

**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	:	Ethanollic
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: Dhami, 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) *Roscoea 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 binate*, (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