicaulis*<*Asparagus racemosus*<*Castanopsis indica*<*Rorippa nasturtium-aquaticum*<*Smilax aspera*<*Bauhinia variegata*<*Diplokenma butyracea*<*Cleistocalyx operculatus* <*Zizyphus mauritiana*<*Bauhinia purpurea*<*Colocasia esculenta*<*Bombax ceiba*<*Lindera neesiana*<*Ficus semicordata*<*Mahonia napaulensis*<*Pyrus pashia*<*Pandanus nepalensis*<*Diospyros lancifolia*<*Ficus glaberrima*<*Choerospondias axillaris*<*Ficus roxburghii*<*Begonia picta*<*Dendrocalamus hamiltonii*<*Prunus cerasoides*<*Ficus lacor*<*Boehmeria rugulosa*<*Ficus subincisa*<*Ficus auriculata*<*Syzygium cumini*<*Rubus ellipticus*<*Berberis aristata*<*Dioscorea bulbifera*<*Phyllanthus emblica*<*Dioscorea deltoidea*<*Morus australis*<*Dioscorea alata*.

Table 13 Proximate chemical analysis of some important wild edible plants

S.N	Botanical name	Local name	Protein (%)	Carbohydrate (%)	Starch (%)	Fat (%)	Crude fiber (%)	Moisture (%)
1	<i>Asparagus racemosus</i> Wild.	Kurilo	5.2±0.5	6.8±0.21	3.2±0.45	2.1±0.45	3.2±0.21	55.9±0.5
2	<i>Bauhinia purpurea</i> L.	Tanki	12.49±0.1	3.9±1.1	1.25±0.2	2.76±0.3	1.7±0.58	65.9±1.2
3	<i>Bauhinia variegata</i> L.	Koiralo	12.75±0.21	4.25±0.9	2.21±0.7	5.5±1.3	2.1±0.3	60.3±1.5
4	<i>Begonia picta</i> Smith.	Magarkanche	4.24±0.21	7.8±0.91	3.25±0.21	3.1±0.11	4.2±0.5	75.9±0.61
5	<i>Berberis aristata</i> DC.	Chutro	2.2±0.21	12.21±1.5	4.24±0.29	0.71±0.31	1.2±.51	83±2.5
6	<i>Boehmeria rugulosa</i> Wedd.	Daar	7.5±0.12	8.4±0.23	3.5±0.11	6.3±0.9	3.5±0.31	79.3±2.9
7	<i>Bombax ceiba</i> L.	Simal	3.4±0.12	9.5±1.1	3.6±0.66	1.8±0.12	1.9±0.3	67.5±3.4
8	<i>Castanopsis indica</i> (Roxb.) Miq.	Katus	6.8±0.26	4.5±0.12	1.9±0.7	3.2±0.12	9±1.1	59±2.6
9	<i>Choerospondias axillaris</i> Roxb.	Lapsee	8.5±0.21	4.9±0.44	1.67±0.22	0.69±0.1	1.5±0.2	75±4.1
10	<i>Cleistocalyx operculatus</i> Robx.	Kyamuno	3.9±0.22	4.5±0.33	1.9±0.21	0.39±0.11	2.1±0.11	62±3.1
11	<i>Colocasia esculenta</i> (L.) Schott.	Jaluko	3.1±0.23	19.67±1.3	4.9±0.23	0.69±0.1	8.2±0.9	67±3.1
12	<i>Dendrocalamus hamiltonii</i> Nees & Arn. ex Munro.	Tama	13.5±0.21	2.2±0.22	0.95±0.11	0.2±0.11	2.2±0.21	77.3±3.2
13	<i>Diplokenma butyracea</i> (Roxb.) H. J. Lam.	Chyauree	3.5±0.21	6.7±0.21	2.3±0.11	7.2±0.20	3.9±0.20	61±2.9
14	<i>Dioscorea alata</i> L.,	Ban Tarul	3.2±0.10	22.35±2.1	11.25±1.9	0.75±0.22	4.6±0.22	92±2.9
15	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	Bhayakur	2.9±0.11	20.25±0.98	9.75±1.2	0.65±0.12	3.2±0.19	85±6.1
16	<i>Dioscorea bulbifera</i> L.,	Geetha	2.8±0.11	18.25±0.12	8.75±1.2	0.81±0.12	6.9±1.2	84±2.1
17	<i>Diospyros lancifolia</i> Roxb.	Khallu	3.3±0.22	6.7±0.19	3.1±0.31	0.98±0.11	5.1±1.4	71.2±4.2
18	<i>Ficus auriculata</i> Lour.,	Bhutuk	13.21±2.1	2.2±0.9	1.1±0.21	5.2±89	1.78±0.21	80.2±2.9
19	<i>Ficus glaberrima</i> Blume.	Pakhuri	13.95±0.10	4.08±1.2	2.35±0.99	4.28±1.2	2.3±1.1	72.2±3.1
20	<i>Ficus lacor</i> Buch.-Ham.	Kabhro	14.35±2.1	2.83±0.56	1.5±0.22	4.21±0.21	1.99±2.1	78.3±2.0
21	<i>Ficus roxburghii</i> Wall. ex Miq.	Newaro	11.21±2.1	3.2±0.34	1.67±0.23	3.21±0.21	2.3±0.99	75.2±5.5
22	<i>Ficus semicordata</i> Buch.-Ham. ex Sm.	Khanayu	14.35±1.7	4.32±1.0	2.3±0.99	4.15±0.88	1.89±0.11	69.2±2.3
23	<i>Ficus subincisa</i> Buch.-Ham ex Sm.,	Bedulo	13.5±2.1	4.31±0.94	2.5±0.19	5.21±0.89	2.11±0.44	79.4±5.6
24	<i>Lindera neesiana</i> (Wall. ex Nees) Kurz.	Siltimur	4.2±0.67	5.2±1.1	2.1±0.89	1.1±0.17	4.1±0.78	68.2±6.1
25	<i>Mahonia napaulensis</i> DC.	Jamanemandro	3.91±0.56	4.32±1.1	1.82±0.10	1.1±0.14	1.61±0.56	69.2±5.6
26	<i>Morus australis</i> Poir. Lam.	Kimbu	4.98±0.90	16.24±2.3	5.6±1.2	0.35±0.11	3.2±0.21	85.3±3.1
27	<i>Nephrolepis auriculata</i> (L.) Trimen.	Paniamala	5.1±0.89	6.2±1.2	2.4±0.99	1.01±0.12	19.5±2.1	1.23±0.13
28	<i>Pandanus nepalensis</i> St. John	Tarika	4.31±0.34	12.34±2.1	3.1±0.12	1.42±0.10	4.2±1.2	70.5±6.7
29	<i>Phyllanthus emblica</i> L.	Amala	1.2±0.33	15.2±2.7	7.1±1.89	0.2±0.10	2.82±0.10	84.4±4.5
30	<i>Piper longum</i> L.	Pipla	4.9±0.47	6.2±1.3	2.9±0.19	2.91±0.24	13.1±2.3	7.7±2.7
31	<i>Prunus cerasoides</i>	Pyanyu	3.98±1.1	6.78±2.3	2.98±0.22	0.42±0.012	2.1±0.17	78.1±4.4
32	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don.	Mayal	3.2±0.33	5.1±0.21	2.6±0.99	0.71±0.11	6.5±2.1	69.23±5.1
33	<i>Rorippa nasturtium-aquaticum</i>	Khole sag	4.6±0.55	7.9±0.59	3.1±0.67	1.2±0.33	1.9±0.10	59.2±3.2
34	<i>Rubus ellipticus</i> Sm.	Ainselu	3.21±0.33	10.34±2.1	4.12±0.78	2.5±0.33	6.45±0.21	82.87±0.33
35	<i>Saurauia napaulensis</i> DC.	Gobino	5.1±0.35	4.6±1.1	2.1±0.10	1.5±0.12	3.1±0.22	52.3±3.2
36	<i>Smilax aspera</i> L.	Kukurdaino	6.3±0.23	8.2±1.5	1.9±0.22	0.91±0.49	2.9±0.98	59.2±2.2
37	<i>Solena amplexicaulis</i> (Lam.) Gandhi.	Ban kankro	2.1±0.21	5.4±0.23	2.1±0.43	0.33±0.012	2.21±0.66	55.2±1.2
38	<i>Syzygium cumini</i> (L.) Skeels.	Jamun	1.5±0.13	10.8±2.1	4.2±0.88	0.52±0.13	2.5±0.23	82.3±5.2
39	<i>Zanthoxylum armatum</i> DC.	Timur	4.9±0.89	6.9±1.1	3.1±0.21	3.2±0.11	16.2±2.1	41.2±4.4
40	<i>Zizyphus mauritiana</i> Lam.	Bayer	9.2±1.1	6.1±2.1	2.9±0.99	1.82±0.34	4.6±1.2	65.34±2.2

Values are mean (n=3)± (Standard deviation)

5.4.2 Phytochemical screening

61 plant species selected on the basis of informants consensus factors (F_{IC}) and Fidelity level (FL) value were screened for preliminary phytochemical values. The presence of flavonoids, protein and amino acids, carbohydrate, alkaloids, phenol, saponins, glycosides, steriods and terpenoids was determined (Table 14).

Alkaloides

Thirty one plants showed the presence of alkaloids in which *Chlorophytum nepalense*, *Litsea cubeba*, *Neolitsea pallens* and *Rauvolfia serpentina* revealed maximum. Alkaloids were present in lower amount (+) in 29.03%, moderate amount (++) in 14.52%, and higher amount (+++) in 6.45% of the studied plants.

Phenol

Fifty two plants showed presence of phenolic contents. Highest phenolic contents were shown in *Abies spectabilis*, *Bergenia ciliata*, *Camellia kissi*, *Crateva unilocularis*, *Juglans regia*, *Litsea cubeba*, *Potentilla fulgens*, *Rheum australe* and *Ricinus communis*. Phenol was present in 43.54% of plants in lower amount, 27.81% in moderate amount and 14.52% in higher amount.

Protein and amino acids

Sixteen plants showed positive indication in ninhydrin test. Only two species *Mahonia napaulensis* and *Potentilla fulgens* showed the highest presence of amino acids and protein. Proteins were present in 22.58% of plants in lower amount (+) and 3.23% in moderate amount (++). In none of the plants, higher amount (+++) of proteins and amino acids were found.

Carbohydrates

Thirty three plants showed positive results in Benedict's test. Carbohydrate contents were shown in equally highest amount in four species, *Abies spectabilis*, *Bergenia ciliata*, *Neolitsea pallens*, *Taxus wallichiana*. Carbohydrate was present in 30.65% of the total plants in lower amount (+), 19.35% in moderate amount (++) and 6.45% in higher amount (+++).

Glycosides

Twenty seven plants showed the Salkowsakis positive response. Highest amount were reported by

Camellia kissi, *Potentilla fulgens*, *Ricinus communis*, *Taxus wallichiana*. Glycosides were present in 20.96% of plants in lower amount, 16.12% in moderate amount and 6.45% in higher amount.

Saponin

Forty four plant species showed saponin contents. Highest was recorded in *Abies spectabilis*, *Chlorophytum nepalense*, *Crateva unilocularis*, *Dactylorhiza hatagirea*, *Juglans regia*, *Paris polyphylla*, *Taxus wallichiana*. Saponins were present in 38.70% of plants in lower amount, 20.97% in moderate amount and 11.29% in higher amount.

Flavonoids

Seventeen plants showed shinoda positive test. *Bryophyllum pinnatum*, *Glycyrrhiza glabra*, *Potentilla polyphylla* plants showed highest strength. Shinoda were present in 12.90% of plants in lower amount, 9.68% in moderate amount and 4.84% in higher amount.

Steroid

Forty nine plants showed steroid positive test. *Bergenia ciliata*, *Chlorophytum nepalense*, *Juglans regia*, *Litsea cubeba*, *Potentilla fulgens*, *Taxus wallichiana* showed highest positive response. Steroids were present in 50% of plants in lower amount, 19.35% in moderate amount and 9.68% in higher amount.

Terpenoids

Twenty eight plants showed positive result in terpenoids test. Highest amount of terpenoids was recorded only in *Juglans regia*. Terpenoids were present in 32.25% of plants in lower amount, in 11.29% in moderate amount and in 1.61% in higher amount.

Table 14 Phytochemical screening of 61 different wild medicinal plant species

S. N	Scientific name	Protein	Carbohydrate	Phenol	Saponin	Glycosides	Steroid	Terpenoids	Alkaloids	Flavonoids
1	<i>Abies spectabilis</i>	+	+++	+++	+++	++	++	-	-	+
2	<i>Acampe papillosa</i>	-	-	+	+	-	++	-	++	-
3	<i>Acorus calamus</i>	-	-	+	+	+	+	-	-	-
4	<i>Arisaema tortuosum</i>	-	-	-	+	++	-	-	-	-
5	<i>Asparagus racemosus</i>	-	-	+	+	-	+	-	+	-
6	<i>Begonia picta</i>	-	+	+	+	-	+	-	-	-
7	<i>Benincasa hispida</i>	-	+	+	+	-	+	-	+	-
8	<i>Berberis aristata</i>	-	+	+	-	-	-	-	+	-
9	<i>Bergenia ciliata</i>	+	+++	+++	+	++	+++	-	-	++
10	<i>Bombax ceiba</i>	-	++	++	+	-	++	++	++	-
11	<i>Bryophyllum pinnatum</i>	-	-	++	+	+	+	+	-	+++
12	<i>Camellia kissi</i>	-	-	+++	++	+++	+	-	-	+
13	<i>Centella asiatica</i>	+	++	++	+	-	++	++	++	-
14	<i>Chlorophytum nepalense</i>	-	+	++	+++	-	+++	-	+++	-
15	<i>Cleistocalyx operculatus</i>	+	++	-	+	+	+	+	-	+
16	<i>Coelogyne corymbosa</i>	+	++	+	++	-	++	+	++	-
17	<i>Crateva unilocularis</i>	-	-	+++	+++	++	+	-	-	
18	<i>Cuscuta reflexa</i>	+	+	+		-	-	-	-	+
19	<i>Dactylorhiza hatagirea</i>	+	++	++	+++	-	+	-	+	-
20	<i>Dendrobium moschatum</i>	-	-	-	++	+	+	+	-	++
21	<i>Dioscorea deltoidea</i>	+	++	+	-	++	-	-	-	
22	<i>Gaultheria fragrantissima</i>	-	+	+	-	-	-	-	-	++
23	<i>Glycyrrhiza glabra</i>	-	-	+	+	+	+	+	+	+++
24	<i>Indigofera bracteata</i>	-	-	++	++	-	++	-	++	-
25	<i>Juglans regia</i>	+	+	+++	+++	-	+++	+++	+	-
26	<i>Justicia adhatoda</i>	-	-	++	-	+	+	+	-	++
27	<i>Litsea cubeba</i>	-	-	+++	-	-	+++	+	+++	-
28	<i>Lycopodium clavatum</i>	-	+	-	-	++	++	++	-	-
29	<i>Mahonia napaulensis</i>	++	+	++	+	++	++	+	+	+
30	<i>Mentha spicata</i>	-	-	+	-	-	-	-	-	-

31	<i>Michelia doltsopa</i>	-	-	+	-	++	++	+	-	-
32	<i>Neolitsea pallens</i>		+++	++			++		+++	
33	<i>Neopicrorhiza scrophulariiflora</i>	-	+	+	-	+	+	+	-	-
34	<i>Nephrolepis auriculata</i>	-	++	+	+	-	+	+	+	-
35	<i>Paris polyphylla</i>	-	-	-	+++	++	+	-	-	-
36	<i>Piper longum</i>	-	-	++	-	-	-	-	+	-
37	<i>Pleione humilis</i>	-	-	-	-	+	+	-	-	+
38	<i>Pogostemon glaber</i>	-	-	+	+	+	+	-	-	-
39	<i>Potentilla polyphylla</i>	-	+	+	+	+	++	-	-	+++
40	<i>Potentilla fulgens</i>	++	-	+++	+	+++	+++	+	-	-
41	<i>Rauvolfia serpentina</i>	-	-	++	++	-	+	-	+++	-
42	<i>Rheum austral</i>	-	-	+++	++	++	+	-	-	+
43	<i>Rheum moorcroftianum</i>	-	-	-	++	+	+	-	-	-
44	<i>Rhododendron arboretum</i>	-	++	++	-	+	++	-	-	++
45	<i>Ricinus communis</i>	-	-	+++	+	+++	+	++	-	-
46	<i>Rubia manjith</i>	-	++	++	++	-	+	-	-	++
47	<i>Sambucus adnata</i>	-	-	+	-	-	+	-	+	-
48	<i>Spilanthes paniculata</i>	-	-	+	-	-	-	++	++	-
49	<i>Spiranthes sinensis</i>	+	-	+	++	-	+	-	+	-
50	<i>Swertia angustifolia</i>	-	-	+	-	-	+	-	+	-
51	<i>Swertia chirayita</i>	-	+	++	+	-	-	+	-	-
52	<i>Taxus wallichiana</i>	+	+++	++	+++	+++	+++	+	-	-
53	<i>Tinospora sinensis</i>	+	+	+	++	-	+	+	+	-
54	<i>Urtica dioica</i>	-	-	+	+	-	+	+	+	-
55	<i>Valeriana hardwickii</i>	-	+	-	+	-	+	-	+	-
56	<i>Valeriana jatamansii</i>	+	++	+	++	-	-	+	++	-
57	<i>Vitex negundo</i>	-	+	+	++	-	+	+	++	-
58	<i>Wikstroemia canescens</i>	-	-	+	-	-	+	++	+	-
59	<i>Zanthoxylum acanthopodium</i>	-	++	+	+	-	-	+	+	-
60	<i>Zanthoxylum armatum</i>	-	+	++	++	-	-	++	+	-
61	<i>Zizyphus mauritiana</i>	-	+	++	+	-	-	-	++	-

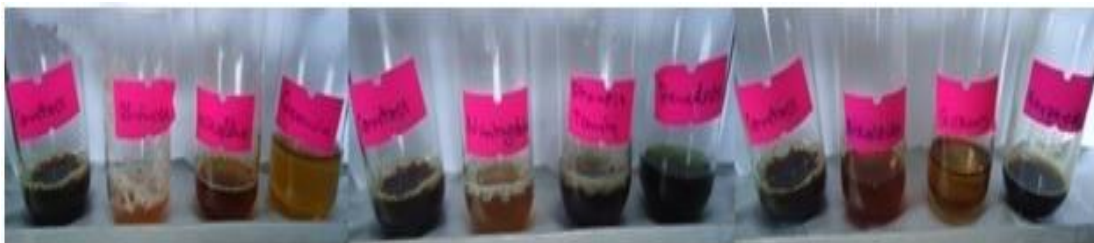


Fig. 10 : Aqueous extract of *Justicia adhatoda* showing positive and negative tests of phytochemical compounds

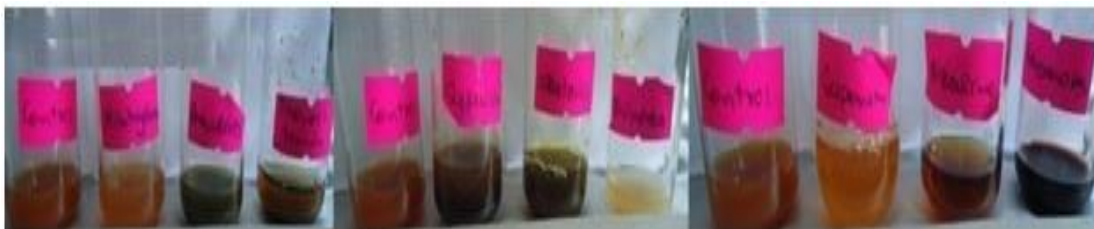


Fig. 11 : Aqueous extract of *Potentilla polyphylla* showing positive and negative tests of phytochemical compounds



Fig. 12 : Aqueous extract of *Mahonia napaulensis* showing positive and negative tests of phytochemical compounds



Fig. 13 : Aqueous extract of *Abies spectabilis* showing positive and negative tests of phytochemical compounds



Fig. 14 : Aqueous extract of *Michelia doltsopa* showing positive and negative tests of phytochemical compounds



Fig. 15 : Aqueous extract of *Swertia chirayita* showing positive and negative tests of phytochemical compounds

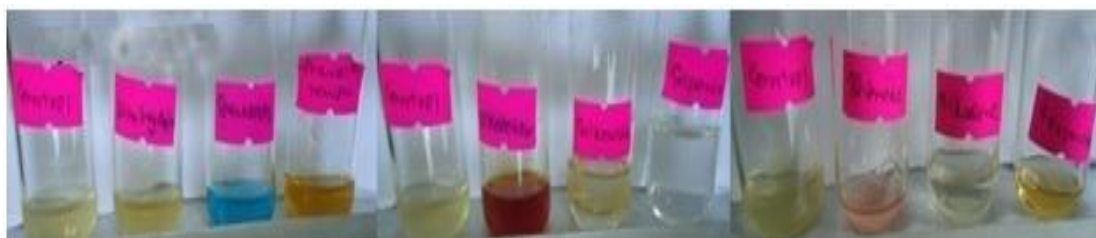


Fig. 16 : Aqueous extract of *Glycyrrhiza glabra* showing positive and negative tests of phytochemical compounds



Fig. 17 : Aqueous extract of *Taxus wallichiana* showing positive and negative tests of phytochemical compounds



Fig. 18: Aqueous extract of *Bryophyllum pinnatum* showing positive and negative tests of phytochemical compounds



Fig. 19 : Aqueous extract of *Lycopodium clavatum* showing positive and negative tests of phytochemical compounds



Fig. 20 : Aqueous extract of *Dendrobium moschatum* showing positive and negative tests of phytochemical compounds



Fig. 21 : Aqueous extract of Orchid *Pleione humilis* showing positive and negative tests of phytochemical compounds

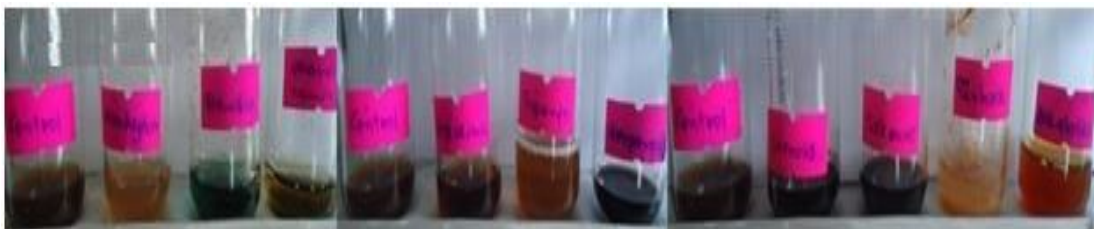


Fig. 22: Aqueous extract of *Rheum moorcroftianum* showing positive and negative tests of phytochemical compounds



Fig. 23 : Aqueous extract of *Mentha spicata* showing positive and negative tests of phytochemical compounds



Fig. 24 : Aqueous extract of *Pogostemon glaber* showing positive and negative tests of phytochemical compounds



Fig. 25: Aqueous extract of *Centella asertica* showing positive and negative tests of phytochemical compounds

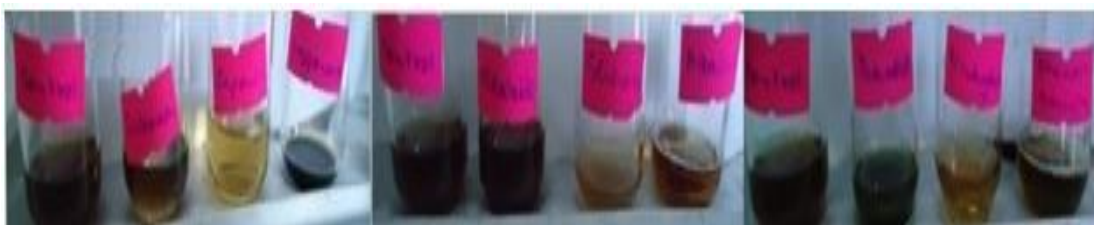


Fig. 26: Aqueous extract of *Neopicrorhiza scrophulariiflora* showing positive and negative tests of phytochemical compounds



Fig. 27: Aqueous extract of *Cleistocalyx operculatus* showing positive and negative tests of phytochemical compounds

5.4.3 DPPH Assay

The present study was carried out to evaluate the antioxidant potential of different organic and aqueous soluble materials of different plants collected from the studied area. Two complementary tests, namely DPPH free radical scavenging and reducing power activity determinations were used for this study. The results are presented in Table 15 and Table 16. A method based on the scavenging of the stable radical 1, 1-diphenyl-2-picrylhydrazyl (DPPH) has been used extensively to predict the antioxidant activities of extracts of plants (Brand-Williams *et al.*, 1995). The effect on DPPH radical scavenging was thought due to their hydrogen donating ability and radical scavenging activity (Oke *et al.*, 2009). In this study, antioxidant activity of medicinal plants was determined using DPPH method, acting possibly as primary antioxidant Huang *et al.* (2005). Inhibition values and IC₅₀ value of aqueous extract of different plants were calculated at concentration of 7.5, 8.0, 8.5, 9.0, 9.5 and 10 µg/ml respectively compared with the inhibition value and IC₅₀ of ascorbic acid (Table 15). The lower IC₅₀ values indicate higher scavenging activity.

In the present study, the values of *Piper longum*, *Camellia kissi*, *Benincasa hispida*, *Neolitsea pallens*, *Neopicrorhiza scrophulariiflora*, *Gaultheria fragrantissima*, *Ricinus communis*, *Taxus wallichiana*, *Valeriana jatamansii*, *Asparagus racemosus*, *Centella asiatica*, *Rubia manjith*, *Cuscuta reflexa*, *Nephrolepis auriculata* and *Abies spectabilis* were observed as 9.52±0.145, 9.81±0.321, 12.82±0.052, 12.98±0.102, 13.337±0.75, 13.98±0.102, 14.47±0.318, 14.81±0.908, 14.83±0.93, 15.122±0.157, 15.13±0.157, 15.38±0.318, 15.57±0.112, 15.91±0.55 and 15.93±0.075 respectively, compared to the IC₅₀ value of ascorbic acid (10.169±0.459), the standard compound.

The antioxidant potential is directly proportional to IC₅₀ value and calculated from linear regression of the percentage inhibition activity with extract concentration. The activity of the samples was compared with ascorbic acid as a standard. The IC₅₀ value ranges from higher 44.1 mg/ml in *Dactylorhiza hatagirea* to lowest 9.52 mg/ml in *Piper longum*. The first group has extremely high inhibition activity (9 µg/ml < IC₅₀ < 20 µg/ml); moderate activity (20 µg/ml < IC₅₀ < 30); low activity (IC₅₀ > 30 µg/ml). *Piper longum* and *Camellia kissi* (9.52 µg/ml and 9.81 µg/ml, respectively) showed IC₅₀ values very much comparable to Ascorbic Acid (10.169 mg/ml).

The plants having highest antioxidant activity is in ascending order: *Piper longum* < *Camellia kissi* < *Benincasa hispida* < *Neolitsea pallens* < *Neopicrorhiza scrophulariiflora* < *Gaultheria*

fragrantissima < *Ricinus communis* < *Taxus wallichiana* < *Valeriana jatamansii* < *Asparagus racemosus* < *Centella asiatica* < *Rubia manjith* < *Cuscuta reflexa* < *Nephrolepis auriculata* < *Abies spectabilis* < *Acampe papillosa* < *Zanthoxylum armatum* < *Acorus calamus* < *Swertia chirayita* < *Coelogyne corymbosa* < *Juglans regia* < *Sambucus adnata* < *Tinospora sinensis* < *Paris polyphylla* < *Bryophyllum pinnatum* < *Swertia angustifolia* < *Spiranthes sinensis* < *Zizyphus mauritiana* < *Dioscorea deltoidea* < *Zanthoxylum acanthopodium* < *Mahonia napaulensis* < *Mentha spicata* < *Indigofera bracteata* < *Litsea cubeba* < *Rauvolfia serpentina* < *Chlorophytum nepalense*.

Likewise, the plants having moderate activity in ascending order: *Wikstroemia canescens* < *Justiciaa dhatoda* < *Rheum australe* < *Spilanthes paniculata* < *Valeriana hardwickii* < *Glycyrrhiza glabra* < *Urtica dioica* < *Dendrobium moschatum* < *Rheum moorcroftianum* < *Potentilla polyphylla* < *Rhododendron arboretum* < *Michelia doltsopa* < *Cleistocalyx operculatus* < *Bergenia ciliata* < *Vitex negundo* < *Bombax ceiba* < *Begonia picta* < *Pogostemon glaber* < *Pleione humilis* < *Crateva unilocularis* < *Arisaema tortuosum* < *Cleistocalyx operculatus*. Finally, the plants having lowest antioxidant activity in ascending order: *Berberis aristata* < *Lycopodium clavatum* < *Potentilla fulgens* < *Dactylorhiza hatagirea*.

Table 15 *In vitro* antioxidant activity of methanolic extracts of wild medicinal plants

S.N.	Scientific Name	Family	Local Name	IC50 (µg/ml)
	Ascorbic acid			10.169±0.459
1	<i>Abies spectabilis</i> (D. Don) Mirb.	Pinaceae	Bunge sallo	15.93±0.075
2	<i>Acampe papillosa</i> (Lindl.) Lindl.	Orchidaceae	Sungava phul	16.40±0.157
3	<i>Acorus calamus</i> L.	Araceae	Bojo	16.61±0.978
4	<i>Arisaema tortuosum</i> (Wall.) Schott.	Araceae	Baako	30.32±0.102
5	<i>Asparagus racemosus</i> Wild.	Asparagaceae	Kurilo	15.12±0.157
6	<i>Begonia picta</i> Smith.	Begoniaceae	Magarkanche	27.65±0.058
7	<i>Benincasa hispida</i> (Thunb.) Cogn.	Cucurbitaceae	Kubhindo	12.82±0.052
8	<i>Berberis aristata</i> DC.	Berberidaceae	Chutro	31.65±0.149
9	<i>Bergenia ciliata</i> (Haw.) Sternb.	Saxifragaceae	Pakhanbed	25.6±0.756
10	<i>Bombax ceiba</i> L.	Bombacaceae	Simal	25.88±0.250
11	<i>Bryophyllum pinnatum</i> (Lam.) Oken.	Crassulaceae	Ajambari	18.14±0.265
12	<i>Camellia kissi</i> Wall.	Theaceae	Ban chiya	9.81±0.321
13	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Ghortapre	15.12±0.157
14	<i>Chlorophytum nepalense</i> (Lindl.) Baker	Liliaceae	Ban pyaj	20.79±0.112
15	<i>Cleistocalyx operculatus</i> (Robx.) Merr. & Perry	Myrtaceae	Kyamuno(bark)	30.49±0.403
----	<i>Cleistocalyx operculatus</i> (Robx.) Merr. & Perry	Myrtaceae	Kyamuno (leaf)	25.55±0.158
16	<i>Coelogyne corymbosa</i> Lindl.	Orchidaceae	Jibanti	17.11±0.321
17	<i>Crateva unilocularis</i> Buch.-Ham.	Capparaceae	Sipleegaan	29.13±0.150
18	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Akasebeli	15.57±0.112
19	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Orchidaceae	Panchaunle	44.12±0.174
20	<i>Dendrobium moschatum</i> (Buch.-Ham.) Swartz.	Orchidaceae	Sugandhe phul	24.43±0.639
21	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	Dioscoreaceae	Bhayaakur	18.43±0.239

22	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Dhansingare	13.98±0.102
23	<i>Glycyrrhiza glabra</i> L.	Fabaceae	Jethi madhu	23.66±0.523
24	<i>Indigofera bracteata</i> Grah. ex Baker	Fabaceae	Phusre ghans	19.83±0.521
25	<i>Juglans regia</i> L.	Guglandaceae	Okhar	17.51±0.25
26	<i>Justicia adhatoda</i> L.	Acanthaceae	Asuro	21.29±0.304
27	<i>Litsea cubeba</i> (Lour.) Pres.	Lauraceae	Sil timur	20.21±0.275
28	<i>Lycopodium clavatum</i> L.	Lycopodiaceae	Naagbeli	33.3±0.213
29	<i>Mahonia napaulensis</i> DC.	Berberidaceae	Jamanemandro	19.91±0.213
30	<i>Mentha spicata</i> L.	Lamiaceae	Pudina	19.82±0.213
31	<i>Michelia doltsopa</i> Buch.-Ham. ex DC.	Magnoliaceae	Chaap	25.3±0.213
32	<i>Neolitsea pallens</i> (D. Don) Momiy & H. Hara.	Lauraceae	Simalte	12.98±0.102
33	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Scrophulariaceae	Kutuki	13.37±0.75
34	<i>Nephrolepis auriculata</i> (L.) Trimen.	Davalliaceae	Paaniamala	15.91±0.55
35	<i>Paris polyphylla</i> Sm.	Liliaceae	Satuwa	17.99±0.635
36	<i>Piper longum</i> L.	Piperaceae	Pipla	9.52±0.145
37	<i>Pleione humilis</i> (Sm.) D. Don	Orchidaceae	Sungava	28.94±0.739
38	<i>Pogostemon glaber</i> Benth.	Lamiaceae	Rudhilo	28.54±0.401
39	<i>Potentilla fulgens</i> Wall. ex Hook.	Rosaceae	Bajra danti	33.00±0.007
40	<i>Potentilla polyphylla</i> Wall. ex Lehm.	Rosaceae	Bajradanti	24.84±0.409
41	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Sarpagandhaa	20.39±0.109
42	<i>Rheum australe</i> D. Don	Polygonaceae	Padamchaal	21.58 ± 0.25
43	<i>Rheum moorcroftianum</i> Royle	Polygonaceae	Padamchaal	24.55±0.032
44	<i>Rhododendron arboreum</i> Sm.	Ericaceae	Lali gurans	25.09±0.688
45	<i>Ricinus communis</i> L.	Euphorbiaceae	Ander	14.47±0.318
46	<i>Rubia manjith</i> Roxb. ex Flem.	Rubiaceae	Majitho	15.38±0.318
47	<i>Sambucus adnata</i> Wall. ex DC.	Adoxaceae	Moti phul	17.91±0.756
48	<i>Spilanthes paniculata</i> Wall. ex DC.	Asteraceae	Maretho	21.69±0.954
49	<i>Spiranthes sinensis</i> (Pers.) Ames.	Orchidaceae	Sunakhari	18.43±0.154
50	<i>Swertia angustifolia</i> Buch.-Ham. ex D. Don.	Gentianaceae	Chiraito	18.35±0.025
51	<i>Swertia chirayita</i> (Roxb.ex Fleming) Karsten	Gentianaceae	Chiraito	16.88±0.145
52	<i>Taxus wallichiana</i> (Zucc.)	Taxaceae	Lothsalla	14.81±0.908
53	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Gurjo	17.91±0.756
54	<i>Urtica dioica</i> L.	Urticaceae	Sisnu	23.84±0.816
55	<i>Valeriana hardwickii</i> Wall.	Valerianaceae	Nakkali jatamansi	22.92±0.816
56	<i>Valeriana jatamansi</i> Jones	Valerianaceae	Sugandhawal	14.83±0.93
57	<i>Vitex negundo</i> L.	Verbenaceae	Simali	25.66±_0.756
58	<i>Wikstroemia canescens</i> Wall. ex Meisn.	Thymelaeaceae	Phurke pati	21.21±0.756
59	<i>Zanthoxylum acanthopodium</i> DC.	Rutaceae	Annkhe timur	18.88±0.208
60	<i>Zanthoxylum armatum</i> DC.	Rutaceae	Timur	16.59±0.756
61	<i>Zizyphus mauritiana</i> Lam.	Rhamnaceae	Bayer	18.53±0.816

Values are mean (n=3)± (Standard deviation)

5.4.4 Reducing power

Studies have suggested a direct correlation between antioxidant capacity and reducing power of certain plant extracts (Tanaka *et al.*, 1988). Higher the concentration of the test samples higher the absorbance, higher the absorbance higher the inhibition. The reducing properties are generally associated with the presence of reductase which has been shown to exert antioxidant action by breaking the free radical chain by donating hydrogen atom (Duh *et al.*, 1999).

The reducing power ability of extracts of different plants was determined using ascorbic acid as standard. The maximum absorbance were observed in *Ricinus communis*, *Abies spectabilis*, *Taxus wallichiana*, *Mentha spicata*, *Cleistocalyx operculatus* (bark), *Bryophyllum pinnatum*, *Cleistocalyx operculatus* (leaf), *Gaultheria fragrantissima*, *Acorus calamus* and *Rheum moorcroftianum* as 0.776 ± 0.0066 , 0.76 ± 0.0019 , 0.752 ± 0.0073 , 0.712 ± 0.0019 , 0.661 ± 0.0038 , 0.652 ± 0.0071 , 0.645 ± 0.0065 , 0.596 ± 0.0063 , 0.594 ± 0.0084 , 0.582 ± 0.0021 at 50 $\mu\text{g/ml}$ respectively as compared to ascorbic acid 1.226 ± 0.0031 (Table 16). The order of reducing power of different samples was *Ricinus communis* > *Abies spectabilis* > *Taxus wallichiana* > *Mentha spicata* > *Cleistocalyx operculatus* (bark) > *Bryophyllum pinnatum* > *Cleistocalyx operculatus* (leaf) > *Gaultheria fragrantissima* > *Acorus calamus* > *Rheum moorcroftianum* (Table 16).

Table 16 Average absorbance at 700 nm of different plants species and ascorbic acid for determination of reducing power

S.N.	Scientific name	Local name	Average absorbance at 700 nm at different concentration ($\mu\text{g/ml}$)				
			10	20	30	40	50
1	Ascorbic acid		0.763 ± 0.0013	0.862 ± 0.0011	1.019 ± 0.0021	1.12 ± 0.0032	1.226 ± 0.0031
2	<i>Abies spectabilis</i>	Bunge sallo	0.561 ± 0.0013	0.607 ± 0.0014	0.63 ± 0.0016	0.666 ± 0.0034	0.76 ± 0.0019
3	<i>Acorus calamus</i>	Bojo	0.525 ± 0.0075	0.541 ± 0.0072	0.56 ± 0.0037	0.573 ± 0.0079	0.594 ± 0.0084
4	<i>Bryophyllum pinnatum</i>	Ajambari	0.506 ± 0.0039	0.545 ± 0.0070	0.563 ± 0.0058	0.621 ± 0.0057	0.652 ± 0.0071
5	<i>Cleistocalyx operculatus</i>	Kyamuno (leaf)	0.489 ± 0.0073	0.545 ± 0.0027	0.606 ± 0.0019	0.629 ± 0.0063	0.645 ± 0.0065
	<i>Cleistocalyx operculatus</i>	Kyamuno (bark)	0.502 ± 0.0069	0.541 ± 0.0032	0.591 ± 0.0046	0.616 ± 0.0072	0.661 ± 0.0038
6	<i>Gaultheria fragrantissima</i>	Dhansingare	0.527 ± 0.0013	0.557 ± 0.0073	0.564 ± 0.0036	0.593 ± 0.0021	0.596 ± 0.0063
7	<i>Mentha spicata</i>	Pudina	0.563 ± 0.0012	0.59 ± 0.0016	0.641 ± 0.0001	0.677 ± 0.0011	0.712 ± 0.0019
8	<i>Rheum moorcroftianum</i>	Padamchaal	0.528 ± 0.0023	0.536 ± 0.00210	0.542 ± 0.0081	0.567 ± 0.0051	0.582 ± 0.0021
9	<i>Ricinus communis</i>	Ander	0.564 ± 0.0056	0.648 ± 0.0034	0.681 ± 0.0036	0.688 ± 0.001347	0.776 ± 0.0066
10	<i>Taxus wallichiana</i>	Lothsalla	0.63 ± 0.0031	0.656 ± 0.0061	0.679 ± 0.0064	0.694 ± 0.0096	0.752 ± 0.0073
The values are expressed as mean \pm standard deviation (n=3)							

Values are mean (n=3) \pm (Standard deviation)

CHAPTER 6

6. DISCUSSION

6.1 Taxonomic diversity of local medicinal flora

The study area is found to be affluent with vast floristic diversity of ethnobotanical plants. A total of 401 ethnobotanical plant species belonging to 289 genera under 114 botanical families were collected. Herbs (186 species) represented the highest proportion of medicinal plant species followed by trees (98 species), shrubs (90 species) and climbers (27 species). It may have been due to the fact that the study sites were located in high elevation ranges where herbs were higher in number than trees, shrubs and climbers. Similar observation were made in the studies of life form of ethnobotanical plants in Nepal (Shrestha & Dhillon, 2003; Bhattarai & Ghimire, 2006; Rokaya *et al.*, 2010; Uprety *et al.*, 2010; Simbo, 2010; Singh *et al.*, 2012; Luitel *et al.*, 2014; Abera, 2014). In some studies, shrubs, trees and climbers were observed to be in descending proportion after herbs (Bhattarai *et al.*, 2010; Uprety *et al.*, 2012; Bhat *et al.*, 2013). Ghimire *et al.* (2008) revealed that 45-70% of the total naturally growing species are long lived herbaceous perennials followed by shrubs (16.6%), annual or biennials herbs (15.6%), trees (13.6%), woody climbers (6.5%) and herbaceous climbers (2.3%). Whereas Rijal (2008) on his research found that out of 115 species, 36 were shrubs, 29 trees, 25 herbs, 21 climbers, 3 ferns and 1 fungus (mushroom).

Out of 401 plants identified in this study, 16 species of 8 families were pteridophytes; 8 species belonging to 4 families were gymnosperm; 313 species from 86 families were dicotyledons and 64 species belonging to 16 families were monocotyledons.

Table 17 Habits of plants

Habit of plants	No. of species	Percentage
Herbs	186	46
Trees	98	24
Shrubs	90	23
Climbers	27	7
Total	401	100

Table 18 Groups of plant species

Plant Groups	No. of Families	No. of Species	Percentage
Pteridophytes	8	16	7
Gymnosperms	4	8	3
Monocotyledons	16	64	15
Dicotyledons	86	313	75
Total	114	401	100

Among 114 families noted in this study, Asteraceae was found to be the most dominant family having highest number of plants i.e., 20 species (4.98%) followed by Fabaceae with 18 species (4.48%), and Orchidaceae with 17 species (4.23%) is the third dominant family. The dominant prevalence of Asteraceae was reported in previous researches as well (Della *et al.*, 2006; Teklehaymanot & Giday, 2007; Bhattarai *et al.*, 2010). Other 48 families from Lamiaceae to Oxalidaceae have the species ranging from 3-15 in number and 63 families contributing 83 species have the least species i.e., two or one species (Table 19).

Table 19 Taxonomic diversity of medicinal plants in Parbat district

S.N	Family	Plant species	No. of genera	% of genera	Plant species	% of species
1	Asteraceae	<i>Anaphalis busua</i> , <i>Anaphalis margaritacea</i> , <i>Anaphalis triplinervis</i> , <i>Rhynchospermum verticillatum</i> , <i>Senecio scandens</i> , <i>Ageratum conyzoides</i> , <i>Ageratum houstonianum</i> , <i>Anaphalis contorta</i> , <i>Artemisia indica</i> , <i>Aster diplostaphioides</i> , <i>Bidens pilosa</i> , <i>Cirsium verutum</i> , <i>Eupatorium adenophorum</i> , <i>Eupatorium odoratum</i> , <i>Galinsoga parviflora</i> , <i>Gnaphalium affine</i> , <i>Gnaphalium luteo-album</i> , <i>Launaea aspleniifolia</i> , <i>Spilanthes paniculata</i> , <i>Taraxacum officinale</i>	14	4.84	20	4.98
2	Fabaceae	<i>Desmodium heterocarpon</i> , <i>Glycyrrhiza glabra</i> , <i>Indigofera bracteata</i> , <i>Parochetus communis</i> , <i>Abrus precatorius</i> , <i>Butea minor</i> , <i>Dalbergia sissoo</i> , <i>Desmodium gangeticum</i> , <i>Desmodium multiflorum</i> , <i>Erythrina arborescens</i> , <i>Erythrina stricta</i> , <i>Flemingia marcophylla</i> , <i>Mucuna nigricans</i> , <i>Mucuna pruriens</i> , <i>Tamarindus indica</i> , <i>Trifolium repens</i> , <i>Desmodium concinnum</i> , <i>Dolichos stantonii</i>	13	4.49	18	4.48
3	Orchidaceae	<i>Acampe papillosa</i> , <i>Chrysoglossum ornatum</i> , <i>Coelogyne corymbosa</i> , <i>Arundina graminifolia</i> , <i>Herminium lanceum</i> , <i>Pleione Praecox</i> , <i>Pleione humilis</i> , <i>Satyrium nepalense</i> , <i>Spiranthes sinensis</i> , <i>Rhynchostylis retusa</i> , <i>Dendrobium aphyllum</i> , <i>Dendrobium moschatum</i> , <i>Oberonia ensiformis</i> , <i>Thunia alba</i> , <i>Platanthera latilabris</i> , <i>Otochilus lancilabius</i> , <i>Dactylorhiza hatagirea</i>	15	5.19	17	4.23
4	Lamiaceae	<i>Nepeta lamiopsis</i> , <i>Notochaete hamosa</i> , <i>Isodon coetsa</i> , <i>Calamintha umbrosa</i> , <i>Salvia campanulata</i> , <i>Colebrookea oppositifolia</i> , <i>Elsholtzia blanda</i> , <i>Mentha arvensis</i> , <i>Mentha spicata</i> , <i>Ocimum basilicum</i> , <i>Ocimum scantum</i> , <i>Pogostemon benghalensis</i> , <i>Pogostemon glaber</i> , <i>Salvia plebeia</i> , <i>Thymus linearis</i>	11	3.80	15	3.74
5	Moraceae	<i>Morus australis</i> , <i>Artocarpus lakoocha</i> , <i>Ficus auricula</i> , <i>Ficus benghalensis</i> , <i>Ficus benjamina</i> , <i>Ficus glaberrima</i> , <i>Ficus hirta</i> , <i>Ficus hispida</i> , <i>Ficus lacor</i> , <i>Ficus neriifolia</i> , <i>Ficus religiosa</i> , <i>Ficus roxburghii</i> , <i>Ficus semicordata</i> , <i>Ficus subincisa</i>	3	1.03	14	3.49
6	Poaceae	<i>Cymbopogon flexuosus</i> , <i>Desmostachya bipinnata</i> , <i>Arundinaria falcata</i> , <i>Cynodon dactylon</i> , <i>Dendrocalamus hamiltonii</i> , <i>Drepanostachyum falcatum</i> , <i>Eulaliopsis binata</i> , <i>Imperata cylindrica</i> , <i>Phragmites karka</i> , <i>Saccharum spontaneum</i> , <i>Thysanolaena maxima</i> , <i>Eleusine indica</i> , <i>Narenga porphyrocoma</i>	13	4.49	13	3.24
7	Euphorbiaceae	<i>Euphorbia heterophylla</i> , <i>Bridelia retusa</i> , <i>Euphorbia hirta</i> , <i>Euphorbia pulcherrima</i> , <i>Euphorbia royleana</i> , <i>Euphorbia thymifolia</i> , <i>Jatropha curcas</i> , <i>Phyllanthus amarus</i> , <i>Phyllanthus emblica</i> , <i>Phyllanthus parvifolius</i> , <i>Ricinus communis</i> , <i>Sapium insigne</i> , <i>Trewia nudiflora</i>	7	2.42	13	3.24
8	Polygonaceae	<i>Bistorta amplexicaulis</i> , <i>Bistorta macrophylla</i> , <i>Persicaria runcinata</i> , <i>Fagopyrum dibotrys</i> , <i>Aconogonum molle</i> , <i>Fagopyrum esculentum</i> , <i>Persicaria perfoliata</i> , <i>Rumex nepalensis</i> , <i>Rheum australe</i> , <i>Rheum moorcroftianum</i>	6	2.07	10	2.49
9	Rosaceae	<i>Pyracantha crenulata</i> , <i>Rubus nepalensis</i> , <i>Fragaria nuicola</i> , <i>Prunus cerasoides</i> , <i>Pyrus</i>	6	2.07	9	2.24

		<i>pashia, Rubus ellipticus, Rubus hoffmeisterianus, Potentilla fulgens, Potentilla polyphylla</i>				
10	Urticaceae	<i>Boehmeria ternifolia, Lecanthus peduncularis, Boehmeria macrophylla, Boehmeria platyphylla, Boehmeria rugulosa, Debregeasia longifolia, Debregeasia salicifolia, Girardinia diversifolia, Urtica dioica</i>	5	1.73	9	2.24
11	Rubiaceae	<i>Galium asparine, Galium mollugo, Mussaenda frondosa, Neohymenopogon parasiticus, Neanotis ingrata, Anthocephalus cadamba, Luculia gratissima, Rubia manjith</i>	7	2.42	8	2.00
12	Araceae	<i>Arisaema concinnum, Arisaema costatum, Arisaema flavum, Arisaema tortuosum, Acorus calamus, Colocasia esculenta, Arisaema griffithii</i>	3	1.03	7	1.75
13	Caesalpiniaceae	<i>Bauhinia purpurea, Bauhinia vahlii, Bauhinia variegata, Cassia mimosoides, Cassia occidentalis, Cassia tora, Cassia fistula</i>	2	0.69	7	1.75
14	Anacardiaceae	<i>Choerospondias axillaris, Lannea coromandelica, Rhus javanica, Rhus succedanea, Semecarpus anacardium, Spondias pinnata</i>	5	1.73	6	1.50
15	Ranunculaceae	<i>Anemone vitifolia, Anemone rivularis, Clematis gouriana, Delphinium altissimum, Ranunculus laetus, Thalictrum reniforme</i>	5	1.73	6	1.50
16	Verbenaceae	<i>Callicarpa macrophylla, Caryopteris nepalensis, Callicarpa arborea, Duranta repens, Lantana camara, Vitex negundo</i>	5	1.73	6	1.50
17	Lauraceae	<i>Litsea cubeba, Neolitsea pallens, Cinnamomum camphora, Cinnamomum tamala, Lindera neesiana, Litsea monopetala</i>	4	1.38	6	1.50
18	Zingiberaceae	<i>Cautleya spicata, Hedychium spicatum, Hedychium ellipticum, Hedychium coccineum, Roscoeia capitata, Curcuma angustifolia</i>	4	1.38	6	1.50
19	Amaranthaceae	<i>Amaranthus caudatus, Cyathula tomentosa, Achyranthes aspera, Achyranthes bidentata, Amaranthus viridis, Amaranthus spinosus</i>	3	1.03	6	1.50
20	Cucurbitaceae	<i>Herpetospermum pedunculatum, Benincasa hispida, Coccinia grandis, Trichosanthes tricuspidata, Solena amplexicaulis</i>	5	1.73	5	1.25
21	Meliaceae	<i>Azadirachta indica, Cipadessa baccifera, Cipadessa fruticosa, Melia azedarach, Toona ciliata</i>	4	1.38	5	1.25
22	Pinaceae	<i>Abies spectabilis, Pinus roxburghii, Pinus wallichiana, Cedrus deodara, Tsuga dumosa</i>	4	1.38	5	1.25
23	Scrophulariaceae	<i>Hemiphragma heterophyllum, Mazus surculosus, Pedicularis gracilis, Neopicrorhiza scrophulariiflora, Pedicularis scullyana</i>	4	1.38	5	1.25
24	Solanaceae	<i>Cestrum nocturnum, Datura stramonium, Nicandra physalodes, Solanum nigrum, Solanum aculeatissimum</i>	4	1.38	5	1.25
25	Gentianaceae	<i>Halenia elliptica, Swertia nervosa, Gentiana ornate, Swertia angustifolia, Swertia chirayita</i>	3	1.03	5	1.25
26	Dioscoreaceae	<i>Dioscorea bulbifera, Dioscorea deltoidea, Dioscorea esculenta, Dioscorea pentaphylla, Dioscorea alata</i>	1	0.34	5	1.25
27	Hypericaceae	<i>Hypericum elodeoides, Hypericum oblongifolium, Hypericum cordifolium, Hypericum japonicum, Hypericum uralum</i>	1	0.34	5	1.25
28	Apiaceae	<i>Eryngium foetidum, Angelica archangelica, Hydrocotyle nepalensis, Centella asiatica</i>	4	1.38	4	1.00
29	Liliaceae	<i>Campylandra aurantiaca, Aloe vera, Chlorophytum nepalense, Paris polyphylla</i>	4	1.38	4	1.00

30	Papaveraceae	<i>Corydalis megacalyx</i> , <i>Dactylicapnos scandens</i> , <i>Dicentra macrocapnos</i> , <i>Meconopsis regia</i>	4	1.38	4	1.00
31	Asclepiadaceae	<i>Ceropegia pubescens</i> , <i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Cryptolepis buchananii</i>	3	1.03	4	1.00
32	Berberidaceae	<i>Berberis aristata</i> , <i>Berberis asiatica</i> , <i>Mahonia</i> <i>napaulensis</i> , <i>Podophyllum hexandrum</i>	3	1.03	4	1.00
33	Melastomataceae	<i>Melastoma normale</i> , <i>Osbeckia nepalensis</i> , <i>Osbeckia stellata</i> , <i>Oxyspora paniculata</i>	3	1.03	4	1.00
34	Rutaceae	<i>Boenninghausenia albiflora</i> , <i>Murraya paniculata</i> , <i>Zanthoxylum acanthopodium</i> , <i>Zanthoxylum</i> <i>armatum</i>	3	1.03	4	1.00
35	Adoxaceae	<i>Viburnum erubescens</i> , <i>Sambucus adnata</i> , <i>Sambucus canadensis</i> , <i>Sambucus hookeri</i>	2	0.69	4	1.00
36	Fagaceae	<i>Castanopsis indica</i> , <i>Castanopsis tribuloides</i> , <i>Quercus glauca</i> , <i>Quercus semecarpifolia</i>	2	0.69	4	1.00
37	Convolvulaceae	<i>Ipomoea purpurea</i> , <i>Ipomoea carnea</i> , <i>Ipomoea</i> <i>cairica</i> , <i>Ipomoea nil</i>	1	0.34	4	1.00
38	Ericaceae	<i>Gaultheria fragrantissima</i> , <i>Lyonia ovalifolia</i> , <i>Rhododendron arboretum</i>	3	1.03	3	0.74
39	Mimosaceae	<i>Albizia chinensis</i> , <i>Mimosa pudica</i> , <i>Acacia catechu</i>	3	1.03	3	0.74
40	Oleaceae	<i>Fraxinus floribunda</i> , <i>Jasminum officinale</i> , <i>Nyctanthes arbor-tristis</i>	3	1.03	3	0.74
41	Polypodiaceae	<i>Drynaria propinqua</i> , <i>Lepisorus thunbergianus</i> , <i>Loxogramme involuta</i>	3	1.03	3	0.74
42	Theaceae	<i>Camellia kissi</i> , <i>Eurya acuminata</i> , <i>Schima wallichii</i>	3	1.03	3	0.74
43	Acanthaceae	<i>Asystasia macrocarpa</i> , <i>Justicia procumbens</i> , <i>Justicia adhatoda</i>	2	0.69	3	0.74
44	Betulaceae	<i>Alnus nepalensis</i> , <i>Betula alnoides</i> , <i>Betula utilis</i>	2	0.69	3	0.74
45	Caryophyllaceae	<i>Drymaria cordata</i> , <i>Drymaria villosa</i> , <i>Spergula</i> <i>arvensis</i>	2	0.69	3	0.74
46	Davalliaceae	<i>Araiostegia pulchra</i> , <i>Nephrolepis auriculata</i> , <i>Nephrolepis cordifolia</i>	2	0.69	3	0.74
47	Lycopodiaceae	<i>Lycopodium cernuum</i> , <i>Lycopodium clavatum</i> , <i>Lygodium japonicum</i>	2	0.69	3	0.74
48	Balsaminaceae	<i>Impatiens bicornuta</i> , <i>Impatiens puberula</i> , <i>Impatiens urticifolia</i>	1	0.34	3	0.74
49	Magnoliaceae	<i>Michelia kisopa</i> , <i>Michelia champaca</i> , <i>Michelia</i> <i>doltsopa</i>	1	0.34	3	0.74
50	Oxalidaceae	<i>Oxalis debilis</i> , <i>Oxalis corniculata</i> , <i>Oxalis latifolia</i>	1	0.34	3	0.74
51	Agavaceae	<i>Agave Americana</i> , <i>Agave sisalana</i>	1	0.34	2	0.50
52	Alliaceae	<i>Allium hypsistum</i> , <i>Allium wallichii</i>	1	0.34	2	0.50
53	Aspidiaceae	<i>Diplazium polypodioides</i> , <i>Diplazium stoliczkae</i>	1	0.34	2	0.50
54	Apocynaceae	<i>Chonemorpha fragrans</i> , <i>Rauvolfia serpentina</i>	2	0.69	2	0.50
55	Boraginaceae	<i>Cynoglossum amabile</i> , <i>Cynoglossum zeylanicum</i>	1	0.34	2	0.50
56	Capparaceae	<i>Cleome viscosa</i> , <i>Crateva unilocularis</i>	2	0.69	2	0.50
57	Chenopodiaceae	<i>Chenopodium album</i> , <i>Chenopodium ambrosioides</i>	1	0.34	2	0.50
58	Combretaceae	<i>Terminalia bellirica</i> , <i>Terminalia chebula</i>	1	0.34	2	0.50
59	Crassulaceae	<i>Bryophyllum pinnatum</i> , <i>Kalanchoe spathulata</i>	2	0.69	2	0.50
60	Equisetaceae	<i>Equisetum debile</i> , <i>Equisetum diffusum</i>	1	0.34	2	0.50
61	Gesneriaceae	<i>Aeschynanthus sikkimensis</i> , <i>Chirita urticifolia</i>	2	0.69	2	0.50
62	Juglandaceae	<i>Engelhardia spicata</i> , <i>Juglans regia</i>	2	0.69	2	0.50
63	Lythraceae	<i>Lagerstroemia indica</i> , <i>Woodfordia fruticosa</i>	2	0.69	2	0.50
64	Malvaceae	<i>Gossypium herbaceum</i> , <i>Urena lobata</i>	2	0.69	2	0.50
65	Menispermaceae	<i>Cissampelos pareira</i> , <i>Tinospora sinensis</i>	2	0.69	2	0.50
66	Myrtaceae	<i>Cleistocalyx operculatus</i> , <i>Syzygium cumini</i>	2	0.69	2	0.50
67	Piperaceae	<i>Piper longum</i> , <i>Piper chaba</i>	1	0.34	2	0.50
68	Rhamnaceae	<i>Ziziphus incurve</i> , <i>Ziziphus mauritiana</i>	1	0.34	2	0.50
69	Saxifragaceae	<i>Astilbe rivularis</i> , <i>Bergenia ciliata</i>	2	0.69	2	0.50
70	Smilacaceae	<i>Smilax aspera</i> , <i>Smilax ovalifolia</i>	1	0.34	2	0.50
71	Thymelaeaceae	<i>Wikstroemia canescens</i> , <i>Daphne bholua</i>	2	0.69	2	0.50
72	Valerianaceae	<i>Valeriana hardwickii</i> , <i>Valeriana jatamansii</i>	1	0.34	2	0.50

73	Asparagaceae	<i>Asparagus racemous</i>	1	0.34	1	0.25
74	Begoniaceae	<i>Begonia picta</i>	1	0.34	1	0.25
75	Bignoniaceae	<i>Oroxylum indicum</i>	1	0.34	1	0.25
76	Bombacaceae	<i>Bombax ceiba</i>	1	0.34	1	0.25
77	Brassicaceae	<i>Rorippa nasturtium-aquaticum</i>	1	0.34	1	0.25
78	Burseraceae	<i>Garuga pinnata</i>	1	0.34	1	0.25
79	Campanulaceae	<i>Campanula pallida</i>	1	0.34	1	0.25
80	Cannabinaceae	<i>Cannabis sativa</i>	1	0.34	1	0.25
81	Commelinaceae	<i>Commelina maculata</i>	1	0.34	1	0.25
82	Cupressaceae	<i>Juniperus indica</i>	1	0.34	1	0.25
83	Cuscutaceae	<i>Cuscuta reflexa</i>	1	0.34	1	0.25
84	Cyperaceae	<i>Cyperus cyperoides</i>	1	0.34	1	0.25
85	Daphniphyllaceae	<i>Daphniphyllum himalense</i>	1	0.34	1	0.25
86	Dipterocarpaceae	<i>Shorea robusta</i>	1	0.34	1	0.25
87	Ebenaceae	<i>Diospyros lancifolia</i>	1	0.34	1	0.25
88	Elaeocarpaceae	<i>Elaeocarpus sphaericus</i>	1	0.34	1	0.25
89	Geraniaceae	<i>Geranium nepalense</i>	1	0.34	1	0.25
90	Hypoxidaceae	<i>Curculigocrassifolia</i>	1	0.34	1	0.25
91	Iridaceae	<i>Iris clarkei</i>	1	0.34	1	0.25
92	Juncaceae	<i>Juncus concinnus</i>	1	0.34	1	0.25
93	Linaceae	<i>Reinwardtia indica</i>	1	0.34	1	0.25
94	Lindsaeaceae	<i>Sphenomeris chinensis</i>	1	0.34	1	0.25
95	Loganiaceae	<i>Buddleja asiatica</i>	1	0.34	1	0.25
96	Loranthaceae	<i>Taxillus umbellifer</i>	1	0.34	1	0.25
97	Marattiaceae	<i>Angiopteris evecta</i>	1	0.34	1	0.25
98	Myricaceae	<i>Myrica esculenta</i>	1	0.34	1	0.25
99	Myrsinaceae	<i>Maesa chisia</i>	1	0.34	1	0.25
100	Nyctaginaceae	<i>Mirabilis jalapa</i>	1	0.34	1	0.25
101	Oleandraceae	<i>Oleandra wallichii</i>	1	0.34	1	0.25
102	Pandanaceae	<i>Pandanus nepalensis</i>	1	0.34	1	0.25
103	Parnassiaceae	<i>Parnassia wightiana</i>	1	0.34	1	0.25
104	Plantaginaceae	<i>Plantago major</i>	1	0.34	1	0.25
105	Podocarpaceae	<i>Podocarpus neriifolius</i>	1	0.34	1	0.25
106	Polygalaceae	<i>Polygala arillata</i>	1	0.34	1	0.25
107	Salicaceae	<i>Salix babylonica</i>	1	0.34	1	0.25
108	Sapindaceae	<i>Sapindus mukorossi</i>	1	0.34	1	0.25
109	Sapotaceae	<i>Dplokema butyracea</i>	1	0.34	1	0.25
110	Saurauiceae	<i>Saurauia napaulensis</i>	1	0.34	1	0.25
111	Sonneratiaceae	<i>Duabanga grandiflora</i>	1	0.34	1	0.25
112	Taxaceae	<i>Taxus wallichiana</i>	1	0.34	1	0.25
113	Ulmaceae	<i>Celtis australis</i>	1	0.34	1	0.25
114	Vitaceae	<i>Cissus repens</i>	1	0.34	1	0.25
	Total		289	99.42	401	99.99

6.2 Indigenous knowledge transfer and practice

Indigenous knowledge is the local knowledge that is unique to a given culture or society; it is the basis for local-level decision making in agricultural or traditional method of preparing medicine, healthcare, food preparation etc. As Pushpangadan *et al.* (2013) deducted traditional knowledge serves as a powerful tool for bio-prospecting of plant wealth and also for converting into value added products. Such a valuable knowledge is often transferred from one generation to another orally. According to Gispert and Campos (1986), indigenous knowledge is transmitted vertically, *i.e.*, from elders to the younger family members and horizontally, *i.e.*, through oral communication, imitation and participation in communal activities. Socio-economic influences are also found to be

accountable for the depletion of indigenous knowledge; their lifestyle is socially and economically influenced by the in-migrated ethnic tribes that hold the influence of an introduced culture results in loss of knowledge (Stamm *et al.*, 2004). Many other factors are believed to effect transmission of knowledge. According to Rijal (2008), loss of species, change in social practices, age difference, influence of migrated culture, influence of development activities, influence of market, change in lifestyle and policy problem have bearence over knowledge transmission. It was inferred from some studies in India that knowledge of herbal medicine remained locked with a few experts alone: Kumar and Yadav (2010) found that large number of old and experienced medicine men never disclosed their knowledge to others. Parabia and Pathak (2008) observed that indigenous knowledge was scattered among the tribal men and women, and all tribes were not experts on medicines.

Most interviewed ethnic people of this study were found to be quite familiar with the plant species used to cure different ailments such as cough and cold, diarrhoea and dysentery, digestive problems, fever, headache, cuts and wounds, skin infection (Table 20). But, in some cases, they were very less familiar with the plant species; sometimes they are even unknown about the species. This observation resembled previous study which concluded that only local healers in the community and medicinal practitioners (*Baidhya, Dhami, Jhakri*) knew more about the plants and their uses (Luitel & Pathak, 2013). Although the number of medicinal plants reported by men were more than those reported by women, the difference was not significant when the average number of medicinal plants reported by each group was compared. This study also revealed that specific knowledge on the use of medicinal plants was common among both sexes. However, it was noted that women were more knowledgeable about the local names of the plants than males but had less knowledge on their uses. This finding was established in the study carried out by Parajuli (2012); it found that elderly women had more knowledge about the medicinal use of plants. This may be because women in rural societies worldwide are often primarily responsible to their household food security, health and family continuity (Howard-Borjas, 1999; Saul, 1992), and thus richer than men in ethnomedicinal indigenous knowledge (Anguilar, 2004; Latoya *et al.*, 2003; Wayland, 2001; Voeks and Leony, 2004; Saul, 1992). Previous studies also observed that men were more knowledgeable than women in the homogenous community, while women were more knowledgeable than men in the heterogeneous community (Rijal, 2008). The reason, men being more knowledgeable than women could be because most of the healers were men (Gurung, 1995).

In terms of age group, a significant difference was observed in the number of medicinal plants reported by senior members of the community (50-79 years) compared to that of middle aged members (30-49 years) (Table 9). A larger number of medicinal plants were reported by elders (\geq

50 years) than young and middle aged informants. Contrarily, Upreti *et al.* (2012) observed that young people (12-25 years) possessed more knowledge pertaining to wild fruit whereas older females (> 35 years) had more knowledge about vegetable plants. No significant difference was observed in the number of medicinal plants listed by informants living around health centers and those living relatively far.

The study discerned that indigenous knowledge was handed over orally by medicinal healers and elders. This was in no way different from what previous researcher's observed (Sacherer, 1979; Singh *et al.*, 1979; Joshi & Edington, 1990; Shrestha & Dhillon, 2003; Bhattarai *et al.*, 2006 a&b; Gronhaug *et al.*, 2008). Apprenticeship as the most dominant mode of knowledge transfer (65%) (Mootoosamy & Mahomoodally, 2014), however, was not observed at all in the studied area. Contrarily, family as inheriter of knowledge (30%) as reported in the study of Mootoosamy and Mahomoodally (2014) was found dominant in this study. In the cases of complicated problems such as poisoning, gynaecological problems, heart problems, urinary problems, knowledge was transferred only to the family members and local healers. Similar observations were made in studies carried out in Nepal (Singh *et al.*, 1979; Chhetri & Gauchan, 2008; Lohani *et al.*, 2008; Rokaya *et al.*, 2010; Upreti *et al.*, 2010), in India (Jain & Saklani, 1991; Kumar & Yadav, 2010; Parabia & Pathak, 2008; Sharma & Pegu, 2011) and other countries (Gispert & Campos, 1986; Bhat *et al.*, 1990; Bhat & Jacobs, 1995). Going further, Shrestha and Dhillon (2003) reasoned that such practices were kept with sanctity and secrecy so as to save the medicines from losing their potency.

The major way of indigenous knowledge transfer among the traditional healers of the ethnic communities of Parbat district was verbal. None of the participants had written documents whereas all healers reported that they received the knowledge from their parents or grandparents orally. It was also found that there was maximum secrecy in passing the knowledge within the family circle. Priority was exclusively given to senior family member, especially an elder son, if not, other interested sons by their seniority, and hardly to daughter. The daughters were informed only if they were unmarried. Among *Magars*, very contradictory tendencies were found; some waited till their last breath to produce in written form about vital diseases whereas some shared their knowledge if they got paid. *Majhis* were observed to be comparatively reserved; they did not want to share their indigenous knowledge outside their community at all. It may be because they believed that if they shared information, the efficacy of the drugs will be lost (Sharma & Pegu, 2011). As Upreti also found traditional healers preferred to keep secrecy because they believed the medicines would lose their potency if revealed to other people (Upreti *et al.*, 2010). As the indigenous knowledge on the usage of plant is transmitted without any systematic process, there is the maximum probability that such knowledge is at risk of disappearance in the future, as seen in Ecuador, where original

knowledge on the usage of plants has declined due to the lack of systematic knowledge transmission (Bussmann & Sharon, 2006).

6.3 Ailment types, number of plant species and treatment methods

Medicinal plants have been used throughout human history because they have a wide variety of chemical compounds usable to defend against attack from various diseases. The World Health Organization (WHO, 2002) estimated that 80% of the people in Asian and African countries use herbal medicines for some aspects of primary health.

In the study area, out of 401, 397 medicinal plant species were used to treat 114 different types of diseases/ailments (Table 20) categorized into 17 different categories (Table 23) whereas four plant species have other uses besides medicinal use *i.e.* *Cyperus cyperoides*, *Platanthera latilabris*, *Chrysoglossum orantum* and *Hedychium coccineum*. This study recognized 98 plant species used to cure fever, 85 species to treat cuts and wounds as well as whitlow, and 76 species to cure dysentery whereas seventeen plant species used solely for one disease (Table 20). Some plant species have capacity to treat multiple ailments/diseases for example *Calotropis gigantea* (16 diseases), *Benincasa hispida* and *Cassia fistula* (12 diseases), *Kalanchoe spathulata* (11 diseases) respectively. Kunwar *et al.* (2006) had found that maximum species were used to treat fever followed by cough and cold, indigestion, and diarrhoea. Previously, Bhattarai *et al.* (2013) had recorded 45 medicinal plants in Panchase area to treat 34 different ailments.

Depending on types of reported ailments, traditional healers diagnosed patients through an interview, which was followed by inspection of eyes, skin colour, tongue, throat, status of sores, bleeding, infections and body temperature through bare hands. Patients with skin infections were treated by rubbing and pasting herbal preparations whereas sores were treated by spitting the chewed part of medicinal plants on the sore. For internal ailments, herbal preparations were mainly administered orally whereas general malaise was treated with steam bath and vapour inhalation. Overall, healers from different communities had their own way of treatment methods even for identical problems.

The treatment of many diseases was noted to be rarely done in the cases of hesitation from patients. Similar was observed during the survey in Uttar Pradesh in cases of women's gynaecological problems (Tiwari & Pandey, 2012).

Table 20 Different human diseases treated by the different plant species

S.N	Human Diseases	Medicinal Plants used in Treatment	Number of Species
1	Abdominal pain	<i>Calotropis gigantea, Thalictrum reniforme, Zanthoxylum acanthopodium, Juniperus indica, Angelica archangelica, Cirsium verutum</i>	6
2	Abortification	<i>Buddleja asiatica, Prunus cerasoides, Jatropha curcas, Cassia fistula, Ocimum scantum, Gossypium herbaceum, Hypericum uralum</i>	7
3	Abscesses	<i>Michelia champaca, Ficus benghalensis, Michelia kisopa</i>	3
4	Anaemia	<i>Gossypium herbaceum</i>	1
5	Aphrodisiac	<i>Cannabis sativa, Dactylorhiza hatagirea, Curculigo crassifolia, Thymus linearis, Desmodium gangeticum</i>	5
6	Appetizer	<i>Camellia kissi, Rhus javanica, Cannabis sativa, Commelina maculata, Thymus linearis</i>	5
7	Asthma	<i>Abies spectabilis, Garuga pinnata, Semecarpus anacardium, Tamarindus indica, Mimosa pudica, Bergenia ciliata, Syzygium cumini, Senecio scandens, Artemisia indica, Calotropis gigantea, Calotropis procera, Taxus wallichiana, Cassia fistula, Justicia adhatoda, Salvia campanulata, Piper chaba, Piper longum, Euphorbia hirta, Urtica dioica, Cannabis sativa, Myrica esculenta, Eleusine indica, Juniperus indica, Dolichos staintonii</i>	24
8	Backache	<i>Drynaria propinqua, Hypericum cordifolium, Zizyphus mauritiana, Prunus cerasoides, Aster diplostephioides, Gnaphalium luteo-album, Cryptolepis buchananii, Justicia procumbens, Persicaria perfoliata, Acampe papillosa, Arisaema costatum</i>	11
9	Bee stings	<i>Impatiens puberula, Hypericum uralum</i>	2
10	Beriberi	<i>Cynoglossum amabile</i>	1
11	Bladder stones	<i>Crateva unilocularis</i>	1
12	Bleeding	<i>Cissampelos pareira, Boenninghausenia albiflora, Cipadessa fruticosa, Herminium lanceum, Dactylorhiza hatagirea</i>	5
13	Blood coagulant	<i>Galinsoga parviflora, Boehmeria rugulosa</i>	2
14	Blood pressure	<i>Corydalis megacalyx, Elaeocarpus sphaericus, Valeriana hardwickii, Rauwolfia serpentina, Crateva unilocularis, Swertia chirayita, Calamintha umbrosa, Urtica dioica, Mentha arvensis, Mentha spicata, Aloe vera, Camellia kissi, Terminalia bellirica, Swertia angustifolia, Neopicrohiza scrophulariiflora</i>	15
15	Blood purification	<i>Thalictrum reniforme, Bauhinia variegata, Swertia angustifolia, Swertia chirayita, Berberis aristata, Thymus linearis</i>	6
16	Body pain	<i>Lycopodium cernuum, Lycopodium clavatum, Hypericum japonicum, Azadirachta indica, Oroxylum indicum, Mussaenda frondosa, Gaultheria fragrantissima, Calotropis gigantea, Cuscuta reflexa, Aeschynanthus sikkimensis, Lindera neesiana, Litsea monopetala, Boehmeria rugulosa, Celtis australis, Cannabis sativa, Ficus benghalensis, Smilax ovalifolia, Araiostegia pulchra, Rumex nepalensis, Dactylicapnos scandens, Thymus linearis, Oberonia ensiformis, Litsea cubeba</i>	23
17	Boils	<i>Lygodium japonicum, Cleome viscosa, Drymaria cordata, Reinwardtia indica, Toona ciliata, Parochetus communis, Abrus precatorius, Erythrina arborescens, Tamarindus indica, Bauhinia vahlii, Bryophyllum pinnatum, Kalanchoe spathulata, Trichosanthes tricuspidata, Valeriana jatamansii, Anaphalis margaritacea, Ageratum conyzoides, Anaphalis contorta, Eupatorium adenophorum, Eupatorium odoratum, Launaea asplenifolia, Ceropegia pubescens, Calotropis gigantea, Buddleja asiatica, Cynoglossum zeylanicum, Datura stramonium, Spargelia arvensis, Sapindus mukorossi, Hydrocotyle nepalensis, Callicarpa arborea, Isodon coetsa, Plantago major, Mirabilis jalapa, Achyranthes aspera, Achyranthes bidentata, Rumex nepalensis, Euphorbia heterophylla, Euphorbia pulcherrima, Phyllanthus parvifolius, Daphniphyllum himalense, Boehmeria ternifolia, Engelhardia spicata, Ficus benjamina, Ficus lacor, Coelogyne corymbosa, Dioscorea pentaphylla, Thysanolaena maxima, Spiranthes sinensis, Betula utilis, Oberonia ensiformis</i>	49
18	Bronchitis	<i>Abies spectabilis, Syzygium cumini, Ipomoea purpurea, Lepisorus thunbergianus, Taxus wallichiana, Anemone rivularis, Justicia adhatoda, Ocimum scantum, Euphorbia hirta, Phyllanthus emblica, Myrica esculenta,</i>	16

		<i>Piper chaba</i> , <i>Dolichos staintonii</i> , <i>Cleistocalyx operculatus</i> , <i>Ipomoea nil</i> , <i>Tsuga dumosa</i>	
19	Burns	<i>Equisetum diffusum</i> , <i>Angiopteris evecata</i> , <i>Impatiens urticifolia</i> , <i>Sapindus mukorossi</i> , <i>Bryophyllum pinnatum</i> , <i>Kalanchoe spathulata</i> , <i>Oroxylum indicum</i> , <i>Eryngium foetidum</i> , <i>Alnus nepalensis</i> , <i>Aloe vera</i> , <i>Cynodon dactylon</i> , <i>Betula utilis</i>	12
20	Cancer	<i>Taxus wallichiana</i> , <i>Kalanchoe spathulata</i> , <i>Podophyllum hexandrum</i> , <i>Bergenia ciliata</i>	4
21	Chest pain	<i>Aster diplostephioides</i> , <i>Trichosanthes tricuspidata</i> , <i>Arisaema griffithii</i> , <i>Calamintha umbrosa</i> , <i>Calotropis gigantea</i>	5
22	Chicken pox	<i>Allium wallichii</i> , <i>Aster diplostephioides</i>	2
23	Cholera	<i>Zanthoxylum armatum</i> , <i>Allium wallichii</i>	2
24	Colic pain	<i>Michelia champaca</i> , <i>Michelia doltsopa</i> , <i>Commelina maculata</i> , <i>Dactylorhiza hatagirea</i> , <i>Benincasa hispida</i>	5
25	Constipation	<i>Trichosanthes tricuspidata</i> , <i>Chonemorpha fragrans</i> , <i>Parnassia wightiana</i> , <i>Piper longum</i> , <i>Phyllanthus emblica</i> , <i>Girardinia diversifolia</i> , <i>Dioscorea deltoidea</i> , <i>Piper chaba</i> , <i>Amaranthus caudatus</i> (pd), <i>Dioscorea alata</i> , <i>Rheum moorcroftianum</i> , <i>Rheum australe</i> , <i>Rumex nepalensis</i> , <i>Rorippa nasturtium-aquaticum</i> , <i>Cassia tora</i>	15
26	Convulsion (epileptic seizure)	<i>Asystasia macrocarpa</i> (pd)	1
27	Cough and cold	<i>Nephrolepis auriculata</i> , <i>Nephrolepis cordifolia</i> , <i>Abies spectabilis</i> , <i>Azadirachta indica</i> , <i>Cipadessa baccifera</i> , <i>Zizyphus mauritiana</i> , <i>Desmodium heterocarpon</i> , <i>Glycyrrhiza glabra</i> , <i>Abrus precatorius</i> , <i>Mucuna nigricans</i> , <i>Tamarindus indica</i> , <i>Mimosa pudica</i> , <i>Potentilla polyphylla</i> , <i>Bergenia ciliata</i> , <i>Terminalia bellirica</i> , <i>Cleistocalyx operculatus</i> , <i>Benincasa hispida</i> , <i>Trichosanthes tricuspidata</i> , <i>Hydrocotyle nepalensis</i> , <i>Sambucus hookeri</i> , <i>Mussaenda frondosa</i> , <i>Anaphalis margaritacea</i> , <i>Anaphalis contorta</i> , <i>Gaultheria fragrantissima</i> , <i>Rhododendron arboreum</i> , <i>Calotropis gigantea</i> , <i>Halenia elliptica</i> , <i>Gentiana ornata</i> , <i>Cynoglossum amabile</i> , <i>Taxus wallichiana</i> , <i>Melastoma normale</i> , <i>Justicia procumbens</i> , <i>Duranta repens</i> , <i>Lantana camara</i> , <i>Elsholtzia blanda</i> , <i>Pogostemon benghalensis</i> , <i>Piper longum</i> , <i>Cinnamomum camphora</i> , <i>Lindera neesiana</i> , <i>Euphorbia hirta</i> , <i>Urtica dioica</i> , <i>Cannabis sativa</i> (pd), <i>Englehardia spicata</i> , <i>Roscoeia capitata</i> , <i>Allium wallichii</i> , <i>Saurauia napaulensis</i> , <i>Rumex nepalensis</i> , <i>Ocimum basilicum</i> , <i>Eleusine indica</i> , <i>Justicia adhatoda</i> , <i>Mazus surculosus</i> , <i>Podophyllum hexandrum</i> , <i>Allium hysistum</i> , <i>Neopicrorhiza scrophulariiflora</i> , <i>Podocarpus neriifolius</i> , <i>Vitex negundo</i>	56
28	Cracks	<i>Lycopodium clavatum</i> , <i>Diploknema butyracea</i> , <i>Michelia champaca</i> , <i>Michelia doltsopa</i> , <i>Cissus repens</i> , <i>Artocarpus lakoocha</i>	6
29	Cuts and wounds, Whitlow	<i>Lycopodium clavatum</i> , <i>Lygodium japonicum</i> , <i>Loxogramme involuta</i> , <i>Diplazium polypodioides</i> , <i>Pinus roxburghii</i> , <i>Pinus wallichiana</i> , <i>Shorea robusta</i> , <i>Bombax ceiba</i> , <i>Garuga pinnata</i> , <i>Rhus javanica</i> , <i>Parochetus communis</i> , <i>Bauhinia variegata</i> , <i>Albizia chinensis</i> , <i>Potentilla polyphylla</i> , <i>Rubus ellipticus</i> , <i>Parnassia wightiana</i> , <i>Bryophyllum pinnatum</i> , <i>Osbeckia nepalensis</i> , <i>Lagerstroemia indica</i> , <i>Benincasa hispida</i> , <i>Trichosanthes tricuspidata</i> , <i>Oroxylum indicum</i> , <i>Galium aparine</i> , <i>Anthocephalus cadamba</i> , <i>Luculia gratissima</i> , <i>Anaphalis busua</i> , <i>Anaphalis margaritacea</i> , <i>Anaphalis triplinervis</i> , <i>Ageratum conyzoides</i> , <i>Ageratum houstonianum</i> , <i>Anaphalis contorta</i> , <i>Aster diplostephioides</i> , <i>Bidens pilosa</i> , <i>Eupatorium adenophorum</i> , <i>Eupatorium odoratum</i> , <i>Galinsoga parviflora</i> , <i>Launaea aspleniifolia</i> , <i>Chonemorpha fragrans</i> , <i>Ceropegia pubescens</i> , <i>Cynoglossum zeylanicum</i> , <i>Cuscuta reflexa</i> , <i>Ipomoea carnea</i> , <i>Artemisia indica</i> , <i>Hemiphragma heterophyllum</i> , <i>Mazus surculosus</i> , <i>Justicia procumbens</i> , <i>Callicarpa macrophylla</i> , <i>Elsholtzia blanda</i> , <i>Salvia plebeia</i> , <i>Achyranthes aspera</i> , <i>Bistorta amplexicaulis</i> , <i>Euphorbia heterophylla</i> , <i>Euphorbia hirta</i> , <i>Euphorbia royleana</i> , <i>Phyllanthus amarus</i> , <i>Phyllanthus emblica</i> , <i>Phyllanthus parvifolius</i> , <i>Boehmeria rugulosa</i> , <i>Boehmeria ternifolia</i> , <i>Artocarpus lakoocha</i> , <i>Ficus auriculata</i> , <i>Ficus benjamina</i> , <i>Ficus hirta</i> , <i>Ficus hispida</i> , <i>Ficus roxburghii</i> , <i>Ficus subincisa</i> , <i>Pleione praecox</i> , <i>Satyrium nepalense</i> , <i>Dioscorea pentaphylla</i> , <i>Paris polyphylla</i> , <i>Cynodon dactylon</i> , <i>Imperata cylindrica</i> , <i>Saccharum spontaneum</i> , <i>Daphniphyllum himalense</i> , <i>Rhynchosstylis retusa</i> , <i>Boenninghausenia albiflora</i> , <i>Iris clarkei</i> , <i>Jatropha curcas</i> , <i>Dactylicapnos scandens</i> , <i>Arisaema griffithii</i> , <i>Eleusine indica</i> , <i>Betula utilis</i> , <i>Juglans regia</i> , <i>Arisaema tortuosum</i> , <i>Pleione</i>	85

		<i>humilis</i>	
30	Diabetes	<i>Coccinia grandis, Jasminum officinale, Nyctanthes arbor-tristis, Chonemorpha fragrans, Cassia fistula, Urtica dioica, Engelhardia spicata, Ficus benghalensis, Herminium lanceum, Dactylorhiza hatagirea</i>	10
31	Diarrhoea	<i>Diplazium stoliczkae, Cissampelos pareira, Mahonia napaulensis, Hypericum cordifolium, Shorea robusta, Bombax ceiba, Zizyphus incurva, Zizyphus mauritiana, Rhus javanica, Rhus succedanea, Semecarpus anacardium, Acacia catechu, Desmodium heterocarpon, Tamarindus indica, Bauhinia purpurea, Bauhinia vahlii, Pyrus pashia, Rubus ellipticus, Astilbe rivularis, Bryophyllum pinnatum, Kalanchoe spathulata, Melastoma normale, Osbeckia stellata, Oxyspora paniculata, Woodfordia fruticosa, Oroxylum indicum, Mussaenda frondosa, Anthocephalus cadamba, Anaphalis margaritacea, Artemisia indica, Campanula pallida, Rhododendron arboreum, Calotropis gigantea, Ipomoea purpurea, Prunus cerasoides, Eurya acuminata, Cassia fistula, Gnaphalium affine (pd), Callicarpa macrophylla, Mentha arvensis, Mentha spicata, Ocimum basilicum, Amaranthus caudatus, Achyranthes aspera, Amaranthus viridis, Chenopodium album, Bistorta macrophylla, Aconogonum molle, Cinnamomum tamala, Lindera neesiana, Litsea monopetala, Bridelia retusa, Phyllanthus emblica, Trewia nudiflora, Debregeasia salicifolia, Myrica esculenta, Ficus auriculata, Ficus benghalensis, Ficus glaberrima, Ficus lacor, Ficus roxburghii, Alnus nepalensis, Colocasia esculenta, Cymbopogon flexuosus, Imperata cylindrica, Piper chaba, Allium wallichii, Urena lobata, Quercus glauca, Juniperus indica, Ipomoea nil, Podocarpus neriifolius, Campylandra aurantiaca, Oxalis corymbosa</i>	74
32	Dislocation of Bones and Fracture	<i>Oleandra wallichii, Drynaria propinqua, Cissampelos pareira, Hypericum cordifolium, Shorea robusta, Garuga pinnata, Ageratum conyzoides, Cissus repens, Rumex nepalensis, Curcuma angustifolia, Fraxinus floribunda, Otochilus lancilabius,</i>	12
33	Dysentery	<i>Lycopodium cernuum, Lycopodium clavatum, Diplazium stoliczkae, Hypericum japonicum, Hypericum cordifolium, Anemone vitifolia, Tinospora sinensis, Berberis aristata, Berberis asiatica, Mahonia napaulensis, Shorea robusta (pd), Gossypium herbaceum, Bombax ceiba, Toona ciliata, Zizyphus incurva, Zizyphus mauritiana, Rhus javanica, Rhus succedanea, Semecarpus anacardium, Acacia catechu, Mucuna pruriens, Bauhinia purpurea, Bauhinia vahlii, Pyracantha crenulata, Pyrus pashia, Rubus ellipticus, Astilbe rivularis, Bryophyllum pinnatum, Kalanchoe spathulata, Melastoma normale, Osbeckia stellata, Oxyspora paniculata, Woodfordia fruticosa, Oroxylum indicum, Mussaenda frondosa, Anthocephalus cadamba, Campanula pallida, Rhododendron arboreum, Rauwolfia serpentina, Calotropis gigantea, Solanum nigrum, Lepisorus thunbergianus, Prunus cerasoides, Murraya paniculata, Cassia fistula, Callicarpa macrophylla, Mentha spicata, Ocimum basilicum, Achyranthes aspera, Amaranthus viridis, Chenopodium album, Bistorta macrophylla, Aconogonum molle, Litsea monopetala, Phyllanthus emblica, Trewia nudiflora, Debregeasia salicifolia, Ficus benghalensis, Ficus glaberrima, Ficus lacor, Ficus roxburghii, Alnus nepalensis, Satyrium nepalense, Dioscorea bulbifera, Smilax ovalifolia, Desmostachya bipinnata, Eulaliopsis binata, Imperata cylindrica, Bridelia retusa, Urena lobata, Quercus glauca, Dactylicapnos scandens, Centella asiatica, Podocarpus neriifolius, Campylandra aurantiaca, Oxalis corymbosa</i>	76
34	Earache	<i>Cleome viscosa, Oxalis corymbosa, Calotropis gigantea, Datura stramonium, Anemone rivularis, Solena amplexicaulis, Eryngium foetidum, Ocimum scantum, Euphorbia hirta, Acampe papillosa, Dendrobium moschatum, Arisaema flavum, Bryophyllum pinnatum, Betula utilis, Juniperus indica</i>	15
35	Eczema	<i>Cassia occidentalis, Swertia chirayita, Lantana camara, Neolitsea pallens, Girardinia diversifolia, Cassia fistula, Duabanga grandiflora</i>	7
36	Epilepsy	<i>Sambucus hookeri, Valeriana hardwickii, Cestrum nocturnum, Colebrookea oppositifolia, Asparagus racemosus, Juniperus indica, Benincasa hispida</i>	7
37	Eye infection	<i>Equisetum debile, Berberis asiatica, Coccinia grandis, Valeriana jatamansii, Cynoglossum zeylanicum, Justicia procumbens, Isodon coetsa, Terminalia bellirica, Terminalia chebula, Begonia picta, Oxalis corymbosa</i>	11
38	Fever	<i>Equisetum debile, Equisetum diffusum, Nephrolepis auriculata, Nephrolepis cordifolia, Berberis aristata, Corydalis megacalyx, Drymaria cordata,</i>	98

		<i>Hypericum elodeoides, Reinwardtia indica, Oxalis corniculata, Oxalis latifolia, Zanthoxylum armatum, Azadirachta indica, Zizyphus incurva, Zizyphus mauritiana, Semecarpus anacardium, Abrus precatorius, Tamarindus indica, Trifolium repens, Cassia occidentalis, Cassia tora, Mimosa pudica, Rubus nepalensis, Rubus ellipticus, Woodfordia fruticosa, Oroxylum indicum, Hydrocotyle nepalensis (pd), Centella asiatica, Sambucus adnata, Sambucus canadensis, Sambucus hookeri, Artemisia indica, Cirsium verutum, Eupatorium adenophorum, Eupatorium odoratum, Chonemorpha fragrans, Rauvolfia serpentina, Halenia elliptica, Swertia nervosa, Swertia angustifolia, Swertia chirayita, Cynoglossum amabile, Nicandra physalodes, Solanum nigrum, Boenninghausenia albiflora, Aeschynanthus sikkimensis, Justicia adhatoda, Justicia procumbens, Callicarpa arborea, Callicarpa macrophylla, Durlanta repens, Vitex negundo, Isodon coetsa, Colebrookea oppositifolia, Elsholtzia blanda, Ocimum scantum, Pogostemon benghalensis (pd), Plantago major, Mirabilis jalapa, Amaranthus caudatus, Amaranthus spinosus, Daphne bholua, Euphorbia hirta, Euphorbia royleana, Phyllanthus amarus, Lecanthus peduncularis, Ficus hirta, Ficus hispida, Salix babylonica, Herminium lanceum, Satyrium nepalense, Hedychium spicatum, Hedychium ellipticum, Roscoeia capitata, Acorus calamus, Pogostemon glaber, Ricinus communis, Saurauia napaulensis, Araiostegia pulchra, Clematis gouriana, Tinospora sinensis, Murraya paniculata, Terminalia chebula, Duabanga grandiflora, Eleusine indica, Dioscorea alata, Taxillus umbellifer, Mazus surculosus (pd), Cedrus deodara, Cissampelos pareira, Neopicrorhiza scrophulariiflora, Campylandra aurantiaca, Girardinia diversifolia, Oxalis corymbosa, Hypericum japonicum, Anthocephalus cadamba, Impatiens urticifolia, Coelogyne corymbosa</i>	
39	Flatulence	<i>Justicia procumbens</i>	1
40	Gastritis	<i>Lycopodium clavatum, Pinus roxburghii, Drymaria villosa, Semecarpus anacardium, Desmodium gangeticum, Rubus nepalensis, Rubus ellipticus, Senecio scandens, Callicarpa arborea, Colebrookea oppositifolia, Mentha arvensis, Ocimum scantum (pd), Daphne bholua, Trewia nudiflora, Girardinia diversifolia, Myrica esculenta, Betula alnoides, Paris polyphylla, Commelina maculata, Arundinaria falcata, Imperata cylindrica, Vitex negundo, Cleome viscosa, Allium hypsistum, Rauvolfia serpentina (pd), Betula utilis</i>	26
41	Gonorrhoea	<i>Equisetum debile, Michelia champaca, Shorea robusta, Ocimum basilicum, Ficus religiosa, Michelia kisopa, Dioscorea alata, Cissampelos pareira</i>	8
42	Gout	<i>Ricinus communis, Chlorophytum nepalense, Podocarpus nerifolius</i>	3
43	Gum bleeding	<i>Cipadessa baccifera, Cipadessa fruticosa, Achyranthes bidentata, Rumex nepalensis, Morus australis, Ficus religiosa, Bergenia ciliata, Thymus linearis, Potentilla fulgens</i>	9
44	Gynaecological problems	<i>Angiopteris evecta, Podophyllum hexandrum, Bergenia ciliata, Nephrolepis cordifolia, Rheum moorcroftianum, Betula utilis</i>	6
45	Headache	<i>Equisetum diffusum, Oleandra wallichii, Drymaria propinqua, Nephrolepis cordifolia, Anemone vitifolia, Dactylicapnos scandens, Polygala arillata, Drymaria cordata, Reinwardtia indica, Oxalis latifolia, Azadirachta indica, Melia azedarach, Zizyphus incurva, Trifolium repens, Begonia picta, Luculia gratissima, Valeriana jatamansii, Artemisia indica, Buddlejia asiatica, Halenia elliptica, Swertia chirayita, Cuscuta reflexa, Cestrum nocturnum, Solanum nigrum, Boenninghausenia albiflora, Terminalia chebula, Solanum aculeatissimum, Vitex negundo, Colebrookea oppositifolia, Elsholtzia blanda, Amaranthus viridis, Ricinus communis, Girardinia diversifolia, Ficus semicordata, Castanopsis indica, Coelogyne corymbosa, Spiranthes sinensis, Pogostemon glaber, Rumex nepalensis, Bryophyllum pinnatum, Cedrus deodara, Podocarpus nerifolius</i>	42
46	Heart problems	<i>Bergenia ciliata, Persicaria runcinata, Dolichos staintonii, Benincasa hispida, Rheum moorcroftianum, Ipomoea cairica</i>	6
47	Hemiplegia	<i>Dactylorhiza hatagirea</i>	1
48	Hemorrhage	<i>Quercus glauca, Cedrus deodara</i>	2
49	Hepatitis	<i>Equisetum debile</i>	1
50	Hypertension	<i>Angelica archangelica, Centella asiatica, Achyranthes bidentata</i>	3
51	Hysteria (psychological)	<i>Valeriana hardwickii, Betula utilis</i>	2
52	Ill waist	<i>Diospyros lancifolia</i>	1

53	Indigestion	<i>Nephrolepis auriculata</i> , <i>Nephrolepis cordifolia</i> , <i>Drymaria cordata</i> , <i>Reinwardtia indica</i> , <i>Cipadessa fruticosa</i> , <i>Desmodium concinnum</i> , <i>Cassia tora</i> , <i>Angelica archangelica</i> , <i>Galium aparine</i> , <i>Anaphalis margaritacea</i> , <i>Diploknema butyracea</i> , <i>Cynoglossum zeylanicum</i> , <i>Ranunculus laetus</i> , <i>Camellia kissi</i> , <i>Callicarpa macrophylla</i> , <i>Callicarpa arborea</i> , <i>Notochaete hamosa</i> , <i>Cyathula tomentosa</i> , <i>Achyranthes bidentata</i> , <i>Sapium insigne</i> , <i>Trewia nudiflora</i> , <i>Castanopsis indica</i> , <i>Castanopsis tribuloides</i> , <i>Hedychium spicatum</i> , <i>Desmostachya bipinnata</i> , <i>Cynodon dactylon</i> , <i>Imperata cylindrica</i> , <i>Pogostemon glaber</i> , <i>Impatiens puberula</i> , <i>Cymbopogon flexuosus</i> , <i>Cissampelos pareira</i> , <i>Centella asiatica</i> , <i>Hypericum japonicum</i>	33
54	Infertility complication	<i>Eryngium foetidum</i>	1
55	Inflammation	<i>Eryngium foetidum</i> , <i>Calamintha umbrosa</i> , <i>Aeschynanthus sikkimensis</i> , <i>Mentha arvensis</i> , <i>Mentha spicata</i> , <i>Piper chaba</i> , <i>Impatiens bicornuta</i> , <i>Kalanchoe spathulata</i> , <i>Narenga porphyrocoma</i> , <i>Hemiphragma heterophyllum</i> , <i>Polygala arillata</i>	11
56	Influenza	<i>Equisetum debile</i> , <i>Lantana camara</i>	2
57	Insect bites	<i>Impatiens puberula</i> , <i>Kalanchoe spathulata</i> , <i>Neanotis ingrata</i> , <i>Paris polyphylla</i>	4
58	Intestinal diseases	<i>Solanum aculeatissimum</i> , <i>Neopicrorhiza scrophulariiflora</i>	2
59	Intestinal ulcer	<i>Angiopteris evecta</i>	1
60	Itches	<i>Cuscuta reflexa</i> , <i>Lyonia ovalifolia</i> , <i>Dioscorea alata</i> , <i>Lygodium japonicum</i>	4
61	Jaundice	<i>Corydalis megacalyx</i> , <i>Abrus precatorius</i> , <i>Tamarindus indica</i> , <i>Centella asiatica</i> , <i>Mussaenda frondosa</i> , <i>Chonemorpha fragrans</i> , <i>Ipomoea purpurea</i> , <i>Cuscuta reflexa</i> , <i>Oroxylum indicum</i> , <i>Lantana camara</i> , <i>Phyllanthus emblica</i> , <i>Aloe vera</i> , <i>Eleusine indica</i> , <i>Cymbopogon flexuosus</i> , <i>Betula utilis</i> , <i>Ipomoea nil</i>	16
62	Joint ache	<i>Lygodium japonicum</i> , <i>Cleome viscosa</i> , <i>Impatiens bicornuta</i> , <i>Rhynchospermum verticillatum</i> , <i>Gossypium herbaceum</i> , <i>Ipomoea carnea</i> , <i>Justicia adhatoda</i> , <i>Litsea cubeba</i> , <i>Taxillus umbellifer</i> , <i>Girardinia diversifolia</i> , <i>Cedrus deodara</i> , <i>Centella asiatica</i>	12
63	Kidney problems	<i>Crateva unilocularis</i> , <i>Mimosa pudica</i> , <i>Geranium nepalense</i> , <i>Terminalia chebula</i> , <i>Rubia manjith</i> , <i>Asparagus racemosus</i> , <i>Aloe vera</i> , <i>Juncus concinnus</i> , <i>Bergenia ciliata</i> , <i>Podophyllum hexandrum</i>	10
64	Leprosy	<i>Melia azedarach</i> , <i>Indigofera bracteata</i> , <i>Cassia mimosoides</i> , <i>Kalanchoe spathulata</i> , <i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Ficus semicordata</i> , <i>Dioscorea alata</i> , <i>Podocarpus neriifolius</i>	9
65	Leucorrhoea	<i>Murraya paniculata</i> , <i>Acacia catechu</i> , <i>Thalictrum reniforme</i> , <i>Gossypium herbaceum</i> ,	4
66	Liver disorders	<i>Nephrolepis cordifolia</i> , <i>Halenia elliptica</i> , <i>Solanum nigrum</i> , <i>Ficus hispida</i> , <i>Asparagus racemosus</i> , <i>Eleusine indica</i> , <i>Thymus linearis</i> , <i>Herpetospermum pedunculatum</i> , <i>Neopicrorhiza scrophulariiflora</i> , <i>Podophyllum hexandrum</i>	10
67	Lungs problems	<i>Bergenia ciliata</i> , <i>Benincasa hispida</i> , <i>Myrica esculenta</i> , <i>Cedrus deodara</i> , <i>Meconopsis regia</i>	5
68	Malaria	<i>Taxillus umbellifer</i> , <i>Terminalia bellirica</i> , <i>Azadirachta indica</i>	3
69	Measles	<i>Sambucus canadensis</i>	1
70	Menstrual problems	<i>Hypericum cordifolium</i> , <i>Rhus javanica</i> , <i>Indigofera bracteata</i> , <i>Fragaria nubicola</i> , <i>Astilbe rivularis</i> , <i>Rhododendron arboreum</i> , <i>Murraya paniculata</i> , <i>Solena amplexicaulis</i> , <i>Ficus semicordata</i> , <i>Paris polyphylla</i> , <i>Arisaema concinnum</i> , <i>Hemiphragma heterophyllum</i> , <i>Rheum australe</i> , <i>Zizyphus mauritiana</i>	14
71	Mental disorders	<i>Elaeocarpus sphaericus</i>	1
72	Mouth and tongue problems	<i>Callicarpa macrophylla</i> , <i>Caryopteris nepalensis</i> , <i>Callicarpa arborea</i> , <i>Mentha spicata</i> , <i>Ficus neriifolia</i> , <i>Ficus semicordata</i> , <i>Arisaema flavum</i> , <i>Fragaria nubicola</i> , <i>Woodfordia fruticosa</i> , <i>Mussaenda frondosa</i> , <i>Cynoglossum zeylanicum</i>	11
73	Mumps	<i>Lantana camara</i> , <i>Euphorbia royleana</i>	2
74	Muscular pain	<i>Hypericum cordifolium</i> , <i>Clematis gouriana</i> , <i>Gaultheria fragrantissima</i> , <i>Commelina maculata</i> , <i>Quercus semecarpifolia</i>	5
75	Nasal congestion	<i>Abies spectabilis</i>	1
76	Nausea	<i>Mentha spicata</i> , <i>Cinnamomum tamala</i>	2
77	Nervous Imbalance	<i>Cestrum nocturnum</i> , <i>Dolichos staintonii</i> , <i>Benincasa hispida</i> , <i>Dactylorhiza hatagirea</i> (pd), <i>Centella asiatica</i> (pd), <i>Galium mollugo</i> , <i>Abrus precatorius</i> ,	8

		<i>Dendrobium aphyllum</i> (pd)	
78	Neuralgia	<i>Acampe papillosa</i>	1
79	Nose bleeding	<i>Acacia catechu</i> , <i>Ageratum conyzoides</i> , <i>Ageratum houstonianum</i> , <i>Artemisia indica</i> , <i>Cirsium verutum</i> , <i>Salvia campanulata</i> , <i>Wikstroemia canescens</i> , <i>Urtica dioica</i> , <i>Cynodon dactylon</i>	9
80	Paralysis	<i>Aster diplosteghioides</i>	1
81	Peptic ulcer	<i>Potentilla polyphylla</i> , <i>Rubus ellipticus</i> , <i>Begonia picta</i> , <i>Cyathula tomentosa</i> , <i>Chenopodium ambrosioides</i> , <i>Bridelia retusa</i> , <i>Oxalis corymbosa</i>	7
82	Piles	<i>Thalictrum reniforme</i> , <i>Berberis aristata</i> , <i>Berberis asiatica</i> , <i>Bauhinia variegata</i> , <i>Bergenia ciliata</i> , <i>Terminalia chebula</i> , <i>Achyranthes aspera</i> , <i>Achyranthes bidentata</i> , <i>Dioscorea bulbifera</i> , <i>Eulaliopsis binata</i> , <i>Salvia plebeia</i> , <i>Dioscorea alata</i> , <i>Mimosa pudica</i> , <i>Acacia catechu</i> , <i>Oxalis corymbosa</i> , <i>Ipomoea nil</i> , <i>Iris clarkei</i>	17
83	Pimple problems	<i>Valeriana jatamansii</i> , <i>Ceropegia pubescens</i> , <i>Calotropis gigantea</i> , <i>Swertia chirayita</i> , <i>Euphorbia royleana</i> , <i>Phyllanthus amarus</i> , <i>Phyllanthusparvifolius</i> , <i>Artocarpus lakoocha</i> , <i>Pedicularis scullyana</i>	9
84	Pneumonia	<i>Jatropha curcas</i> , <i>Curculigo crassifolia</i> (pd)	2
85	Pregnancy	<i>Astilbe rivularis</i> , <i>Dioscorea alata</i> , <i>Asparagus racemosus</i> , <i>Euphorbia pulcherrima</i> , <i>Dalbergia sissoo</i> , <i>Murraya paniculata</i>	6
86	Proliferation	<i>Cuscuta reflexa</i> , <i>Rorippa nasturtium-aquaticum</i>	2
87	Rabies	<i>Datura stramonium</i> , <i>Hypericum uralum</i>	2
88	Respiratory problems	<i>Viburnum erubescens</i> , <i>Garuga pinnata</i> , <i>Glycyrrhiza glabra</i>	3
89	Rheumatism	<i>Lycopodium clavatum</i> , <i>Abies spectabilis</i> , <i>Crateva unilocularis</i> , <i>Urena lobata</i> , <i>Semecarpus anacardium</i> , <i>Spondias pinnata</i> , <i>Tamarindus indica</i> , <i>Valeriana hardwickii</i> , <i>Valeriana jatamansii</i> , <i>Diploknema butyracea</i> , <i>Cuscuta reflexa</i> , <i>Ipomoea cairica</i> , <i>Lepisorus thunbergianus</i> , <i>Melia azedarach</i> , <i>Justicia procumbens</i> , <i>Lantana camara</i> , <i>Vitex negundo</i> , <i>Fagopyrum esculentum</i> , <i>Jatropha curcas</i> , <i>Ricinus communis</i> , <i>Juglans regia</i> , <i>Ficus benghalensis</i> , <i>Acampe papillosa</i> , <i>Asparagus racemosus</i> , <i>Aloe vera</i> , <i>Smilax ovalifolia</i> , <i>Hemiphragma heterophyllum</i> , <i>Piper chaba</i> , <i>Cedrus deodara</i> , <i>Podophyllum hexandrum</i> , <i>Podocarpus neriifolius</i> , <i>Arisaema griffithii</i> , <i>Polygala arillata</i>	33
90	Ringworm	<i>Cassia occidentalis</i> , <i>Cassia tora</i> , <i>Maesa chisia</i> , <i>Cynoglossum zeylanicum</i> , <i>Jasminum officinale</i> , <i>Euphorbia thymifolia</i> , <i>Girardinia diversifolia</i> , <i>Tamarindus indica</i>	8
91	Scabies	<i>Equisetum diffusum</i> , <i>Lygodium japonicum</i> , <i>Anemone vitifolia</i> , <i>Reinwardtia indica</i> , <i>Boenninghausenia albiflora</i> , <i>Albizia chinensis</i> , <i>Osbeckia stellata</i> , <i>Lyonia ovalifolia</i> , <i>Maesa chisia</i> , <i>Cryptolepis buchananii</i> , <i>Mirabilis jalapa</i> , <i>Neolitsea pallens</i> , <i>Debregeasia longifolia</i> , <i>Ficus lacor</i> , <i>Arundina graminifolia</i> , <i>Smilax aspera</i> , <i>Bistorta macrophylla</i> , <i>Dioscorea pentaphylla</i>	18
92	Scorpion sting	<i>Gossypium herbaceum</i> , <i>Semecarpus anacardium</i> , <i>Glycyrrhiza glabra</i> , <i>Rubia manjith</i> , <i>Mucuna pruriens</i> , <i>Neanotis ingrata</i> , <i>Ocimum scantum</i> , <i>Cassia fistula</i> , <i>Paris polyphylla</i> , <i>Oberonia ensiformis</i>	10
93	Scurvy	<i>Galium mollugo</i> (pd)	1
94	Seminal weakness	<i>Dactylorhiza hatagirea</i>	1
95	Sexual diseases	<i>Murraya paniculata</i>	1
96	Sinusitis	<i>Ranunculus laetus</i> , <i>Cleistocalyx operculatus</i> , <i>Anemone rivularis</i> , <i>Vitex negundo</i> , <i>Rheum moorcroftianum</i>	5
97	Skin disease and cosmetics	<i>Cissampelos pareira</i> , <i>Berberis aristata</i> , <i>Urena lobata</i> , <i>Bombax ceiba</i> , <i>Garuga pinnata</i> , <i>Azadirachta indica</i> , <i>Melia azedarach</i> , <i>Rhus succedanea</i> , <i>Acacia catechu</i> , <i>Desmodium heterocarpon</i> , <i>Abrus precatorius</i> , <i>Cassia tora</i> , <i>Rubus hoffmeisterianus</i> , <i>Centella asiatica</i> , <i>Senecio scandens</i> , <i>Artemisia indica</i> , <i>Launnea aspleniifolia</i> , <i>Jasminum officinale</i> , <i>Buddleja asiatica</i> , <i>Calotropis gigantea</i> (pd), <i>Ranunculus laetus</i> , <i>Thalictrum reniforme</i> , <i>Cassia fistula</i> , <i>Bryophyllum pinnatum</i> , <i>Galium mollugo</i> , <i>Ipomoea carnea</i> , <i>Amaranthus caudatus</i> , <i>Litsea cubeba</i> , <i>Lindera neesiana</i> , <i>Taxillus umbellifer</i> , <i>Euphorbia pulcherrima</i> , <i>Euphorbia thymifolia</i> , <i>Ficus religiosa</i> , <i>Castanopsis indica</i> , <i>Dioscorea bulbifera</i> , <i>Cynodon dactylon</i> , <i>Phragmites karka</i> , <i>Arisaema flavum</i> , <i>Cedrus deodara</i> , <i>Duabanga grandiflora</i> , <i>Chonemorpha fragrans</i> , <i>Podophyllum hexandrum</i> , <i>Meconopsis regia</i> , <i>Pandanus nepalensis</i> , <i>Arundina graminifolia</i> , <i>Achyranthes aspera</i> (pd), <i>Pedicularis scullyana</i> , <i>Aloe vera</i> , <i>Michelia champaca</i> , <i>Michelia doltsopa</i>	50

98	Snakebites	<i>Cissampelos pareira</i> (pd), <i>Hypericum oblongifolium</i> , <i>Gossypium herbaceum</i> , <i>Semecarpus anacardium</i> , <i>Bryophyllum pinnatum</i> , <i>Spilanthes paniculata</i> , <i>Notochaete hamosa</i> , <i>Ocimum scantum</i> , <i>Neolitsea pallens</i> , <i>Arisaema tortuosum</i> , <i>Ficus religiosa</i> , <i>Meconopsis regia</i> , <i>Pandanus nepalensis</i> , <i>Cassia fistula</i> , <i>Urena lobata</i>	15
99	Sore nipples	<i>Begonia picta</i> , <i>Acacia catechu</i>	2
100	Sore throat	<i>Berberis aristata</i> , <i>Glycyrrhiza glabra</i> , <i>Abrus precatorius</i> , <i>Cassia occidentalis</i> , <i>Potentilla polyphylla</i> , <i>Syzygium cumini</i> , <i>Sambucus hookeri</i> , <i>Anthocephalus cadamba</i> , <i>Diospyros lancifolia</i> , <i>Cassia fistula</i> , <i>Achyranthes bidentata</i> , <i>Phyllanthus emblica</i> , <i>Juglans regia</i> , <i>Acorus calamus</i> , <i>Spiranthes sinensis</i> , <i>Asparagus racemosus</i> , <i>Rhododendron arboretum</i> , <i>Satyrium nepalense</i> , <i>Dilichos stantonii</i>	19
101	Sprains	<i>Calotropis gigantea</i> , <i>Drynaria propinqua</i> , <i>Astilbe rivularis</i> , <i>Parnassia wightiana</i> , <i>Lecanthus peduncularis</i> , <i>Sphenomeris chinensis</i> , <i>Rheum australe</i>	7
102	Stomach ache	<i>Angiopteris evecata</i> , <i>Tinospora sinensis</i> , <i>Dactylicapnos scandens</i> , <i>Oxalis corniculata</i> , <i>Rhus javanica</i> , <i>Cassia mimosoides</i> , <i>Spilanthes paniculata</i> , <i>Cuscuta reflexa</i> , <i>Clematis gouriana</i> , <i>Eurya acuminata</i> , <i>Pedicularis gracilis</i> , <i>Chirita urticifolia</i> , <i>Phyllanthus amarus</i> , <i>Dioscorea pentaphylla</i> , <i>Rheum australe</i> , <i>Rheum moorcroftianum</i> , <i>Neopicrorhiza scrophulariiflora</i> , <i>Campylandra aurantiaca</i> , <i>Rorippa nasturtium-aquaticum</i>	19
103	Stomach disorders	<i>Hypericum japonicum</i> , <i>Gossypium herbaceum</i> , <i>Urena lobata</i> , <i>Zanthoxylum armatum</i> , <i>Cipadessa fruticosa</i> , <i>Zizyphus incurva</i> , <i>Garuga pinnata</i> , <i>Desmodium multiflorum</i> , <i>Terminalia bellirica</i> , <i>Osbeckia nepalensis</i> , <i>Luculia gratissima</i> , <i>Cirsium verutum</i> , <i>Taraxacum officinale</i> , <i>Gaultheria fragrantissima</i> , <i>Nepeta lamiopsis</i> , <i>Celtis australis</i> , <i>Castanopsis indica</i> , <i>Cautleya spicata</i> , <i>Dactylorhiza hatagirea</i> , <i>Glycyrrhiza glabra</i> , <i>Thymus linearis</i> , <i>Mazus surculosus</i> , <i>Fraxinus floribunda</i> , <i>Hypericum uralum</i> , <i>Oxalis corymbosa</i>	25
104	Swellings	<i>Polygala arillata</i> , <i>Rhus javanica</i> , <i>Acacia catechu</i> , <i>Indigofera bracteata</i> , <i>Abrus precatorius</i> , <i>Flemingia marcophylla</i> , <i>Astilbe rivularis</i> , <i>Woodfordia fruticosa</i> , <i>Trichosanthes tricuspidata</i> , <i>Gaultheria fragrantissima</i> , <i>Mimosa pudica</i> (pd), <i>Vitex negundo</i> , <i>Mirabilis jalapa</i> , <i>Fagopyrum dibotrys</i> , <i>Rumex nepalensis</i> , <i>Ricinus communis</i> , <i>Trewia nudiflora</i> , <i>Sphenomeris chinensis</i> , <i>Centella asiatica</i> , <i>Neopicrorhiza scrophulariiflora</i>	20
105	Syphilis	<i>Cassia fistula</i> , <i>Agave americana</i> , <i>Agave sisalana</i> , <i>Dioscorea bulbifera</i> , <i>Sapium insigne</i> , <i>Jatropha curcas</i> , <i>Ipomoea purpurea</i>	7
106	Tonic (weakness and dizziness)	<i>Bauhinia variegata</i> , <i>Tinospora sinensis</i> , <i>Isodon coetsa</i> , <i>Rheum australe</i> , <i>Trewia nudiflora</i> , <i>Spiranthes sinensis</i> , <i>Paris polyphylla</i> , <i>Podocarpus neriifolius</i> , <i>Anthocephalus cadamba</i> , <i>Asparagus racemosus</i> , <i>Curculigo crassifolia</i> , <i>Valeriana hardwickii</i>	12
107	Tonsillitis	<i>Urena lobata</i> , <i>Terminalia chebula</i> , <i>Terminalia bellirica</i> , <i>Aeschynanthus sikkimensis</i>	4
108	Toothache	<i>Anemone vitifolia</i> , <i>Dactylicapnos scandens</i> , <i>Murraya paniculata</i> , <i>Zanthoxylum acanthopodium</i> , <i>Zanthoxylum armatum</i> , <i>Zizyphus mauritiana</i> , <i>Potentilla polyphylla</i> , <i>Potentilla fulgens</i> , <i>Neohymenopogon parasiticus</i> , <i>Anaphalis margaritacea</i> , <i>Spilanthes paniculata</i> , <i>Datura stramonium</i> , <i>Solanum aculeatissimum</i> , <i>Achyranthes bidentata</i> , <i>Lindera neesiana</i> , <i>Ficus benghalensis</i> , <i>Ficus religiosa</i> , <i>Desmostachya bipinnata</i> , <i>Thalictrum reniforme</i> , <i>Hemiphragma heterophyllum</i> , <i>Neanotis ingrata</i> , <i>Cymbopogon flexuosus</i> , <i>Juniperus indica</i> , <i>Thymus linearis</i> , <i>Arisaema griffithii</i> , <i>Desmostachys bipinnata</i>	26
109	Tuberculosis	<i>Bombax ceiba</i> , <i>Kalanchoe spathulata</i> , <i>Benincasa hispida</i> , <i>Rorippa nasturtium-aquaticum</i>	4
110	Ulcer	<i>Syzygium cumini</i> , <i>Shorea robusta</i> , <i>Azadirachta indica</i> , <i>Lannea coromandelica</i> , <i>Desmodium multiflorum</i> , <i>Parnassia wightiana</i> , <i>Jasminum officinale</i> , <i>Chonemorpha fragrans</i> , <i>Ficus lacor</i> , <i>Ficus neriifolia</i> , <i>Eulaliopsis binata</i> , <i>Dioscorea bulbifera</i>	12
111	Uric acid	<i>Mimosa pudica</i> , <i>Centella asiatica</i>	2

112	Urinary problems	<i>Equisetum diffusum, Lycopodium clavatum, Tinospora sinensis, Crateva unilocularis, Impatiens urticifolia, Azadirachta indica, Acacia catechu, Glycyrrhiza glabra, Abrus precatorius, Mucuna pruriens, Mimosa pudica, Bergenia ciliata, Kalanchoe spathulata, Benincasa hispida, Rubia manjith, Lepisorus thunbergianus, Cassia fistula, Duabanga grandiflora, Nepeta lamiopsis, Amaranthus caudatus, Amaranthus spinosus, Chenopodium album, Dactylorhiza hatagirea, Salvia plebeia, Eleusine indica, Dolichos staintonii, Pandanus nepalensis, Cassia occidentalis, Rorippa nasturtium-aquaticum, Juncus concinnus</i>	30
113	Vomiting	<i>Cynoglossum amabile, Ipomoea nil, Mentha arvensis, Mentha spicata, Iris clarkei</i>	5
114	Worms	<i>Cleome viscosa, Azadirachta indica, Cipadessa fruticosa, Butea minor, Erythrina arborescens, Benincasa hispida, Murraya paniculata, Chonemorpha fragrans, Rumex nepalensis, Morus australis, Dioscorea bulbifera, Dioscorea deltoidea, Dioscorea esculanta, Paris polyphylla, Salvia plebeia, Rheum moorcroftianum, Arisaema griffithii, Thymus linearis, Maesa chisia, Cassia occidentalis, Clematis gouriana, Anemone vitifolia</i>	22

* (pd), pediatric

6.4 Plant parts used for remedy preparation

The present investigation provides information about the traditional medicinal practice in the studied area. It was noted that the ethnic people commonly used plants and their parts such as roots, rhizomes, tubers, leaves, stem, wood, barks, flowers, seeds, latex, pseudobulb, cone, whole plant and fruits. The parts most commonly used as medicine were leaves (190 species) followed by roots/rhizomes/tubers (162 species), stems/barks/woods (115 species), fruits (98 species), whole plant (83 species), seeds (38 species), flowers (34 species), tubers (11 species), twigs (6 species), pseudobulbs (5 species), resins (4 species), corms, gums, inflorescences, needles and pods (2 species each) (Fig. 28). Our findings resembled conclusions based on the study of Chepang community in Chitwan district (Rijal, 2008), Rai and Tamang community in Sunsari district (Deokota & Chhetri, 2009), Tamang community in Rasuwa district (Uprety *et al.*, 2010), and Tharu and Magar community in Rupendehi district (Singh *et al.*, 2012). In other studies roots were observed to be the most commonly used parts (Poudel & Gautam, 2008; Bhattarai *et al.*, 2010; Dangwal & Sharma, 2010); and in some fruit and fruit/seed (Uprety *et al.*, 2012; Luitel *et al.*, 2014). It explicates that diversity prevailed in the preparation methods and the use of plant parts.

The medical remedies were based on formulations ranging from preparation made out of a single plant for a single ailment or polyherbal formulations for single/multiple ailments. Sundrying of leaves was regarded as the cheapest and the most convenient form of preserving medicinal plants. It showed that the people were unaware of the loss of essential micronutrients such as vitamins A and C (Hoeven *et al.*, 2013) and availability of high concentration of bioactive compounds (Robinson, 1974; Moore, 1994; Basualdo *et al.*, 1995).

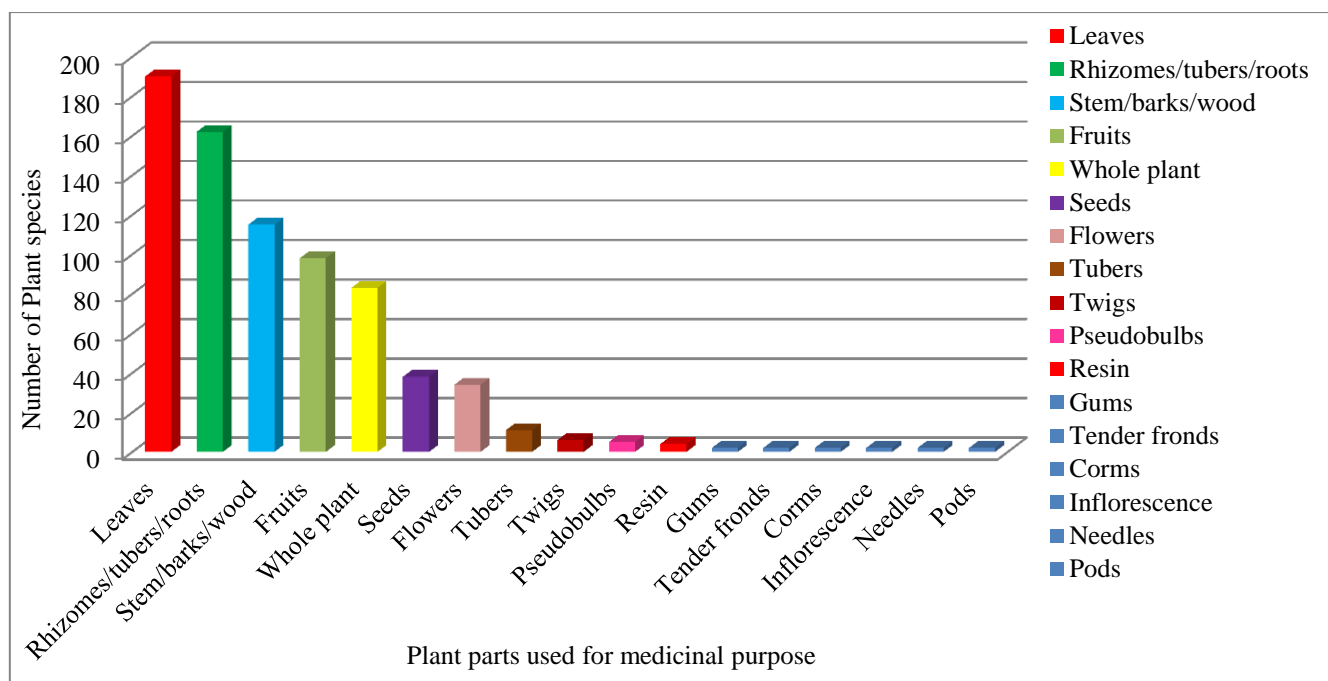


Fig. 28: Different plant parts used by *Gurung*, *Magar* and *Majhi* community in Parbat district

6.5 Modes of remedy preparation and application

The medicinal plants in the study area were noted to be used in various ways for remedy preparation. The modes of preparation of remedies were common in many places despite differences in which form of remedy was in maximum use. The most common preparation and administration methods were juice (36.61%) followed by paste (18.50%), decoction (15.12%), vegetables (6.56%), pickle (5.27%), powder (4.97%), eaten raw/chewed (4.27%), infusion (3.58%), latex (1.99%), ash (1.19%), smoke (0.89%), oil (0.59%), and pills/tablets (0.39%) (Fig.29). In previous studies, different modes of preparations, infusion (Bano *et al.*, 2014), juice (Kunwar *et al.*, 2006; Burlakoti & Kunwar, 2008), decoction (Shrestha & Dillion, 2003) and paste (Upreti *et al.*, 2010), were observed to be the most prominent.

Some healers were found to believe that mixing modes of preparation with animal parts, oil, food grains and soil maximized effectiveness of the medicine. Identical finding was documented previously by Poudel *et al.* (2010). In many instances, application of fresh parts of plant was observed because of the healers' belief regarding higher efficiency of the medicine made from fresh plants.

Plant parts were generally prepared as medicine using hot and cold water as the solvent; and occasionally, remedies were prepared with milk, honey, oil and ghee. Common use of water rather than ghee, milk, honey during the preparation of medicine may be because they are expensive to buy for those who do not have animals in home.

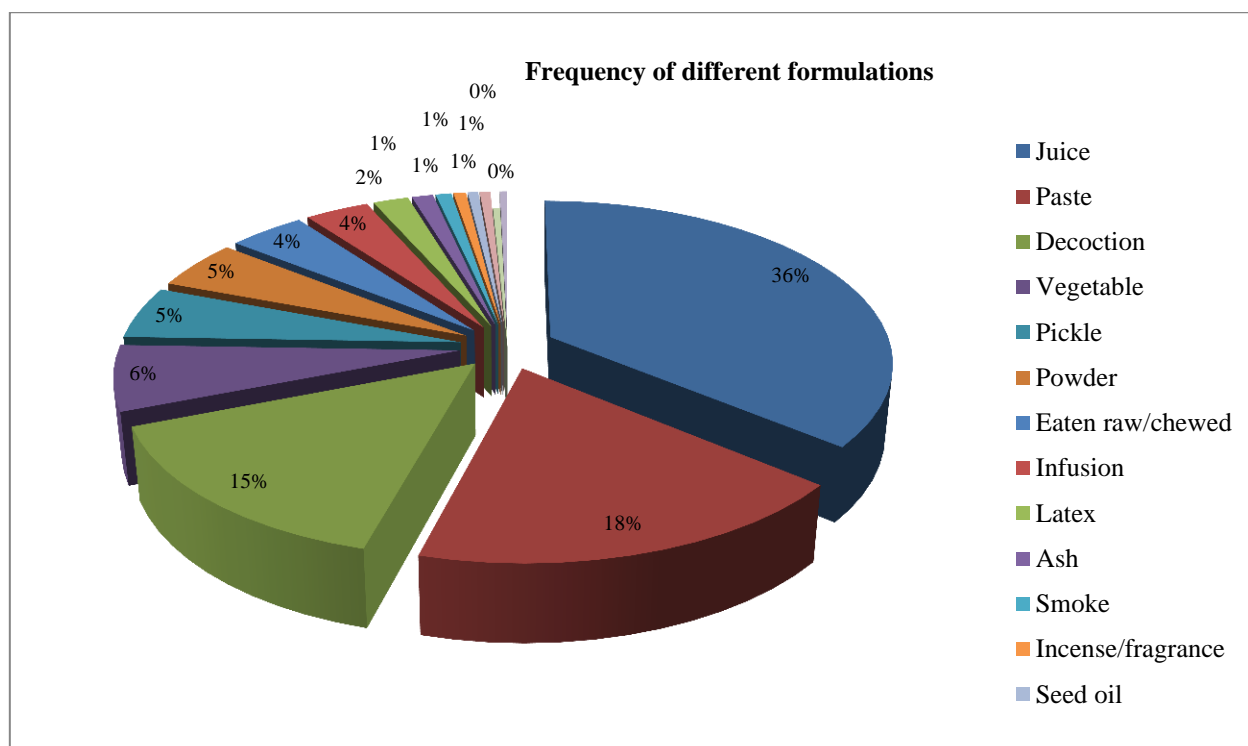


Fig. 29: Frequency of different formulations used by ethnic communities in Parbat district

6.6 Routes of administration

Various routes of administration were reported during the study. Most frequently administered route was oral (62.7%) followed by external (17.78%) and topical/dermal/cosmetics (14.48%). The other routes included nasal (1.29%), dental (1.43%), anal (0.64%), optical (0.79%), otic (0.93%); the least being internal (0.21%) (Fig.30). In a few other studies as well, oral mode of administration was found to be the most dominant (Mood, 2008; Brandao *et al.*, 2012; Luitel *et al.*, 2014). Contrarily, inhalation (Shrestha & Dhillon, 2003), concoction (Lulekal *et al.*, 2008), infusion (Panghal *et al.*, 2010), decoction (Singh *et al.*, 2012; Lulekal *et al.*, 2013) were observed to be the most dominant routes of administration. The finding of Teklay *et al.* (2013) differed more substantially from the above mentioned findings in the sense that it was observed that more than half (55%) remedy preparations were applied externally.

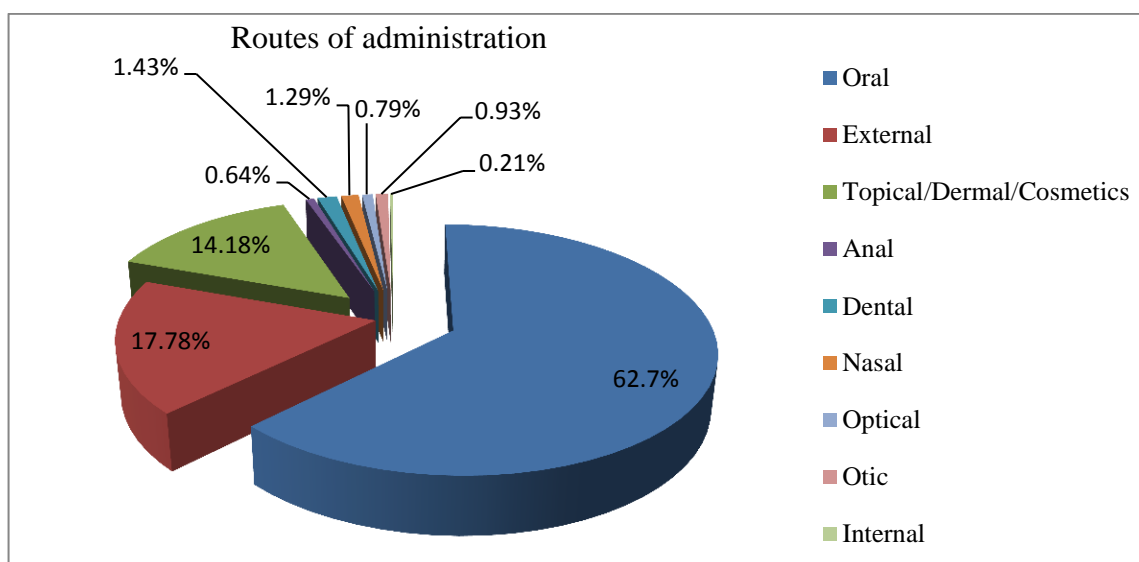


Fig. 30: Frequency of different routes of administration

6.7 Dosages and antidotes

The analysis of medicine prescription practice revealed that the prescribed quantity was always approximate. The measurements used by the informants were found to be non-uniform allowing the patients to understand in their own sense. It was observed that the same mode of medicine was mentioned in small cups locally called '*kachaura*' while others were measured as handful, spoonful or size of fingers. The dosages were found to depend on herbal healers, disease types, duration of infection, and treatment method. It is also decided based on age groups, sex and physical appearance of the patients. The frequency of use is suggested with the terms like (x) number of times in a day, and the duration with (x) number of days/weeks/months.

A number of plant species were reported to have specific antidotes (Table 21). Among the three communities, *Majhi* and *Magar* used plants as antidotes to treat snake bites, scorpion stings, bee stings, insect bites and rabies. *Gurungs* were not found to use plants as antidotes for bee stings, insect bites and rabies. The number of plants used to treat snake bites was lowest among the *Gurungs* (2 species) whereas highest (7 species) among the *Magars* and *Majhis*.

Table 21 Plants used for antidotes

Antidotes	Gurung	Magar	Majhi
Snake bites	<i>Urena lobata</i> , <i>Arisaema tortuosum</i>	<i>Gossypium herbaceum</i> , <i>Notochaete hamosa</i> , <i>Ocimum scantum</i> , <i>Neolitsea pallens</i> , <i>Meconopsis regia</i> , <i>Cassia fistula</i> , <i>Urena lobata</i> ,	<i>Hypericum oblongifolium</i> , <i>Semecarpus anacardium</i> , <i>Bryophyllum pinnatum</i> , <i>Spilanthes paniculata</i> , <i>Ficus religiosa</i> , <i>Pandanus nepalensis</i> , <i>Urena lobata</i>
Scorpion stings	<i>Mucuna pruriens</i> , <i>Oberonia ensiformis</i>	<i>Gossypium herbaceum</i> , <i>Ocimum scantum</i> , <i>Cassia fistula</i> , <i>Glycyrrhiza glabra</i> , <i>Mucuna pruriens</i> , <i>Paris polyphylla</i> , <i>Oberonia ensiformis</i>	<i>Semecarpus anacardium</i> , <i>Rubia manjith</i> , <i>Neanotis ingrata</i>
Bee stings		<i>Hypericum uralum</i>	<i>Impatiens puberula</i> , <i>Hypericum uralum</i>
Insect bites		<i>Paris polyphylla</i>	<i>Impatiens puberula</i> , <i>Kalanchoe spathulata</i> , <i>Neanotis ingrata</i>
Rabies		<i>Datura stramonium</i> , <i>Hypericum uralum</i>	<i>Datura stramonium</i> , <i>Hypericum uralum</i>

The plant species like *Impatiens puberula*, *Hypericum uralum*, *Gossypium herbaceum*, *Semecarpus anacardium*, *Glycyrrhiza glabra*, *Rubia manjith*, *Mucuna pruriens*, *Neanotis ingrata*, *Ocimum scantum*, *Cassia fistula*, *Paris polyphylla*, *Oberonia ensiformis*, *Cissampelos pareira*, *Hypericum oblongifolium*, *Gossypium herbaceum*, *Semecarpus anacardium* were mostly used as the antidotes against various poisons by the three communities. Majority of the antidotes were reported to have no adverse effects except for *Lantana camara*, *Abrus precatorius*, *Iris clarkei*, *Prunus cerasoides*, *Euphorbia royleana*, *Ricinus communis*, *Engelhardia spicata*, and *Kalanchoe spathulata* (Table 21).

6.8 Ethnodomestication of medicinal plants

Domestication, one of the most essential developments in human history, is modeled by human culture, social needs and technology (Parra *et al.*, 2012). The process is also influenced by variable nature of ecosystems and populations of the managed organism (Doebley *et al.*, 1992). Plants are usually domesticated for medicine, fruits, vegetables, compost manure, furniture, spices and condiments, ornament, religious purpose. Such domestication indicates ethnic people's awareness of low cost conservation of economically important plants in a greater extent (Chhetri, 2006).

Nepal is rich in medicinal plant resources with greater potential to strengthen local economy, and contribute to subsistence health and natural resources management for national economy. As per the available statistics, about USD 10 million of medicinal and aromatic plants are exported legally from Nepal each year (UNEP, 2012). An average of 20,000 tons of raw materials are traded and/or exported annually from Nepal. The figure, researchers argued, demonstrate weak efforts of Nepal government to manage medicinal and aromatic plants (Magar, 2014) for the generation of substantial revenue (Rokaya *et al.*, 2012). Importantly, it was observed that marketable medicinal plants were mainly sold for their non-medicinal uses, and only applied as medicine when the need arose (Table 22).

Table 22 Marketing value of the plants

S.N	Scientific name	Local name	Marketing purpose
1	<i>Allium hypsistum</i>	Jimbu	As flavouring agent
2	<i>Asparagus racemosus</i>	Kurilo	Vegetable
3	<i>Azadirachta indica</i>	Neem	Medicinal value
4	<i>Bauhinia variegata</i>	Koiralo	Vegetable
5	<i>Benincasa hispida</i>	Kubhindo	Vegetable
5	<i>Berberis aristata</i>	Chutro	Medicinal, Fruits and to distill local alcohol
6	<i>Betula utilis</i>	Bhojapatra	Medicinal
7	<i>Begonia picta</i>	Magarkanche	Flavouring agent
8	<i>Bombax ceiba</i>	Simal	Furniture, cosmetic product and fruits
9	<i>Cannabis sativa</i>	Ganja	Smoke, illegal trade
10	<i>Castanopsis indica</i>	Katus	Fruit nuts, traditional plates 'tapari' and 'duna'
11	<i>Choerospondias axillaris</i>	Lapsee	Pickle and chutney
12	<i>Cinnamomum camphora</i>	Kapur	Camphor
13	<i>Cinnamomum tamala</i>	Tejpat	Flavouring of food

14	<i>Cleistocalyx operculatus</i>	Kyamuno	Fruits and alcoholic beverages
15	<i>Colocasia esculenta</i>	Karkalo	Vegetable
16	<i>Dactylorhiza hatagirea</i>	Panchaunle	Medicinal
17	<i>Daphniphyllum himalense</i>	Rakta chandan	Artifacts and carving
18	<i>Datura stramonium</i>	Dhaturo	Flowers/ alcoholic beverages
19	<i>Dendrocalamus hamiltonii</i>	Tama/Tusa	Tama as pickle and vegetable
20	<i>Dioscorea alata</i>	Ban Tarul	Edible food
21	<i>Dioscorea bulbifera</i>	Githa	Vegetable
22	<i>Dioscorea deltoidea</i>	Bhayakur	Boiled and eaten as vegetable
23	<i>Diospyros lancifolia</i>	Khallu	Fruits, alcoholic beverages and agricultural tools
24	<i>Diplokenma butyracea</i>	Chyauree	Fruit and alcoholic beverages
25	<i>Fagopyrum esculentum</i>	Fapar	Alcoholic beverages
26	<i>Ficus auriculata</i>	Newaro	Vegetable
27	<i>Ficus glaberrima</i>	Pakhuri	Fruits
28	<i>Ficus roxburghii</i>	Newaro	Vegetable
29	<i>Ficus semicordata</i>	Khanayu	Medicinal and fruits
30	<i>Ficus subincisa</i>	Bedulo	Fruits
31	<i>Juglans regia</i>	Okhar	Fruits
32	<i>Lindera neesiana</i>	Siltimur	Fruits
33	<i>Mahonia napaulensis</i>	Jamanemandro	Flower and fruits
34	<i>Mentha arvensis</i>	Pudina	Pickle
35	<i>Morus australis</i>	Kimbu	Fruits
36	<i>Myrica esculenta</i>	Kaphal	Eaten fresh and pickled
37	<i>Neopicrorhiza scrophulariiflora</i>	Kutaki	Medicinal
38	<i>Ocimum scantum</i>	Tulsi	Medicinal
39	<i>Nephrolepis auriculata</i>	Pani amala	Eaten raw
40	<i>Pandanus nepalensis</i>	Tarika	Fruit and alcoholic beverages
41	<i>Phyllanthus emblica</i>	Amala	Fruit as vitamin C and sold for various purpose
42	<i>Piper longum</i>	Pipla	Fruits
43	<i>Potentilla fulgens</i>	Bajradanti	Toothbrush
44	<i>Potentilla polyphylla</i>	Bajradanti	Toothbrush
45	<i>Pyrus pashia</i>	Mayal	Fruit and alcoholic beverages
46	<i>Rheum moorcroftianum</i>	Padamchaal	Medicinal/Pickel
47	<i>Rhododendron arboreum</i>	Lali gurans	Medicinal/Pickel
48	<i>Rorippa nasturtium-aquaticum</i>	Khole sag	Vegetable
49	<i>Rubus ellipticus</i>	Ainselu	Fruits
50	<i>Rubus nepalensis</i>	Bhui kafal	Fruits
51	<i>Sapindus mukorossi</i>	Reetha	Soap/ International trade
52	<i>Saurauia napaulensis</i>	Gobino	Fruits
53	<i>Smilax aspera</i>	Kukurdaino	Vegetable and pickle
54	<i>Solena amplexicaulis</i>	Ban kankro	Fruits
55	<i>Swertia chirayita</i>	Chiraito	Medicinal
56	<i>Syzygium cumini</i>	Jamun	Pickled, alcoholic beverages and construction
57	<i>Tamarindus indica</i>	Imlee	Pickle and medicinal
58	<i>Terminalia bellirica</i>	Barro	Medicinal
59	<i>Terminalia chebula</i>	Harro	Medicinal
60	<i>Urtica dioica</i>	Sisnu	Vegetable
61	<i>Valeriana hardwickii</i>	Nakkali jatamansi	Medicinal
62	<i>Zanthoxylum armatum</i>	Timur	Fruits/ International trade
63	<i>Zizyphus incurva</i>	Hade bayer	Pickle, alcoholic beverages, medicinal value
64	<i>Zizyphus mauritiana</i>	Bayer	Fruits, pickle and alcoholic beverages

6.9 Plant species used for different purposes

The fact that plants contain beneficial properties as well as chemicals for natural remedies has long enticed people to find their use. In this study, a number of uses was identified and categorized based on the types in previous research (Changkija & Kumar, 1996; Sen & Batra, 1997; Kumar & Jain, 1998; Panthi & Chaudhary, 2002; Rijal, 2008; Malla & Chhetri, 2009; Aryal *et al.*, 2009; Bhattarai *et al.*, 2010; Srivastava, 2010; Volpato *et al.*, 2012; and Lulekal *et al.*, 2013). Out of 401 species, 397 were used for medicinal purpose, 161 species for fodder, 157 species for human consumption, 66 species for ornamental and ceremony. The detail list of species and the categories of utilization are shown in (Fig. 31).

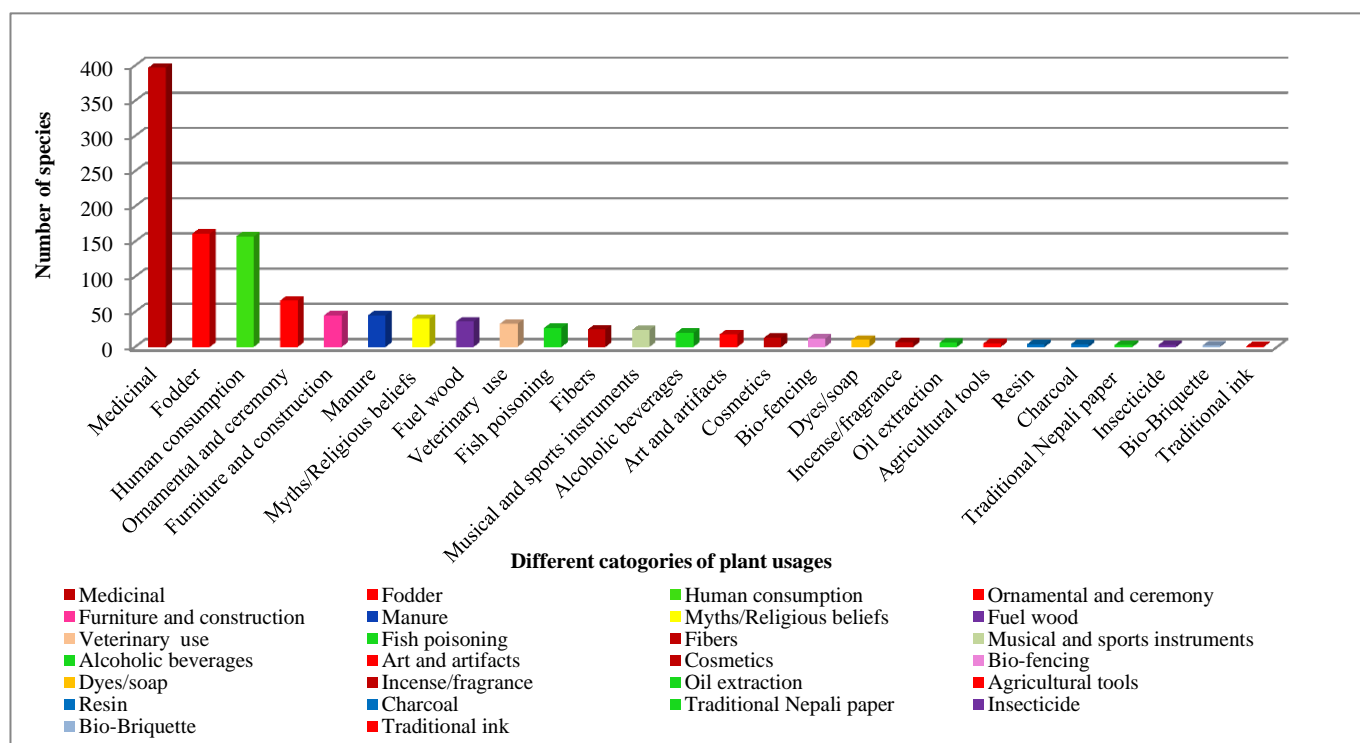


Fig. 31: Different categories of plant usages

6.10. Quantitative Analysis (Statistical analysis)

6.10.1 Informants consensus factor (F_{IC})

Informants consensus factors (F_{IC}) was calculated to identify ethnopharmacological importance of the collected plant species and to analyze the degree of agreement of the informant's knowledge about each category of ailments (Song *et al.*, 2013). In ethnomedicinal studies, F_{IC} provides a measure of reliable reliability for the given claim of evidence (Malla & Chhetri, 2012b). F_{IC} values are used as important tool for the ethnobotanical research works (Upreti *et al.*, 2010; Cheikhyousef *et al.*, 2011; Singh *et al.*, 2012; Megersa *et al.*, 2013; Lulekal *et al.*, 2013; Song *et al.*, 2013).

The different ailments and diseases were classified into 17 categories and F_{IC} value for each category was calculated. The result showed that cancer had the greatest agreement with F_{IC} of 0.98, followed by cardiovascular (0.93), pediatric diseases (0.92), and gynaecological disorders (0.90) (Table 23). The least agreement was recorded in the evil spirit and religious beliefs with F_{IC} of 0.55 followed by dermatological and cosmetics use with F_{IC} of 0.57. In another study, however, malaria and headache were found to have the highest F_{IC} value (0.85), and rabies had the lowest F_{IC} value (0.25) (Megersa *et al.*, 2013). According to Uprety *et al.* (2010), ophthalmological problems, tooth ache and kidney problems showed F_{IC} value 1 and 0.82 whereas gastro-intestinal disorders, fever and headache showed relatively low levels of consensus i.e., F_{IC} value 0.53 and 0.61 respectively. Yet, gastro-intestinal disorders (Singh *et al.*, 2012; Lulekal *et al.*, 2013), cold/flu/fever (Sadeghi *et al.*, 2014) were found to have maximum F_{IC} value. The value was found to be relatively higher in the cases of single plant use (Kumar *et al.*, 2011).

Table 23 Informant consensus factor (F_{IC}) by categories of diseases

S.N.	Disease category	Use reports (N_{ur})	Number of taxa (N_t)	F_{IC}
1	Gastro-intestinal, parasitic and hepatobiliary	1483	386	0.74
2	Blood and lymphatic system	27	11	0.61
3	Cardiovascular diseases	379	25	0.93
4	Hormonal disorders	58	12	0.81
5	Other (fever, headache, cough and cold)	997	212	0.78
6	Urinogenital and venereal	432	66	0.84
7	Oral, dental and ENT	396	97	0.75
8	External injuries and bleeding	291	90	0.69
9	Pulmonary diseases	189	64	0.66
10	Antidote	79	33	0.58
11	Dermatological and cosmetics	413	177	0.57
12	Musculoskeletal and nervous system	524	161	0.69
13	Ophthalmological problems	28	11	0.63
14	Cancer	157	4	0.98
15	Gynaecological disorders	333	34	0.90
16	Pediatric diseases	221	18	0.92
17	Evil spirit and religious beliefs	87	40	0.55

6.10.2 Fidelity level (FL) value

Fidelity level (FL) was used to identify the most preferred species for treating certain ailments by the informants. FL level shows the percentage of informants claiming the use of a certain plant species for the same major purpose (Khan *et al.*, 2014). In this analysis, FL values were calculated for medicinal plants which were mentioned by four or more informants. We found that the most important species, according to their FL, were *Centella asiatica* (100%) used for Musculoskeletal and nervous system, *Crateva unilocularis* (100%) used for cardiovascular disease, *Dactylorhiza hatagirea* (100%) used for urinogenital and venereal ailments, *Swertia chirayita* (100%) used for cardiovascular diseases, *Glycyrrhiza glabra* (96.77%) for urinogenital and venereal ailments, and *Juglans regia* (96.77%) for musculoskeletal and nervous system (Table 24). Studies carried out in

other places also revealed 100% FL value of four plant species i.e. *Achillea welhemsii*, *Caralluma tuberculata*, *Citrullus colocynthis* and *Seripidium quettense* (Bibi *et al.*, 2014). In terms of disease category, the plants used to treat gastro-intestinal and parasitic diseases (Srithi *et al.*, 2009; Rokaya *et al.*, 2010; Song *et al.*, 2013 and Lulekal *et al.*, 2013), and the plants used to treat blackleg and respiratory tract problems (Giday & Teklehaymanot, 2013) were found to have highest FL value.

Table 24 Fidelity level (FL) value of medicinal plants against a given ailment category

S.N	Medicinal Plant	Therapeutic categories	I _p	I _n	FL Value (%)
1	<i>Abies spectabilis</i>	Pulmonary diseases	10	13	76.92
2	<i>Acampe papillosa</i>	Oral, dental and ENT	9	19	47.36
3	<i>Acorus calamus</i>	Pulmonary diseases	12	13	92.30
4	<i>Ageratum houstonianum</i>	External injuries and bleeding	17	21	80.95
5	<i>Arisaema tortuosum</i>	Antidote	9	13	69.23
6	<i>Artemisia indica</i>	Oral, dental and ENT	11	14	78.57
7	<i>Asparagus racemosus</i>	Gastro-intestinal, parasitic and hepatobiliary	17	18	94.44
8	<i>Begonia picta</i>	Ophthalmological problems	9	15	60.00
9	<i>Benincasa hispida</i>	Antidote	13	16	81.25
10	<i>Berberis aristata</i>	Gastro-intestinal, parasitic and hepatobiliary	14	19	73.68
11	<i>Bergenia ciliata</i>	Gynaecological disorders	19	20	95.00
12	<i>Bombax ceiba</i>	Pulmonary diseases (tuberculosis)	10	18	55.55
13	<i>Bryophyllum pinnatum</i>	External injuries and bleeding	10	11	90.90
14	<i>Camellia kissi</i>	Blood and lymphatic system	10	12	83.33
15	<i>Centella asiatica</i>	Musculoskeletal and nervous system	9	9	100.00
16	<i>Cestrum nocturnum</i>	Evil spirit and religious beliefs	8	10	80.00
17	<i>Chonemorpha fragrans</i>	Hormonal disorders	10	17	58.82
18	<i>Chlorophytum nepalense</i>	Urinogenital and venereal	5	13	38.46
19	<i>Cleistocalyx operculatus</i>	Other (fever, headache, cough and cold)	19	20	95.00
20	<i>Coelogyne corymbosa</i>	Dermatological and cosmetics	6	9	66.66
21	<i>Crateva unilocularis</i>	Cardiovascular disease	23	23	100.00
22	<i>Cuscuta reflexa</i>	Gastro-intestinal, parasitic and hepatobiliary	20	21	95.23
23	<i>Dactylorhiza hatagirea</i>	Urinogenital and venereal	21	21	100.00
24	<i>Dendrobium moschatum</i>	Oral, dental and ENT	5	8	62.50
25	<i>Dioscorea deltoidea</i>	Gastro-intestinal, parasitic and hepatobiliary	17	19	89.47
26	<i>Engelhardia spicata</i>	Hormonal disorders	13	15	86.66
27	<i>Gaultheria fragrantissima</i>	Musculoskeletal and nervous system	12	13	92.30
28	<i>Glycyrrhiza glabra</i>	Urinogenital and venereal	26	27	96.77
29	<i>Herminium lanceum</i>	Hormonal disorders	7	12	58.33
30	<i>Indigofera bracteata</i>	Gynaecological disorders	8	15	53.33
31	<i>Juglans regia</i>	Musculoskeletal and nervous system	30	31	96.77
32	<i>Justicia adhatoda</i>	Other (fever, headache, cough and cold)	15	17	88.23
33	<i>Litsea cubeba</i>	Dermatological and cosmetics	25	28	89.28
34	<i>Lycopodium clavatum</i>	Gastro-intestinal, parasitic and hepatobiliary	12	17	70.58
35	<i>Mahonia nepaulensis</i>	Gastro-intestinal, parasitic and hepatobiliary	14	15	93.33
36	<i>Mentha spicata</i>	Gastro-intestinal, parasitic and hepatobiliary	9	12	75.00
37	<i>Michelia doltsopa</i>	Evil spirit and religious beliefs	8	15	53.33
38	<i>Neanotis ingrata</i>	Evil spirit and religious beliefs	7	19	36.84
39	<i>Neolitsea pallens</i>	Antidote	4	17	23.52
30	<i>Neopicrorhiza scrophulariiflora</i>	Cardiovascular disease	23	24	95.83
41	<i>Nephrolepis auriculata</i>	Cardiovascular disease	5	8	62.50
42	<i>Paris polyphylla</i>	Gastro-intestinal, parasitic and hepatobiliary	24	25	96.00

43	<i>Piper longum</i>	Pulmonary diseases	12	16	75.00
44	<i>Pleione humilis</i>	External injuries and bleeding	9	10	90.00
45	<i>Podophyllum hexandrum</i>	Cancer	10	13	76.92
46	<i>Pogostemon glaber</i>	Other (fever, headache, cough and cold)	14	19	73.68
47	<i>Potentilla polyphylla</i>	External injuries and bleeding	23	25	92.00
48	<i>Rauvolfia serpentina</i>	Other (fever, headache, cough and cold)	7	8	87.50
49	<i>Rheum australe</i>	Gynaecological disorders	11	13	84.61
50	<i>Rheum moorcroftianum</i>	Gynaecological disorders	14	15	93.33
51	<i>Rhododendron arboreum</i>	Gastro-intestinal, parasitic and hepatobiliary	13	18	72.22
52	<i>Ricinus communis</i>	Musculoskeleton and nervous system	6	10	60.00
53	<i>Rubia manjith</i>	Urinogenital and venereal	15	29	51.72
54	<i>Sambucus adnata</i>	Common cold and cough	7	17	41.17
55	<i>Spilanthes paniculata</i>	Antidote	4	9	44.44
56	<i>Spiranthes sinensis</i>	Oral, dental and ENT	7	11	63.63
57	<i>Swertia angustifolia</i>	Cardiovascular disease	14	15	93.33
58	<i>Swertia chirayita</i>	Cardiovascular disease	12	12	100.00
59	<i>Taxus wallichiana</i>	Cancer	27	28	96.42
60	<i>Tinospora sinensis</i>	Gastro-intestinal, parasitic and hepatobiliary	11	17	64.70
61	<i>Urtica dioica</i>	Cardiovascular disease	17	21	80.95
62	<i>Valeriana hardwickii</i>	Blood and lymphatic system	15	19	78.94
63	<i>Valeriana jatamansii</i>	Ophthalmological problems	9	11	81.81
64	<i>Vitex negundo</i>	Pulmonary diseases	19	24	89.16
65	<i>Wikstroemia canescens</i>	Cardiovascular disease	15	18	83.33
66	<i>Zanthoxylum acanthopodium</i>	Musculoskeleton and nervous system	9	10	90.00
67	<i>Zanthoxylum armatum</i>	Gastro-intestinal, parasitic and hepatobiliary	17	27	62.96
68	<i>Zizyphus mauritiana</i>	Gastro-intestinal, parasitic and hepatobiliary	7	9	77.78

6.11 Cross-cultural pattern

Cross-cultural pattern demonstrates broad spectrum of comparative differences in ethnomedicinal use, *i.e.*, it shows the use of any single plant species for the treatment of various diseases/ailments, and various other purpose by different tribes. Such comparisons highlight common patterns from independent discoveries that can make the case for efficacy of certain taxa stronger (Heinrich *et al.*, 1998; Bletter, 2007; Roersch, 2010). Nevertheless, existing literature showed very less emphasis on cross-cultural comparison of medicinal plant species or other taxa (family, genera) (Heinrich, 1994; Moerman, 1996; Heinrich, 1998). Halberstein (2005) observed that two ethnomedicines – *Banisteriopsis inebrians* and *Cannabis sativa* – were prescribed for psychiatric disorders such as euphoria and mental stimulation.

Very recently, Pieroni *et al.* (2011) reinforced the hypothesis that cultural components played crucial role in determining how people used plants. Navaneethan *et al.* (2011) found that about 10 species were commonly used by different tribal people in Karnataka, India. Similarly, Saslis-lagoudakis *et al.* (2011) observed common pattern in ethnomedicinal uses of three independent ethnomedicinal floras in Nepal, New Zealand and South Africa. They claimed that the common use was the result of independent discovery in the three regions due to efficiency of local cultures in

identifying plants.

This research examined cross-cultural differences among the three ethnic communities. Some medicinal plants were found to be used commonly by all the three tribes. Differences were observed in the understanding of the concepts and treatment method used by the different ethnic communities. In some instances, similarities were minimal even within a single community based on gender, age, education, ethnicity and altitude of their living. Some medicinal plants were reported to treat common diseases in the different communities. Out of total plant species, it was observed that 83 ethnobotanical species were used by all the tribes whereas 45 ethnomedicinal species were used commonly by either two or all the three tribes (Table 25). Among total plant species reported, it was found that *Magar* tribe uses 301 plant species to cure 112 diseases, *Gurung* tribe uses 197 plant species to treat 88 diseases and *Majhi* tribe uses 126 plant species to administer 80 diseases. *Cedrus deodara*, *Centella asiatica*, *Dactylorhiza hatagirea* are the species commonly used by *Magar* tribes to cure 10 diseases, *Rumex nepalensis*, *Justicia procumbens*, *Dactylorhiza hatagirea* are the species that are used mostly by *Gurung* tribe to cure 8 diseases and *Calotropis gigantea* is the species that is used mostly by *Majhi* tribes to cure 12 diseases. *Choerospondias axillaris* was used by all as a source of vitamin C. It was also found that *Pyrus pashia* and *Bauhinia vahlii* were used to cure the same disease. Some plants, however, were used differently by different tribes. *Cassia fistula*, for example, was used by *Gurung* to cure hematuria, diarrhoea and dysentery; *Magar* used it to administer asthma, diabetes, eczema, abortification and gargling, and *Majhi* used it to treat skin diseases, syphilis, gargling to relieve sore throat, asthma, diabetes, eczema, abortification, scorpion stings and snake bites. *Cynodon dactylon* was commonly used by *Gurung* and *Majhi* to administer bleeding from nose, fresh cuts and wounds, burning sensation and skin diseases; but *Magar* used the plant to cure indigestion only. In some cases, two tribes were observed to use a plant for the same purpose totally different from that of the remaining one. *Ficus religiosa*, for instance, was used to cure gonorrhoea, toothache, gumache and skin diseases by *Gurung* and *Magar* whereas *Majhi* used the same plant to cure snakebites. Also, *Jatropha curcas* was used to cure rheumatism by *Gurung* and *Majhi*; but *Magar* used the plant to and syphilis, pneumonia, wounds and abortification. Most important of all differences was the use of same plant for different diseases/ailments: *Majhi* used *Mimosa pudica* to administer uric acid, asthma, fever, cough, and piles whereas *Magar* used it to administer uricacid, asthma, fever, cough, glandular swelling of childrens, kidney and urinary problem, and piles; and *Gurung* used the plant just to treat piles. Few plants like *Neopicrorhiza scrophulariiflora*, *Dactylorhiza hatagirea*, *Dioscorea deltoidea*, *Juglans regia*, *Acorus calamus*, *Bergenia ciliata* are used to treat various diseases by *Gurung* and *Magar* tribe whereas *Majhi* people donot have any idea about the use of such plants.

Tinospora sinensis, *Acampe papillosa*, *Asparagus racemosus* are the species used by *Magar* and *Majhi* tribes to cure diseases like Stomachache, urinary problems, to stimulate urination, kidney and liver troubles, sore throat, epilepsy, rheumatism, neuralgia, earache etc but *Gurung* tribe are not aware about the uses of these species. Living in the same community people have the cross cultural way of using the species whereas some are even completely unaware about the implication and identification of plant species.

Table 25 Cross-cultural patterns in the use of ethnomedicinal plants by the three ethnic communities of Parbat district

S.N	Scientific name	Local name	Gurung	Magar	Majhi
1	<i>Acacia catechu</i> (Mimosaceae)	<i>Khayar</i> (N, G, M, Ma)	Nose bleeding, skin eruptions and sore nipples	Swellings pain or injury, diarrhoea, dysentery, hemorrhoids, leucorrhoea, uterine hemorrhage, nose bleeding, skin eruptions and sore nipples	Swellings pain or injury, diarrhoea, dysentery, hemorrhoids, leucorrhoea and uterine hemorrhage
2	<i>Acampe papillosa</i> (Orchidaceae)	<i>Sungava phul</i> (N, M, Ma)		Rheumatism, backache, neuralgia, earache	Rheumatism, backache, neuralgia, earache
3	<i>Achyranthes aspera</i> (Amaranthaceae)	<i>Utekuro</i> (N), <i>Tine</i> , <i>Ulte paju</i> (G), <i>Jamjite</i> (M), <i>Bipyu kanda</i> , <i>Chorato</i> (Ma)	Piles, cuts and boils and skin diseases of childrens	Diarrhoea, dysentery and skin diseases of childrens	Diarrhoea, dysentery and skin diseases of childrens
4	<i>Acorus calamus</i> (Araceae)	<i>Bojho</i> (N, M, G)	Fever and sore throat	Fever and sore throat	
5	<i>Anthocephalus cadamba</i> (Rubiaceae)	<i>Kadam</i> (N, G, M, Ma)	Gargling during throat infection, diarrhoea and dysentery	Gargling during throat infection, decoction diarrhoea and dysentery	Wounds, as antipyretic and tonic
6	<i>Asparagus racemosus</i> (Asparagaceae)	<i>Kurilo</i> , <i>Satawari</i> (N), <i>Kurilo</i> (M), <i>Kurila</i> (Ma)		Post-pregnancy period of woman, worms in the stomach of animals, expelling the placenta of animals after delivery, kidney and liver troubles, sore throat, epilepsy and rheumatism	Worms in the stomach of animals, expelling the placenta of animals after delivery, kidney and liver troubles, sore throat, epilepsy and rheumatism
7	<i>Bauhinia vahlii</i> (Caesalpiniaceae)	<i>Bhorla</i> (N, M, Ma), <i>Malu, peli</i> (G)	Boils and dysentery	Diarrhoea and dysentery	Diarrhoea and dysentery
8	<i>Bergenia ciliata</i> (Saxifragaceae)	<i>Pakhanbed</i> (N), <i>Padambet</i> (G), <i>Silparo</i> (M)	Piles tumor, urinary trouble, kidney stone, heart disease, asthma and lungs problem	Piles tumor, urinary trouble, kidney stone, heart disease, asthma and lungs problem, cough and cold, post-partum women	
9	<i>Bombax ceiba</i> (Bombacaceae)	<i>Simal</i> (N, M, Ma), <i>Simaltun</i> (G)	Skin diseases	Diarrhoea, dysentery and tuberculosis, cuts and wounds	Diarrhoea, dysentery and tuberculosis
10	<i>Cannabis sativa</i> (Cannabaceae)	<i>Bhang</i> , <i>Gaanja</i> (N, G), <i>Bhangso</i> (M, Ma)	To stimulate sexual desire	Stimulate sexual desire	Cold cough (children), asthma, severe body pain and as an appetizer
11	<i>Cassia fistula</i>	<i>Rajbriksha</i> (N,	Hematuria	Gargling to relieve sore	Skin diseases, syphilis,

	(Caesalpiniaceae)	M, G, Ma)	(presence of blood in urine), diarrhoea and dysentery	throat, asthma, diabetes, eczema and abortification	gargling to relieve sore throat, asthma, diabetes, eczema, scorpion stings, snake bite and abortification
12	<i>Chonemorpha fragrans</i> (Apocynaceae)	<i>Gothala phul</i> , <i>Ghurilo</i> (N, M, Ma), <i>Ghibinduri</i> (G)	Ulcers, fever, constipation, to remove intestinal worms	Diabetes and jaundice	Wounds and skin diseases
13	<i>Chenopodium album</i> (Chenopodiaceae)	<i>Bethe</i> (N, G, Ma), <i>Bethe gan</i> (M)	Diarrhoea and dysentery	Urinary trouble	Urinary trouble
14	<i>Cynodon dactylon</i> (Poaceae)	<i>Dubo</i> (N, M, Ma), <i>No dubo</i> (G)	Bleeding from nose, cuts and wounds, burning sensation and skin diseases	Indigestion	Bleeding from nose, fresh cuts and wounds, burning sensation and skin diseases
15	<i>Dactylorhiza hatagirea</i> (Orchidaceae)	<i>Panchaunle</i> (N, M), <i>Lob</i> , <i>Panchaule</i> (G)	nerve tonic, bleeding, colic pain, urinary problems, seminal weakness, diabetes and hemiplegia	Aphrodisiac, nerve tonic, bleeding, colic pain, urinary problems, seminal weakness, diabetes and hemiplegia	
16	<i>Dioscorea deltoidea</i> (Dioscoreaceae)	<i>Kukur tarul</i> (N, G, M)	Constipation, leprosy, piles, fever and gonorrhoea, labour pain, rashes and itches	Constipation, leprosy, piles, fever and gonorrhoea, labour pain, rashes and itches	
17	<i>Daphne bholua</i> (Thymelaeaceae)	<i>Lokta</i> (N, Ma), <i>Setabaduwa</i> , <i>Syugu mhendo</i> (G), <i>Logoto</i> (M)	Fever and gastric disorder	Gastric disorder	Gastric disorder
18	<i>Eryngium foetidum</i> (Apiaceae)	<i>Bandhaniya</i> , <i>Brahmdhaniya</i> (N, M, G, Ma)	Earache, inflammation and burns	Infertility complication, earache, inflammation and burns	Infertility complication
19	<i>Eupatorium adenophorum</i> (Asteraceae)	<i>Banmara</i> (N, M), <i>Banmasa</i> (G), <i>Sano banmara</i> (Ma)	Cuts, wounds and boils	Cuts, wounds and boils	Fever
20	<i>Euphorbia hirta</i> (Euphorbiaceae)	<i>Dudhejhar</i> (N), <i>Dudhi jhar</i> (M), <i>Dudhe aainar</i> (Ma), <i>Chimphar jhar</i> (G)	Cough, fever, asthma and bronchitis	Infected ear and cuts and wounds	Cough, fever, asthma and bronchitis
21	<i>Euphorbia royleana</i> (Euphorbiaceae)	<i>Siundee</i> (N), <i>Syuri</i> (G), <i>Dha</i> , <i>Mete</i> (M), <i>Kanpate</i> (Ma)	Fever, mumps, pimples and cuts	Wounds	Wounds
22	<i>Ficus benghalensis</i> (Moraceae)	<i>Bar</i> (N, M, G, Ma)	Dysentery, diarrhoea and diabetes	Dysentery, diarrhoea and diabetes	Rheumatism, toothache and as poultice to treat abscesses
23	<i>Ficus religiosa</i> (Moraceae)	<i>Peepal</i> (N, Ma), <i>Pipal</i> (G, M)	Gonorrhoea, toothache, gumache and skin disease	Gonorrhoea, toothache, gumache and skin disease	Snakebite
24	<i>Ficus roxburghii</i> (Moraceae)	<i>Newaro</i> (N, M, Ma), <i>Mako</i> (G)	Cuts and wounds, cure diarrhoea and dysentery	Cuts and wounds, cure diarrhoea and dysentery	Cuts and wounds, cure diarrhoea and dysentery
25	<i>Girardinia</i>	<i>Allo</i> , <i>Chanle</i>	Ringworm,	Antipyretic, headache and	Constipation and

	<i>diversifolia</i> (Urticaceae)	<i>sisno</i> (N, Ma), <i>Ghyo</i> (M), <i>Naipolo, Puwa</i> (G)	eczema, antipyretic, headache and joint aches	joint aches	gastric disorders
26	<i>Jatropha curcas</i> (Euphorbiaceae)	<i>Sajiwan</i> (N), <i>Aren, Aril</i> (Ma), <i>Rajani giri</i> (G), <i>Ratyun</i> (M)	Rheumatism	Syphilis, pneumonia, wounds and abortification	Rheumatism and abortification
27	<i>Juglans regia</i> (Juglandaceae)	<i>Okhar</i> (N, M), <i>Akhor, Katu</i> (G)	Rheumatism	Sore throat and wounds	
28	<i>Justicia adhatoda</i> (Acanthaceae)	<i>Asuro</i> (N, G, M, Ma)	Fever, cough, asthma, bronchitis, malarial fever and joint pain	Fever, cough and asthma	Bronchitis, malarial fever and joint pain
29	<i>Melia azedarach</i> (Meliaceae)	<i>Bakaino</i> (N), <i>Bakainu</i> (G, M, Ma)	Headache and rheumatic pain	Leprosy and skin diseases	Leprosy and skin diseases
30	<i>Mentha spicata</i> (Lamiaceae)	<i>Pudina</i> (N), <i>Daunne</i> (M), <i>Bawari</i> (G)	Cysts on the tongue, blood pressure and inflammation of the body	Nausea, diarrhoea, dysentery, vomiting, cysts on the tongue, blood pressure and inflammation of the body	
31	<i>Mimosa pudica</i> (Mimosaceae)	<i>Lajawati jhar</i> (N, M, Ma), <i>Mhaira</i> (G)	Piles	Uric acid, asthma, fever, cough, glandular swelling of childrens, kidney and urinary problem to remove kidney stone and piles	Uric acid, asthma, fever, cough and piles
32	<i>Neopicrorhiza scrophulariiflora</i> (Scrophulariaceae)	<i>Kutaki</i> (N, M, G)	Fever, stomachache, dropsy, cough and cold	Fever, stomachache and dropsy, cough and cold, bile diseases, intestinal pain and blood pressure	
33	<i>Oroxylum indicum</i> (Bignoniaceae)	<i>Talelo</i> (N, Ma), <i>Krimtata</i> (G), <i>Tatal</i> (M)	Diarrhoea, jaundice and dysentery	Body pain, fever, burns and wounds	Diarrhoea, jaundice and dysentery
34	<i>Phyllanthus emblica</i> (Euphorbiaceae)	<i>Amala</i> (N), <i>Kyun, Titi</i> (G), <i>Aaunlesa,</i> <i>Ghwarbhet</i> (M), <i>Amala</i> (Ma)	Diarrhoea, dysentery, sore throat, jaundice cuts and wounds, constipation and bronchitis	Diarrhoea, dysentery, sore throat, jaundice, cuts and wounds, constipation and bronchitis	Cuts and wounds, constipation and bronchitis
35	<i>Pyrus pashia</i> (Rosaceae)	<i>Mayal</i> (N,G), <i>Mel</i> (M, Ma)	Diarrhoea and dysentery	Diarrhoea and dysentery	Diarrhoea and dysentery
36	<i>Rheum moorcroftianum</i> (Polygonaceae)	<i>Padamchaal</i> (N, M), <i>Kesa,</i> <i>Keje</i> (G)	Constipation and antiseptic,	Sinusitis, constipation, antiseptic, stomachache, expel intestinal worm and to stimulate blood circulation	
37	<i>Rhododendron arboreum</i> (Ericaceae)	<i>Lali gurans</i> (N, Ma), <i>Porota,</i> <i>Pota</i> (G), <i>Lalisar</i> (M)	Menstrual disorder and chewed if fish bone is stuck up in the oesophagus	Menstrual disorder and fish bone is stuck up in the oesophagus	Cough and cold, dysentery and diarrhoea
38	<i>Rubus ellipticus</i> (Rosaceae)	<i>Ainselu</i> (N), <i>Palan</i> (G), <i>Dhewasi, Juis</i> (M), <i>Melanchi</i> (Ma)	Fever, gastric trouble, diarrhoea and dysentery	Wounds and peptic ulcer	Wounds and peptic ulcer
39	<i>Shorea robusta</i> (Dipterocarpaceae)	<i>Sal or Agrath</i> (N, Ma), <i>Jhesin</i> (G), <i>Agras,</i>	Ulcer, wounds, diarrhoea and dysentery	Ulcer, wounds, diarrhoea and dysentery	Dislocated bones as plaster, gonorrhoea, dysentery (child)

		<i>Phoksin</i> (M)			
40	<i>Solanum nigrum</i> (Solanaceae)	<i>Behi</i> (N), <i>Ninaura</i> , <i>Petingan</i> (M), <i>Khursani jhar</i> , <i>Pinnendo</i> (G), <i>Kaligedi</i> (Ma)	Liver problem, fever and dysentery	Liver problem, fever and dysentery	Relieve pain
41	<i>Syzygium cumini</i> (Myrtaceae)	<i>Jamun</i> (N), <i>Jamuna</i> (G), <i>Jamunu</i> (M), <i>Phandil</i> (Ma)	Bronchitis and ulcer	Sore throat and asthma	Sore throat and asthma
42	<i>Tinospora sinensis</i> (Menispermaceae)	<i>Gurjo</i> (N, M), <i>Guruj</i> (Ma)		Stomachache, urinary problems and to stimulate urination	Dysentery, tonic and febrifuge
43	<i>Woodfordia fruticosa</i> (Lythraceae)	<i>Dhairo</i> (N), <i>Dhanyar</i> (G), <i>Dhainra</i> (M), <i>Dhauri</i> (Ma)	Swelling, fever and cysts on the tongue	Dysentery, diarrhoea, swelling, fever, and tongue cysts	Dysentery and diarrhoea
44	<i>Zanthoxylum armatum</i> (Rutaceae)	<i>Timur</i> (N, M, Ma), <i>Prumo</i> (G)	Fever, cholera and stomach disorder	Fever, cholera and stomach disorder	Toothache
45	<i>Zizyphus mauritiana</i> (Rhamnaceae)	<i>Bayer</i> (N, M), <i>Bahe</i> (G), <i>Boyar</i> (Ma)	Fever, dysentery, diarrhoea and menstrual disorders	Toothache, cough and cold	Backache

Significant differences were observed regarding F_{IC} value of the plants and corresponding diseases. In *Magar* community, cancer had the highest F_{IC} value of 0.98 which in *Gurung* community had 0.88 F_{IC} , and *Majhi* community had 0 F_{IC} . Likewise, in case of *Majhi* community, ophthalmological disorders had 1 F_{IC} value; the same had 0.50 and 0.63 F_{IC} value in *Magar* and *Gurung* community respectively. Another significant observation was unanimous acceptance of some plant species use for certain disease in a particular community. Among *Majhi*, blood and lymphatic system and ophthalmological problem had F_{IC} value of 1 (Table 26). Variations were also observed regarding the number of plant species used by three ethnic groups.

Table 26 Comparison of F_{IC} in three ethnic communities (*Gurung*, *Magar* and *Majhi*)

S.N	Disease categories	Gurung			Magar			Majhi		
		N_{ur}	N_t	F_{IC}	N_{ur}	N_t	F_{IC}	N_{ur}	N_t	F_{IC}
1	Gastro-intestinal, parasitic and hepatobiliary	523	167	0.68	827	253	0.69	233	111	0.52
2	Blood and lymphatic system	12	4	0.72	89	10	0.90	20	1	1
3	Cardiovascular diseases	79	9	0.90	125	23	0.82	175	5	0.98
4	Hormonal disorders	17	5	0.75	29	11	0.64	12	3	0.90
5	Other (fever, headache, cough and cold)	298	88	0.70	479	137	0.71	220	44	0.80
6	Urogenital and venereal	102	27	0.74	277	50	0.82	53	16	0.71
7	Oral, dental and ENT	97	24	0.77	218	68	0.70	81	26	0.79
8	External injuries and bleeding	109	42	0.62	157	51	0.68	55	27	0.51
9	Pulmonary diseases	72	21	0.71	91	45	0.51	32	21	0.36
10	Antidote	25	3	0.91	52	16	0.70	39	17	0.58
11	Dermatological and cosmetics	180	77	0.58	179	114	0.37	97	44	0.56
12	Musculoskeletal and nervous system	157	53	0.67	313	106	0.67	54	42	0.22
13	Ophthalmological problems	12	5	0.63	13	7	0.50	3	1	1
14	Cancer	9	2	0.88	148	4	0.98	----	----	----
15	Gynaecological disorders	103	10	0.91	172	28	0.84	37	6	0.87
16	Pediatric diseases	99	2	0.99	57	11	0.82	54	7	0.89
17	Evil spirit and religious beliefs	24	20	0.17	37	29	0.22	26	18	0.32

6.12 Veterinary medicines and insecticides

The three ethnic communities used 33 plant species from different families as veterinary medicine to treat 15 different types of diseases/ailments (Table 27). Likewise, 4 plant species were recorded for the treatment of different insect bites and 3 species were used as insecticides. It has been noted that leaves, stems, and fruits were the most frequently used parts. In many cases the whole plant parts were also used for the treatment of various veterinary ailments. The most common ailments in which plant parts were used included foot and mouth disease, food poisoning, ring worm, bone fracture, stomach disorder, conjunctivitis, muscular soiling and diarrhoea. The use of veterinary medicine indicates that the plant species in this area can be good source for pharmacological study. As Martinez and Lujan (2011) emphasized, ethnomedicine and ethnopharmacology in many developing countries for veterinary often provide the most cost-effective methods of obtaining effective remedies and adequate health coverage.

Table 27 Veterinary uses of medicinal plants

S.N	Scientific Name	Administration	Disease Treated
1	<i>Abrus precatorius</i>	Oral	Constipation
2	<i>Acorus calamus</i>	External	Remove lice
3	<i>Anemone rivularis</i>	Oral	Poisoning
4	<i>Anemone vitifolia</i>	Oral	Poisoning
5	<i>Arisaema tortuosum</i>	Oral, dermal	Colic, Stomach disorders, Worms
6	<i>Asparagus racemosus</i>	Oral	Delivery, Stomach disorders, Worms
7	<i>Boehmeria macrophylla</i>	Oral	Poisoning, Stomach disorders
8	<i>Boehmeria platyphylla</i>	Dermal, Oral	Cuts and wounds, Injury, Stomach disorders, Urinary problems
9	<i>Boenninghausenia albiflora</i>	External, Oral	Remove lice, Worms
10	<i>Cleistocalyx operculatus</i>	External	Injury, Swelling
11	<i>Cuscuta reflexa</i>	External, Internal	Foot and mouth
12	<i>Delphinium altissimum</i>	Dermal	Worms
13	<i>Dendrocalamus hamiltonii</i>	Oral	Delivery
14	<i>Dioscorea esculanta</i>	External, Oral	Remove lice, Worms
15	<i>Drepanostachyum falcatum</i>	External	Bone fracture
16	<i>Erythrina stricta</i>	Dermal	Skin diseases
17	<i>Eulaliopsis binata</i>	External	Cuts and wounds, Injury
18	<i>Fraxinus floribunda</i>	External, Oral	Bone fracture, Poisoning
19	<i>Juglans regia</i>	External	Remove lice
20	<i>Juncus concinnus</i>	Oral	Poisoning
21	<i>Lindera neesiana</i>	Oral	Stomach disorders
22	<i>Litsea cubeba</i>	Oral	Stomach disorders
23	<i>Melia azedarach</i>	External	Remove lice
24	<i>Osbeckia stellata</i>	Oral	Poisoning
25	<i>Paris polyphylla</i>	Oral	Poisoning
26	<i>Phyllanthus parvifolius</i>	External	Remove lice
27	<i>Pogostemon benghalensis</i>	Oral	Stomach disorders
28	<i>Rhus javanica</i>	External, Internal	Foot and mouth
29	<i>Rumex nepalensis</i>	Oral	Poisoning
30	<i>Salvia plebeia</i>	External	Remove lice
31	<i>Sapium insigne</i>	Dermal, Oral	Cuts and wounds, Injury, Stomach disorders
32	<i>Schima wallichii</i>	Dermal, Oral	Cuts and wounds, Liver fluke
33	<i>Thunia alba</i>	External	Bone fracture

6.13 Fish stupefying

A wide prevalence of ethnobotanical plants to stupefy fish was observed among the ethnic communities in the studied area. A total of 27 plant species belonging to 23 genera and 17 families

were identified and used in different ways. This observation suggested that the ethnic people practiced this tradition with the belief of the plant species' effectiveness to stupefy. But, in the case of *Majhi*, who rely on fising for their living, were not found to use the plants for stupefy while fishing in the running rivers. Similar observations were made in previous studies carried out in different location (Manandhar, 2002; Joshi & Joshi, 2005). The list of plant species used for fish poisoning is presented below:

Agave americana, *Agave sisalana*, *Ageratum conyzoides*, *Anemone vitifolia*, *Asystasia macrocarpa*, *Buddleja asiatica*, *Chenopodium ambrosioides*, *Daphne bholua*, *Dioscorea deltoidea*, *Dioscorea esculanta*, *Engelhardia spicata*, *Eupatorium odoratum*, *Euphorbia royleana*, *Euphorbia thymifolia*, *Gnaphalium luteo-album*, *Hypericum uralum*, *Juglans regia*, *Lindera neesiana*, *Litsea cubeba*, *Lyonia ovalifolia*, *Maesa chisia*, *Piper chaba*, *Piper longum*, *Sapium insigne*, *Schima wallichii*, *Spilanthes paniculata*, *Zanthoxylum armatum*

Plant species used in fish poisoning

6.14 Wild edible plants

Plants contribute to a larger part of edibles used by human beings. Specially, in the case of aboriginal people, the plants are used without examining the potential hazards to their health. Any wild plant needs to be identified in terms of safety before it is used as edible. In the present study, high diversity of wild edible plants was recorded consisting 159 species from 64 families under 115 genera in which 75 species of plants' fruits were consumed. Among them, different parts of 66 species were used as vegetables; 53 species of plants were used to make pickles, and 20 species were utilized to produce alcoholic beverages. The list of some important plant species used as edible is given below:

Asparagus racemosus, *Bauhinia purpurea*, *Bauhinia variegata*, *Begonia picta*, *Berberis aristata*, *Boehmeria rugulosa*, *Bombax ceiba*, *Castanopsis indica*, *Choerospondias axillaris*, *Cleistocalyx operculatus*, *Colocasia esculenta*, *Dendrocalamus hamiltonii*, *Diploknema butyracea*, *Dioscorea alata*, *Dioscorea deltoidea*, *Dioscorea bulbifera*, *Diospyros lancifolia*, *Ficus auriculata*, *Ficus glaberrima*, *Ficus lacor*, *Ficus roxburghii*, *Ficus semicordata*, *Ficus subincisa*, *Lindera neesiana*, *Litsea monopetala*, *Mahonia napaulensis*, *Morus australis*, *Nephrolepis auriculata*, *Pandanus nepalensis*, *Phyllanthus emblica*, *Piper longum*, *Prunus cerasoides*, *Pyrus pashia*, *Rorippa nasturtium-aquaticum*, *Rubus ellipticus*, *Saurauia napaulensis*, *Smilax aspera*, *Solena amplexicaulis*, *Syzygium cumini*, *Zanthoxylum armatum*, *Zizyphus mauritiana*

List of wild and cultivated edible plant species

6.15 Homegardens

Homegarden has proved very useful to avail healthy and organic food, and to save money. In the studied area, the ethnic people harvested plants for most essential needs like food, fodder, ornament, firewood, and fibers. The study revealed that 12 species were domesticated for bio-fencing. The cultivation of plants for their medicinal purpose was observed to be relatively less. The list of plant species observed in homegarden is given below:

Acampe papillosa, Aloe vera, Bauhinia variegata, Benincasa hispida, Dactylorhiza hatagirea, Duabanga grandiflora, Erythrina stricta, Euphorbia pulcherrima, Ficus roxburghii, Girardinia diversifolia, Iris clarkei, Nectanthes arbor-tristis, Salvia campanulata, Urtica dioica, Zizyphus mauritiana, Mentha spicata

List of some important plants grown in homegardens

6.16 Fodder yielding plants

The use of plant species as fodder, which is the agricultural foodstuffs for domestic animals, was found highly prevalent among the ethnic communities. During this study, 161 plant species were found to be used for fodder purposes. Most of the plants are abundant in wet season and scarce in dry season. It can be given to animals in the form of wet, dry, grain or tuber, or silage. Similar studies were carried out by Shrestha (1989) in Sindhupalchowk and Parajuli (2000) in Sankhuwasabha districts. Some important fodder yielding plants is given below:

Bauhinia vahlii, Bauhinia variegata, Boehmeria rugulosa, Cyperus cyperoides, Ficus auriculata, Ficus benghalensis, Ficus benjamina, Ficus glaberrima, Ficus hirta, Ficus hispida, Ficus lacor, Ficus neriifolia, Ficus religiosa, Ficus roxburghii, Ficus semicordata, Ficus subincisa, Herminium lanceum, Litsea monopetala, Rhus succedanea, Rubus nepalensis, Schima wallichii, Saurauia napaulensis

List of some important fodder yielding plants

6.17 Fiber yielding plants

The use of plants to yield fibers has been in practice because of their importance in a number of purposes. It was observed that different parts of the plants were used to obtain fibers. As per the information obtained during this study, 25 plant species were used to obtain fibers by the tribal people. Strong threads derived from the barks of *Boehmeria platyphylla* were used for making, fishnet, rope, bhangra, sacks and rough clothes. Similarly, coarse fiber extracted from the barks of *Girardinia diversifolia* is used to make threads, weaving ropes, porter's tumplines, mats, sacks, bags, coarse coats, fish nets and typical traditional clothing 'bhangra' (Gurung and Magar). The following plants were most frequently used to yield fiber:

Agave americana, Agave sisalana, Boehmeria rugulosa, Boehmeria macrophylla, Butea minor, Calotropis gigantea, Calotropis procera, Chonemorpha fragrans, Cissampelos pareira, Cissus repens, Cryptolepis buechananii, Curculigo crassifolia, Debregeasia longifolia, Debregeasia salicifolia, Engelhardia spicata, Girardinia diversifolia, Ficus glaberrima, Wikstroemia canescens Gossypium, herbacium, Urena lobata

Some important fiber yielding plants

6.18 Conservation practices/issues

Ethnomedicinal plants in Nepal are increasingly threatened due to variety of pressures. Moreover, effective and result oriented efforts for conservation have been put neither by the local inhabitants not by Nepal government. Consequently, a large number of medicinal plants are at the verge of

extinction. Almost all the traditional healers of the study area were observed to depend on the wild to collect medicinal plants. Most of the plant species (395) were principally harvested from the wild; the plant species were collected from nearby forest as per the needs. Only a very few species (6) were cultivated. It was observed that there was a strong forest law and restrictions were put to collect threatened and endangered plant species from natural habitat.

The existing pattern of fresh plant use was observed to be highly threatening. Because the local healers and medicinal persons prepared different modes of medicine from fresh plants, this would threaten plant species (Megersa *et al.*, 2013). The ethnic people added that most of the medicinal plants were under threat due to increasing anthropogenic influence on natural habitat of the plants. Most of the informants agreed that deforestation (89%); agricultural expansion (80%), charcoal and firewood (33%), and overgrazing (29%) were the major factors affecting medicinal plant wealth. The origins of conservation were rooted in a general concern to protect nature because of its intrinsic and aesthetic values. Therefore conservation is very important prospect for the protection of plant for their utmost needs and importance.

6.19 Socio-economic benefit of medicinal plants

Medicinal plants have socio-economic potential. The fact that plants have diversity in terms of their potential use such as oil bearing plants, oil-seed plants, gums and resins, fruit and nuts, vegetables and the medicinal (Prana & Ahirwar, 2015) have generated great demand of medicinal plants. A few studies have come up with the finding that medicinal plants were alternative to conventional medicine, especially in rural areas having poor access to health services (Andriamparany *et al.*, 2014).

Identifying the benefit and cost of conservation, and determining production systems for medicinal and aromatic plants (MAP) are believed to decide whether plant species conservation should take place in nature or the nursery or both (Schippmann *et al.*, 2005). In addition, cost benefit analysis is also required to evaluate whether and how logging of medicinally valuable species make short-term or long-term economic and socio-cultural sense (Shanley & Luz, 2003). Though such studies have not been carried out in Parbat, the plants of *in-situ* and *ex-situ* conservation area were observed to have great economic benefit for the local communities, public and private land owners. Selling medicinal plants in various forms (preparing tablets, pills, juice and powder) were reported to have benefitted the ethnic people.

6.20 Phytochemical Analysis

Wild edible plants contain protein, carbohydrate, starch, fat, vitamin, and mineral required for the

local residents to a greater extent (Sundriyal, 1999). Among the plants consumed in Nepal, some have been analyzed in terms of their nutritional constituents (Bhandari & Kawabata, 2004; Upreti & Shrestha, 2006; Gauchan *et al.*, 2008; Sharma *et al.*, 2009; Acharya & Acharya, 2010; Bhattarai *et al.*, 2009; Joshi & Siwakoti, 2012; Singh *et al.*, 2012; Shrestha, 2013; Uprety *et al.*, 2012; Thapa, 2014).

Many VDCs of Parbat district depend upon a variety of plants for their survival. Though the people are gradually involved in agriculture, the use of wild edible plants is still prominent. These plants are a good source of nutrients. The present analysis showed high nutritional values in different plant parts. Nutritional constituents of *Pyrus pashia*, *Prunus cerasoides*, *Morus australis*, *Rubus ellipticus*, *Zanthoxylum armatum*, *Castanopsis indica*, and *Diplokenma butyracea* showed somewhat similar value compared with the previous studies (Sundriyal, 1999; Abbasi *et al.*, 2014). The nutritive values of the plants of Parbat district are found in comparable range with the value of wild edible species from different parts of the Nepal (Bhandari *et al.*, 2003, Abbasi *et al.*, 2014; Bajracharya, 1980). In the present investigation, the proximate chemical analysis of important edible plants is observed to be highly nutritive which suggests that the wild edible species are good sources of various nutrients.

The richness of Nepal in biodiversity has long been recognized (Hara *et al.*, 1978; Caldecott *et al.*, 1994) showing its 10th rank in Asia and 31st in the world (Caldecott *et al.*, 1994; Biodiversity Profile Project, 1995). Of the 6,653 Angiosperms (Rokaya *et al.*, 2010), 534 Pteridophytes and 31 Gymnosperms (DPR, 2007), 1792-2331 plants are recorded to have medicinal values (Rokaya *et al.*, 2010). Nonetheless, examination of the medicinal plants through phytochemical screening is very limited (Karanjit *et al.*, 2007; Bhattarai *et al.*, 2008; Chhetri *et al.*, 2008; Prakash *et al.*, 2008; Rawal *et al.*, 2009; Adhikary *et al.*, 2011; Baral *et al.*, 2011; Karmacharya, 2011; Shrestha, 2011; Amatya & Pradhan, 2012; Baral *et al.*, 2012, Gyawali and Kim, 2012; Parajuli *et al.*, 2012; Rokaya *et al.*, 2012; Aryal *et al.*, 2014, Giri *et al.*, 2014; Srivastava *et al.*, 2014).

Compared with the phytochemical studies of *Swertia chirayita* (Wang *et al.*, 2003), *Zanthoxylum armatum* (Chhetri *et al.*, 2008), *Taxus wallichiana* (Nisar, 2007), *Rhodendron setosum* (Chhetri *et al.*, 2008), *Ipomoea carnea* (Sahayaraj & Ravi, 2008), *Vitex negundo* (Dhakal *et al.*, 2009), *Bergenia ciliata* (Adhikary *et al.*, 2011; Yadav & Agarwala, 2011), *Tinospora cordifolia* (Wani *et al.*, 2011), *Rauvolfia serpentina* (Bhatnagar *et al.*, 2013), *Centella asiatica* (Devkota & Jha, 2010; Haque *et al.*, 2012), *Litsea monopetala* (Islam *et al.*, 2012), *Rheum moorcroftianum* (Wani *et al.*, 2012), *Piper longum* (Anu *et al.*, 2013), Orchids (Johnson & Janakiraman, 2013), *Justicia adhatoda* (Godghate & Sawant, 2013), *Juglans regia* (Ganesh *et al.*, 2013), *Asparagus racemosus* (Ravishankar *et al.*, 2012; Thenmozhi *et al.*, 2013), *Ricinus communis* (Vandita *et al.*, 2013),

Justicia adhatoda (Giri *et al.*, 2014), *Ricinus communis*, *Tinospora cordifolia* (Devi & Bhasker, 2014; Mishra *et al.*, 2014), *Pogostemon glaber* (Naise & Bhadange, 2014) the values in this study resembled very much. This finding, however, differed from some other studies. Unlike the observation that found absence of tannin in *Justicia adhatoda* (Arora, 2013), presence of tannin and shikimic acid in *Michelia doltsopa* (Geetha *et al.*, 2011), presence of carbohydrate, flavonoids, tannin and alkaloids in *Acorus calamus* (Saxena & Saxena, 2012), presence of saponins, tannin, steroid and flavonoids in *Urtica dioica* (Maobe, 2013) and the absence of tannin, terpenoids, flavonoids and alkaloids in *Ricinus communis* (Rao *et al.*, 2013), the present study observed the opposite.

Available literature on antioxidant activities and reducing power of medicinal plants (Ayoola *et al.*, 2008; Sharma *et al.*, 2009; Itodo *et al.*, 2010; Peteros & Uy, 2010; Roersch, 2010; Damodar, 2011; Sutharsingh *et al.*, 2011; Haque *et al.*, 2012; Loganayagi *et al.*, 2012; Rana & Sutee, 2012; Gargouri *et al.*, 2013; Khan *et al.*, 2013; Okach *et al.*, 2013) have suggested potential use of plants for regenerative biological activities such as antiapoptosis, antiaging, anticancerous, antiinflammation, antiatherosclerosis, cardiovascular protection and inhibition of angiogenesis and cell proliferation. The present study observed maximum presence of carbohydrate and phenol, but moderate presence of flavonoids and steroid in *Abies spectabilis* suggesting good presence of antioxidant. DPPH test revealed that *Abies spectabilis* contained high percentage inhibition compared with the standard (Ascorbic Acid) showing comparable relation of antioxidants activity with phenolic compound. This result, however, failed to corroborate the results observed by Tote *et al.* (2009).

Other studies have analyzed *Centella asiatica* and observed very high IC₅₀ value (Rahman *et al.*, 2012; Desai *et al.*, 2013), and scrutinized *Coelogyne nervosa* and found cytotoxic with IC₅₀ 126 µg/ml (Shibu *et al.*, 2013). Some studies have examined *in vitro* antioxidant activity of extracts from methanolic leaves and barks of four *Litsea* species extensively and reported that the extracts showed significant antioxidant properties and thus could serve as free radical inhibitors, acting possibly as primary antioxidants (Choudhury *et al.*, 2013). An assessment of Fazal *et al.* (2011) for DPPH free radical scavenging activity in medicinal plants used for herbal formulation indicated that *Acorus calamus* yielded (69.8 %) and *Rauvolfia serpentina* yielded (61.8%). The present study observed much less values of these plants.

The value for flavonoid compound from *Spiranthes sinensis* observed in this study resembled the finding of Liang *et al.* (2014) who found the plant to be a good inhibitor of tyrosinase activity. An excellent presence of flavonoid compounds in *S. sinensis*, as observed in the present study, could be beneficial to protect the human body against oxidative damage, both internally and externally.

Assessment of antioxidant activities of ethyl acetate extract from *Urtica dioica* in the present study suggested slightly different value compared with quite recent study (Ghaima *et al.*, 2013). Significant antioxidant activity of the methanol extract of *U. dioica* comparable to standard antioxidant compounds like α -tocopherol, ascorbic acid and butylated hydroxyl anisole was also observed (Ghaima *et al.*, 2013). This activity may be due to significant presence of phenols and phenolics in *U. dioica*, as observed in this study.

The present study exhibited potent antioxidant activity of *Valeriana hardwickii* in comparison to that of ethanol, aqueous and petroleum ether extracts. This supports the finding of Sajad *et al.* (2014), who found that acetone and hexane extracts contain potent antioxidant activity. Total phenolic content in acetone extract was found to be 186 $\mu\text{g/ml}$ followed by hexane extracts having 175 $\mu\text{g/g}$ gallic acid equivalents. IC₅₀ value of acetone extract was found to be 15.60 $\mu\text{g/ml}$ followed by hexane extracts viz. 18.00 $\mu\text{g/ml}$ in DPPH radical scavenging assay (Sajad *et al.*, 2014).

Decrease in the absorbance of DPPH in the presence of antioxidants is correlated with the free radical scavenging potential of the antioxidant. The results indicated that the antioxidant activity of *Zanthomonas armatum* oil is lower than that of ascorbic acid. *Z. armatum* oil showed antioxidant activity with IC₅₀ value of 27.0 ± 0.1 $\mu\text{g/ml}$ while IC₅₀ value for ascorbic acid was 15.0 ± 0.5 $\mu\text{g/ml}$. The antioxidant effectiveness of the essential oil is probably due to a relatively high content of bornyl acetate, cymene, α -copaene, γ -terpinene, camphene, β -ocimene and linalool (Negi *et al.*, 2012, Kanwal *et al.*, 2015). Our results are in agreement with the above mentioned reports.

Phenolics and flavonoids are established to show antioxidant activity through their scavenging or chelating activity (Kessler *et al.*, 2003). The antioxidant activity, however, is not the sole property of phenolics; other compounds including vitamins C and E, carotenoids, and chlorophylls are also recognized to work in synergy with antioxidants (Rice-Evans *et al.*, 1995). Several other studies have reported a high correlation of phenolic content and antioxidant activity (Qusti *et al.*, 2010; Haque *et al.*, 2012). In the present analysis, *Piper longum*, *Camellia kissi*, *Benincasa hispida*, *Neolitsea pallens*, *Neopicrorhiza scrophulariiflora*, *Gaultheria fragrantissima*, *Ricinus communis*, *Taxus wallichiana*, *Valeriana jatamansii*, *Asparagus racemosus*, *Centella asiatica*, *Rubia manjith*, *Cuscuta reflexa*, *Nephrolepis auriculata*, *Abies spectabilis*, *Acampe papillosa*, *Zanthoxylum armatum*, *Acorus calamus*, *Swertia chirayita*, *Coelogyne corymbosa*, *Juglans regia*, *Sambucus adnata*, *Tinospora sinensis*, *Paris polyphylla*, *Bryophyllum pinnatum*, *Swertia angustifolia*, *Spiranthes sinensis*, *Zizyphus mauritiana*, *Dioscorea deltoidea*, *Zanthoxylum acanthopodium*, *Mahonia napaulensis*, *Mentha spicata*, *Indigofera bracteata*, *Litsea cubeba*, *Rauvolfia serpentina*,

and *Chlorophytum nepalense* showed higher antioxidant activity in correspondence with higher phenolic compounds. This relation indicated that high DPPH activity is related to the phenolic compounds in these plants.

6.21 Identification of new claims

The present research identified new claims related to four major areas: the different varieties of medicinal plants, cross-cultural use, medicinal uses, and phytochemical value of the plants in the studied area. Reported ethnobotanical plant species were compared with the previous research works of Thapa (2012) and Bhattarai *et al.* (2011).

The current study documented 401 ethnobotanical plant species belonging to 289 genera under 114 botanical families (Table 17, 18 and 19). This finding was significant when compared with the previous studies. Thapa had recorded the use of 75 species of medicinal plants belonging to 46 families and 72 genera whereas Bhattarai *et al.* (2013) had found 45 plants species belonging to 32 families under 44 genera. The present study identified the use of 359 new plant species among the ethnic tribes. A total of 60 plants in the fact sheet published by the Department of Plant Resources under the category of threatened medicinal and aromatic plants in Nepal, 24 plant species were found in the studied area (Table 32). Similarly, among 30 plants in the fact sheet, 23 species were found to be listed in the category of medicinal plants prioritized for research and development (Table 28), and 10 plants in the group of medicinal plants prioritized for agro-technology development were reported in the studied area (Table 29). Similarly, 12 plant species were found in the category of protected plants of Nepal (2 plants in the category of banned for the collection, transportation and trade; 4 plants in the category of banned for export outside the country without processing; 5 plants banned for felling, transportation and export; 1 plant banned for export without identification and certification (Table 30). Importantly, 8 plant species listed under the category of Nepalese flora under CITES appendices were discovered during this study (Table 31). This showed that Parbat district is affluent with vast floristic diversity of ethnobotanical plants.

The use of 397 medicinal plants for diseases/ailments treatment revealed 114 different types of ailment. Previously, 39 ailments (Thapa, 2012) and 24 ailments (Bhattarai *et al.*, 2013) were found. Of the 114 ailments reported in this study, 72 are new (see the box below). Notably, the use of *Kalanchoe spathulata* to treat cancer and tuberculosis, *Bergenia ciliata* and *Persicaria runcinata* to treat heart problems, *Elaeocarpus sphaericus* to cure mental disorders, *Aster diplostephioides* used for the remedy of paralysis, *Datura stramonium* to heal rabies, *Mimosa pudica* to treat uric acid, *Bauhinia variegata* used as tonic and blood purifier, *Terminalia chebula* to administer eye problem, *Glycyrrhiza glabra* to treat genito-urinary diseases and scorpion stings, *Eryngium foetidum* to cure infertility complication were not observed for such uses by the tribes in the previous studies.

New diseases: 72

Abortification, Abscesses, Anaemia, Aphrodisiac, Appetizer, Asthma, Bee stings, Beriberi, Bladder stones, Blood pressure, Blood purification, Body pain, Cancer, Chest pain, Chicken pox, Colic pain, Convulsion (epileptic seizure), Cracks, Earache, Eczema, Epilepsy, Flatulence, Gonorrhoea, Gout, Gynaecological problems, Heart problems, Hemiplegia, Hemorrhage, Hepatitis, Hypertension, Hysteria (psychological), Ill waist, Indigestion, Infertility complication, Inflammation, Influenza, Insect bites, Intestinal diseases, Intestinal ulcer, Itches, Kidney problems, Leprosy, Liver disorders, Lungs problems, Malaria, Measles, Mental disorders, Mouth and tongue problems, Muscular pain, Nasal congestion, Nausea, Nervous Imbalance, Neuralgia, Nose bleeding, Paralysis, Peptic ulcer, Piles, Pimple problems, Pneumonia, Pregnancy, Proliferation, Rabies, Respiratory problems, Ringworm, Scorpion sting, Seminal weakness, Snakebites, Sore nipples, Sore throat, Sprains, Swellings, Syphilis, Tonic (weakness and dizziness), Uric acid, Urinary problems, and Vomiting.

A comparative study of the plant species use among the three ethnic communities showed: a) the use of multiple plant species for the treatment of the same diseases/ailments: *Pyrus pashia* and *Bauhinia vahlii*, for instance, were used to cure diarrhoea; b) the use of a single plant for different purpose: *Cassia fistula*, for example, was used to cure hematuria, diarrhoea and dysentery (*Gurung*), asthma, diabetes, eczema, abortification and gargling (*Magar*), skin disease, syphilis, sore throat, asthma, diabetes, eczema, abortification, scorpion stings and snake bites (*Majhi*); c) the use of the same plant for different diseases/ailments: *Mimosa pudica*, for instance, to administer uric acid, asthma, fever, cough, and piles (*Majhi*), uric acid, asthma, fever, cough, glandular swelling of children, kidney and urinary problem, and piles (*Magar*) and to treat piles (*Gurung*).

Proximate analysis of 40 wild edible species and phytochemical screening of 61 medicinal plants were determined. The plant species showed different level of presence of moisture, crude fiber, fat, starch, carbohydrate and protein. *Dioscorea alata* contained highest moisture (92.01 ± 2.9); *Nephrolepis auriculata* showed highest crude fiber content (19.5 ± 2.1); *Diplomenma butyracea* indicated highest fat percentage (7.2 ± 0.2); *Dioscorea alata* had highest starch content (11.25 ± 1.9); and carbohydrate content (22.35 ± 2.1); and *Ficus semicordata* had highest protein content (14.35 ± 1.7). The values of flavonoids, protein, carbohydrates, alkaloids, phenol, steroids, saponins, glycosides, steroid and terpenoids were determined. Flavonoids was found in sixteen plants, alkaloids in thirty one plants, phenolic contents in fifty three plants, saponin in forty three plants, and steroid in forty eight plants and glycosides in twenty six plants. Similarly, sixteen plants showed positive indication in Ninhydrin test, thirty three in Benedict's test, twenty seven in Salkowsakis test, seventeen in Shinoda test, and twenty eight in terpenoids test.

Table 28 Medicinal plants prioritized for research and development

S.N.	Scientific Name	Family	Nepali Name
1.	<i>Acorus calamus</i> L.	Araceae	Bojho
2.	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Satawari
3.	<i>Azadirachta indica</i> A. Juss	Meliaceae	Neem
4.	<i>Bergenia ciliata</i> (Haw.) Sternb.	Saxifragaceae	Pakhanbed
5.	<i>Cinnamomum tamala</i> (Buch-Ham.) Nees & Eberm.	Lauraceae	Tejpat
6.	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Orchidaceae	Panchaunle
7.	<i>Dioscorea deltoidea</i> Wall. ex Griseb	Dioscoreaceae	Bhayaakur
8.	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Dhansingare
9.	<i>Juglans regia</i> L.	Juglandaceae	Okhar
10.	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Scrophulariaceae	Kutaki
11.	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Amala
12.	<i>Piper longum</i> L.	Piperaceae	Pipla
13.	<i>Podophyllum hexandrum</i> Royle	Berberidaceae	Laghupatra
14.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Sarpagandhaa
15.	<i>Rheum australe</i> D. Don	Polygonaceae	Padamchaal
16.	<i>Rheum moorcroftianum</i> Royle	Polygonaceae	Padamchaal
17.	<i>Rubia manjith</i> Roxb.ex Flem.	Rubiaceae	Majitho
18.	<i>Sapindus mukorossi</i> Gaertn.	Sapindaceae	Reetha
19.	<i>Swertia chirayita</i> (Roxb.ex Fleming) Karsten	Gentianaceae	Chiraito
20.	<i>Taxus wallichiana</i> (Zucc.)	Taxaceae	Lothsalla
21.	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Gurjo
22.	<i>Valeriana jatamansii</i> Jones	Valerianaceae	Sugandhawal
23.	<i>Zanthoxylum armatum</i> DC.	Rutaceae	Timur

Table 29 Medicinal plants prioritized for agro-technology development

S.N.	Scientific Name	Family	Nepali Name
1.	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Satawari
2.	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Orchidaceae	Panchaunle
3.	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Scrophulariaceae	Kutaki
4.	<i>Piper longum</i> L.	Piperaceae	Pipla
5.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Sarpagandhaa
6.	<i>Swertia chirayita</i> (Roxb. ex Fleming) Karsten	Gentianaceae	Chiraito
7.	<i>Taxus wallichiana</i> (Zucc.)	Taxaceae	Lothsalla
8.	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Gurjo
9.	<i>Valeriana jatamansii</i> Jones	Valerianaceae	Sugandhawal
10.	<i>Zanthoxylum armatum</i> DC.	Rutaceae	Timur

Table 30 Protected Plants of Nepal

I. Banned for the collection, Transportation and Trade

S.N.	Scientific Name	Family	Nepali Name
1.	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Orchidaceae	Panchaunle
2.	<i>Juglans regia</i> L.	Juglandaceae	Okhar

II. Banned for export outside the country without processing (not applicable for cultivated products)

3.	<i>Abies spectabilis</i> (D. Don) Mirb.	Pinaceae	Bungasalla
4.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Sarpagandhaa
5.	<i>Taxus wallichiana</i> (Zucc.)	Taxaceae	Lothsalla
6.	<i>Valeriana jatamansii</i> Jones	Valerianaceae	Sugandhawal

III. Banned for felling, transportation and export

7.	<i>Acacia catechu</i> (L. f.) Willd.	Mimosaceae	Khayar
8.	<i>Bombax ceiba</i> L.	Bombacaceae	Simal
9.	<i>Juglans regia</i> L.	Juglandaceae	Okhar
10.	<i>Michelia champaca</i> L.	Magnoliaceae	Champ
11.	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Sal

IV. Banned for Export without identification & certification

1.	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Scrophulariaceae	Kutaki
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Table 31 Nepalese flora under CITES appendices

S.N.	Plants Species	Family	Nepali Name	Appendix
1.	<i>Ceropegia pubescens</i> Wall.	Asclepiadaceae	Ban semi	II
2.	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	Dioscoreaceae	Bhayaakur	II
3.	<i>Meconopsis regia</i> G. Taylor	Papaveraceae	Kesar	III
4.	Orchidaceae (Orchids)	Orchidaceae	Sungava, Sunakhari	II
5.	<i>Podocarpus neriifolius</i> D. Don	Podocarpaceae	Gunsee	III
6.	<i>Podophyllum hexandrum</i> Royle	Berberidaceae	Laghupatra	II
7.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Sarpagandhaa	II
8.	<i>Taxus wallichiana</i> (Zucc.)	Taxaceae	Lothsalla	II

Table 32 Threatened medicinal and aromatic plants in Nepal

S.N.	Plant Species	Family	Nepali Name	Threat Category	
				CAMP	IUCN
1.	<i>Acacia catechu</i> (L.f.) Willd.	Leguminosea	Khayar	-----	T
2.	<i>Allium hypsistum</i> Stearn	Alliaceae	Jimbu	V	-----
3.	<i>Arisaema costatum</i> (Wall.) Mart. ex Schott	Araceae	Banko	-----	-----
4.	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Satawari	V	-----
5.	<i>Bergenia ciliata</i> (Haw.) Sternb.	Saxifragaceae	Pakhanbed	-----	T
6.	<i>Corydalis megacalyx</i> Ludlow.	Papavaraceae	Bhutkesh	EN	-----
7.	<i>Crateva unilocularis</i> Buch.-Ham	Capparaceae	Sipleegaan	EN	R
8.	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Orchidaceae	Panchaunle	EN	-----
9.	<i>Dioscorea deltoidea</i> Wall. ex Griseb	Dioscoreaceae	Bhayaakur	EN	T
10.	<i>Elaeocarpus sphaericus</i> (Gaertn.) K. Schum.	Elaeocarpaceae	Rudraksha	-----	V
11.	<i>Michelia champaca</i> L.	Magnoliaceae	Champ	CR	EN
12.	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Scrophulariaceae	Kutaki	V	-----
13.	<i>Oroxylum indicum</i> (L.) Kurz.	Bigoniaceae	Talelo	EN	-----
14.	<i>Paris polyphylla</i> Sm.	Liliaceae	Satuwa	V	V
15.	<i>Piper longum</i> L.	Piperaceae	Pipla	V	-----
16.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz.	Apocynaceae	Sarpagandhaa	CR	EN
17.	<i>Rheum australe</i> D. Don	Polygonaceae	Padamchaal	V	V
18.	<i>Rheum moorcroftianum</i> Royle	Polygonaceae	Padamchaal	NT	-----
19.	<i>Rubia manjith</i> Roxb. ex Flem.	Rubiaceae	Majitho	V	-----
20.	<i>Swertia angustifolia</i> Buch.-Ham. ex D. Don.	Gentianaceae	Chiraito	EN	-----
21.	<i>Swertia chirayita</i> (Roxb. ex Fleming) Karsten	Gentianaceae	Chiraito	V	V
22.	<i>Taxus wallichiana</i> (Zucc.)	Taxaceae	Lothsalla	EN	-----
23.	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Gurjo	V	-----
24.	<i>Valeriana jatamansii</i> Jones.	Valerianaceae	Sugandhawal	V	-----

CR= Critically endangered, DD = Data deficient, EN =Endangered, K= Insufficiently known, NT= Nearly threatened, V= Vulnerable, R= Rare, T = Threatened, CAMP = Conservation Assament and Management Planing, IUCN= International Union for Conservation of Nature

CHAPTER 7

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The present research was set out to explore various aspects of ethnobotany in Parbat district of Nepal. The focus was on floristic composition, vegetation analysis, phytochemical analysis, ethnomedicinal uses, ethnodomestication, plant utilities for different purposes, cross-cultural pattern of uses, informants consensus factors (F_{IC}) and fidelity level (FL) value of plant species. The study also examined superior/identical nutritional status of the plant species in terms of carbohydrate, starch, protein, fat and fiber contents. The findings contribute to the database of traditional indigenous knowledge of the plants in Parbat district. In particular, the information documented in this study may serve as baseline data for future studies on nutritional values and possible side effect, and to identify plants that can improve nutrition and increase dietary diversity in the study areas.

The district is observed to be rich in plant species used for a wide range of purposes. The use of ethnobotanical plants by the three ethnic communities means that the district substantially provides medicinal plants for traditional healing practice. Among the 401 reported plant species, 397 species are used to cure both human and veterinary diseases, 27 species for fish poisoning, and 33 species to cure 15 different types of veterinary diseases. Similarly, 24 plant species are reported to have specific antidotes to treat snake bites, scorpion stings, bee stings, insect bites and rabies.

In addition, the plants are found to have good food value. The available wild edible plant species play a significant role in the food and nutrient security of the ethnic communities of Parbat. The use of these plants as a major source of food is bound to increase when the stock of cultivated crops dwindles. These plants form a good source of protein, fat, vitamins, sugars, and minerals, and interestingly they are available in different months/seasons of the year. It can be concluded that the selected plants can contribute significantly to the nutrient requirements of the community and as a supplement to other major sources.

The plants also provide ecological security as they are disease resistance, grow in diverse climatic and habitat conditions, and ensure sufficient production despite adverse conditions. Studied wild plants can be incorporated in commercial crop plants and this might improve the economic condition of ethnic community. This might be strong motive for local people to conserve wild fruit

species and encourage their domestication as dryland agro-biodiversity and agroforestry; live fence and in area closure of pasture areas. It needs to be emphasized that it is necessary to investigate further into nutritional profiles, processing methods, cultivation techniques, conservational studies and pharmacological properties of the reported plant species. Such study can contribute to educate the ethnic people about their importance and improve food scarcity status. It suggests that the ethnic communities rely highly on the plant species not only for medicinal purpose but also for other purposes.

The ethnic people's understanding and the use of medicinal plants are found to ground on traditional beliefs. Knowledge transfer practice among the ethnic communities is reported to be received from parents and grandparents orally. Along with the family bound transfer of tradition, gender issue is reported to play significant role in the selection of successor, *i.e.*, male members are chosen to transfer their knowledge. The finding from cross-cultural study implies for stronger efficacy of certain taxa. Hence, the most urgent need is to record and institutionalize the indigenous knowledge in different ethnic communities on plant in the form of digitalization database before its extinction.

The medicinal plants are found to be put on use to treat 114 different types of diseases/ailments, categorized into 17 different illness groups. The use of multiple plants for a single ailment or a single plant species for multiple uses is observed. The highest numbers of species (98) are reported to administer in fever; and single species *Calotropis gigantea* is used to treat 16 diseases. Regarding the plant parts, leaves, roots/rhizomes/tubers, stems/barks/woods, fruits, whole plants, seeds, flowers, resins, corms, gums, inflorescences, needles and pods are reported to be the most commonly used plant parts. These parts are noted to be used in a variety of ways for remedy preparation: juice, paste decoction, powder, and infusion. These modes are prepared using hot and cold water as the solvent; but occasionally, other additives like milk, honey, oil and ghee are added. Various routes of administration are reported, very frequent of which are oral, external and topical/dermal/cosmetics, and nasal; the least being internal. The plants are used for various purposes such as medicinal purpose, fodder, human consumption, ornamental and ceremony, furniture, manure, fuelwood, fibers, fishpoisoning, fibers, musical and sports instruments, alcoholic beverages, art and artifacts, cosmetics, biofencing, dyes, soaps, incense, oil extraction, agricultural tools, bio-briquette, traditional ink, charcoal, insecticide. It is common among the healers to prescribe approximate and non-uniform allowing the patients to understand in their own sense. The dosages are observed to depend on disease types, duration of infection, and treatment method.

Other considerations are also taken into account: age groups, sex, and physical appearance of the patients.

A number of ethnomedicinal plants are observed to have absolute consensus among the three ethnic groups. Cancer had the greatest agreement with F_{IC} of 0.98, followed by cardiovascular (0.93), pediatric diseases (0.92), and gynaecological disorders (0.90) which shows the higher degree of agreement of the informant's knowledge about each category of ailments. *Centella asiatica*, used for Musculoskeletal and nervous system; *Crateva unilocularis*, used for cardiovascular disease; *Dactylorhiza hatagirea*, used for urinogenital and venereal ailments; *Swertia chirayita* used for cardiovascular diseases are found to have 100% fidelity. Other plants with more than 96% FL value include *Glycyrrhiza glabra* for urinogenital and venereal ailments, *Juglans regia* for musculoskeletal and nervous system, *Paris polyphylla* for gastro-intestinal, parasitic and hepatobiliary and *Taxus wallichiana* used for cancer respectively. Such a higher value suggests that the traditional knowledge is still effective.

The result pointed out the fact that wild edible species are significantly important in the life of ethnic people in Parbat district. Though the people have been using the edibles without having appropriate knowledge about nutritional composition of what they eat, the edible were found to have high value. The plants having rich nutritional status of carbohydrate, protein, starch, fat and fiber contents are *Morus australis*, *Dioscorea alata*, *Diplokenma butyracea*, *Nephrolepis auriculata*. It can be concluded that wild edible fruits have scope for their use as an alternative source of bio-nutrition. The potential outlined by the finding necessitates study of other edible species so as to identify promising species for inclusion in agro and farm-forestry, and reforestation programme which have so far focused only on timber species. Plantation of wild edible plants will ultimately improve food base for humans.

Phytochemical screening of methanolic extracts revealed the presence phenol, tannins, terpenoids, saponins, steroids, alkaloids. Results indicated that a number of plants are rich in phenolics and thus exhibited highest antioxidant and reducing activities. Total phenolic content had positive correlation with antioxidant capacity. It was observed that the leaf extract contain high level of phenolic content. The finding of this study suggests that plant leaves could be a potential source of natural antioxidant that can work as therapeutic agents in preventing or slowing down the progress of ageing and age associated oxidative stress related degenerative diseases. The results of preliminary qualitative phytochemical study showed the presence of flavonoids, protein and amino acids, carbohydrate, alkaloids, phenol, saponins, glycosides, steroid and terpenoids. Because, the plants have substantive phytochemical value, these plants can be potential source of new useful

drugs. Further research on anti-nutrients and antioxidants of wild species would be useful in selecting nutritious fruits from wild resources, analyzing phytochemical characterization of the extracts, and identifying bioactive compounds.

What is observed from the screening of phytochemical and antioxidant properties of 61 different plants is promising. First, the finding lends support to the folkloric uses of medicinal plant in traditional medicine. Second, it presents a strong case for some plants as a source of potential antioxidant which can be used in the treatment of various ailments. The methanolic extracts carry a number of compounds like flavonoids and triterpenes means that they are responsible for marked free radical scavenging potential. This could prove beneficial for future if the extracts are to be evaluated for analgesic activity. The scope for isolation of desired compound can be an advantageous step in field of drug discovery from natural sources. The abundance of secondary metabolites found in the studied plants suggest that they can contribute to a number of antioxidant purposes like antidiuretic, anti-inflammatory, antianalgesic, anticancer, anti-viral, anti-malarial, anti-bacterial and anti-fungal activities. They can be used in preventing or slowing the progress of ageing and age associated oxidative stress related degenerative diseases. The phytochemical properties identified by this study might be helpful in coping with different diseases in this region. Importantly, the analysis is also important for pharmaceuticals companies to formulate the new drugs.

The area is observed to have poor cultivation of valuable medicinal plants, and the ethnic groups collect the plants from the wild. In addition, as there is no practice of permanent storage, the villagers still maintain the practice of collecting fresh plants and using as per their requirements. This situation is highly likely to cause depletion of medicinal plant or even result into extinction from natural habitat. To preserve the plants, it is essential to establish medicinal gardens for *ex-situ* conservation by mobilizing the local ethnic people. Similarly, *in-situ* conservation will help highly usable and depleting species by propagating, and reintroducing them.

7.2 RECOMMENDATIONS

- The observation that certain taxa have higher value points to an urgent need is to record and institutionalize the indigenous knowledge in digital database. The pattern of ethnobotanical study can be further extended by taking into consideration a comparative study of the plant-uses existing among a specific group of ethnic community residing in different parts of the country.

- An appropriate conservation planning is essential to preserve the medicinal and aromatic plants in Parbat district. There is also a need to start research leading to the genetic improvement and manipulation through plant breeding, genetic engineering, and tissue culture on various wild edible species. Moreover, developing a best growth stage versus harvest calendar will help obtain the highest nutrient content available for different species as the nutritional quality of the edible parts of any species changes at different growth stages.
- To preserve the plants in natural habitat, it is essential to establish medicinal/herbal gardens for *ex-situ* and *in-situ* conservation by mobilizing the local ethnic people. Such establishments will help highly usable and depleting species by propagating, reintroducing, regularly monitoring and evaluating processes. Identifying the benefit and cost of conservation, and determining production systems for medicinal and aromatic plants (MAP) can help to decide whether plant species conservation should take place in nature or the nursery or both.
- Applications of the selected target plant as food supplement for human health care need to be evaluated; meantime, clinical trial, animal trial and ultimately human trial is essentially needed to commercialize various functional food and other herbal products.
- The preferred wild edible plants at community level should be given proper attention in the light of agrobiodiversity and agroforestry by complementing local knowledge and modern practices. If properly mobilized, this can enormously contribute to the ecological balance and economic resilience of people. It is, therefore, necessary to use the documented, nutritional, toxicity analysis of wild edible plants. Policy enhancement is recommended to properly utilize and manage the existing potential of wild edible plants.
- Reported medicinal plants need to be analyzed and investigated by fractionation of the extracts and then analysed for active compounds responsible for antioxidant, anti-alzheimer and antidiabetic, anticancerous. Experimental validation of these remedies may help in developing new drugs. This will be a great contribution for pharmaceutical and herbal industries in Nepal. It will also be worthwhile to study the anti-nutritional factors and toxicity of different edible plant parts. It will greatly enhance the existing knowledge about the nutritional values. Study about the lower group of plants which is not included in this study can further be researched as it also contains various medicinal properties.

- Based on the nutrition value observed in the plant species, food package for school children between 6-14 years can be prepared. The package of 100 g containing 15% protein, 25% fat, and 35% carbohydrate with 400 Kilocalories will help the children in the remote areas and places at higher altitude like Parbat to save from malnutrition. The consumption of these plants will help to meet the nutritional requirement of the children.
- The medicinal plants can be tracked through the establishment of barcoding database using plant DNA barcoding techniques; it will help to identify the specific medicinal plants and understand the ecology, evolution and conservation of the potent indigenous and endemic medicinally significant plants.

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