TRADITIONAL USE OF PLANT RESOURCES IN AATHBISKOT MUNICIPALITY, RUKUM WEST DISTRICT, WESTERN NEPAL

A dissertation submitted for the partial fulfillment of the requirements for the Master Degree in Botany

Submitted by

Khadka Bahadur Bhandari

Plant Systematics and Biodiversity Conservation Unit

Exam Roll No: Bot.711/075

TU Regd. No: 5-2-49-273-2014

Batch: 2075/77

Central Department of Botany

Tribhuvan University, Kirtipur, Kathmandu, Nepal

August, 2023

TRADITIONAL USE OF PLANT RESOURCES IN AATHBISKOT MUNICIPALITY, RUKUM WEST DISTRICT, WESTERN NEPAL

A dissertation submitted for the partial fulfillment of the requirements for the Master Degree in Botany

Submitted by

Khadka Bahadur Bhandari

Plant Systematics and Biodiversity Conservation Unit

Exam Roll No: Bot.711/075

TU Regd. No: 5-2-49-273-2014

Batch: 2075/77

Central Department of Botany

Tribhuvan University, Kirtipur, Kathmandu, Nepal

August, 2023

TRIBHUVAN UNIVERSITY
INSTITUTE OF SCIENCE AND TECHNOLOGY
CENTRAL DEPARTMENT OF BOTANY

Ref. No.

KIRTIPUR, KATHMANDU
NEPAL

RECOMMENDATION

This is to certify that M.Sc. Dissertation work entitled "**TRADITIONAL USE OF PLANT RESOURCES IN AATHBISKOT MUNICIPALITY, RUKUM WEST DISTRICT, WESTERN NEPAL**" has been carried out by **Mr. Khadka Bahadur Bhandari** under our supervision. This work has been accomplished on the basis of the candidate's original research work based on self-collection. This work has not been submitted for any other academic degree. We recommend this dissertation work be accepted as a partial fulfillment of the requirements of the Master's Degree in Botany at the Institute of Science and Technology, Tribhuvan University.

.....

Supervisor

Sangeeta Rajbhandary, Ph. D

Professor

Central Department of Botany

Tribhuvan University

Kirtipur, Kathmandu, Nepal

.....

Co-supervisor

Yadav Uprety, Ph. D

Associate Professor

Central Department of Botany

Tribhuvan University

Kirtipur, Kathmandu, Nepal

Date: 27 July 2023

Phone: 4331322, 4333722 Fax: ++977-1-4332636, Post Box: 26429
E-mail: info@cdbtu.edu.np, Webpage: www.cdbtu.edu.np

TRIBHUVAN UNIVERSITY
INSTITUTE OF SCIENCE AND TECHNOLOGY
CENTRAL DEPARTMENT OF BOTANY

Ref. No.

KIRTIPUR, KATHMANDU
NEPAL

LETTER OF APPROVAL

The M.Sc. Dissertation entitled **"TRADITIONAL USE OF PLANT RESOURCES IN AATHBISKOT MUNICIPALITY, RUKUM WEST DISTRICT, WESTERN NEPAL"** submitted by **Mr. Khadka Bahadur Bhandari** has been accepted for the partial fulfillment of his Master's Degree in Botany (Plant Systematics and Biodiversity Conservation Unit).

Examination Committee

.....

Supervisor
Sangeeta Rajbhandary, Ph. D
Professor
Central Department of Botany
Tribhuvan University
Kirtipur, Kathmandu, Nepal

.....

Co-supervisor
Yadav Uprety, Ph. D
Associate Professor
Central Department of Botany
Tribhuvan University
Kirtipur, Kathmandu, Nepal

.....

(Internal Examiner)
Deepak Raj Pant, Ph. D
Associate Professor
Central Department of Botany
Tribhuvan University
Kirtipur, Kathmandu, Nepal

.....

(External Examiner)
Sudha Joshi, Ph. D
Associate Professor
Patan Multiple Campus Patan Dhoka
Lalitpur Nepal

.....

Head of Department
Sangeeta Rajbhandary, Ph. D
Professor
Central Department of Botany
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Date: 14th August, 2023

Phone: 4331322, 4333722 Fax: ++977-1-4332636, Post Box: 26429
E-mail: info@cdbtu.edu.np, Webpage: www.cdbtu.edu.np

DECLARATION

I hereby affirm that I am the author of this work and attest that this dissertation is entirely my own original creation. It has not been previously submitted, in whole or in part for a degree at any other academic institution. The views and opinions expressed in this dissertation are solely my responsibility. Any information obtained from external sources has been duly acknowledged in the text, and a comprehensive list of references has been provided. Every reasonable effort has been made to obtain permission and acknowledge the copyright holders of any materials used.

……

Khadka Bahadur Bhandari

August, 2023

ACKNOWLEDGEMENTS

I express my great sense of gratitude and debt for my supervisor Professor Dr. Sangeeta Rajbhandary, Head of Department (HOD) and Co-supervisor Associate Prof. Dr. Yadav Uprety Central Department of Botany (CDB), Tribhuvan University (TU), Kathmandu, Nepal for their continuous guidance, incredible support, encouragement and suggestions throughout the research work. I am thankful to Prof. Dr. Ram Kailash Prasad Yadav former Head of Department, Central Department of Botany, Tribhuvan University, for his administrative support.

I would like to thank Mr. Subhash Khatri, senior research officer of National Herbarium and Plant Laboratories (KATH), Lalitpur and all other staffs of KATH for giving permission to assess the herbarium and for their assistance in plant identification.

This research work was supported by the Aathbiskot municipality, Rukum West district. I would like to thank Mr. Gorkha Bahadur K.C. former Mayor of the Municipality and Mr. Mani Raj Shah Chief administrative officer and all municipality members for the support and help to complete this research work. I am also thankful to Mr. Dal Bahadur Shah, Head of Karnali Beverage Industry Pvt. Ltd. for co-operation during my field work.

I am heartily thankful to my seniors Mr. Yogendra Bikram Paudel, Shanta Budha Magar and Dhurba Khakurel for their continuous support and help throughout the research work. I am grateful to my friends Ms. Nita Kumari Somai, Mr. Saroj Bashyal, Mr. Puskar Basyal, Mr. Bikash Rawot, Ms. Sabita Neupane and Pooja Ghimire for their encouragement and support during the course of my study and thesis writing. Thanks also go to seniors, juniors and all other colleagues who directly and indirectly helped me. I express my great sense of gratitude to my parents and family members for their unwavering support and encouragement throughout my academic journey. I am immensely thankful to the residents of Aathbiskot Municipality for generously sharing their knowledge, extending their assistance, and dedicating their precious time during my fieldwork, without which my research would not have been possible.

LIST OF ACRONYMS AND ABBREVIATIONS

CBD	Convention on Biological Diversity
NSO	National Statistical Office
DFO	Division Forest Office
DPR	Department of Plant Resources
FGDs	Focus Group Discussions
ICF	Informant Consensus Factor
FL	Fidelity Level
GBIF	Global Biodiversity Information Facility
GoN	Government of Nepal
GPS	Global Positioning System
KATH	National Herbarium and Plant Laboratories
IUCN	International Union for Nature Conservation
MAPs	Medicinal and Aromatic Plants
MFSC	Ministry of Forest and Soil Conservation
SPSS	Statistical packages for Social Science
TEK	Traditional Ecological Knowledge
TU	Tribhuvan Univeristy
TUCH	Tribhuvan University Central Herbarium
UV	Use value
UF	Use frequency
VIFs	Variation Inflation Factors

ABSTRACT

An ethnobotanical study focusing on the uses of various categories of plants was conducted in the Aathbiskot Municipality of Rukum West District. The study spanned three field visits taking place during the periods of 17-26 July, 16-28 October 2021 and 5-20 2022. The area was chosen due to the presence of diverse groups of inhabitants along caste group Bhandari, BK, Budha magar, Sarki, Thapa, Bista, Oli, Damai, Bohora, and others, who have been residing in this area for an extended period. The main objective of this research work was to document the traditional knowledge regarding the utilization of plants in the Aathbiskot Municipality. To achieve this, quantitative ethnobotanical methods were employed to assess the usefulness of various plant species. A total of 201 plant species, belonging to 89 families and 166 genera were recorded as useful. The useful plant species were grouped into 10 use categories. Of the 201 species, the majority (68.16%) of species were valued as medicine, followed by food (wild edible) (42.85%), timber (23.88%), fodder (21.39%), social uses (religious and cultural) (16.42%), agricultural implements (14.43%), vegetables (7.96%), fiber yielding (5.47%), fermentation (2.99%) and poisonous (1.99%). Rosaceae was the dominant family followed by Asteraceae, Fabaceae, Moraceae, Pineaceae, and Poaceae. Of the total 166 genera, *Ficus* was the most dominant followed by Rubus, Quercus, Allium, Berberis, *Solanum, Abies, Agave* and *Ampelocissus*. Angiosperms were distributed in 75 families, 148 genera, and 178 species. Likewise, dicots were 85% of the total flowering plants. Among total useful plants, 69 species had single use, 79 species had double uses, 31 species had triple use, 13 species had quadrupled, 7 species had quintuple use, and 2 species had sextuple use. The majority of the useful species were herbs (45.27%), followed by trees (31.34%), shrubs (16.42%), and climbers (3.48%). Altogether, 14 different plant parts were used in the study area.

The value of the informant consensus factor ranges from 0.19 to 0.94 with a mean value of 0.72.The genito-urinary problem had highest Fic (0.94) while gastro-intestinal disorders had lowest (0.19). The most frequently used species of the study area (calculated as use frequency) were *Pouzolzia rugulosa* (0.73), *Terminalia alata* (0.71), *Desmostachya bipanata* (0.71), *Diploknema butyracea* (0.71), *Grewia serrulata* (0.69), *Berberis aristata* (0.65), *Phanera vahlii* (0.65), *Leibnitzia nepalensis*

(0.59), *Cuscuta reflexa* (0.59), *Ficus nerifolia* (0.52), and *Woodfordia fruticosa* (0.55). The most useful plant species in terms of overall use-value considering all use categories were *Grewia serrulata* (UV = 3.13), *Diploknema butyracea* (2.91), *Eulaliopsis binata* (2.55), *Cannabis sativa* (2.22), *Zanthoxylum oxyphyllum*(2.22), *Lindera megaphylla* (2.2), *Juglans regia* (2.05), *Cinnamomum tamala* (2) *Girardinia diversifolia* (2) and *Phanera vahlii* (1.94). Due to various socio-economic factors, the knowledge concerning the utilization of plants is diminishing. Therefore, the comprehensive documentation of this knowledge can serve as valuable foundational information for future investigations

Keywords: Ethnobotany, Documentation, Medicinal plants, Wild edible species, Quantitative ethnobotany

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

1.1 Background

1.1.1 Ethnobotany

Plants have held great significance throughout history, fulfilling diverse roles as essential resources, economic units and essential elements in societal traditions (Alcorn, 1995). The exploration of beneficial plants has an extensive historical background, dating back to ancient Greece. A significant and influential contribution to this field is "De Materia Medica" a seminal work published in AD 77. Written by the Greek surgeon Padanius Dioscorides of Anazarbus, this remarkable compilation offers a wealth of knowledge on six hundred plants native to the Mediterranean region. De Materia Medica remains among the earliest written texts providing in-depth description of plant names, synonyms, characteristics, habitats, distributions, medicinal applications, and methods of preparation and treatment (Collins, 2000).

The Swedish botanist Linnaeus often regarded as the founder of modern botany, also made significant contributions to the study of useful plants. In his book "Flora Lapponica" Linnaeus not only documented the plants of Lapland but also documented their local uses and applications (Linnaeus, 1737). The exploration and documentation of the uses of plants by humans have been a continuous and evolving process, spanning centuries and cultures. The knowledge and understanding gained from these studies have been instrumental in shaping various fields, including medicine, agriculture and industry while also deepening our appreciation for the immense value and significance of the plant kingdom.

Ethnobotany, the term coined by the American botanist John William Harshberger in 1896, focuses on exploring the relationship between plants and people, specifically how local communities utilize plant resources in their daily lives. The study employs ethnobotanical approaches to identify the plant resources used by the specific groups of people in a particular region (Martin, 1995). These approaches aim to document indigenous knowledge related to species conservation and the sustainable use of resources (Gemedo-Dalle *et al.*, 2005). Ethnobotany encompasses all studies that

investigate the interconnectedness between plants and traditional societies (Cotton, 1996). It investigates the intricate bond between plants and people within aboriginal communities (Schulta, 1962). This scientific field seeks to understand the system knowledge by employing both anthropological and botanical approaches (Ford, 1978; Davis, 1995). Various modern definitions of ethnobotany, such as those by (Ford, 1978; Berlin, 1992; Cotton, 1996) emphasize the importance of local people and their knowledge of plants, highlighting the relationship between plants, people and culture. Ethnobotany explores the dynamic relationships between plants, human beings, and their cultural affiliations, aiming to understand their interplay. Traditional Ecological Knowledge (TEK) or Traditional Knowledge (TK) of local communities forms the fundamental basis for ethnobotanical research (Balick and Cox, 1996). People who have long interacted with ecosystems and developed sustainable lifestyles possess valuable insights into resource dynamics, utilization, and management practices (Berks *et al*., 2000; Tengo *et al*., 2014).

Traditional knowledge encompasses the beliefs, experiences and practices of local communities in specific areas, passed down through oral traditions from one generation to another (Gadgil *et al*., 1993). This knowledge holds great significance not only for the daily lives of the people but also plays a vital role in modern industries and agriculture. Ethnobotanical information derived from traditional knowledge has paved the way for the development of modern products, including health products, cosmetics and various industrial goods (Balick and Cox, 1996). Through trial and error, ethnobotanical knowledge has also contributed to the creation of modern agricultural practices and the utilization of non-timber forest products such as handicrafts, fiber products, ropes and clothing. The interaction of traditional knowledge with contemporary scientific insights can guide the development of new holistic models of sustainable development that are both eco-friendly and socially acceptable (Shinwari and Gilani, 2003). In the modern world, there is growing interest in the scientific study of the interactions between plants and people in their natural environments, particularly among indigenous communities commonly referred to as Adhivasi, Janajathi, Tribal and Others (Maheshwori, 1996). These communities are found in approximately 70 countries, with an estimated population of around 300 million people, residing in diverse regions from the Arctic to rainforests of Asia and South America. Among these regions, the Amazon basin stands out as one of the

richest areas in terms of ethnobotanical diversity (Schults, 1983). The Asian region also boasts significant ethnobotanical treasures with at least 6500 plant species being utilized locally in traditional and folklore medicine, as well as for other purposes (Maheshwori, 1996).

Ethnobotanical study was started in 1955 by Banerji with the publication of a paper on medicinal and food plants of eastern Nepal. Ethno-medicinal plants of Nepal have been conducted in the past by the Nepalese and foreign researcher; and comprehensive works has already been published (Coburn, 1996; Manandhar, 1980, 1986, 1990, 1991, 1994, 1995, 2002; Shrestha and Pradhan, 1986; Shrestha *et al*. 2002; Lama *et al*., 2001; Shrestha and Dhillion 2003; Mahato and Chaudhary, 2003; Malla and Chhetri, 2009; Kunwar *et al*., 2009, 2013; 2014), Dhanusha, Sindhuli, Dadeldhura: (Manandhar, 1986: 1989: 1990, 1995; Bhattarai, 1998; Eigner and Scholz, 1999), Kaligandaki area (Joshi and Joshi, 2000), Shrestha and Dhillion, 2003), Palpa (Mahato and Chaudhary, 2003), Eight district of western Nepal (Kunwar and Bussmann, 2008), Arghakhanchi (Panthi and Chaudhary, 2002; Sharma *et al*., 2005), Manang (Bhattarai *et al*., 2006, 2009), Nawalparasi (Ghimire and Basakoti, 2009), Far western Nepal (Kunwar *et al*., 2009), Rupandehi (Acharya and Acharya, 2009), Rasuwa (Uprety *et al*., 2010), Parbat (Malla *et al*., 2015; Rajbhandary and Winkler, 2015), Darchula Rolpa, (Budha-Magar *et al*., 2020), Panchthar (Bhandari *et al*., 2021), Kaski (Khakurel *et al*., 2021), Bhaktapur (Dulal *et al*., 2022). There are more than 2000 wild medicinal plants that are traditionally used by various communities of Nepal and the majority of which await proper documentation (Baral and Kurmi 2006; Ghimire *et al*. 2008).

1.1.2. Biodiversity

Biological diversity is the heterogeneous distribution of a variety of life across the globe (Gaston, 2000). Biodiversity is the diversity of life at three levels, variability within species, diversity of different taxa among living organisms between species, genera, and families, etc. The variety of ecosystems and variety of their assemblages including communities and ecological complexes are a part of the biome (Glowka *et al*., 1994; Gaston and Spicer 2004). The term biodiversity in its expanded form as "biological diversity" primarily emphasizing species richness (Lovejoy, 1980). The term is commonly used in the fields of politics and environmental technology in

addition to various scientific disciplines (Ghilarvo, 1996). The U.S. Strategy Conference on Biological Diversity (1981) and the National forum on Biodiversity (1986) in Washington, D.C. were the critical debates in crafting a definition, and it was the proceedings from the later, edited by E.O. Wilson, that lunched the word 'biodiversity' into general use (Harper &Hawksworth, 1994).

The term biodiversity was made popular by E.O. Wilson (Wilson, 1988). Biodiversity is defined as the variability among living organisms from all sources including inter alia, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part which includes diversity within species, between species, and of ecosystems (CBD, 1992). Three terms for measuring biodiversity over spatial scales: alpha, beta, and gamma diversity. Alpha diversity refers to the diversity within a particular habitat or ecosystem (within-habitat diversity). It is expressed as the number of species per unit area. If we compare the species diversity between two habitats or ecosystems then it is called beta diversity (between-habitat diversity). Gamma diversity is the total species diversity in a landscape or regional diversity (Whittaker, 1972).

Biodiversity is a basic need for human survival and economic well-being and ecosystem function and stability. So, biodiversity conservation and sustainable management are very important (Mulchand, 2012). Biodiversity conservation means the conservation of vegetation in a particular region or locality. Hence, knowledge of the vegetation of any area is essential for the study of biodiversity and the environment. Floristic studies are fundamental for the further study of vegetation (Georgieva *et al*. 2013). It helps in the identification of important elements of plant diversity, protects and preserves threatened plant species, and monitors and provides effective management for the particular vegetation type (Sahu and Dhal, 2012; Akinyemi and Oke, 2014).

Nepal located in the central part of the main Himalayan range, with distinct variations in altitude (from 60 m ASL in Southern Terai to over 8000 m asl towards the Himalayan range) has a wide range of habitats with more than 10 different bio-climatic zones (Dobremez, 1976). West Nepal is relatively less explored still now in comparison to East Nepal (Rajbhandary *et al*., 1994). Although Nepal covers 0.1% of the earth's land area it is disproportionately a species-rich country (Siwakoti &

Rajbhandary, 2015). Recent estimates of species number indicate 465 species of lichens (2.3% of global diversity), 1822 fungi (2.6%), algae, 1001 which are 2.5% in the world, 1150 species of bryophytes (8.2%), 534 pteridophytes, 26 gymnosperms, 6973 angiosperms which are 5.1%, 5.1% and 3.2% respectively (GoN/MoFSC 2014).

1.1.3 Diversity and distribution pattern of useful plants

There is a wide range of topographic features and climatic conditions in Nepal; one can find large environmental variations (from the humid lowland forests to glaciated mountain tops). This variation has supported the isolated localities that host a large number of plant species nearly around 7000 species of angiosperms have been documented in Nepal (DPR, 2001). There are around 1792 species (including lichens and fungi) used for medicinal purposes (Baral and Khurmi, 2006). The number of medicinal plants in Nepal is still uncertain. Almost 60% of the world's population and 80% of the population in developing countries are using traditional medicines (Shrestha and Dillion, 2003). There are the majority of the people in rural areas who fully depend on plants and plant products for their traditional medicines as well as other basic needs. So dependency on useful plant resources is due to easy availability, low side effect, affordable prices and sometimes being the only source for the poor people.Useful plant resources are depleting day by day because of forest clearing for agriculture, land for settlement of the growing population, overharvest, and demand for forest-based raw materials (Manandhar, 1995; Chaudhary, 1998). So many species are already threatened due to collection pressures (Ghimire *et al*., 2005).

Resources availability and variability have a great influence on the pattern of species diversity along the environmental gradients (Pausa and Austin, 2001). In mountains, elevation has a major role or represents an important ecological gradient to which a large number of environmental variables influence species diversity patterns (Austin, 1980). Environmental factors such as topography, rainfall, temperature, and available spatial area, affect the species richness elevation (Brown and Lomolino, 1998). The maximum endemics are concentrated between 3800-4200 m and the highest diverse elevation zone on earth in terms of species richness is between 1500-2500 m (Barthlott *et al*., 2005).

Generally, species diversity tends to decrease with increasing altitude (Stevens, 1992; Rahbek 1995; Brown and Lomolino, 1998; Kunwar and Bussman 2008). But various

studies found a unimodal pattern of species richness in the Himalayas (Grytnes and Vetaas, 2002; Bhattarai and Vetaas, 2003; Carpenter, 2005; Panthi *et al*., 2007; Acharya *et al*., 2009; Baniya *et al*., 2010; Rokaya *et al*., 2012; Bhattarai, K.R. 2018.) and elsewhere (Rahbek, 1995: Barthlot, 1996; Odland and Birks, 1999). There is still no clear relationship between useful plant species and elevation in Nepal Himalaya. Although, some of the works show a unimodal pattern (Bhattarai and Ghimire, 2006; Ghimire *et al*., 2008; Gautam, 2012; Rokaya *et al*., 2012; Ghimire *et al*. 2006) found a unimodal pattern of species richness of commercially threatened medicinal plant species along an altitudinal gradient in the Dolpo region with the maximum number of medicinal plant diversity in sub-alpine meadows. However, Kunwar and Bussman (2008) showed a negative linear relationship between the richness of medicinal plant species and elevation. Anthropogenic disturbance is the next factor that causes a change in the pattern of species diversity of useful plants. For example, at high and low disturbed areas, the species diversity of useful plants is low but at an intermediate level of disturbance, the species diversity is high (Ghimire *et al*., 2006).

Most of the research activities in Nepal, related to the flora and distribution of plant species, have been focused on central and eastern regions compared to western regions. Very few works have been done in Western Nepal like Humla Karnali Basin (Gautam, 2012), Humla (Thapa, 2015), and Rolpa (Budha-magar, 2016) on the diversity and distribution of useful plant species in the high Himalayan zone and mid-hill. The present study was conducted in the Chitripatan area of Aathbiskot Municipality in the Rukum West District.

1.1.4 Rationale of the Study

Aathbishkot Municipality is an important area where high-valued medicinal plant species such as *Rheum australe, Dactylorhiza hatagirea*, *Nardostachys jatamansi, Neopicrorhiza scrophulariiflora, Swertia chirayita*, *Paris polyphylla, Valeriana jatamansi* and *Taxus controta* are found. However, till now no detailed works related to floral diversity and ethnobotany have been conducted in this region. So, present research work was undertaken to enumerate and document flowering as well as useful plants. This research work is based on the documentation of the useful plant resources which are the living life supporting sources are declining and oral knowledge also

going to disappearing from the local area. This study would be one of the reference accounts for further research in western Nepal.

1.1.5 Objectives

The general objective of the present study was the documentation of traditional knowledge related to plants and their use through a quantitative ethnobotanical approach in Aathbiskot Municipality, Rukum West district, Western Nepal.

The specific objectives of this study are as follows:

- To document the traditional knowledge and utilization patterns of valuable plant species in specific villages of Aathbiskot Municipality.
- To assess the level of agreement among informants regarding the utilization of plants for various purposes.

1.1.6 Limitations

Collection of some cited specimens in the study area was not possible because of the seasonal constraint. The study was carried out in the selective villages of the Aathbiskot Municipality so the present findings cannot be generalized for the entire Rukum West District.

CHAPTER 2: MATERIALS AND METHODS

2.1 Study Area

2.1.1 Physiography and Location

The study was carried out in Chitripatan Mountain area which lies in the Rukum West district of Karnali province in western Nepal. Rukum West district lies between 28. 520 to 28.992 N latitudes and 82.180 to 82.704 E longitudes with an elevation range of 672-5773 m asl. Rukum West district covers an area of 1213 square kilometers. The Ward number one to six of the Aathbiskot Municipality lies in this mountain region. The ethnobotanical informations were collected from these wards. However, herbarium specimens were collected from the Chitripatan Mountain region because the informants cited the region for collection of medicinal plants.

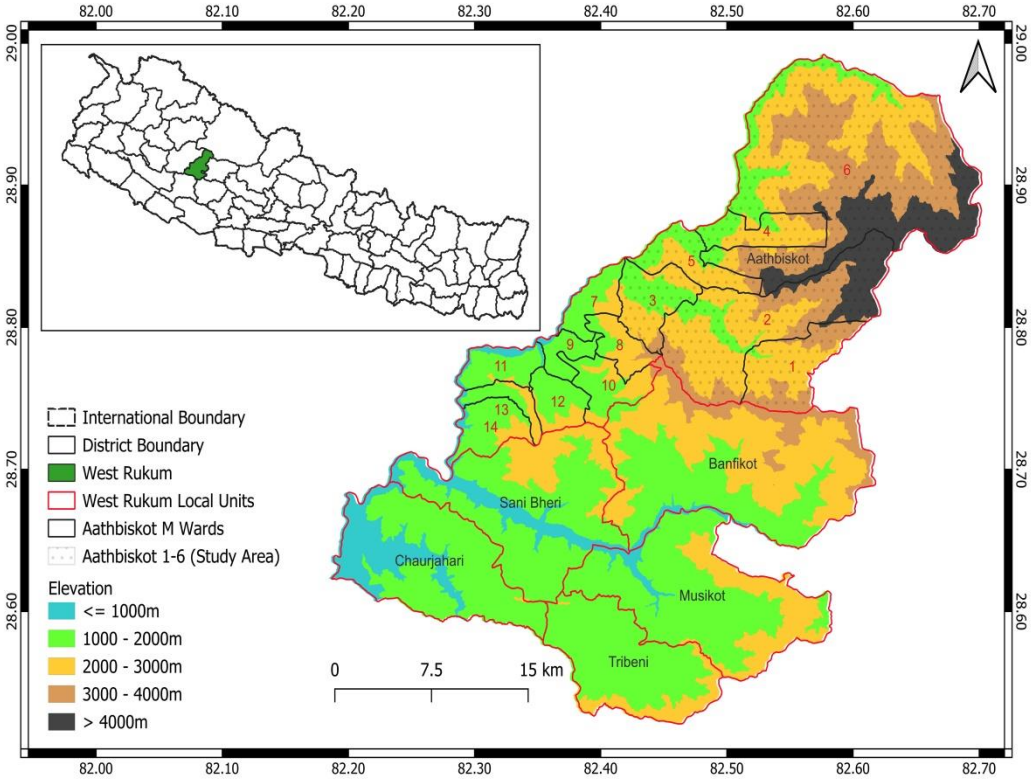


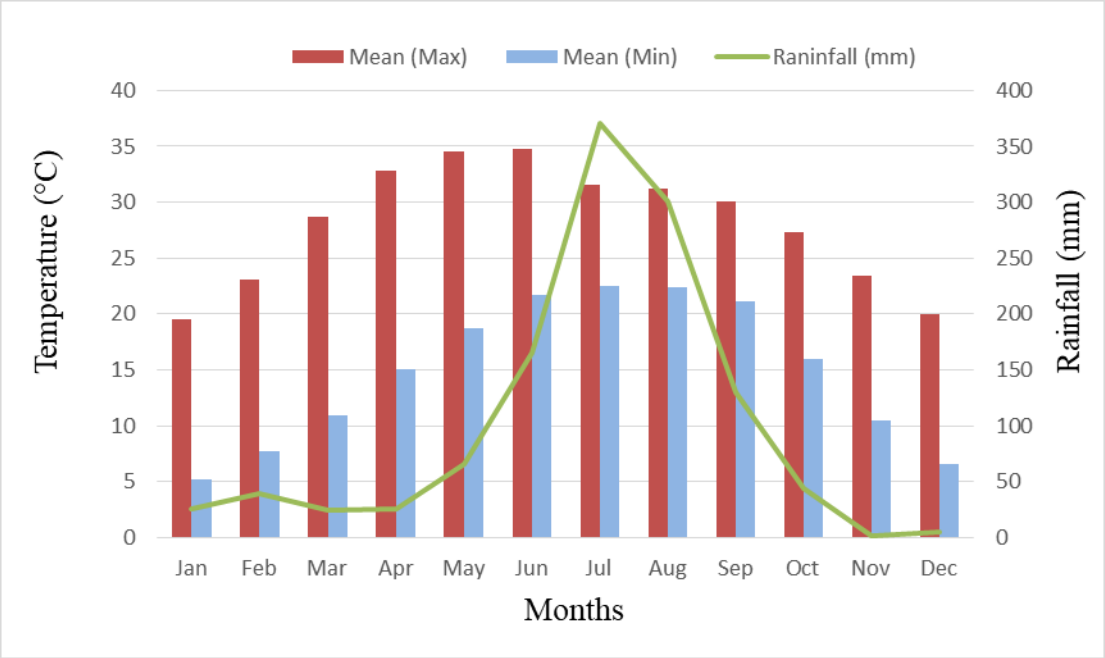
Figure 1: Map showing the Aathbiskot municipality in Rukum West District

Aathbiskot municipality lies between 28.698 to 28.992 N latitudes and 82.278 to 82.704 E longitudes with an elevation range of 783-5749 m asl. The area of Aathbiskot Municipality in Rukum West is 560.34 square kilometers. The districts of Dolpa, Jajarkot, and Rukum East are located in the north, west, and east, respectively.

On the southern side are Sanibheri and Banfikot Rural Municipalities. The Aathbiskot Municipality is home to a variety of flora and fauna found in tropical to alpine zones, with an altitudinal range of 750 to 4600 m. It is a rural part of the district, and recent modern development activities have changed the way of life of the locals. From this region, highly valuable medicinal herbs are harvested and exported . The Municipality has 35,917 inhabitants (men: 49.1% and women: 50.9%), distributed among 7,553 different households. The main ethnic cast groups in the Municipality include Kshetri, Bishworkarma, Thakuri, Magar, Pariyar, Mijar, Brahaman-hill, Sanyasi, Gurung, Badi, etc. (CSO, 2021).

2.1.2 Climate

Aathbiskot Municipality, located within the lower Himalayas, experiences significant topographic and seasonal variations. The local climate is strongly influenced by the monsoon. At lower elevations, the climate is characterized as warm-temperate, while high elevations exhibit an alpine climate. Unfortunately, there is no meteorological station within the Municipality area. So meteorological data from the nearest station, Chaurajhari Tar within Rukum, has been utilized. This station is situated at an altitude of 863 m above sea level, with coordinates Latitude 28.65399 and Longitude 82.21031. The average annual precipitation recorded at the station over this period was 99.99mm. Notably the monsoon season (June to September) witnessed the highest average precipitation, reaching 907.24 mm (Figure:2). The mean annual maximum temperature (Tmax) ranged from 19.52 to 34.70 ^{0}C, while the minimum temperature (Tmin) varied from 5.22 to 22.53^{0}C (Figure:2).



(Source: Department of Hydrology and Metrology, 2023)

Figure 2: Climatic data of Aathbiskot Municipality and Chaurjhari Tar

2.1.3 Biodiversity

The topography and climate diversity of the Chitripatan Mountain area produce complex biological gradients within a small area. As a result, it supports a wide variety of ecosystems, such as lush woods, vast meadows, and beautiful grasslands. Numerous exquisite orchid species and the majority of significant medicinal plants, such as *Morchella esculenta*, *Hericium ernaceus*, *Nardostachys jatamansi*, *Swertia chirayita*, *Valeriana jatamansi*, *Taxus contorta*, *Dactylorhiza hatagirea*, and *Neopicrorhiza scrophulariiflora*, have been identified in this area.

The following types of forest similar to Stainton (1972) are found in the study area.

Oak-Alder forest

A typical elevation for the oak-alder woodland is 2200–2300 meters above sea level (asl). It can be identified by the presence of dominating tree species like *Alnus nepalensis*, *Quercus glauca* (Phalat) and *Quercus oblongata* (Rayaj). *Aesculus indica* (Pangro), *Juglans regia* (Okhar), *Quercus oblongata* (Rayaj), *Carpinus faginea* (Gara), and *Rhododendron arboretum* (Buras/Laliguras) are additional tree species connected to this type of forest.

Numerous shrub and herb species, such as *Viburnum erubescens* (Okaare), *Viburnum mullah* (Malewa), *Prinsepia utilis* (Dotyalo), *Cotoneaster microphyllus* (Jhyau), and *Daphne bholua* (Barulo/Lokta), can also be found inside this forest. *Desmodium elegans* (Chamli), *Jasminum humile, Sarcococca wallichii* (Telparo), *Arisaema jacquemontii* (Bako), *Arisaema erubescens* (Bako), *Commelina pallida* (Kanjaro), *Fragaria nubicula* (Bhuikaphal), *Hemiphragma heterophyllum, Axonopus affinis* (Ghas), *Rubia manjith* (Macheto), *Schisandra propinqua* (Siwaltalahara), *Leibnitzia nepalensis* (Jhulo) and *Swertia chirayita* (Tite).

Lindera- Symplocos-Rhododendron forest

At an altitude of 2400–2500 meters above sea level (ASL), the Cinnamomum–Rhododendron forest exhibits a wide range of plant species. *Lindera megaphylla,* (Kaulo), *Lindera pulcherima* (Kimeri). *Symplocos ramosissima* (Sirpo), *Viburnum cylindricum, Viburnum cotinifolium, Taxus contorta, Rhododendron arboretum, Quercus glauca,* etc. are a few of the notable trees that can be found in this forest.

Acer sterculiaceum, Ilex dipyrena, Lyonia ovalifolia, and *Lindera pulcherima* itself are some of the associated tree species. A variety of shrubs, including *Berberis aristata, Daphne bholua, Elaeagnus parvifolia, Hedera nepalensis, Jasminum humile, Sarcococca hookerina, Viburnum erubescens,* and *Zanthoxylum oxyphyllum,* can be found in the forest's understory. *Primula denticulata, Valeriana hardwickii, Swertia dilatata, Thalictrum reniforme, Rubia manjith, Polygonatum cirrhifolium, Persicaria capitata,* and *Ainsliaea latifolia* are among the herb species found in this woodland. Dominant species within this forest type are *Schisandra propinqua* and *Holboellia latifolia,* while *Taxus contorta* and *Daphne bholua* are also notably abundant. This ecosystem offers a diverse range of plant life, creating a unique and picturesque environment.

Oak-Laurel forest

The Oak-Laurel forest, found at an elevation of 2600-2700 m, is primarily characterized by the dominance of *Quercus semecarpifolia* (Kharsu) and *Rhododendron arboretum* (Buras/ Laliguras) as the main tree species. Associated trees include *Ilex dipyrena* (Liso), *Lindera Pulcherrima* (Kimeri), *Lyonia ovalifolia* (Ayar) and *Tsuga dumosa* (Gobresallo). Among the shrub species, *Viburnum erubescens* (Okare), *Daphne bholua* (Lokta/Barulo), *Sarcococca saligna*

(Kalotelparo), and *Zanthozyllum oxyphyllum* (Siltimur) stand out as dominant representatives. In terms of herb species, notable examples include *Viola pilosa, Rumex nepalensis* (Hale), *Strobilanthes thomsonii; Rubia manjith* (Machetto), *Carex decora* (Ghas) and *Ainsliaea latifolia* (Ekdale).*Tsuga dumosa* and *Quercus semecarpifolia* (Kharsu) are the dominant tree species found within this forest type. This forest ecosystem offers a unique blend of oak and laurel elements, creating a diverse and captivating natural environment.

Mixed forest

This mixed forest is predominantly found at an elevation of 2800-2900 meters and it consists of a diverse array of tree species including *Ilex dipyrena* (Liso), *Rhododendron arboretum* (Buras/Laligurs), *Quercus semecarpifolia* (Kharsu) and *Tsuga dumosa* (Gobresallo), and *Lindera pulcherrima* (Kimeri). *Daphne bholua* (Barulo/Lokta), *Sarcococca saligna* (Kalotelparo), and *Viburnum cotinifolium* (Banthura) are a few of the significant shrub species found in this forest. *Ainsliaea latifolia* (Ekdale), *Impatiens scrabida* (Garkauli/Patkejhar), *Calanthe manii* (Sunakhari), and *Polygonatum cirrhifolium* (Khiraulo) are all abundant in the herbaceous layer. Observed dominant species in this type of forest are *Taxus contorta* (Laito), *Clematis buchananiana* (Dwarelahara), and *Smilax menispermoides*.The mixed forest presents a harmonious blend of different tree, shrub and herb species, creating a diverse and captivating natural landscape. This ecosystem provides a habitat for a wide range of plant life, contributing to its unique ecological significance.

***Tsuga* forest**

This particular forest type, which is largely found in the research area at an altitude of 3000-3100 m, is dominated by the *Tsuga dumosa* (Gobresalla) forest. As related understory species, it is joined by *Quercus semicarpifolia* (Kharsu) and *Rhododendron arboretum* (Buras/Laliguras). This forest is home to notable shrub species such as *Bergenia ciliata* (Silpari/ Pakhanved), *Jasminum humile, Rubus hoffmeisterianus* (Aiselu), *Rosa macrophylla* (Airi), *Sarcococca saligna* (Kalotelparo), *Fagopyrum dibotrys* (Bhare), and *Primula denticulata* (Doiliphul). Herb species observed in this forest type encompass *Elatostema monandrum, Persicaria capitata* (Ranaulo jhar) *Impatients scrabida* (Patke jhar/ Garkauli),

Ainsliaea latifolia (Ekdale), and *Roscoea purpurea* (Bhardayo). The *Tsuga dumosa* (Gobresallo) forest presents a distinct ecological setting characterized by its dominant tree species and the rich variety of shrubs and herbs that thrive within it. This forest type contributes to the overall biodiversity and natural beauty of the area, offering a diverse range of plant species and creating a captivating environment for exploration.

Abies **forest**

The *Abies* forest type is characterized by the dominant presence of *Abies spectabilis* (Thigo) and is primarily found at an altitude of 3200-3300 meters in the study area. Associated tree species in this forest include *Rhododendron arboretum* (Buras\Laliguras) *Rhododendron campanulatum* (Chimalo), *Tsuga dumosa* (Gobresallo). The forest exhibits a dense growth of woody species, forming a thick understory vegetation layer. Prominent elements within this layer include Viburnum *cotinifolium* (Banthura), *Drepanostachyum* sp (Nigalo), *Berberis angulosa* (Chutro), *Rubus hoffmeisterianus* (Aiselu), *Salix sikkimensis* (Baisa). The herbaceous layer of the *Abies* forest is characterized by diverse species including *Polygonatum molle, Ainsliaea latifolia, Rheum australe, Androsace sarmentosa, Anemone demissa, Satyrum nepalense, Carex decora, Fragaria nubicola, Roscoea purpurea, Galium asperuloides, Ophiopogon intermedius, Rumex nepalensis, Primula edgeworthii, Ranunculus brotherusii* and *Viola biflora.* The abies forest creates a unique and enchanting landscape with its towering *Abies spectabilis* trees and the diverse array of vegetation in the understory and herbaceous layers. This forest type plays a significant role in the ecosystem, contributing to the overall biodiversity and ecological balance of the area.

Betula-Rhododendron **forest**

The *Betula-Rhododendron* forest, classified as a sub-alpine forest type, is found at an elevation of 3400-3500 meters. It is primarily characterized by the dominant presence of *Betula utilis* (Bhujpat rukha), *Rhododendron campanulatum,* (Rato Chimalo), *Rhododendron barbatum*, and *Sorbus foliolosa.* Associated species are *Juniperus squmata, Padus cornuta.* Within the understory shrub layer, Lotable species such as *Lonicera angustifolia, Lonicera lanceolata, Rubus hoffmeisterianus and Viburnum erubescens* thrive. The herbaceous layer of this unique forest type is characterized by a diverse range of species, including *Anemone demisssa, Leibnitzia nepalensis,*

Clematis connata, *Impatients laxiflora*, *Carex munda*, *Valeriana jatamansi*, *Maianthemum purpureum*, *Persicaria capitata*, *Polygonatum cirrhifolium*, *Primula glomerata*, *Rumex nepalensis*, *Artemisia indica*, and *Morina longifolia*.

Alpine grassland species

Grassland habitat lies from 3500-4200m in the Chitripatan area. Above 4200-4600m, rocky areas are found and because of this, plants are not reported from that area. In the grassland of the Chitripatan area, very important medicinal plants such as *Nardostachys jatamansi, Rheum australe, Dactylorhiza hatagirea, Neopicrorhiza scrophulariiflora,* and *Aconitum* species are recorded. Some other species are *Pedicularis hoffmeisteria, Selinum tenuifolium, Potentilla peduncularis, Pernassia cabulica, Allium wallichii, Rhododendron lepidotum, Crementhodium retusum, Geranium donianum, Eragrostis nigra Saussurea roylei, Saussurea graminifolia, Saussurea simpsoniana, Meconopsis paniculata*, etc. species are recorded from the study area.

2.1.4 Ethnicity and Culture

Baisekingdom is a historical feature of the Rukum district. Specific and potent whole kingdoms are Rukumkot, Musikot, Banfikot, Gotamkot, and Jaharikot. The name of the Rukmani 'Devi Mandir' in the Rukumkot kingdom was derived from the Devi. The Rukum district's current name, Rukum, is likewise derived from Rukumkot, which just states Rukum (DFO, 2020). After the political revision of the country as per the Constitution of Nepal 2072, politically Rukum district is divided into two districts: Rukum East and Rukum West. There are several ethnic groups in Rukum West district but of the total population [1,66,740 (male: 48.6% and female: 51.4%)] of the district, Kshetri (53%) are the dominant inhabitants, followed by Bishworkarma (15%), Magar (14%), Thakuri (6%), Pariyar and Brahaman-hill are equal (4%) (CSO, 2021). The district is divided into 3 urban municipalities (Musikot, Chaurjari, and Aathbiskot) and three Rural Municipalities (Banphikot, Tribeni, and SaniBheri). The present study was conducted in Aathbiskot Municipality. Kshetri, (40%), Bishworkarma (23%), Thakuri (13%), Magar (12%), Pariyar and Mijar are equal (4%) and the remaining groups (Brahaman-hill, Sanyasi, Gurung, Badi, etc.) coexist peacefully in the Aathbiskot Municipality. For everything, even medical issues, they have faith in a religious God, with hospitals coming in second. They have traditional

religious practices, speak a Khas-Nepali language mix, and hold political views. There is a strong theological conviction that blaming, racial prejudice, and worship of the evil Devi are acceptable. Hindus (97.25%), Buddhists (0.2%), Christians (2.5%), and Muslims (0.03%) make up the majority of the population (CSO, 2021). Agriculture makes up the majority of peoples' jobs (75.2%), followed by elementary school teachers (13.2%) and (4.2%) crafts and associated occupations (CSO, 2021)

There is no facility of hotel for lodging and fooding in the study area specially in the ward No. one to five and people use to welcome the outsiders (tourists) in their own home and give residential facility. Outsiders are treated as their own family members and warm hospitality is provided. At the time of field visit Gotamkot to Pahada, Rokaja, Chaitikhara Okhle, Philinge, Sylakhadi, Daaje-Danphe, Aathbiskot Sundarpaani, Gharikhola Goiri-Barkhu, Ghetma and Chisapani, Chaura different area of Aathbiskot Municipality visited through walk. I am remembering those days enjoying myself with them as a family member, eat and stay without cost. So our culture and thoughts are really impressive and symbol of civilization cant separate civilization with religion and culture.

2.1.5 People's socio-economic status and Dependency

Traditional agriculture practice and animal husbandry (more than 80%) is the chief occupation of local people for their livelihood. Local farmers rear cattle, goats, sheep, carpenters, and local businesses for their subsistence. On the other side, Non-timber forest products (NTFPs) including medicinal and aromatic plants are the next source of income for local people. Some young people go abroad especially to India either single or with family for earning and they are normally involved in an unskilled labor job.

2.2 Methods

2.2.1 Ethical Consideration

Before undertaking this research, a permission letter from the Department of Plant Resources and Division Forest Office Rukum West was taken. On the other hand, the objectives of the research were discussed with local authorities and consent was taken from them. The purpose of the study was also explained to local communities, including the ward chairman of Wards No. one, two, three, four, five and six of

Aathbiskot Municipality. Cultural sensitivities were respected and their rights over traditional knowledge and natural resources were acknowledged throughout the study. Only photos were taken for CITES-listed plant species. Verbal consent was taken from the respondents for recording their knowledge.

2.2.2 Ethnobotanical study

The study spanned three field visits taking place during the periods of 17-26 July, 16-28 October 2021 and 5-20 2022. The research work was based on the primary data collection during the field visits as well as some secondary literature. The required information regarding the population and households of the study area was taken from secondary sources (CSO, 2021). The fieldwork comprised of two approaches i.e. survey and inventory technique (Cunningham, 2001, Martin1995). The primary data collection methods include Focus Group Discussions (FGDs), Key Informant Interviews (KII), participatory observations, community resources mapping, and transect walk.

The ethnobotanical information about useful plants was collected from FGDs (n=5). There were 9-12 people including traditional healers, community leaders and Jhakri, Dhami, housewives, and elderly people of different ages and castes in discussion meetings. Local informants were provided with a comprehensive undersanding of the study's purpose and importance. Basic information about local names, purposes, parts, mode of use, conservation status, and trade value was recorded through the discussion. Detailed information about the plant used in different categories was obtained through key informant interviews, focus group discussions, and individual informant interviews. First of all, a pilot study was conducted to gather ethnobotanical information. Focus group discussion was made with local people after pilot survey. After focus group discussion, personal interviews were taken to collect information on local use of plants. A total of 52 local people (8 female and 44 male), among them 12 local healers, 9 local Dhami/Jhakri, 2 household mother, 12 knowledgeable on medicinal plants, 1 local medicinal plant trader, 7 local leader, and 9 farmers, were interviewed and local individuals who participated in interviews applying semi-structured questionnaires (Appendix 1). Interviews were conducted in locations that respondents found most convenient, including their homes, nearby residences and their workplaces. Interviews was taken with local healers and asked him to suggest

another knowledgeable person as soon as his/her interviewed was completed. Based on local suggestions, three local people participated in the field, during which different plant specimens cited as useful by local people were collected and detailed ethnobotanical information was by transect walk. In addition to this, ethnobotanical information was also collected through participant observation.

2.2.3 Plant collection and Identification

The plant specimens were collected with the help of the local people. The field note and photographs were also taken. The collections were done in three different seasons. The collected specimens were taged in field. Finally specimens were pressed, dried mounted and preserved following (Bridson and Forman, 1998; Rajbhandary and Rajbhandary 2015).

Finally, specimens were pressed, dried, mounted, and preserved following (Formen and Bridson 1998) and (Rajbhandary & Rajbhandary, 2015). The collected specimens were also validated with local people. The specimens were identified with the help of standard literature such as (Hara *et al*., 1979, 1982; Hara &Williams, 1979; Press *et al*., 2000; Polunin & Stainton, 1984; Stainton, 1988; Obha *et al*., 2008; and Rajbhandari & Rai, 2017). Furthermore, the species were confirmed by comparing with herbarium specimens deposited at KATH (National Herbarium and Plant Laboratories, Godawori), Tribhuvan University Central Herbarium, (TUCH), and digital specimens. Then, voucher specimens were deposited in (TUCH). For nomenclature, the plant list, Catalogue of Life and Shrestha *et al*. (2018), and online efloras were followed. Finally, various kinds of literature on ethnobotany (e.g., Lama *et al*., 2001; Rajbhandari, 2001; Manandhar, 2002; Bhattarai & Ghimire, 2006; Ghimire & Pyakurel, 2008; Rokaya *et al*., 2010; Uprety *et al*., 2010, 2011, 2012, Shrestha *et al*., 2022) was consulted to compare plant uses.

2.2.4 Categorization of mode of use

Indigenous people utilize various modes of medicine preparation by employing medicinal plants in their natural state to treat different ailments. The following were the categories recognized during the field visits.

- Paste: Fresh or dry parts of plants are grind on stone grinder (Okhalo) with required liquid (may be oil or water).

- Juice: An extract or plant parts are grind on stone grinder (Okhalo) then mixed with water. That mixed liquid is filtered with the help of muslin clothes or other such types of cloth and ready for use.
- Decoction: Different parts of the plants were cooked for two-three hours and extracted gelly substance is separated and ready for use.
- Powder: Dry plant part is grind in stone grinder (Okhal) and make a powder and applied or use in different purposes.
- Raw: Fresh plant parts are washed and take in natural form.
- Chewed: Fresh plant parts are washed and chewed directly.
- Swallowing: Small pieces are prepared and directly swallowed.
- Smoke: Different parts of the plants are taken as tamakhu or like as for medicine.
- Milky latex: Extracted from plant parts.
- Oil: Dry seeds are grind and extract oil.
- Resin: Plant bark is crushed and resin is collected.
- Mixed food: some medicinally important plants are eaten as vegetables or fruits or as a food.

2.2.5 Data Analysis

The number of different plant species in useful plants, life forms, and ethnobotanical data were analyzed in Microsoft Excel 2010. Quantative data analized by using the formula.

The consensus of the local population regarding the usage of valued plants for specific disease categories. The Fic value is between 0 and 1. When a large percentage of informants report using only one or a small number of plant species to treat particular diseases, the Fic value is high. The Heinrich et al. (1998) formula is used to calculate the informant consensus factor.

$$\boldsymbol{Fic = \frac{Nur - Nt}{Nur - 1}}$$

Where 'Nur' is the number of useful reports in each ailments category and 'Nt' is the total number of taxa used in each ailments category by all informants.

The researchers used the idea of usage frequency (UF) to calculate the predominance of valuable species. Use frequency measures how frequently informants bring up a certain plant species, ranging from high when many do so to close to zero when only a few do. It does not, however, indicate if a species of plant has a single or a variety of uses. The Tardio and Santayana (2008) formula was used to get the UF value.

$$\boldsymbol{UF} = \frac{\mathbf{U}}{\mathbf{n}}$$

Where **U** is the number of informants who cite the given plant species and **n** is the total number of informants interviewed in the survey.

Similar to this, Arulappan et al. (2015) used the idea of usage value (UV) to assess the importance of important species. When a certain species is mentioned in several categories, the use value is thought to be high; yet, when a species is only mentioned in one or a few categories, the use value is close to zero. This indicator shows whether a plant species has a narrow focus or a wide range of functions (Philips and Gentry, 1993).

$$\mathbf{UV} = \frac{\boldsymbol{\Sigma Uc}}{\boldsymbol{n}}$$

Where **Uc** is the number of uses mentioned by each informant for a given species and **n** is the total number of informants.

CHAPTER 3: RESULTS

3.1. Socio-economic characteristics of the respondents

The ethnobotanical survey included 52 native informants. The major occupation of the respondents was agriculture. Of the total respondents, 12 were local healers followed by local herbalists (12), farmers (9), local Dhamies/Jhakry (9), local leaders (7), housewives (2), and local trader (1) The major differences among local healers, herbalists and Dhami/Jhakry was that local healers not as Dhami/ Jhakri and herbalists were collecters of medicinal plants and sell for extra income sources. (Figure 3).

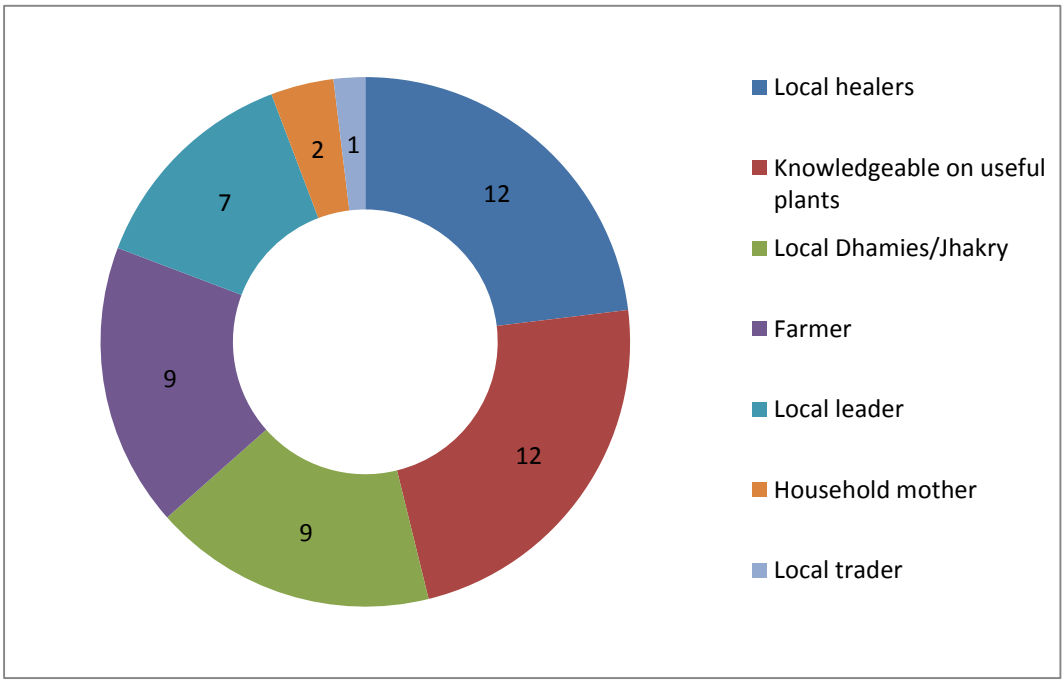


Figure 3: Total informants participated in ethnobotanical studies

3.1.1. Characteristics of Informants and Traditional Knowledge

Altogether, 201 plant species were recorded from the informants interviewed in the study area. The age groups are categorized in to six classes: 20-29, 30-39, 40-49, 50-59, 60-69, 70-79 and >70. Maximum number of informants were from age group 60-69 age (n=14) followed by 40-49 and 50-59 equal 11 number of informants participated in the survey (Figure 4).

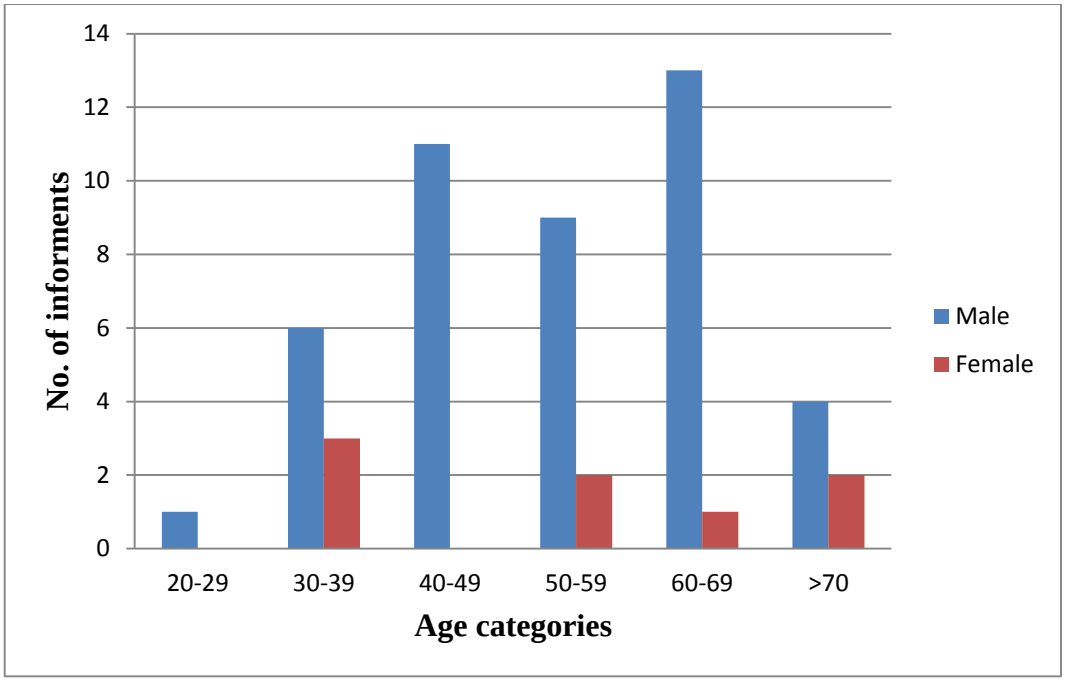


Figure 4: No. of informants of various groups

Of these, age groups 60-69 cited 102 useful plants, followed by age groups 50-59 with 98 and other age groups with 102 (Figure 5).

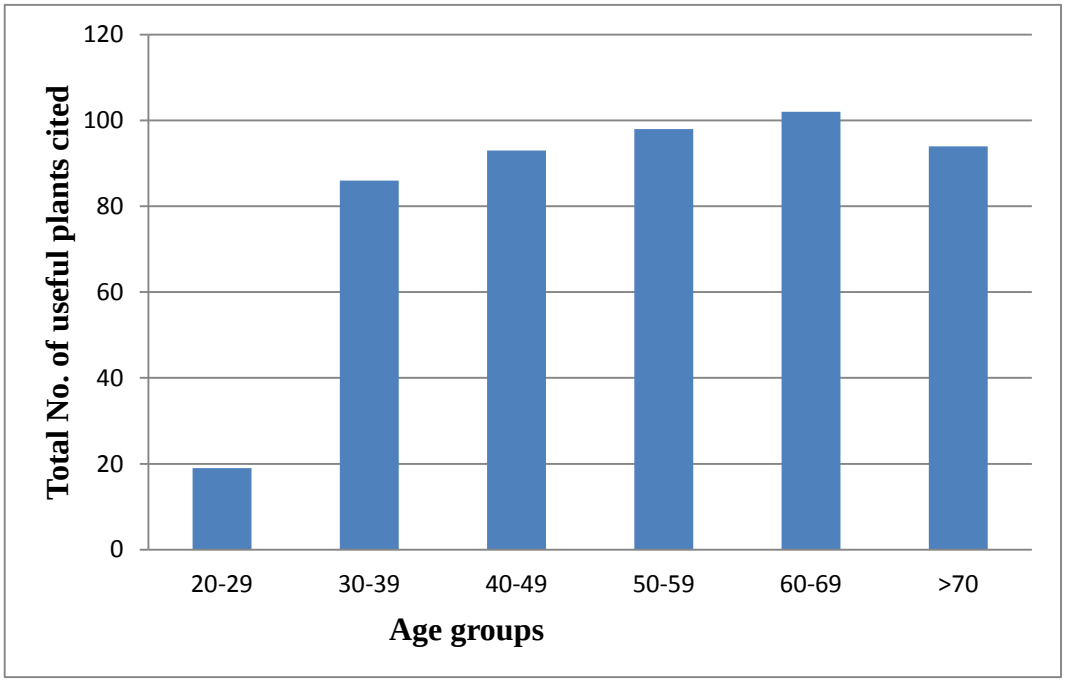


Figure 5: Numberof useful plants cited by different age group.

The age group 60-69 cited highest number of useful plants (102) and lowest number of plants was cited by the age group 20-29 (only 15 species). On the basis of this data, regression analysis was done that shows significance F values 0.049 which is significance in 95% confidence level (Table 1).

Table 1: Informants' age groups with cited number of useful plants

ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	3394.421	3394.421	7.892108	0.04835188			
Residual	4	1720.413	430.1032					
Total	5	5114.833						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.452773	30.63615	0.014779	0.988916	-84.60681677	85.51236	-84.6068	85.51236
X Variable 1	1.575503	0.560819	2.80929	0.048352	0.018419808	3.132586	0.01842	3.132586

3.1.3 Ethnobotany and useful plant species

A total of 201 plant species, belonging to 89 families and 166 genera were recorded as useful plants.

3.1.4 Diversity of lower to higher useful plants

Of the total 201 species, 89% (178) were flowering plants followed by 4% (9) gymnosperms, 3% (7) pteridophytes, 3% (5) fungi, and 1% (2) lichens (Figure 6).

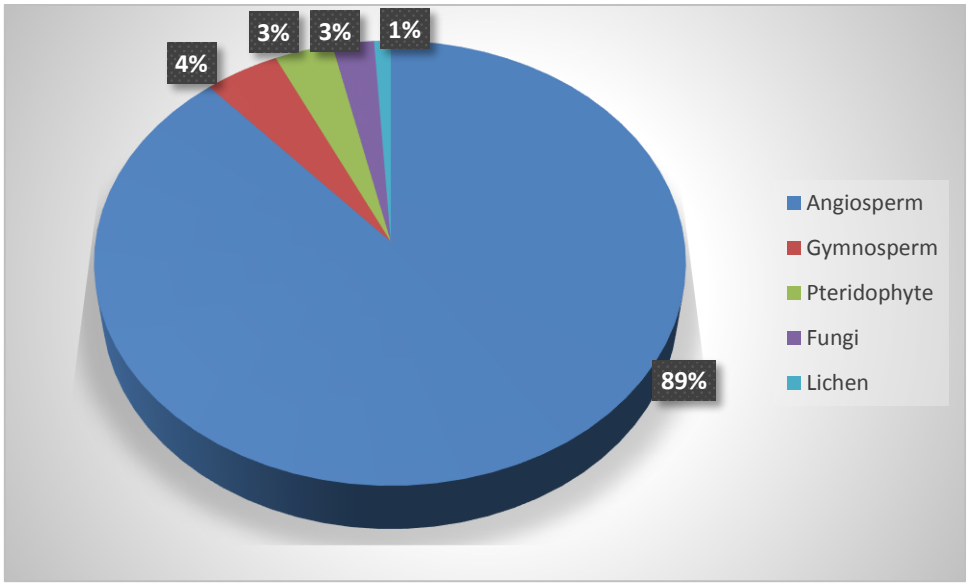


Figure 6: Total lower to higher plant species reported in the study area

3.2 Categories of useful plants

The useful plant species were grouped into 10 use categories. Among 201 species, the majority of species had medicinal value (68.16%), followed by food value (wild edible, 42.85%), timber (23.88%), fodder (21.39%), social uses (religious and cultural, 16.42%), agricultural implements (14.43%), vegetables (7.96%), fiber yielding (5.47%), fermentation (2.99%) and poisonous (1.99%) which is shown in the chart below (Figure 7) (Appendix V).

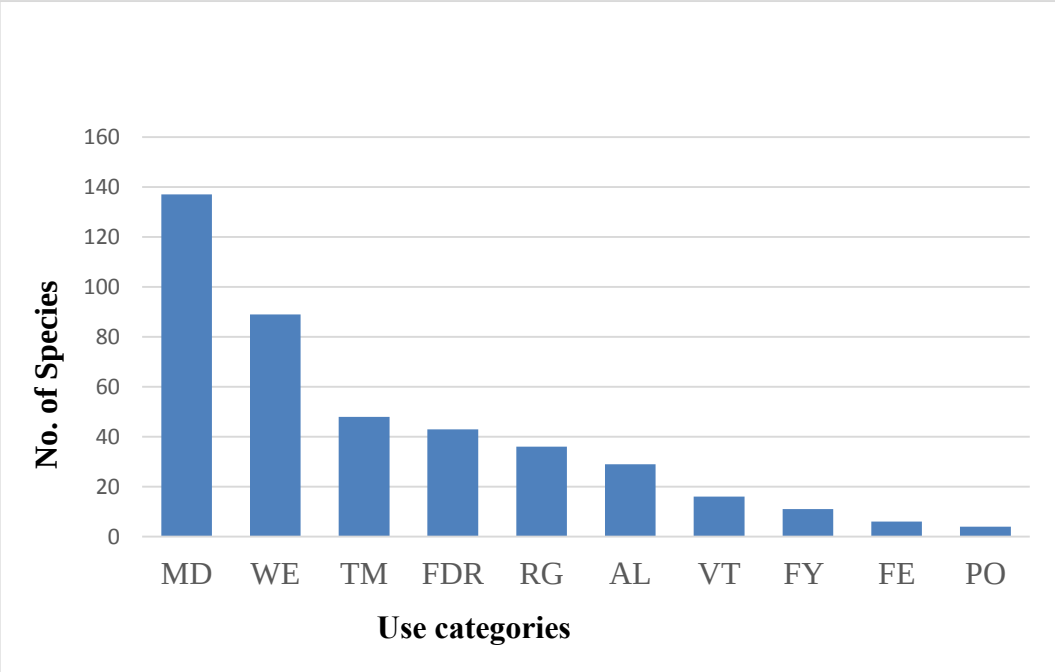


Figure 7: Total number useful plants use category

Legends. MD: Medicinal. WE: Wild edible, TM, Timber, FDR: Fodder, RG: Regilious, AL: Agricultural implements, VT: Vegetables, FY: Fiber Yielding, FE: Fermentation, PO: Poision.

3.3 Life forms of useful plants

The majority of useful species were herbs (45.27%), followed by trees (31.34%), shrubs (16.42%), and climber (Figure 8). Lichen and fungi were excluded from this analysis.

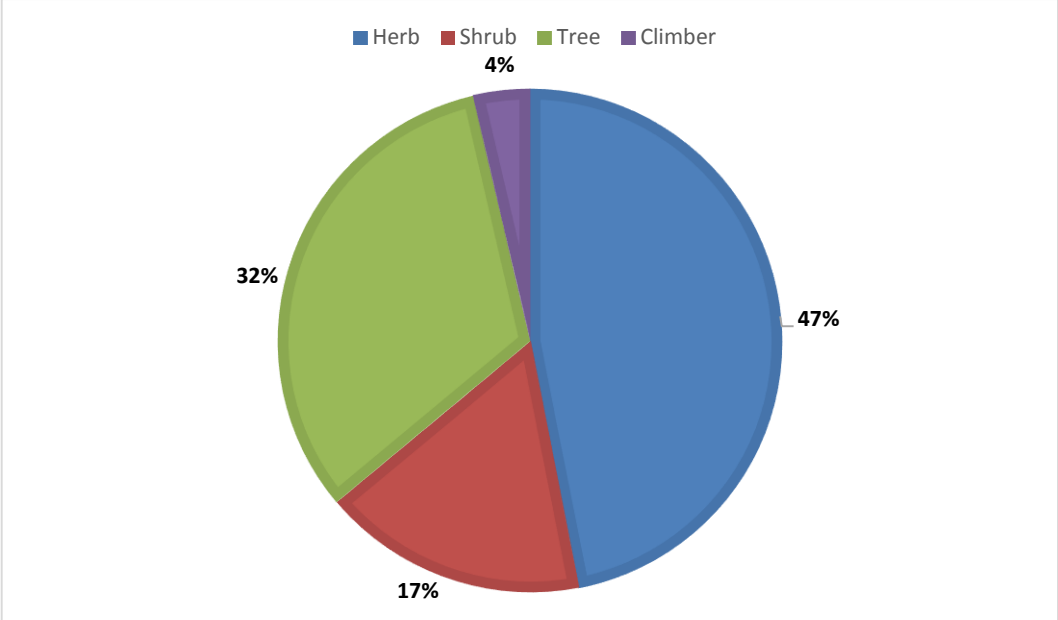


Figure 8: Life form of the useful plants

3.4 Dominant families

Rosaceae was the dominant family with 13 species followed by Asteraceae (8 species), Fabaceae (8 species), Moraceae (8 species), Pineaceae (7 species), and Poaceae (7 species) (Figure 9).

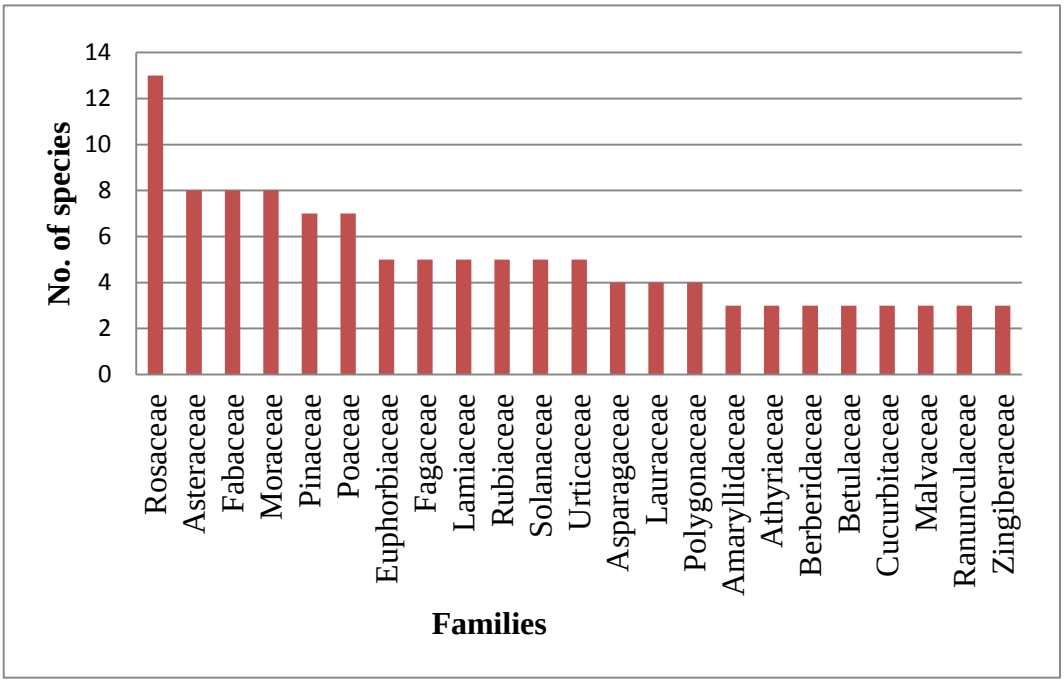


Figure 9: Dominant families of reported plants

3.5 Dominent Genera

The dominant genera were *Ficus* with 6 species and it was followed by *Rubus* (5 species), *Quercus* (4 species), *Allium* (3 species), *Berberis* (3 species), *Solanum* (3 species) and *Ampelocissus* (2 species) which are shown in the chart below (Figure10).

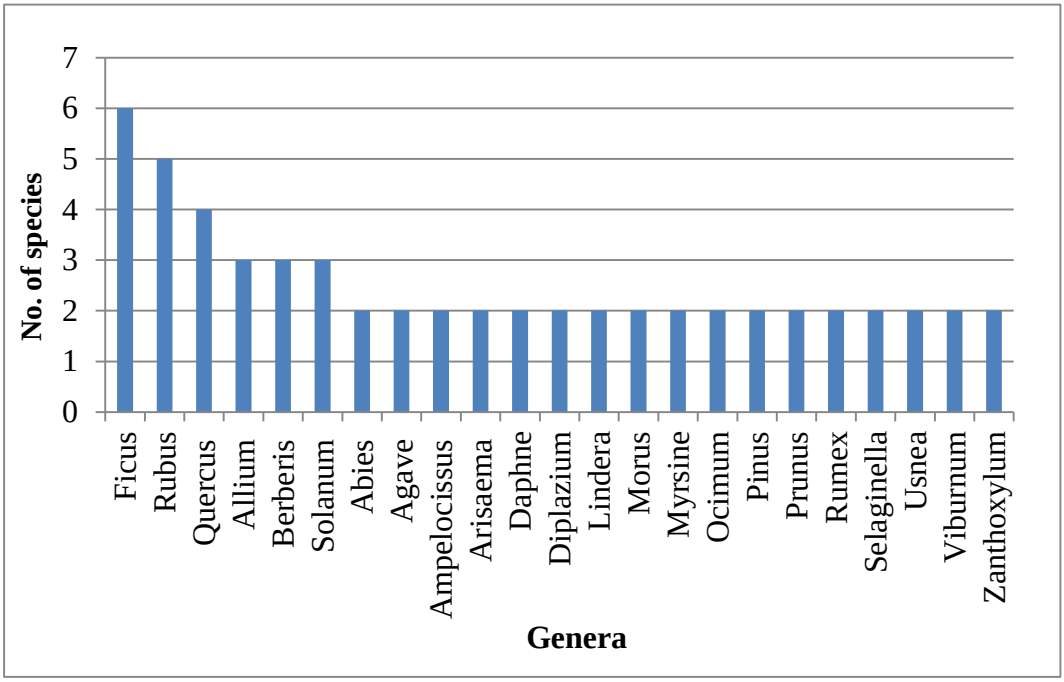


Figure 10: Dominant genera of reported plants

3.2 Medicinal plants

3.2.1 Parts used

Altogether, 14 different parts such as leaf, root, bark, fruit, whole plant, young stem, tuber, seed, stem flower spore, etc. were used in different traditional medicinal formulations. The leaves were most frequently used parts (14.43%), followed by roots (12.48%), bark (9.45%), fruit (9.45%), whole plant (7.46%), young stem (6.47%), tuber (6.47%), seed (6.47%) which are shown in the chart (Figure 11).

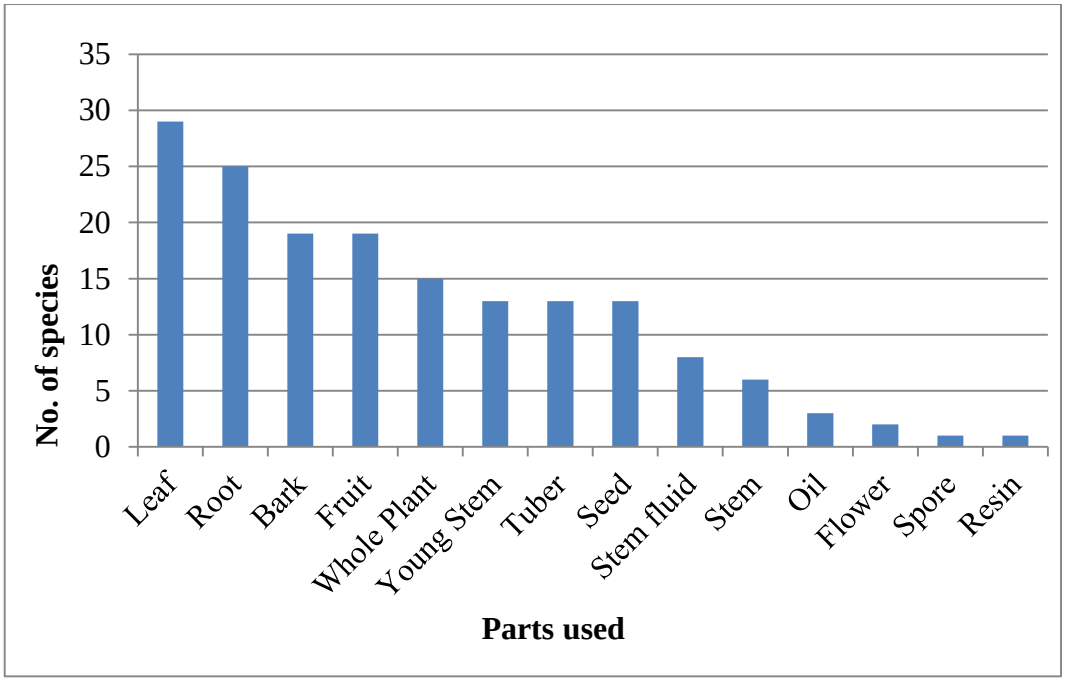


Figure 11: Medicinal plants parts use

3.2.1 Mode of use and preparation methods

The forms of medicine prepared by local people in the study area were mostly used in the form of juice, followed by paste, powder, decoction, and chewing, which are shown in the chart below (Figure 12) and preparation method described in (Table 2).

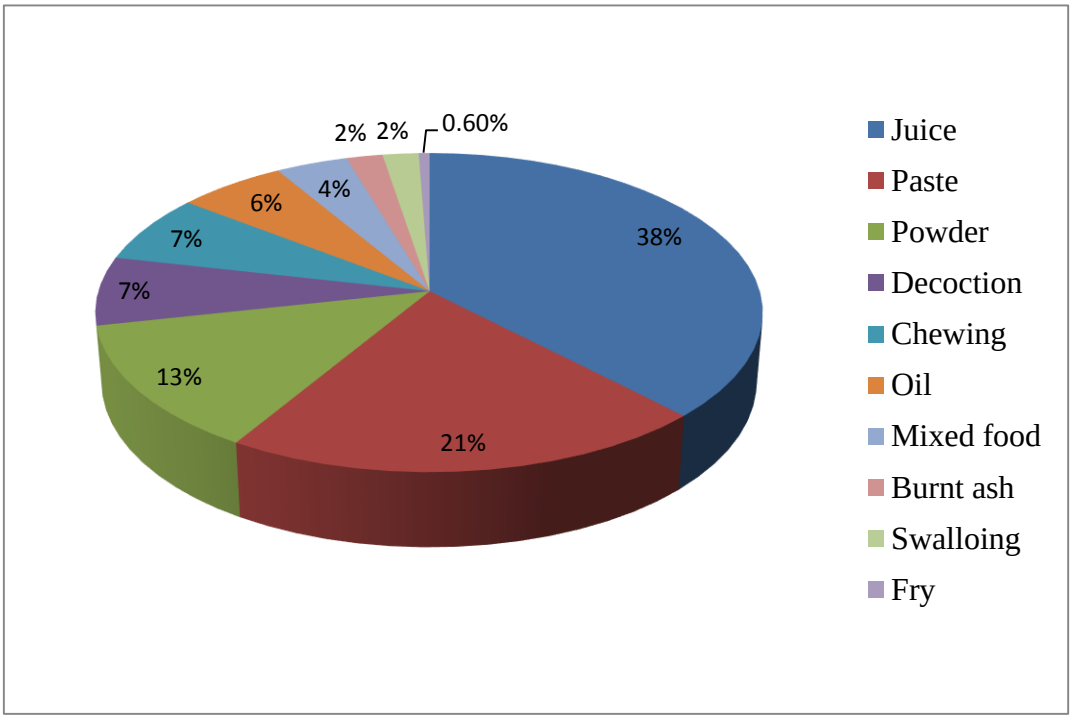


Figure 12: Medicinal plants' mode of use

Table 2: Common forms of remedies preperations method

S.N	Perpetration method	Description	No. of Species
1	Chewing	Fresh plant bring and wash with help of water and chewed	10
2	Decoction	Plant parts are boiled for two three hours and extracted gel is used	10
3	Juice	The plant parts are crushed in stone grinder (Okhalo) and mixed with water and make solution then filtered with the help of muslin clothes.	57
4	Fry	Mustard or Ghee of animal fried with plant part .	1
5	Oil	The oil is extracted generally seed but sometimes heart wood boiled for two three hours and extracted liquid called also oil.	9
6	Paste	Fresh plant or plant part ground in stone grinder (Okhal) and make a paste.	31
7	Powder	Sundried or dried parts are crushed and make a powder.	20
8	Swallowing	The plant or plant part are directly swallowed.	3
9	Burned ash	Plant parts keep in stove (Chulo) and burned ash collect.	3
10	Mixed food	Mixed with food and eat	6

3.3 Wild edible plants

Altogether 89 species of plants were documented having food values or wild edible plants. Important wild edible plant species were *Cornus capitata, Elaeagnus, kanaii, Juglans regia, Cinnamomum tamala, Grewia serrulata, Ficus auriculata, Syzygium cumini, Ophioglossum reticulatum, Fagopyrum dibotrys, Myrsine africana, Myrsine semiserrata, Rubus ellipticus, Rubus paniculatus, Diploknema butyracea, Debregeasia longifolia, Pouzolzia rugulosa, Vibrunum mullaha, Vibrunum cotinifolium*, etc. (Appendix:V) Wild edible plants were either eaten raw or cooked. Raw food included: fruit (60 species), young shoot (12), whole plant (8), leaf (5), and flower (4) which is shown in the table below (Figure13).

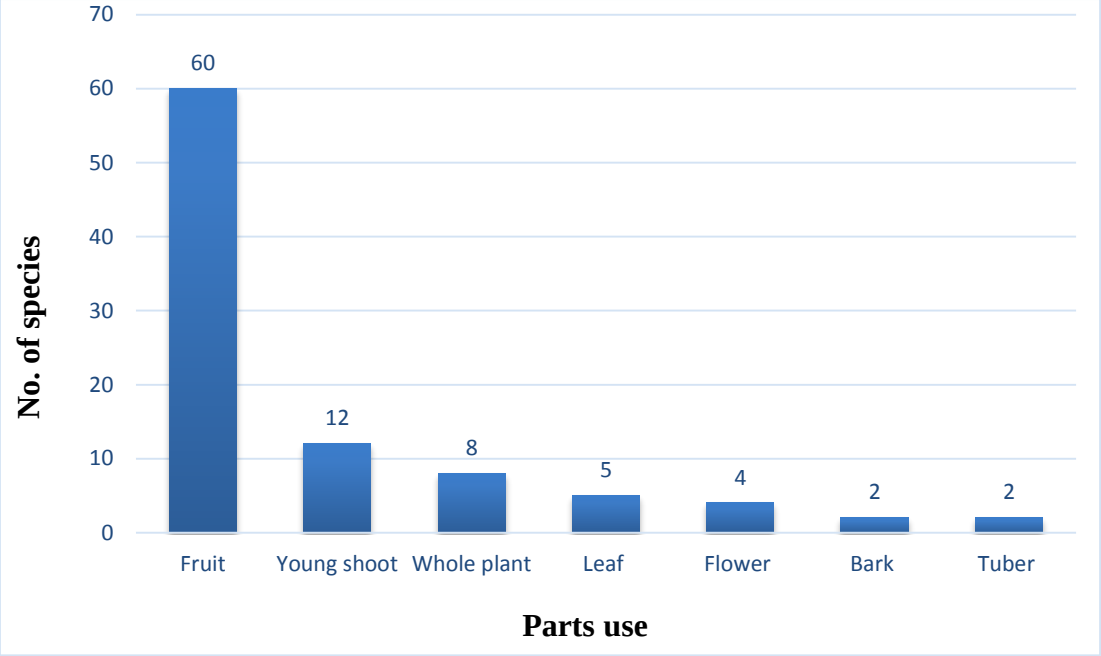


Figure 13: Wild edible plant parts use

3.4 Useful Socio-cultural (religious) Plants

A total of 33 plants (16.42% of total plants) have social (religious and cultural) value. The communities of the study area are very complex. They worship gods and ghosts commonly two-three times every month because they own their culture. Every Purnima of the month has religious value. They believe on the god thoughts and worship of god. Some of important religious plant species are *Juniperus squamata, Artemisia indica, Ficus benghalensis, Diploknema butyracea, Pouzolzia rugulosa Chrysanthemum mutellina, Ocimum tenuiflorum, Juglans regia, Phanera vahlii, Desmodium oojeinense, Betula utilis, Eulaliopsis binata, Cynodon dactylon, , Aegle marmelos, Desmostachya bipinnata* etc. A total of 33 plants (16.42%) have social (religious and cultural) value among which whole plant part were used for 48.48% plant followed by leaves (21.21%), wood (12.12%), flower (9.09%), seed (9.09%), fruit (6.06%) and root (3.03%) shown below (Figure14).

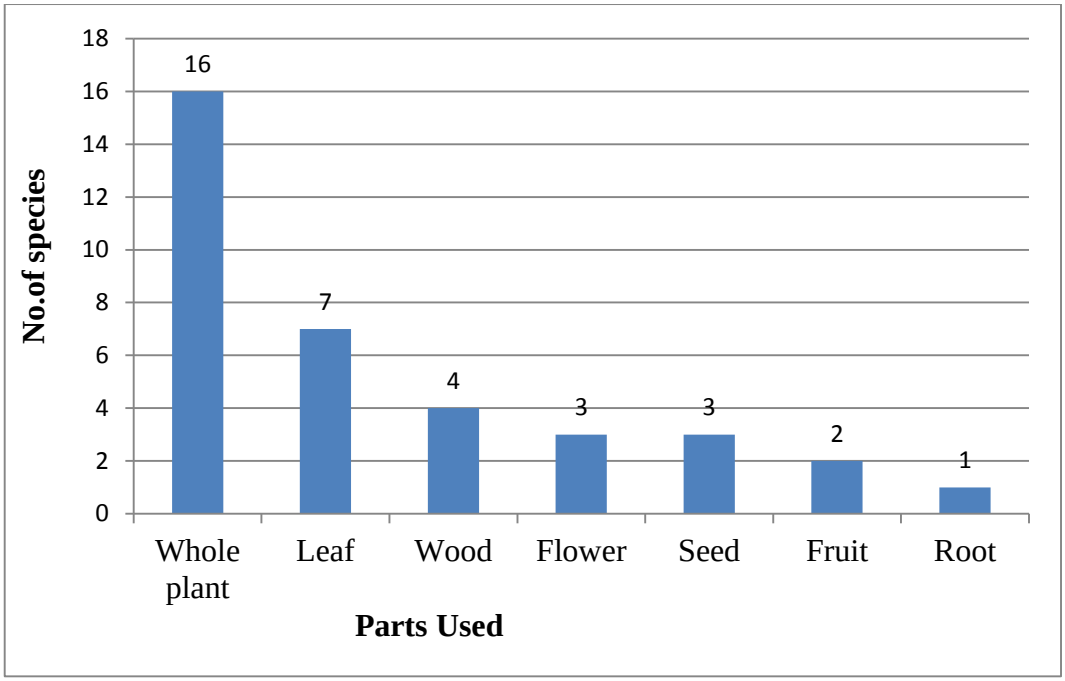


Figure 14: Socio-cultural valuable(Religious) plants part use

3.5 Useful timber plants

Altogether 48 plant species were documented as the most renowned and important timber plants which were mainly used to make local houses, bridges, Temples, and agricultural implements. Some of the most useful and highly demanded plant species are *Taxus contorta, Abies spectablilis, Tsuga dumosa, Pinus roxburghii, Pinus wallichiana, Diploknema butyracea, Pouzolzia rugulosa, Fraxinus floribunda, Toona ciliata, Quercus glauca, Quercus oblongata, Quercus semecarpifolia, Senegalia, catechu, Dalbergia latifolia, Coriaria napalensis, Cornus capitata Cedrus deodara, Alnus nepalensis, Syzygium cumini, Juglans regia* etc.

3.6 Useful fodder plants

Altogether 43 plant species were documented as fodder plants. The study area lifestyle is completely based on local farming like as sheep, cows, buffaloes, and goats are common domesticates animals. Agricultural crop plants remaining parts and fresh wild tree grass and grasslands species are major fodder for animals. Some co"mmonly used fodder plant species are *Pouzolzia rugulosa, Butula alnoides, Fagopyrum dibotrys, Thysanolaena latifolia, Eulaliopsis binate, Drepanostachyum sp., Ficus palmate, Ficus nerifolia, Ficus semicordata, Ficus lacor, Grewia serrulata, Litsea monopetala, Quercus glauca, Quercus lanata, Quercus semecarpifolia,*

Bauhinia variegate, Terminalia alata, Carpinus faginea, Ilex dipyrena, etc. and other seasonal grass species are also very important.

3.7 Informant consensus factor (Fic)

The value of the informant consensus factor ranges from 0.19 to 0.94 with a mean value of 0.72. The genito-urinary problem had highest Fic(0.94) and followed by opthalmological uses (Fic: 0.92), Toxic (Fic: 0.91), Respiratory disorder (Fic: 0.9), Tonic (Fic: 0.88) Gastro-intestinal disorders (Fic:0.19) which was lowest value. The list of plant species in each ailgnments categories is presented in table below Table 3.

Table 3: Categories of ailments and plant species

S.N	**Ailment**	**Details of ailment category**	**Nur.**	**Nt.**	**Fic**	**Plant species**
1	**Toxic**	Poision, Bite, Venom	46	5	0.91	*Barleria cristata, Ricinus communis, Phanera vahlii, Rumex hastatus, Delphinium vestitum,*
2	**Tonic**	Strength to boday	43	6	0.88	*Nardostachys jatamansi, Polygonatum cirrhifolium, Ophiocordyceps sinensis, Coelogyne cristata, Pyrus pashia, Astilbe rivularis*
3	**Skeleto-muscular problems**	Body pain, Fracture, Joint pain	51	16	0.7	*Coriaria nepalensis, Dalbergia latifolia, Senegalia catechu, Trigonella foenum-graecum, Quercus lanata, Juglans regia, Scurrula parasitica, Fraxinus floribunda, Pinus roxburghii, Rheum australe, Rumex nepalensis, Thalictrum foliolosum, Viscum Sp, Taxus contorta, Urtica dioica, Amomum sabulatum*
4	**Respiratory disorder**	Asthama, Bronchitis	32	4	0.9	*Calotropis procera, Rosa macrophylla, Viburnum mullah*
5	**Ophthalmological uses**	Eye problems,	26	3	0.92	*Valeriana hardwickii, Paris polyphylla, Ampelocissus rugosa,*

S.N	Ailment	Details of ailment category	Nur.	Nt.	Fic	Plant species
		such as swelling, itching, eye pain				
6	**Menstrual disorder**	Menstrual problem	3	2	0.5	*Trichosanthes tricuspidata, Astilbe rivularis*
7	**Genito-Urinary problems**	Urinary problems, Post-partum recovery	18	2	0.94	*Macrotyloma uniflorum, Bergenia ciliate*
8	**Hepato-circulatory disorder**	High blood Pressure, Jaundice, Typhoid	21	4	0.85	*Cuscuta reflexa, Swertia chirayita, Neopicrorhiza scrophulariiflora, Saccharum officinarum*
9	**Gastro-intestinal disorders**	Abdominal pain, diarrhea, dysentery, gastric, indigestion,, stomach disorders, vomiting, constripation	47	38	0.91	*Acorus calamus, Achyranthes aspera, Allium sativum, Allium sp, Allium wallichii, Rhus punjabensis, Heracleum candicans, Begonia picta, Berberis angulosa, Berberis aristata, Berberis asiatica, Betula utilis, Cyperus rotundus, Rhododendron arboretum, Falconeria insignis, Bauhinia variegata, Indigofera cassioides, Geranium nepalense, Cinnamomum tamala, Bombax ceiba, Grewia serrulata, Melia azedarach, Cissampelos pareira, Tinospora cordifolia, Ficus auriculata, Musa balbisiana, Myrica esculenta, Syzygium cumini, Oxalis corniculata, Phyllanthus emblica, Plantago major, Imperata cylindrical,*

S.N	Ailment	Details of ailment category	Nur.	Nt.	Fic	Plant species
						Thysanolaena latifolia, Aegle marmelos, Nicandra physalodes, Elatostema platyphyllum, Pouzolzia rugulosa, Zingiber officinale
10,	**Fever and headache**	Fever, headche	28	10	0.66	*Centella asiatica, Asparagus filicinus, Dahlia pinnata, Drymaria cordata, Hellenia speciosa, Mentha arvensis, Ocimum basilicum, Morchella esculenta, Nephrolepis cordifolia, Rubia manjith*
11.	**ENT problem**	Cough and cold throat pain, ear-achene	31	7	0.77	*Cucurbita pepo, Solena heterophylla, Ocimum tenuiflorum, Cheilanthes albomarginata, Aconitum spicatum, Nicotiana tabacum, Curcuma longa*
12.	**Dental problems**	Toothache, swelling around the teeth, wounds	17	3	0.87	*Agave Americana, Agave cantala, Zanthoxylum oxyphyllum*
13.	**Dermatological disorder**	Skin diseases, mumps, cracks on skin, scorpion bites, burns allergies	36	18	0.51	*Lycoperdon perlatum, Aloe vera, Arnebia benthamii, Lyonia ovalifolia, Jatropha curcas, Elsholtzia blanda, Lilium nepalense, Woodfordia fruticosa, Ficus benghalensis, Ficus palmata, Cedrus deodara, Prinsepia utilis, Prunus persica, Boenninghausenia albiflora, Zanthoxylum armatum, Aesculus indica, Diploknema butyracea, Solanum lycopersicum*

S.N	**Ailment**	**Details of ailment category**	**Nur.**	**Nt.**	**Fic**	**Plant species**
14.	**Cut and wounds**	Cut wounds, bleeding	47	19	0.6	*Ageratina adenophora, Ainsliaea aptera, Artemisia indica, Bidens pilosa, Leibnitzia nepalensis, Impatiens balsamina, Alnus nepalensis, Cannabis sativa, Macaranga denticulata, Ganoderma lucidum, Colebrookea oppositifolia, Reinwardtia indica, Dactylorhiza hatagirea, Meconopsis paniculata, Cynodon dactylon, Prunus cerasoides, Selaginella biformis, Usnea florida, Usnea thomsonii.*

(AC: ailments category, Nur. Number of use report, Nt. Number of Taxa and Fic. Informant consensus factor)

3.8 Use Frequency (UF)

Based on use frequency (UF) of overall use the most frequently used species of the study area were *Pouzolzia rugulosa* (0.73), *Terminalia alata* (0.71), *Desmostachya bipanata* (0.71), *Diploknema butyracea* (0.71), *Grewia serrulata* (0.69), *Berberis aristata* (0.65), *Phanera vahlii* (0.65), *Leibnitzia nepalensis* (0.59), *Cuscuta reflexa* (0.59), *Ficus nerifolia* (0.52), and *Woodfordia fruticosa* (0.55) (Table 4) (Figure 15).

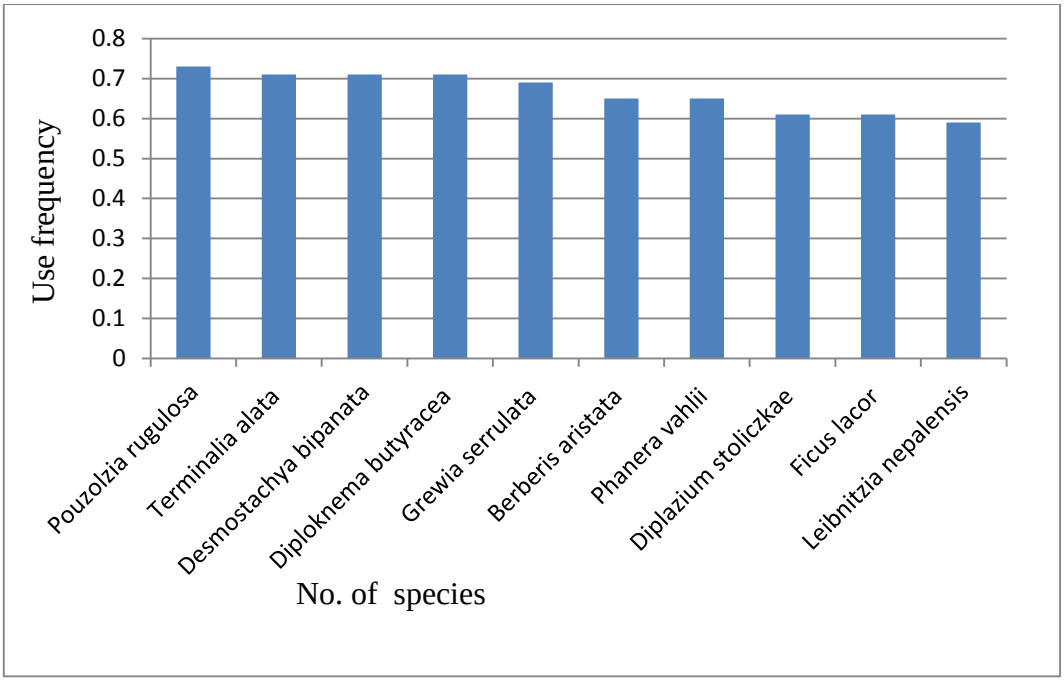


Figure 15: Overall use frequency of useful plants

3.9 Use Value (UV)

Most of the plants used in the study area had multiple uses, nearly one third of total species single use (79 species). while the rest has two (79 species) 31 species three four (13 species), 7species five and (2 species) six uses. On the basis of multiple use categories of single species overall use value was calculated (Table 4). The most useful plant species in terms of overall use-value considering all use categories were *Grewia serrulata* (UV = 3.13), *Diploknema butyracea* (2.91), *Eulaliopsis binata* (2.55), *Cannabis sativa* (2.22), *Zanthoxylum oxyphyllum*(2.22), *Lindera megaphylla*, (2.2), *Juglans regia* (2.05), *Cinnamomum tamala* (2) *Girardinia diversifolia* (2) and *Phanera vahlii* (1.94) The use value of top ten species are shown in (Figure 16).

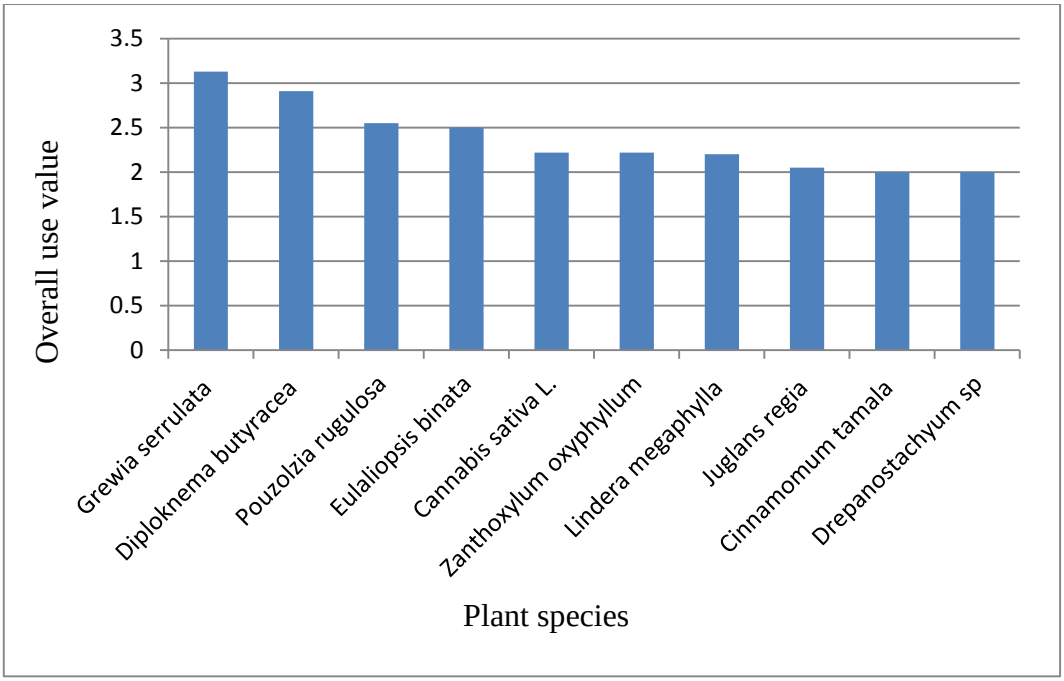


Figure 16: Overall use value of useful plants

Table 4: Useful plant species with their use frequency and use value

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
1	*Barleria cristata* L.	1	1	0.01	1
2	*Justicia adhatoda* L.	9	1	0.17	1
3	*Acorus calamus* L.	17	1	0.32	1
4	*Lycoperdon perlatum* Pers.	8	1	0.15	1
5	*Achyranthes aspera* L.	13	1	0.25	1
6	*Allium sativum* L.	15	1	0.28	1
7	*Allium* sp	16	1	0.3	1
8	*Allium wallichii* Kunth	17	1	0.32	1
9	*Rhus punjabensis* J.L.Stewart ex brandis	1	1	0.01	1
10	*Toxicodendron succedaneum* (L.) Kuntze	17	2	0.32	1.29
11	*Centella asiatica* (L.) Urb.	23	1	0.44	1

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
12	*Heracleum candicans* Wall. Ex DC.	9	1	0.17	1
13	*Calotropis procera* (Aiton.) Aiton fil.	14	1	0.26	1
14	*Ilex dipyrena* Wall.	11	2	0.21	1.36
15	*Arisaema costatum* (Wall.) Mart.	18	1	0.34	1
16	*Arisaema griffithii* Schott.	21	2	0.4	1.42
17	*Phoenix acaulis* Roxb.	12	1	0.23	1
18	*Agave americana* L.	16	2	0.3	1.25
19	*Agave cantala* (Haw.) Roxb.ex Salm-Dyck	19	1	0.36	1
20	*Asparagus filicinus* (Buch.-Ham.ex D.Don) Kamble	15	2	0.28	1.53
21	*Polygonatum cirrhifolium* (Wall.) Royle	14	2	0.26	1.57
22	*Aloe vera* (L.) Burm.f.	8	1	0.15	1
23	*Ageratina adenophora* (Spreng.) R.M. King &H.Rob.	7	1	0.13	1
24	*Ainsliaea aptera* DC.	8	1	0.15	1
25	*Artemisia indica* Willd.	9	2	0.17	1.77
26	*Bidens pilosa* L.	28	2	0.53	1.14
27	*Chrysanthemum mutellina* (Hand.-Mazz.) Hand.-Mazz.	19	1	0.36	1
28	*Dahlia pinnata* Cav.	24	2	0.46	1.12
29	*Leibnitzia nepalensis* (Kunze) Kitam.	31	1	0.59	1
30	*Saussurea* sp	10	1	0.19	1
31	*Athyrium strigillosum* (T. Moore	19	1	0.36	1

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
	ex E. J.Lowe)				
32	*Diplazium esculentum* (Retz.) Sw.	14	1	0.26	1
33	*Diplazium stoliczkae* Bedd.	32	1	0.61	1
34	*Impatiens balsamina* L.	14	2	0.26	1.21
35	*Begonia picta* Sm.	28	1	0.53	1
36	*Berberis angulosa* Wall.ex Hook.f.&Thomson	31	1	0.59	1
37	*Berberis aristata* DC.	34	1	0.65	0.91
38	*Berberis asiatica* Roxb.ex DC.	17	1	0.32	1.23
39	*Alnus nepalensis* D.Don	7	1	0.13	1
40	*Betula utilis* D.Don	12	2	0.23	1.41
41	*Carpinus faginea* Lindl.	16	2	0.3	1.37
42	*Arnebia benthamii* (Wall.ex G.Don) Jhonston	18	1	0.34	1
43	*Sarcococca hookeriana* Baill.	14	2	0.26	1.42
44	*Cannabis sativa* L.	9	2	0.17	2.22
45	N*ardostachys jatamansi* (D. Don) DC.	7	1	0.13	1
46	*Valeriana hardwickii* Wall.	23	1	0.44	1
47	*Drymaria cordata* (L.) Willd.ex Schult.	21	1	0.4	1
48	*Terminalia alata* Roth	37	2	0.71	1.05
49	*Cuscuta reflexa* Roxb.	31	1	0.59	1
50	*Coriaria napalensis* Wall.	7	3	0.13	1.85
51	*Cornus capitata* Wall.ex Roxb.	22	4	0.42	1.68
52	*Hellenia speciosa* (J. Koenig) S.R.Dutta	16	1	0.3	1

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
53	*Cucurbita pepo* L.	7	1	0.13	1
54	*Solena heterophylla* Lour.	8	1	0.15	1
55	*Trichosanthes tricuspidata* Lour	9	1	0.17	1
56	*Juniperus* squamata Buch.-Ham.ex D.Don	17	1	0.32	1
57	*Cyperus rotundus* L.	8	2	0.15	1.75
58	*Shorea robusta* C.F. Gaertn.	5	1	0.09	1
59	*Elaeagnus kanaii* Momiy.	15	1	0.28	1
60	*Lyonia ovalifolia* (Wall.) Drude	8	2	0.15	1.12
61	*Rhododendron arboreum* Sm.	9	1	0.17	0.11
62	*Euphorbia royleana* Boiss.	3	2	0.05	1.33
63	*Falconeria insignis* Royle	5	2	0.09	0.6
64	*Jatropha curcas* L.	6	1	0.11	1
65	*Macaranga denticulata* (Blume) Mull.Arg.	7	2	0.13	1.14
66	*Ricinus communis* L.	6	1	0.11	1
67	*Bauhinia variegata* L.	23	4	0.44	1.78
68	*Dalbergia latifolia* Roxb.	27	2	0.51	1.11
69	*Desmodium oojeinense* (Roxb.) H.Ohashi	17	3	0.32	1.88
70	*Indigofera cassioides* DC.	21	2	0.4	1.09
71	*Macrotyloma uniflorum* (Lam.) Verdc	25	2	0.48	1.48
72	*Phanera vahlii* (Wight & Arn.)Benth.	34	6	0.65	1.94
73	*Senegalia catechu*(L.f.) P.J.H. Hurter & Mabb.	16	2	0.3	1.18

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
74	*Trigonella foenum-graecum* L.	11	2	0.21	1.45
75	*Castanopsis indica* (Roxb. Ex Lindl.) A.DC.	18	3	0.34	1.27
76	*Quercus glauca* Thunb.	19	3	0.36	1.73
77	*Quercus lanata* Sm.	24	3	0.46	1.2
78	*Quercus oblongata* D.Don	3	2	0.05	1.66
79	*Quercus semecarpifolia* Sm.	7	2	0.13	1.42
80	*Ganoderma lucidum*(Curtis) P. Karst.	8	1	0.15	1
81	*Swertia chirayita* (Roxb.) H.Karst	20	1	0.38	1
82	*Geranium* nepalense Sweet	16	1	0.3	1
83	*Hericium erinaceus* (Bull.) Persoon	19	1	0.36	1
84	*Juglans regia* L.	20	3	0.38	2.05
85	*Colebrookea oppositifolia* Sm.	9	2	0.17	1.33
86	*Elsholtzia blanda* (Benth.) Benth	3	2	0.05	1.66
87	*Mentha arvensis* L.	9	2	0.17	1.55
88	*Ocimum basilicum* L.	6	2	0.11	1.5
89	*Ocimum tenuiflorum* L.	23	2	0.44	1.52
90	*Stauntonia angustifolia* (Wall.) Christenh.	8	1	0.15	1
91	*Cinnamomum tamala* (Buch.-Ham.) Nees &Eberm	9	2	0.17	2
92	*Lindera megaphylla* Hemsl.	5	2	0.09	2.2
93	*Lindera pulcherrima* (Nees) Benth.ex Hook.f.	8	2	0.15	1
94	*Litsea monopetala* (Roxb.ex Baker) Pers	5	2	0.09	1.4

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
95	*Lilium nepalense* D.Don	17	2	0.32	1.17
96	*Reinwardtia indica* Dum.	19	2	0.36	1.31
97	*Scurrula parasitica* L.	22	2	0.42	1.4
98	*Punica granatum* L.	18	1	0.34	1
99	*Woodfordia fruticosa* (L.) Kurz	29	1	0.55	1
100	*Bombax ceiba* L.	23	2	0.44	1.34
101	*Grewia serrulata* DC.	36	4	0.69	3.13
102	*Sterculia villosa* Roxb.ex Sm.	21	2	0.4	1.61
103	*Paris polyphylla* Sm.	20	1	0.38	1
104	*Melia azedarach* L.	7	1	0.13	1
105	*Toona ciliata* M. Roem.	9	1	0.17	1
106	*Cissampelos pareira* L.	13	2	0.25	1.84
107	*Tinospora cordifolia* (Willd.) Miers	17	1	0.32	1
108	*Ficus auriculata* Lour.	14	3	0.26	1.57
109	*Ficus benghalensis* L.	19	3	0.36	1.89
110	*Ficus lacor* Buch.-Ham.	32	4	0.61	1.62
111	*Ficus nerifolia* Sm.	30	4	0.57	1.9
112	*Ficus palmata* Forssk.	2	3	0.03	1.5
113	*Ficus semicordata* Buch.Ham.ex.Sm.	3	2	0.05	1.66
114	*Morus australis* Poir.	5	2	0.09	1.8
115	*Morus serrata* Roxb.	7	3	0.13	1.71
116	*Morchella esculenta* Fr.	8	1	0.15	0.12
117	*Musa balbisiana* colla	26	3	0.5	1.69
118	*Myrica esculenta* Buch.-Ham.ex D.Don.	21	3	0.4	1.38

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
119	*Syzygium cumini* (L.) Skeels	18	3	0.34	1.61
120	*Nephrolepis cordifolia* (L.) K. Presl	29	1	0.55	1
121	*Fraxinus floribunda* Wall.	21	3	0.4	1.47
122	*Ophiocordyceps sinensis* (Berk.) G.H. Sung, Hywel-Jones & Spatafora	23	3	0.44	1.34
123	*Ophioglossum reticulatum* L.	18	1	0.34	1
124	*Coelogyne cristata* Lindl.	9	1	0.17	1
125	*Dactylorzia hatagirea* (D.Don.) Soo	12	1	0.23	1
126	*Oxalis corniculata* L.	20	1	0.38	1
127	*Meconopsis paniculata* (D.Don) Prain	9	1	0.17	1
128	*Phyllanthus emblica* L.	18	2	0.34	1.5
129	*Abies Pindrow* Royle	7	1	0.13	1
130	*Abies spectablilis* (D.Don) Mirb.	9	1	0.17	1
131	*Cedrus deodara* (Roxb. ex D.Don) G.Don	9	2	0.17	1.33
132	*Picea smithiana* (Wall.) Boiss	5	1	0.09	1
133	*Pinus roxburghii* Sarg.	9	2	0.17	1.55
134	*Pinus wallichiana* A.B. Jacks.	11	1	0.21	1
135	*Tsuga dumosa* (D.Don) Eichler	29	1	0.55	1
136	*Neopicrorhiza scrophulariiflora* (Pennell) D. Y. Hong	7	1	0.13	1
137	*Plantago major* L.	6	1	0.11	1
138	*Cynodon dactylon* (L.) Pers.	13	1	0.25	1
139	*Desmostachya bipinnata* (L.) Stapf	37	1	0.71	1

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
140	*Drepanostachyum* sp	2	3	0.03	2
141	*Eulaliopsis binata* (Retz.) C.E. Hubb.	26	3	0.5	2.5
142	*Imperata cylindrica* (L.) P. Beauv.	17	2	0.32	1.52
143	*Saccharum officinarum* L.	19	3	0.36	1.52
144	*Thysanolaena latifolia* (Rox.ex Hornem) Honda	26	2	0.5	1.26
145	*Fagopyrum dibotrys (D.Don) H.Hara*	9	2	0.17	1.55
146	*Rheum australe* D.Don.	6	2	0.11	2
147	*Rumex hastatus* D.Don	11	1	0.21	1
148	*Rumex nepalensis* Spreng.	23	2	0.44	1.34
149	*Myrsine africana* L.	27	2	0.51	1.25
150	*Myrsine semiserrata* Wall.	20	3	0.38	1.6
151	*Cheilanthes albomarginata* C.B. Clarke	3	1	0.05	1
152	*Aconitum spicatum* (Bruihl) Stapf	4	2	0.07	0.75
153	*Delphinium vestitum* Wall.ex Royle	2	1	0.03	1
154	*Thalictrum foliolosum* DC.	1	1	0.01	1
155	*Fragaria nubicola* (Hook.f.) Lindl.ex Lacaita	19	1	0.36	1
156	*Potentilla indica* (Andrews) Wolf	19	1	0.36	1
157	*Prinsepia utilis* Royle	15	3	0.28	1.46
158	*Prunus cerasoides* D.Don	29	4	0.55	1.72
159	*Prunus persica* (L.) Stokes	8	2	0.15	1.5
160	*Pyracantha crenulata* (D.Don) M. Roem.	4	2	0.07	1.5

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
161	*Pyrus pashia* Buch.-Ham. Ex D.Don	6	3	0.11	1
162	*Rosa macrophylla* Lindl.	20	1	0.38	1
163	*Rubus acuminatus* Sm.	14	1	0.26	1
164	*Rubus biflorus* Buch.-Ham.ex Sm.	16	1	0.3	1
165	*Rubus ellipticus* Sm.	19	1	0.36	1
166	*Rubus nepalensis* (Hook.f.) Kuntze	14	1	0.26	1
167	*Rubus paniculatus* Smith.	9	1	0.17	1
168	*Rubia manjith* Roxb.	21	1	0.4	1
169	*Aegle marmelos* Corr.	23	2	0.44	1.56
170	*Boenninghausenia albiflora* (Hook.) Rchb.ex Meisn	1	1	0.01	1
171	*Zanthoxylum armatum* DC.	17	2	0.32	1.41
172	*Zanthoxylum oxyphyllum* Edgew.	9	2	0.17	2.22
173	*Viscum* Sp	5	2	0.09	1.6
174	*Aesculus indica* (Colebr.ex.Cambess) Hook.	8	2	0.15	1.75
175	*Diploknema butyracea* (Roxb.) H.J.Lam	37	5	0.71	2.91
176	*Astilbe rivularis* Buch.Ham..ex D.Don	20	1	0.38	1
177	*Bergenia ciliata* (Haw.)Sternb.	7	1	0.13	1.57
178	*Schisandra propinqua* (Wall.) Baill.	1	2	0.01	2
179	*Selaginella biformis* A. Braun ex Kuhn	18	1	0.34	1
180	*Nicandra physalodes* (L.) Gaertn	15	2	0.28	1.2
181	*Nicotiana tabacum* L.	11	1	0.21	1

S.N	Botanical name	Number of informants for each species (of the total 52)	Use categories	UF of overall Useful	UV of overall Usefulness
182	*Solanum lycopersicum* L.	27	1	0.51	1.33
183	*Solanum nigrum* L.	19	1	0.36	1
184	*Solanum pseudo-capsicum* L.	26	2	0.5	1.26
185	*Taxus contorta*Griff.	9	2	0.17	1.77
186	*Daphne bholua* Buch.-Ham.ex D.Don	26	2	0.5	1.26
187	*Daphne papyracea* Wall.ex G.Don	11	1	0.21	1
188	*Debregeasia longifolia* (Burm.f.) Wedd.	21	2	0.4	1.52
189	*Elatostema platyphyllum* Wedd.	17	1	0.32	1
190	*Girardinia diversifolia* (Link.) Friis	9	2	0.17	2
191	*Urtica dioica* L.	8	2	0.15	1.87
192	*Pouzolzia rugulosa* (Wedd.) Acharya &Kravtsova	38	5	0.73	2.55
193	*Usnea florida* (L.) Weber ex F.H. Wigg.	12	1	0.23	1
194	*Usnea thomsonii* Stirt.	15	2	0.28	1.2
195	*Viburnum cotinifolium* D.Don	9	1	0.17	1
196	*Viburnum mullaha* Buch-Ham.ex D.Don	7	2	0.13	1.42
197	*Ampelocissus latifolia* (Roxb.) Planch.	13	1	0.25	1
198	*Ampelocissus rugosa* (Wall.ex Roxb.) Planch	11	2	0.21	1.63
199	*Amomum sabulatum* Roxb.	10	1	0.19	1
200	*Curcuma longa* L.	9	1	0.17	1
201	*Zingiber officinale* Roscoe	28	1	0.53	1

3.10 Conservation and Management of Medicinal Plants

High demand and multiple-use category of plants causes loss of plant species from vulnerable to extinction. As a result of the threat, the Nepal government promoted the cultivation of many medicinal species through its policy and law. Some species are banned for collection and trade. The establishment of conservation areas supports for the protection of high valued useful plants. Numerous plant species are listed in several official threat categories, demonstrating that these hazards are widespread. Species such as *Taxus contorta* is included in the Endangered (EN) in the IUCN Red List category and CITES Appendix II, *Nardostachys jatamansii* is critically Endangered (CR) in IUCN Red List Category and CITES Appendix II, *Coelogyne cristata, Dactylorhiza hatagirea* are listed in CITES Appendix: II. There are highly valuable medicinal plants *Paris polyphylla, Neopicrorhiza scrophulariiflora, Aconitum spicatum, Valeriana jatamansii, Morchella esculenta, Ophiocordyceps* sp., *Hericium ernaceus* etc in the study area (Table:5).

Table 5: Endangered and Threatened Plants reported from study area

S.N	**Family**	**Scientific name**	**Local name**	**Conservation Status**	
				CITES	**IUCN**
1	Caprifoliaceae	*Narostachys jatamansi* (D.Don) DC.	भुल्ते	II	EN
2	Euphorbiaceae	*Euphorbia royleana* Boiss.	सिउँडी	II	
3	Fabaceae	*Dalbergia latifolia* Roxb.	खयर	II	VU
4	Melanthiaceae	*Paris polyphylla* Sm.	सतुवा		VU
5	Orchidaceae	*Coelogyne cristata* Lindl.	पानीपखरा	II	
6	Pinaceae	*Abies spectabilis* (D.Don) Mirb.	ठिगो		NT
7	Taxaceae	*Taxus contorta* Griff.	लैंटो	II	EN
8	Orchidaceae	*Dactylorhiza hatagirea*	पाँचऔँले	II	VU

CHAPTER 4: DISCUSSION

4.1 Characteristics of Informants and Traditional Knowledge

The local people of Aathbiskot Municipality, Sylakhadi-Gotamkot and Daaje Danphe Ghetma area, Rukum West Nepal were rich in terms of traditional knowledge about plant utilization. Most of the informants reported numbers of plant species used in different use categories like medicinal plants (68.16%), wild edible plants (44.28%), timber (23.88%) and religious (16.42%). Previously Bhatta (1999) carried out ethnobotanical research in Vijayashori village of Rukum district and reported 44 locally useful plants. Among them (43.18%) had medicinal value, fodder (27.27%), construction, furniture and agricultural implements (22.72%), edible fruit (38.63%), miscellaneous uses like basketry, fibre yielding religious and cultural purposes, fish poisoning, ornamental etc. (18.18%).

Manandhar (1995) documented ethnobotany in adjoining district Jajarkot and reported 60 plants used as traditional medicines. Kunwar et al. (2006) reported 107 types of ethnomedicinal plants from Dolpa. Eighty two species of medicinal plant were documented from Rolpa (Budha-Magar *et al*., 2020). According to Panta *et al*. (2021), 37 wild edible plants were documented from Pyuthan.

The local people of Aathbiskot Municipality and their lifestyle are dependent on the surrounding environment and useful plant resources. Ethnobotanical knowledge is not only focused on medicinal or food values. The reason may be their rural and remote locality and lack of alternative resources, as evidenced by the relatively large number of species of ethnomedicinal plant (137) and wild edible species (89). On the other side, they hold traditional beliefs regarding the use of modern medical facilities and supernatural power. It is an attempt to document the entirity of lifestyle, including cultural values, food, medical products, consumable goods, timber, and fiber from 12 distinct plant categories. Using useful plants to solve their daily life demand and problem is as long as their history. In the case of locally available species fresh plant parts were used whereas for high-altitudinal plants storage is common. This shows that high-altitude useful plants were not collected on a regular yearly basis for domestic use.

The socioeconomic level, lifestyle, and profession are some of the variables that may influence the distribution of knowledge about the uses of plants within a local community (Toledo *et al*., 2009). This is supported by the present study; relation between useful plants and age show that older people have greater knowledge and use of useful plants than younger ones. Older people had more experience and contact with the plant resources. This may indicate that the knowledge on indigenous useful plant is declining among the younger generations in the study area. It could be attributed to the low interest of the younger generation to inherit and use ethnobotanical knowledge. Similar findings were also reported by Luitel *et.al* (2014), Budha Magar (2016), Bhattarai (2018), and Khakurel (2019).

This suggests that knowledge will transfer and use of useful plants from parents as long as they belong to a knowledgeable family and their lifestyle in a particular local area. So knowledge of useful plants is dependent on their lifestyle and available alternative sources and their interest. In the study area women were not ready to give interviewes because of their hesitation but least women participate in the interview. Knowledge of medicinal plants among the gender was independent in the study area because respondents were selected from the referring key informants who were equally knowledgeable but variation in knowledge was observed in the case of medicinal use Women were more knowledgeable. But overall use category of useful plants knowledge in men. The result is similar from Luitel et.al. (2014) who reported women were more knowledgeable in Tamang community in Makawanpur district, and Bhattrai (2018), who reported women were more knowledgeable in MAPs in the Thami community in eastern Nepal. But Khakurel (2019) supports this work where his work was done in Madi Rural municipality, Kaski District Nepal.

4.2 Ethnobotany and Useful Plants

This study is based solely on transects and is ethnobotanically oriented, therefore there is still a good chance that more species will be recorded as being native to this area. Rukum West district is one of the remote districts of Nepal. This region is bestowed with a diversity of wild plant resources, including medicinal, food, fiber, timber fodder, and poisonous, religious cultural, and dye-yielding plants. This is the very first study conducted in a mixed community. This study documented and provided the importance of plants for the fulfillment of the daily needs of people in

Sylakhadi-Gotamkot, Daje Danphe Ghetma area of Rukum West Nepal. The recordings, of this study support the possibility of recording new information of ethnobotanical importance through extensive ethnobotanical study as the previous studies (Gautam 2012; Thapa 2015). Most of the wild plant species were used for food and medicine as reported in other parts of Nepal (Kunwar and Bussmann 2008; Gautam 2012; Uprety *et al*., 2012; Budha Magar 2016; Khakurel 2019) as well as elsewhere in the world (Rossato *et al*., 1999).

The majority of plant species were used in medicine (137) species followed by food (wild edible), timber fuelwood, fodder, and religion. For 14 ailments categories, 137 ethnomedicinal plants in total have been reported. Genito-Urinary issues (urinary issues, postpartum recovery) have high values (Fic=0.94), which suggest that problems with pregnancy mother care and drinking water are present.On the other hand, all of the informants were farmers and hard workers who weren't much concerned with their health care. After giving birth to a child, they barely have rest and continue their work in the field doing things like household work and carrying heavy objects like firewood and grass that were seen during the field visit.

The fact that 89 species of wild edible plants from the study area suggests that availability, dependency and consumption habits play a significant effect. The most common wild edible plants were *Diploknema butyracea, Cornus capitata, Solena heterophylla, Elaeagnus kanaii, Bauhinia variegata, Phanera vahlii, Juglans regia, Cinnamomum tamala, Grewia serrulata, Sterculia villosa, Debregeasia longifolia, Pouzolzia rugulosa, Vibrunum mullaha, Vibrunum cotinifolium, Hericium erinaceus.*Farmers have long lived near forests and they are more or less depend on wild edible fruits.

This result was different from similar studies in different parts of the country. Gautam (2012) reported the majority of species were used in food. Thapa (2015) found the majority of species were used in fodder. This is because the mixed communities are involved mainly in agro-pastoral activities. Strong cultural beliefs, inaccessibility of modern facilities and limited interactions with the outer world (Manandhar, 2002; Budha Magar, 2016) have made the locals, totally dependent on natural resources.

This study shows herbs were the most commonly used species and mainly their leaves and young shoots were harvested which was similar to the previous trends (Shrestha and Dhillon, 2003; Gautam, 2012; Thapa, 2015).

The medicinal plant parts were mostly used as juice, followed by paste, powder, decoction, and chewing (Kunwar *et al*. 2013; Budha Magar.2016; Khakurel 2019). In some cases, oil, burned ash, sap, latex, and resins of the plants were also used as medicine. But, Thapa (2015) reported that medicinal plant parts were mostly formulated as powder. Some plants can be formulated in multiple preparation methods based on the knowledge provided to the individual by their predecessors (Uprety *et al*., 2010; Bhattarai *et al*., 2006). The food plants were eaten mostly raw than cooked. Mainly fruits, seeds, and young shoots were eaten raw.

Quantitative techniques such as Informant Consensus Factor (Fic), Use Frequency (UF), and Use Value (UV) have been used to analyze the usefulness of the ethnobotanical species (Philips & Gentry, 1993; Rossato *et al*., 1999; Tardio and Santayana, 2008). Fic values were determined to know the agreement among the informants of the study area for the use of plants to treat certain ailment categories.

The Fic value in 3 ailment categories i.e., Toxic (0.91), Tonic (0.88), and Skeleto-Muscular disorder (0.7) was high, which are indicating a high level of informant agreement compared to similar studies conducted in Nepal Himalaya (Kunwar *et al*. 2010), Rolpa District (Budha Magar, 2016) and Kaski (Khakurel, 2019). The plant species having a high value of Fic were supposed to be efficient in treating particular ailments.

4.3 Use value and use frequency of overall plants

The UF of overall useful plant species was high. This is because the UF value depends on the number of informants who cites plant species for their effectiveness and easy accessibility (Tardio and Santayana, 2008). Here, *Pouzolzia regulosa, Terminalia alata, Desmostachya bipanata, Diploknema butyracea* and *Grewia serrulata* had with highest UF value of overall useful. Similarly, the UV overall species is highest *Grewia serrulata* (3.13) followed by *Diploknema butyracea* (2.91*), Pouzolzia rugulosa* (2.55), and *Eulaliopsis binata* (2.5) respectively. This may be due

to the high-use reports for each species because most of the species were cited for multiple use categories (Tardio and Santayana, 2008). Thus, the highest important (Fic, UF & UV) values shown by useful plants indicate that these species are highly preferred by local people which might be due to easy accessibility or easy to harvest.

4.4 Conservation and Management of Useful Plants

Conservation of biodiversity is integral to the biological and cultural inheritance of many people and the critical components of healthy ecosystems that are used to support economic and social developments. Because the over trade and utilization of resources may cause the extinction of valuable species so it is necessary to regulate and safeguard certain species from overexploitation requires international cooperation (Kala, 2009), the modern conservation strategies include the IUCN red list and the CITES that enable to regulate the over-exploitation of valuable biodiversity including rare and endangered species of useful plants.

The combination of well-designed, well-monitored, and local people-centered managed systems, In-situ or Ex-situ practices should be enough to protect all land plant species through the next few decades of rapid global change. The community-based conservation approach is one emerging concept in biodiversity conservation (Colding *et.al.*, 2003). For the conservation of natural resources local people-centered awareness programs and together for conservation concepts should be developed and giving ownership of natural resources to local people and encouraging profitable uses of those resources should provide local people for conservation and sustainable use economic development (Child, 2002).

Cultivation practices of useful plants are started in different areas of Nepal which is important for the improvement of the lifestyle of local people. Useful plants (Medicinal, fiber, food, and other required plants) are viewed as possible bridges between sustainable economic development, affordable health care, and the conservation of major biodiversity. Therefore proper knowledge and awareness to provide cultivation techniques, economic support, and markets may encourage the farmers to cultivate useful plant species.

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The Sylakhadi-Gotamkot area, Rukum West district represents one of the important cultural sites as well as the area that harbors a wide variety of useful plants with a huge number of high-value useful plants (Medicinal, wild edible, timber, fodder, and religious plants). The local people of Aathbiskot Municipality residing have a greater dependency upon natural resources for subsistence and livelihood. A total of 201 plant species with 137 medicinally used, 89 wild edible, 48 timber, 43 fodder, and 33 socially used (religious cultural value), plant reported from the study area shows that the area is rich in terms of biodiversity and traditional knowledge. A large number of plants are used for local health and whole lifestyle support.

A discrepancy between medicinal plant knowledge among the younger generations and older generations from study shows the knowledge between the inter-generational gap. The gap may be particularly due to the lack of interest of younger generations, decreasing natural resources, and increasing access to modern medicine. Since knowledge of medicinal plants as well as useful plant study is of utmost importance to document this knowledge for future generations. Both biological diversity and traditional knowledge are inextricably interlinked, and the loss of one directly affects the other.

Therefore the documentation of ethnobotanical knowledge is necessary for their traditional values and the conservation and sustainable use of the plants. This can further lead to considering access and benefit sharing (ABS) mechanisms under the framework of the convention on biological diversity and Nagoya Protocol.

On the other hand, high-value demand plant species and less available resources have a high chance of habitat degradation, habitat loss, and habitat fragmentation because of unsustainable harvesting and illegal harvesting has a remarkable reduction of population density. Highly traded and over-exploitation species in the past *Nardostachys jatamansii, Neopicrorhiza scrophulariiflora, Paris polyphylla, Dactylorhiza hatagirea* and *Taxus contorta*.

The main factor that influences the threat of useful plants in the study area has arisen from agricultural expansion, firewood, and construction. The utilization and harvesting of useful plants for the remedies of ailments and disorders cause negligible threat. Whereas threats that erode indigenous knowledge emanate from secrecy, oral-based knowledge transfer, reluctance of young generations to gain knowledge, unavailability of the species, the influence of modern education, change the occupation, and awareness factors are the major ones. Further biological studies should be conducted for the flora and fauna exploration and take benefit from them.

5.2 Recommendations

The Socio-economic and cultural, demographic, developmental, and political changes in recent years in this region have affected the indigenous knowledge and biodiversity, so focus should be given for

- To safeguard biodiversity from additional depletion, it is essential to manage overexploitation and foster a shift in awareness.
- To Evaluating the impact of socio-political changes on valuable biodiversity allows us to understand their influence on ecosystems and species conservation.
- Local communities should have control over resources for conservation and sustainable utilization. This approach not only deters illegal harvesting by outsiders but also fosters economic growth within the community.

REFERENCES

Acharya, K.P. and Acharya, R. 2009. Ethnobotanical study of medicinal plants used by Tharu community of parroha VDC, Rupandehi district, Nepal. *Scientific World*, **7:**84. DOI: https://doi.org/10.3126/sw.v7i7.3832.

Akerele, O.B.A. 1993. Nature's medicinal bounty: don't throw it away.*World Health Forum,* **14**: 390-395.

Akinyemi, D.S and Oke, S.O. 2014. Floristic composition and structural diversity of Shasha Forest Reserve in Ile-Ife, southwestern Nigeria. *Notulae Scintia Biologicae,* **6**(4): 433-440.

Alcorn, J.B. 1995. The scope and aims of ethnobotany in a developing world. In: *Ethnobotany: evolution of a discipline* . (Shulters, R.E. and Von. Reis (eds.), Portland, Dioscorides Press. Pp. 23-49.

Alexiades, M. 1996. Collecting ethnobotanical data. An introduction to basic concepts and techniques In: *Selected Guideline for Ethnobotanical Research: A Field Manual*. (Alexiades, M. (eds.), The New York Botanical Garden, USA Sheldon, JW, pp. 53–94.

Anonymous, 1970. *Medicinal plants of Nepal.* Department of Medicinal plants, Kathmandu Nepal.

Anyinam, C. 1995. Ecology and ethnomedicine: exploring links between current environmental crisis and indigenous medicinal practices. *Social Science and Medicin*e, **40**: 321–332.

Arulappan, M.T., Britto, S.J, Ruckmani, K. and Kumar, R.M. 2015. An ethnobotanical study of medicinal plants used by ethnic people in Gingee Hills, Villupuram District, Tamilnadu, India. American *Journal of Ethnomedicine,* **2**(2): 88-102.

Arvigo, R. and Balick, M. 1998. *Rainforest Remedies*. Lotus Press, Twin Lakes, Wisconsin.

Austin, M.P. 1980. Searching for a model for use in vegetation analysis. *Vegetation,* **42**: 11-21.

Balick, M.J. and Cox, P.A. 2005. *Plants, people, and culture: The science of ethnobotan,* Scientific American Press, New York.

Balick, J.M. and Cox, P.A. 1996. *Plants, People, and Culture: The Science of Ethnobotany.* New York: Scientific American Library.

Banerji, M.L. 1995. Some edible and medicinal plants from east Nepal. *Journal of Bombay Natural History Society,* **53**:153-155.

Baniya, C.B., Solhoy, T. Gauslaa, Y. and Palmer, M.E. 2010. The elevation gradient of lichen species in Nepal. *The Lichenologist*, **42**(1): 83-96.

Baral, S.R. and Kurmi, P.P. 2006. *A compendium of Medicinal plants in Nepal.* Published by Mrs Rachana Sharma MaijuBahal, Chabahil Kathmandu, Nepal.

Barthlot, W., Lauer, W. and Placke, A. 1996. Global distribution of species diversity in vascular plants: towards a world map of phytodiversity. *Erdkunde,* **50**: 317–328.

Barthlot, W., Mutke, J., Rafiqpoor, D., Kier, G. and Kret, H. 2005. Global centres of vascular plant diversity. *Nova Acta Leopoldina,* **342**: 61–83.

Berkes, F., Colding, J. and Falke, C. 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications*, **10**(5): 1251-1262.

Berkes, F. 2004. Rethinking Community based Conservation. *Conservation Biology,* **18**(3):621-630.

Berlin, B. 1992. *Ethnobiological classification: principles of categorization of plants and animals in traditional societies*. Princeton, Princeton University Press. 335 Pp.

Bhandari, P., Gurung, M.B., Subedi, C.K., Chaudhary, R.P., Basnet, K.B.,Gurung., J., Uprety, Y., Neupane, A. and Shrestha, K.K. 2021. Traditional use of medicinal plants in the Chyangthapu-Phalaicha biological sub-corridor, Panchthar District, Kanchenjunga Landscape, Nepal. *Ethnobotany Research and Applications*, **22**:1-43.

Bhat, P., Hedge, G.R., Hedge, G., Mulgund, G.S., 2013. Ethnomedicinal plants to cure skin diseases—an account of the traditional knowledge in the coastal parts of central Ghats, Karnataka, India. *Journal of Ethnopharmacology*, **151**: 493–502.

Bhatta, L.R. 1999. Ethnobotanical study in a village at Rukum District, Nepal. *Banko Jankari*, **9**(2):40-43.

Bhatta, L.R. 2021. *Wild Edible Fruits of Nepal.* Nepal Academy of Science and Technology, Khumlatar, Lalitpur, Nepal, pp252.

Bhattarai, K.R. and Ghimire, M. 2006. Commericially important medicinal and aromatic plants of Nepal and their distribution pattern and conservation measure along the elevation gradient of the Himalayas. *Banko Jankari*, **16**: 3-13.

Bhattarai, K.R. and Vetaas, O.R. 2003. Variation in plant species richness of different lifeforms along a subtropical elevation gradient in the Himalayas, East Nepal.*Global Ecology and biogeography*, **12**: 327-340.

Bhattarai, K.R., Maren, I.E., Chaudhary, R.P., 2005. Medicinal plant knowledge of the Panchase region in the middle hills of the Nepalese Himalayas.*BankoJanakari*, **21** (2), 31–33.

Bhattarai, N.K., 1998. Traditional medicine, medicinal plants and biodiversity conservation in the global and Nepalese contexts. *Plant Research*, **1**: 22–31.

Bhattarai, S., Chaudhary, R.P., Quave, C.L. and Tylor, R.S.L., 2010. The use of medicinal plants in the transhimalayan arid zone of Mustang district, Nepal. *Journal of Ethnobiology and Ethnomedicine*, **6:** 14. doi.org/10.1186/1746-4269-6-14.

Bhattarai, S., Chaudhary, R.P. and Taylor, R.S.L. 2006. Ethnomedicinal plants used by the people of Manang district, Central Nepal. *Journal of Ethnobiology and Ethnomedicine,* **2:** 41. doi.org/10.1186/1746-4269-2-41.

Bhattarai, S., Chaudhary, R.P. and Taylor, R.S.L. 2009. Ethno-medicinal plants used by the People of Nawalparasi district, central Nepal. *Our Nature*, 7:82–9. doi.org/10.3126 /on.v7i1.2555.

Bhattrai, A.P., Bhatta, G.D., Joshi, L. and Baral, S.R. 2009. Ethnobotanical note on medicinal plants used by Amchis of upper Mustang of Nepal adjoining Tibet. *Bulletin of Department of Plant Resources*, **31:**101-107.

Bhattrai, K.R. 2018. Ethnobotanical study of plants used by Thami community in Ilam District, eastern Nepal. *Our Nature,* **16**(1): 55-67.

Bhattrai, S., Chaudhary, R.P., Quave, C.L. and Tylor, R.S.L. 2010. The use of medicinal plants in the trans-Himalayan arid zone of Mustang District, Nepal. *Journal of Ethnobiology and Ethnomedicine*, **6:**14. https://.org/10.1186/1746-4269-614.

Bradley, C. Bennett, B. B. 2005. Ethnobotany Education, Opportunities and Needs in the USA. *Ethnobotany Research And Applications,* **3**:113-121.

Brown, J.H. and Lomolino, M.V. 1998. *Biogeography*, 2nd edition. Sinauer, Sunderland, MA, USA.

Budha-Magar, S., Bhandari, P., and Ghimire, S.K. 2020. Ethno-medicinal survey of plants used by Magar (Kham) community, Rolpa district, Western Nepal. *Ethnobotany Research & Applications,* **19**:1-18.

Burghman, M.A., Keith, D.A. and Walshe, T.V. 1999. Uncertainty in comparative risk analysis of threatened Australian Plant species. *Risk Analysis,* **19:**585-598.

Burlakoti, C. and Kunwar, R.M. 2008. Folk herbal medicines of Mahakali watershed area, far west Nepal. In: *Medicinal Plants in Nepal: An Anthology of Contemporary Research.* (Jha, PK., Karmacharya, S.B., Chettri, M.K., Thapa, C.B., Shrestha, B.B. (eds.), Ecological Society, Kathmandu, Nepal, pp. 187–193.

Cameron, M.M. 1996. Biodiversity and medicinal plants in Nepal: Involving untouchables in Conservation and Development. *Human Ecology,* **36**(2): 259-272.

Central Bureau of Statistics (CBS). 2012.National population and Housing Census 2011. Government of Nepal, National planning Commission Secretariat.

Chaudhary, R.P.1998. *Biodiversity in Nepal Status and Conservation* S. Devi Saharanpur, India and Tec Press Books , Bangkok, Thailand.

Collins, M. 2000. *Medieval herbals: the illustrative traditions*. London, British Library. 334 p.

Cotton, C.M. 1996. *Ethnobotany: Principles and Applications*. Chichester: John Wiley and Sons. Densmore, Francis.

Cox, P.A. and Ballick, M.J. 1994. The Ethnobotanical approach to drug discovery. *Scientific American,* **270**(6):82-87.

Cuningham, A.B. 2001. *Applied Ethnobotany: People, Wild Plant Use and Conservation.* Earthscan Publication Ltd. London and Sterling, VA., USA.

Cuningham, A.B., Brinckmann, J.A., Bi, Y.F., Pei, S.J., Schippmann, U. and Lou, P. 2018. Paris in the spring: A review of the trade, conservation and opportunities in the shift from wild harvest to cultivation of Paris polyphylla (Trilliaceae). *Journal of Ethnopharmacology,* **222**: 208-216.

Cunningham, A.B. 1996. *People, Park and Plant Use: recommendations for multiple –use zones and development alternatives around Bwindi National Park, Uganda.* People and Plants working paper 4. Paris: UNESCO.

Dasmann, R. 1959. *Environmental conservation*. John Wileyand Sons, New York.

Dasmann, R. 1968. *A different kind of country*. Macmillan, New York.

Davis, E.W. 1995. *Ethnobotany: an old practice, a new discipline. In ethnobotany: Evolution of a Discipline (*R.E. Schultts and S.V. Reis, edition). Dioscoriodes Press, Oregon.

Devkota, R. and Chhetri, R.B. 2009. Traditional Knowledge on Wild fiber processing of Allo in Bhedetar of Sunsari District, Nepal. *Khathmandu University Journal of Science Engineering And Technology*, **5:**136-142.

DFO, 2021. Barsika Pragati Pustika 2076/077. Division Forest Office, Rukum West.

Dobremez, J.-F. 1976. Le Nepal: ecologie et biogeographie. Paris: Centre National de la Recherche Scientifique 356p. (Cahiers Nepalais)-Illus., col. illus., maps. Icones, Maps. Geog, 6.

Domenighetti G, Grilli R, Gutzwiller F, and Quaglia, J. 2000. Usage personnel de pratiques relevant des médecinesdoucesou alternatives parmi les médecinssuisses. *Médecine & Hygiène,* **58:** 22-91.

DPR, 2007. *Medicinal plants of Nepal.* Department of Plant Resources, Ministry of Forest and Soil Conservation, Government of Nepal. Thapthali, Kathmandu, Nepal.

DPR. 2016. *Medicinal plants of Nepal*2nd edition. Kathmandu Nepal: Government of Nepal, Department of plant resources.

Dulal, K., Chaudhary, S.,Uprety, Y. Shrestha, N., Shakya, and S., Munankarmi, N.2022. Ethnomedicinal plants used by the local people of Changunarayan Municipality, Bhaktapur, Nepal. *Ethnobotany Research and Applications,* **23:**1-17.

Edwards, D.M. 1996. *Non Timber forest products from Nepal: Aspects of the trade in Medicinal and Aromatic Plants.* FORSC Monograph 1/96, Forest research and Survey center, Babarmahal, Kathmandu, Nepal.

Eigner, D. and Scholz, D. 1999. Ferula asa-foetida and Curcuma longa in traditional medical treatment and diet in Nepal. *Journal of Ethnopharmacology*, **67:** 1–6.

Farnsworth, N.R., Akerele, O., Bingal, A.S. and Guo, A. 1985. Medicinal plants in therapy. *Bulletin of the World Health Organization*, **63:** 965–981.

Farooquee, N.A., Majila, B.S. and Kala, C.P. 2004. Indigenous knowledge systems and sustainable management of natural resources in high altitude society in Kumaun Himalaya, India. *Journal of Human Ecology*, **16:**33-42.

Faulks, P.J.1958. *An Indroduction to Ethnobotany :* Moredale, London.

Fisher, P. and Ward, A. 1971. Medicine in Europe, complementary medicine in Europe. *British Medical Journal,* 309:107-111.

Folke, C. 2004. Traditional Knowledge in social ecological systems. *Ecology and Society*, **9**(3): 7. http:www.ecologyandsociety.org/vol9/iss3/art7/.

Ford, R.I. 1978. *Ethnobotany: historical diversity and synthesis*. In: Ford RI ed. The nature and status of ethnobotany. 1st edition. Ann Arbor, Museum of Anthropology, University of Michigan. Pp. 35-50.

Forman, L. and Bridson, D. 1989. *The Herbarium Handbook* Royal Botanic Gardens, Kew.

Fuller, R.J.M. 2013. Ethnobotany: major developments of a discipline abroad, reflected in New Zealand, *New Zealand Journal of Botany*, **51**:(2): 116-138 DOI: 10.1080/0028825X.2013.778298.

Gadgil, M., Berkes, F. and Folke, C. 1993. Indigenous Knowledge for biodiversity conservation. *A Journal of the Human Environment,* **22**:151-156.

Gaston, K.J. 2000. Global patterns in biodiversity. *Nature,* **405**: 220-227.

Gautam, R.K. 2012. *Diversity of useful plant species in Humla Karnali Basin, Northwest Nepal*. M. Sc. thesis in Plant Systematics and Biodiversity, Central Department of Botany Tribhuvan University.

Gemedo, D.T., Brigitte, L.M. and Johannes, I. 2005. Plant Biodiversity and Ethnobotany of Borana Pastoralists in Southern Oromia, Ethiopia. *Economic Botany*, **59** (1):43-65.

Ghilarov, A. 1996. What does ‘‘biodiversity’ mean-Scientific problem or convenient myth? *Trends in Ecology and Evolution,* **11**: 304–306.

Ghilarov, A. and Timonin, A. G. 1972. Relations between biomass and species diversity in marine and freshwater zooplankton communities. *Oikos,* **23**: 190–196.

Ghimire, K., Bastakoti, R.R., 2009. Ethnomedicinal knowledge and healthcare practices among the Tharus of Nawalparasi district in central Nepal. *Forest Ecology and Management,* **257**: 2066–2072.

Ghimire, S.K. 2008. Medicinal Plants in the Nepal Himalaya:issues, sustainable harvesting, knowledge gaps and research priorities. In: *Medicinal plants in Nepal:an Analogy of Contemporary Research.* (Jha, P.K., Karmacharya, S.B., Cheetri, M.K, Thapa, C.B. and Shrestha, B.B (eds.), Ecological Society (ECOS). Kathmandu Nepal. pp25-42.

Ghimire, S.K., Pyakurel, D., Nepal, B., Sapkota, I.B., Prajuli, R.R. and Oli, B. 2008. *A Manual of NTFs of Nepal Himalaya.* WWF Nepal, Kathmandu, Nepal.

Ghorbani, A., Naghibi, F. and Mosaddegh, M. 2006. Ethnobotany, ethnopharmacology and drug discovery.*Journal of Pharmaceutical Sciences Springer,* **2:**109–118.

GoN/MoFSC. 2014. *Nepal Biodiversity Strategy and Action Plan 2014-2020*. Government of Nepal, Ministry of Forest and Soil Conservation, Kathmandu, Nepal.

Grierson, A.J.C. and Long, D.G. 1983-2000. *Flora of Bhutan*. Vol. 1, Part 1-3; Vol. 2, Part 1-3. Royal Botanic Garden, Edinburgh and Royal Government of Bhutan.

Grytnes, J.A. and Vetaas, O.R. 2002. Species richness and altitude: A comparision between null models and interpolated plant species richness along the Himalaya altitudinal gradient, Nepal. *The American Naturalist*, **159**(3): 294-304.

Hamilton, A.J. 2005. Species diversity or biodiversity. *Journal of Environmental Management,* **75**: 89-92.

Hara, H., Chater, A.O and Williams, L.H.J. 1982. *An Enumeration of the followring plants of Nepal.* Vol.3. British Museum (Natural History), London.

Hara, H., Williams, L.H.J., 1979. *An Enumeration of the Flowering Plants of Nepal* Vol.2. British Museum (Natural History), London.

Harper, J. L. and Hawksworth, D. L. 1994. Biodiversity: Measurement and estimation. *Philosophical Transactions of Royal Society* London, Ser. B, **345**:5–12.

Harris, J.G. and Harris, M.W. 2001. *Plant identification terminology: An illustrated glossary*. 2nd Edition. Spring Lake Publishing, Spring Lake, Utah.

Harshberger, J.W.1986. *The purpose of Ethnobotany. Botanical Gazette,* **21:** 146-154.

Heinrich, M., Ankli, A., Frei, B., Wieman, C. and Sticher, O. 1998. Medicinal plants in Mexico: Healers‟ consensus and cultural importance. *Social Science and Medicine,* **47**: 1859-1871.

Jain, S.K. and Rao, R.R. 1997. *A Handbook of Field& Herbarium Methods.* Today and TomorrowsPrinter, &Publ, New Delhi.

Jha, P.K., Siwakoti, M. and Rajbhandary, S. 2016. *Frontires of Botany.*Central Department of Botany, Tribhuvan University Kathmandu Nepal.

Joshi, K. and Joshi, A.R. 2000. Indigenous knowledge and uses of medicinal plants by local communities of the Kali gandaki Watershed area, Nepal. *Journal of Ethnopharmacology*,**73**(1-2): 83-175.

Khakurel, D. 2019. *Ethnobotany and Medicinal Plants in Madi Rural Municipality, Kaski District, Nepal.* Masters dissertation. Central Department of Botany, Tribhuvan University Kathmandu, Nepal.

Khakurel, D., Uprety, Y., Luczaj, Y.L. and Rajbhandary, S. 2021. Foods from the wild: Local knowledge, use pattern and distribution in Western Nepal. *PLoS ONE* **16**(10):e0258905.https://doi.org/10.1371/journal.pone.0258905.

Kunwar, R.M, Nepal, B.K., Kshhetri, H.B., Rai, S.K.and Bussmann, R.W. 2006. Ethnomedicine in Himalaya: a case study from Dolpa, Humla,Jumla and Mustang districts of Nepal. *Journal of Ethnobiology and Ethnomedicine,* **2:**1-27 doi:10.1186/1746-4269-2-27.

Kunwar, R.M. and Adhikari, N. 2005. Ethnomedicine of Dolpa district, Nepal: the plants, their Vernacular names and uses. *Lyonia,* **8**(1): 43-49.

Kunwar, R.M. and Bussmann, R.W. 2008. Ethnobotany in the Nepal Himalaya. *Journal of Ethnobiology and Ethnomedicine*, **4:**24 https://doi.org/10.1186/1746-4269-4-24.

Kunwar, R.M., Mahat, L., Acharya, R.P., and Bussmann, R.W. 2013. Medicinal plants, traditional medicine, markets and management in far western Nepal. *Journal of Ethnobiology and Ethnomedicine,* **9:**24. doi:10.1186/1746-4269-9-24.

Kunwar, R.M., Uprety, Y., Burlakoti, C., Chaudhary, C.L., Bussmann, R.W. 2009. Indigenous use and ethnopharmacology of medicinal plants in Far-west Nepal. *Ethnobotany Research and Applications,* **7:** 005–028.

Kunwar, R.M., Uprety, Y., Burlakoti, C., Chaudhary, C.L., Bussmann, R.W. 2009. Indigenous use and ethnopharmacology of medicinal plants in Far-west Nepal. *Ethnobotany Research and Applications,* **7:** 5–28.

Lama, Y.C., Ghimire, S.K. and Aumeeruddy-Thomas, Y. 2001. *Medicinal plants of Dolpo: Amchis Knowledge and Conservation.* People and Plants Initiative, WWF Nepal Program, Kathmandu, Nepal.

Lee, R., Balick, M., Ling, D., Sohl, F., Brosi, B. and Raynor, W. 2001.Cultural dynamism and change – An example from the Federated States of Micronesia. *Economic Botany*, **55**(1): 9–13.

Linnaeus, C. 1737. *Genera Plantarum* eorumque characters naturales. Leiden: Conrad Wishoff.

Lovejoy, T. E. 1980. *The Global 2000 Report to the President* (G. O. Barney, ed.), Vol. **2**, The Technical Report, pp. 327–332. Penguin, New York.

Luitel, D.R. and Pathak, M. 2019. Documentation of Medicinal and Aromatic Plants of Dhorpatan Hunting Reserve, Western Nepal. *Journal of Plant Resources* **35**:36-43.

Luitel, D.R., Rokaya, M.B., Timsina, B., Munzbergova, Z., 2014. Medicinal plants used by the Tamang community in Makwanpur district of central Nepal. *Journal of Ethnobiology and Ethnomedicine*, **10:** 5.doi:10.1186/1746-4269-10-5.

Lulekal, E., Asfaw, Z., Kelbessa, E. and Damme, P.V. 2013. Ethnomedicinal study of plants used for human ailments in Ankober district, North Shewa Zone, Amhara Region, Ethiopia. *Journal of Ethnobiology and Ethnomedicine*, **9:**63.doi:10.1186/1746-4269-9-63.

Mahato, R.B. and Chaudhary, R.P. 2003. Ethnomedicinal study and antibacterial activities of selected plants of Palpa district, Nepal. *Scientific World*, **2:** 41-45.

Maheshwori, J.K. 1996. *Ethnobotany and medicinal plants of Indian Subcontinent*. Scientific Publisher, Jodhpur, India.

Malla, B. and Chhetri, C.B. 2012a. Ethnoveterinary practices of some plant species by ethenic people of Parbat district. *Kathmandu Univeristy Journal of Science, Engineering and Technology*, **8**(1):44-50.

Malla, B. and Chhetri, R.B. 2009. Observation on some ethnomedicinal plants in kavreplanchok district, Nepal. *Ethnobotany*, **21:**41-45.

Malla, B. and Chhetri, R.B. 2012. Indigenous knowledge on medicinal non-timber forest product (NTFP) in parbat district of Nepal. *Indo global Journal of pharmaceutical Sciences,* **2(**2): 213-225.

Malla, B., gauchan, D.P. and Chhetri, R.B. 2015. An ethnobotanical study of medicinal plants used by ethinic people of parbat district of Western Nepal. *Journal of Ethnopharmacology,***165:** 103-117.

Manandhar, N.P. 1980. Some less known medicinal plants of Rasuwa District (Nepal). *Quarterly Journal of Crude Drug Research,***18**(3): 147-151.

Manandhar, N.P. 1986. A contribution to the ethnobotany of Mooshar tribes of Dhanusha district, Nepal. *Journal of Natural History Museum,* **10**(1-4):53-64.

Manandhar, N.P. 1989. Medicinal Plants used by Chepang Tribes of Makawanpur District, Nepal. *Fitoterapia* (Italy), **60**(1): 61-68.

Manandhar, N.P. 1990. Traditional phytotherapy of Danuwar tribe of Kamlakhong in Sindhuli district, Nepal. *Fitoterapia,* **61**(4): 325-232.

Manandhar, N.P. 1991.Medicinal plant lore of Tamang tribe of Kabhreplanchok district Nepal.*Economic Botany,* **45**(1): 5871.

Manandhar, N.P. 1995. A survey of medicinal plants of Jajarkot district, Nepal. *Journal of Ethnopharmacology,* **48:**1-6.

Manandhar, N.P. 2002. *Plants and people of Nepal.*Timber press Portland, Oregon, USA.

Martin, G. J. 1995. *Ethnobotany*: *A Methods Manual*. London: Chapman and Hill.

NSO.2021. *National Population and Housing Census.* Government of the Prime Minister and Council of Ministers, Kathmandu.

Obha, H., Iokawa, Y. and Sharma, L.R. 2008. *Flora of Mustang,* Nepal. Kodansha Scientific Ltd., Tokyo.

Odland, A.. and Birks, H.J.B. 1999. The altitudinal gradient of vascular plant species richness in Aurland, Western Norway. *Ecography* **22:** 548-566.

Panta, S., Parjulee, D., Sudedi, G. and Giri, B. 2021. Ethnoboyanical study of Wild Edible Plants in Pyuthan, Nepal. *International Journal of Environment, Agriculture and Biotechnology*,**6**(4):79-87. doi.org/10.22161/ijeab.64.10.

Panthi, M.P. and Chaudhary, R.P. 2002. Angiospermic flora of Arghakhanchi district and adjoining areas, west Nepal. *Journal of Natural History Museum,Tribhuvan University, Nepal,* **21:**7-31.

Panthi, M.P., Chaudhary, R.P. and Vetaas, O.R. 2007. Plant species richness and composition in a trans-Himalayan inner valley of Manang district, central Nepal. *Himalaya Journal of Sciences,* **4**(6): 57-64.

Pausa, J.G. and Austin, M.P. 2001. Patterns of plant species richness in relation to different environments: An appraisal. *Journal of Vegetation Science,* **12:** 153-166.

Philips, O. and Gentry, A.H. 1993. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. *Economic Botany*, **47**: 15-32.

Philips, O. and Gentry, A.H. 1993. The Useful plants of Tambopata, Peru: II. Additional Hypothesis Testing in Quantitative Ethnobotany. *Economic Botany* ,**47** (1) :33-43.

Polunin, O. and Stainton, J.D.A. 1984. *Flowers of the Himalaya*. Oxford University Press, New Delhi, India.

Press, J.R., Shrestha, K.K. and Sutton, D.A. 2000. *Annotated Checklist of the Flowering Plants of Nepal*. The Natural History Museum, London.

Pyakurel, D., Bhattrai, sharma, I. and Ghimire, S.K. 2017. Trade and conservation value of medicinal and aromatic plants in western Nepal. *BotanicaOrientalis-Journal of plant Science,* **11**:27-37.

Rahbek, C. 1995. The elevational gradient of species richness: a uniform pattern? *Ecogeography*, **18:** 200-205.

Rajbhandari, K.R. 2001. *Ethnobotany of Nepal*. Ethnobotanical Society of Nepal (ESON). Kishor Offset Press (P.) Ltd., Kathmandu.

Rajbhandari, K.R. and Rai, S.K. 2017. *A Handbook of the flowering plants of Nepal.* Department of Plant Resources. Thapathali Kathmandu Nepal.

Rajbhandary, S. And Ranjitkar, S. 2006. *Herbal Drugs and Pharmacognosy : Monographs on commercially Important medicinal Plants of Nepal.* Ethnobotanical Society of Nepal. Kathmandu.

Rajbhandary, S. and Winkler, D. 2015.Ethnobotany, In: *Nepal: An introduction to the natural history, ecology and human environment of the Himalayas*. (Miehe, G.

C.A. pendry and R. Chaudhary (eds.), Edinburgh: Royal botanic Garden Edinburgh, pp.271-285.

Rajbhandary, S.2013. Ethnobotanical Heritage of Nepal. *HamroSampada,***10**:73-81.

Raskoti, B.B. 2009. *The Orchids of Nepal*. Quality Printers, Kathmandu, Nepal.

Rokaya, M.B., Munzbergova, Z., Shrestha, M.R. and Timsina, B. 2012. Distribution patterns of medicinal plants along an elevational gradient in Central Himalaya, Nepal. *Journal of Mountain Science,* **9:**201-213.

Sahu, S.C. and Dhal, N.K. 2012. Floristic composition, diversity and status of Threatened medicinal plants in tropical forests of Malyagiri Hill Ranges, Eastern Ghats, India. *Tropical Forests* http://www.intechopen.com/books/tropical-forests/floristiccomposition-diversity-and-status-of-threatened-medicinal-plants-in-tropicalforests-of-mal

Schults, R. E. 1962. The role of ethnobotanist in the search of new medicinal plants. *Lloydia,* **25**(4): 45-64.

Schults, R.E. 1983. Richard Spruce: An early ethnobotanists and explorer of the northwest Amazon and northern Andes. *Journal of Ethnobiology*, **3**: 139-147.

Sharma, U.R., Malla, K.J. and Uprety, R.K. 2005. Conservation and management efforts of medicinal and aromatic plants in Nepal. *Banko Jankari,* **14**(2):3.11.

Shinwari, S.K. and Gilani, S.S. 2003. Sustainable harvest of medicinal plants at Bulshbar Nullah,Astore (Pakistan). *Journal of Ethnopharmacology*, **84**: 289-298.

Shrestha, I. and Pradhan, N. 1986. Medicinal Plants of Chobhar Village of Kathmandu, Nepal. *Journal of Natural History Museum,* **10**(1-4): 65-72.

Shrestha, K.K., Bhandari, P. and Bhattrai, S. 2022. *Plants of Nepal (Gymnosperms and Angiosperms).* Heritage Publishers & Distributers Pvt. Ltd.., Kahmandu.

Shrestha, K.K., Tiwari, N.N. and Ghimire, S.K. 2002. Medicinal and aromatic plants database of Nepal. In: *Proceeding of Nepal Japan Joint Symposium on Conservation and Utilization of Himalayan Medicinal Plant Resources.* (Watanabe, T., Takano, A., Bista, M.S. and Saiju, H.K (eds.), Society of Himalayan Medicinal Plants resources, Japan, pp53-74.

Shrestha, P.M. and Dillison, S.S. 2003. Medicinal plant diversity and use in the highlands of Dolakha district, Nepal. *Journal of Ethnoparmacology*, **86:**81-96.

Shrestha. K.K., Bhattrai, S. and Bhandari, P. 2018. *Handbook of Flowering plants of Nepal.(Volume 1. Gymnosperms and Angiosperms: Cycadaceae-Betulaceae).* Scientific Publishers, Jodhpur, India.

Siwakoti, M and Rajbhandary, S. 2015. *Taxonomic Tools and Flora Writing*. Department of Plant Resources and Central department of Botany, TU, Kathmandu, Nepal.

Siwakoti, M., Jha, P.K., Rajbhandari, S.and Rai. S.K.(eds). 2020. *Plant Diversity in Nepal.* Botanical Society of Nepal, Kathmandu.

Stainton, J.D.A. 1972. *Forest of Nepal*. John Murray, London.

Stainton, J.D.A. 1987. *Concise Flowers of Himalaya*. Oxford University Press, New Delhi, India.

Stainton, J.D.A. 1988. *Flowers of the Himalaya: A supplement*. Oxford University Press, New Delhi, India.

Stevens, G.C. 1992. The elevational gradient in altitudinal range, an extension of Rapoport‟s latitudinal rule to altitude. *American Naturalist,* **140:** 893-911.

Tardio, J. and Santayana, M.P.D. 2008. Cultural importance indices: A comparative analysis based on the useful wild plants of Southern Cantabrai (Northern Spain). *Economic Botany*, **62**(1): 24-39.

Tengo, M., Brondizio, E.S., Elmqvist, T., Malmer, P. and Spierenbur, M. 2014. Connecting diverse knowledge systems for enhanced ecosystem governance: the multiple evidence base approach. *A Journal of the Human Environment*, **43**(5): 579-591.

Thapa, C. 2015. *Diversity of useful plant species along an elevation gradients in Chungsa Valley, Humla, Northwest Nepal*. M.Sc. thesis in Plant Systematics and Biodiversity, Central Department of Botany Tribhuvan University.

Uprety, Y., Asselin, H., Boon, E.K., Yadav., S. and Shrestha, K.K. 2010. Indigenous use and bio-efficacy of medicinal plants in the Rasuwa District, Central Nepal.

Journal of Ethnobiology and Ethnomedicine, **6**:3 http://creativecommons.org/licenses/by/2.0

Uprety, Y., Paudel, R.C., Shrestha, K.K., Rajbhandary, Tiwari S., Shrestha, N.N, and Asselin, U.B.H. 2012. Diversity of use and local knowledge of wild edible plant resources in Nepal. *Journal of Ethnobiology and Ethnomedicine,* **8**:16 http:// creativecommons.org/licenses/by/2.0

Uprety, Y., Rajbhandary, S. and Paudel, R.C. 2006. Ecology and Ethnobotany of wild edible plants in Kailali, Far west Nepal. In: *Proceeding of the fourth National Conference on Science and Technology*, March 23-26, 2004, NAST. pp 967-979.

Uprety, Y., Ram, Poudel, R.C., Asselin, H., and Boon, E. 2011. Plant biodiversity and ethnobotany inside the projected impact area of the Upper Seti Hydropower Project, Western Nepal. *Environment, Development and Sustainability,* **13:**463-492.

Uprety, Y., Poudel, R.C., Gurung, J., Chhetri, N. and Chaudhary, R.P. 2016. Traditional use and management of NTPs in KKanchenjunga Landscape; implications for conservation and livelihoods. *Journal of Ethnobotany and Ethnomedicine*, **12**(1): 19https://doi.org/10.1186/s13002-016-0089-8.

Whittaker, R.H. 1972. Evolution and Measurement of species diversity. *Taxon*, **21**:213-251.

WHO, 1998. Technical Briefing on Traditional Medicine. 49th Regional Committee Meeting, 18 September. WHO Regional Office for the Western Pacific, Manila.

APPENDIX: I

Permission lettor of Department of Plant Resources

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
वनस्पति विभाग
(.....जैविक विविधता तथा साईटिस. शाखा)

४२६१४६६
४२६१४६७
४२५११६०
४२५११६१

फ्याक्स नं.: ४२५११४१

पत्र संख्या:- ८२५१९
चलानी नम्बर:- ९६६

इमेल:- info@dpr.gov.np
वनस्पतिमार्ग, थापाथली
काठमाडौं
मिति: २०७८/०६/०७

विषय: अनुसन्धान अनुमति सम्बन्धमा ।

श्री खड्क बहादुर भण्डारी
गोतामकोट, रुकुम ।

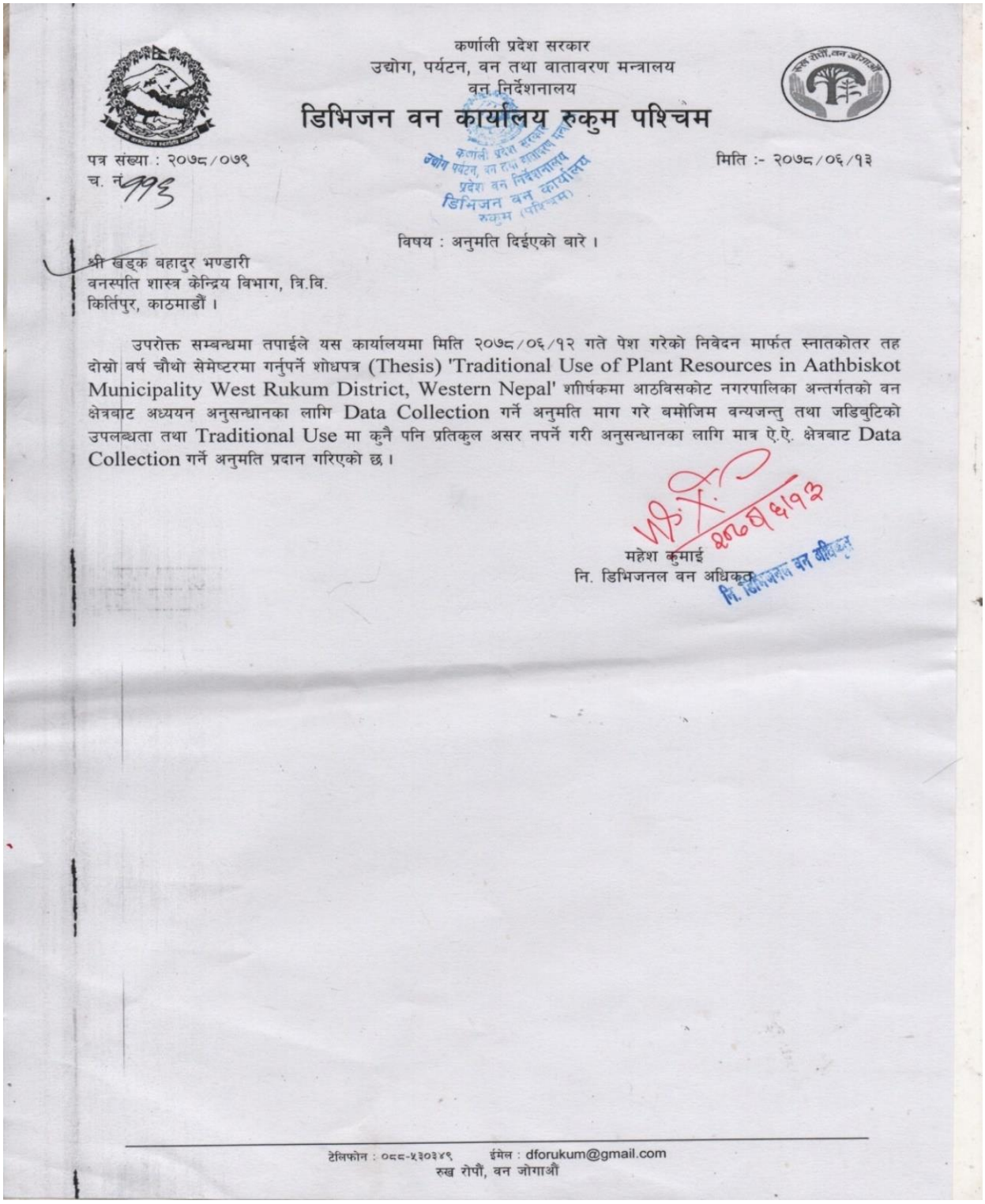
प्रस्तुत विषयमा यस विभागको मिति २०७८/०६/०६ को निर्णयानुसार तपाईंलाई देहाय बमोजिमका शर्तहरुमा रही वनस्पति स्रोतको अनुसन्धान कार्यविधि, २०७०(पहिलो संशोधन,२०७३) बमोजिम अनुसन्धान गर्न निम्नानुसार अनुमति प्रदान गरिएको छ ।

अनुसन्धानकर्ताको नाम	पहिलो	बीचको	थर
	खड्क	बहादुर	भण्डारी
अनुसन्धानकर्ताको ठेगाना	स्थायी : रुकुम। अस्थायी : काठमाडौं।	ईमेल :- kbbhandari74@gmail.com	फोन नं. : ९८४७८९७६८६
सम्बद्ध संस्था	संस्थाको नाम :	ठेगाना :	
	वनस्पति शास्त्र केन्द्रीय विभाग, त्रि.वि. ।	कीर्तिपुर, काठमाडौं ।	
पद	विद्यार्थी ।		
अनुसन्धान तह	व्यक्तिगत : स्नातक तह / स्नातकोत्तर तह✓ / पि.एच.डी. अन्य :	संस्थागत : राष्ट्रिय ✓ / अन्तर्राष्ट्रिय	
अनुसन्धानको शीर्षक	**"Traditional Use of Plant Resources in Athbiskot Municipality, West Rukum Distict, Western Nepal "**		
अनुसन्धानको क्षेत्र	आठबिसकोट, पश्चिम रुकुम।		
अनुसन्धानको विधि	Survey based ।	नमुना संकलन: गर्ने ✓	नमूनाको परीक्षण: नेपालमा -
अनुसन्धानको समयावधि	वि.सं. २०७८ असोज देखि २०७९ सम्म ।		
अनुसन्धानको शर्तहरु	१. अनुसन्धानकर्ताले विभाग र सम्बन्धित कार्यालयसँग समन्वय गरी अनुसन्धान कार्य गर्नु पर्नेछ । २. अनुसन्धानकर्ताले आफ्नो अनुसन्धानको प्रस्ताव सम्बन्धित कार्यालयमा समेत बुझाउनु पर्नेछ । ३. अनुसन्धानकर्ताले अनुसन्धान समाप्त भएपछि एक प्रति कागजी प्रतिवेदन र एक प्रति विद्युतीय प्रतिवेदन विभागमा बुझाउनु पर्नेछ। ४. अनुसन्धानकर्ताले नतिजाहरु प्रकाशित गर्दा अनुसन्धानमा संलग्न कर्मचारीको योगदानको आधारमा सह-लेखकको रुपमा समावेश गराउनु पर्नेछ । ५. संकलित नमूना नेपाल सरकारको पूर्व स्वीकृति नलिई विदेश लैजान पाईने छैन् । ६. संकलित वनस्पतिका प्रत्येक प्रजातिका मृत नमूनाहरु एक/एक थान श्री राष्ट्रिय हर्बेरियम तथा वनस्पति प्रयोगशाला (KATH) गोदावरी, ललितपुरमा बुझाउनु पर्नेछ। ७. नेपालको प्रतिबन्धित र साइटिस सूचीमा सूचीकृत वनस्पति बाहेकका वनस्पति नमूनाहरु मात्र संकलन गर्नु पर्नेछ ।		

कल्पना शर्मा (ढकाल)
सहायक वैज्ञानिक अधिकृत
(१९८४८२)

Appendix II

Permission Letter of Devision Forest Office Rukum



कर्णाली प्रदेश सरकार
उद्योग, पर्यटन, वन तथा वातावरण मन्त्रालय
वन निर्देशनालय

डिभिजन वन कार्यालय रुकुम पश्चिम

पत्र संख्या : २०७८/०७९
च. नं. ११३

मिति :- २०७८/०६/१३

विषय : अनुमति दिईएको बारे ।

श्री खड्क बहादुर भण्डारी
वनस्पति शास्त्र केन्द्रिय विभाग, त्रि.वि.
किर्तिपुर, काठमाडौं ।

उपरोक्त सम्बन्धमा तपाईले यस कार्यालयमा मिति २०७८/०६/१२ गते पेश गरेको निवेदन मार्फत स्नातकोतर तह दोस्रो वर्ष चौथो सेमेष्टरमा गर्नुपर्ने शोधपत्र (Thesis) 'Traditional Use of Plant Resources in Aathbiskot Municipality West Rukum District, Western Nepal' शीर्षकमा आठबिसकोट नगरपालिका अन्तर्गतको वन क्षेत्रबाट अध्ययन अनुसन्धानका लागि Data Collection गर्ने अनुमति माग गरे बमोजिम वन्यजन्तु तथा जडिबुटिको उपलब्धता तथा Traditional Use मा कुनै पनि प्रतिकुल असर नपर्ने गरी अनुसन्धानका लागि मात्र ऐ.ऐ. क्षेत्रबाट Data Collection गर्ने अनुमति प्रदान गरिएको छ ।

२०७८।६।१३

महेश कुमाई
नि. डिभिजनल वन अधिकृत

टेलिफोन : ०८८-५३०३४९ ईमेल : dforukum@gmail.com
रुख रोपौं, वन जोगाऔं

Appendix:III

Ethnomedicinal survey of Aathbiskot Municipality Rukum West

1. Respondent's name: _____

2. Age: (< 15, 15-25, 25-50, >50) Sex: (Male/Female)

3. Ethnicity: _____

4.VDC/Village/Ward: _____

5. Education: _____Occupation: _____

6. Do you know about medicinal plants? (a) Yes (b) No

7. Do you believe on traditional medicinal practice? Y / N

8. Do you use plant parts to cure illness? Yes No

If yes, is the use ☐ Self Administered or ☐ given by local healers?

9. If yes, which plant is used to treat which disease?

a. ……is used to treat……

b. ……is used to treat……

c. ……is used to treat……

d. ……is used to treat……

e. ……is used to treat……

9. Which parts of the plants are mostly used?

a. b. c. d. e.

10. In which stage is the plant used? (Age of the plants)

11. For what purpose is this plant used as medicine? (Name of disease)

12. What are the forms of medication?

a. Pest b. Juice c. Powder d. Liquid e. Decoction f. Latex g. Oil h. Pulp i. Ash

j. Chewed

13. Taste of preparation if taken orally: None / Sweet / Bitter / Bland.

14. Do you have particular dose for particular disease?

Frequency: Morning / Afternoon / Evening / Night

Once a day / Twice a day / Thrice a day / Four times a day.

Duration: Day/days/ Week, weeks / Month, months/ Up to recovery.

15. Do you store the drugs that should not be used immediately? a. Yes b. No

16. If yes, in what form?

17. Do you collect medicinal plants? Y / N

18. What is the extent of collection? a. Small scale b. Large scale

19. How many family members are involved in Medicinal plant collection?

20. Do outsiders come to collect the plants? Y / N

21. What are the major localities of medicinal plants?

a. b. c. d. e.

22. Do you conserve the plants? Y / N

23. What medicinal plants have you cultivated?

a. b. c. d. e.

24. What are the highly traded medicinal plants from your area?

a. b. c. d. e.

25. Do you use the medicinal plants for other purposes? Y / N

26. If yes, for what purpose you use?

a. b. c. d. e.

27. How do you earn your livelihood?

a. Fishing b. Agriculture c. Business d. Job holder e. Others

28 Name the nearby area where the medicinal plants are mostly dominated.

a. …… b. ……. c. …….. d. …… e. …….

29 How long do you spend for the collection of MAPs ?

(a) 1 week (b) 2 weeks (c) 1 month (d) 1-2 months

30 Which species are more important in terms of market demand? Please list priority wise.

a. …… c. …….. e. ……..

b. …… d. …… f. ……..

31. How do you evaluate the availability of market for trading of medicinal plants?

a. Easily available [ ] b. Not easily available [ ] c. Not available at all [ ] d. I don't know [ ]

32. To what extent does the activity of collecting medicinal plants contribute to your income?

a. To very large extent [ ] b.To large extent [ ] c.To low extent [ ] d. Not at all [ ]

33. To what extent does this activity contribute to improving your livelihood?

a. To very large extent [ ] b.To large extent [ ] c.To low extent [ ] d. Not at all [ ]

34. Do you think that these resources are abundantly available?

a. Yes [ ] b. No [ ] c. I don't know [ ]

35. Do you think that these resources are becoming extinct?

a. Yes [ ] b. No [ ] c. I don't know [ ]

36. In your opinion what are the causes of extinction of the medicinal plants?

a. Over-exploitation [ ] b. Over-grazing [ ] c. Forest fires [ ]d. Deforestation [ ]

e. Expansion of agricultural land [ ]

37. To what extent your livelihood will be affected if these resources become extinct?

a. To very large extent [ ] b.To large extent [ ] c.To low extent [ ] d. Not at all [ ]

38. Do you think that conservation measures should be taken?

a. Yes [ ] b. No [ ]

39. Is there any programs going on for the conservation of the medicinal plants? Please list.

a. ……..

b. ……

40. Which conservation measures do you think are appropriate?

a. Collection regulation [ ] b. Habitat conservation [ ] c. Conservation education [ ]

d. If others (specify please)……

41. In your opinion who is responsible for the conservation of these resources?

a. Local communities [ ] b. District forest office [ ] c. National park authority [ ] d. NGOs [ ]

e. Others (specify please) ……

B. Ethnobotanical knowledge of respondent on different plant groups.

S.N	**Groups**	**Name of plants**			
		Local Name	**Scientific Name**	**Local Name**	**Scientific Name**
1	Timber				
2	Wild plant/fruit				
3	Fiber				
4	Fuel wood				
5	Dye & tanning				
6	Social & religious				

Appendix: IV

Name of Informants of ethnobotanical survey

S. N	Name of Informent	Sex	Age	Education	Informants information
1	Parbir Bhandari	M	86	No academic education	Panchayati pancha pradhan
2	Parbir Khatri	M	79	Primary education	Dhami/ Jaisi
3	Maisari Bhandari	F	77	No academic education	Knowledge on useful plant resources.
4	Jagat Puri	M	75	No academic education	Bhakti
5	Maisari Bhandari	F	74	No academic education	Household mother
6	Mandir Budha	M	73	No academic education	Farmer
7	Dale Bhandari	M	69	Primary education	Knowledge on medicinal plant use
8	Mote Bhandari	M	69	No academic education	Local Healer
9	Kale Dangi	M	68	No academic education	Traditional Theki maker
10	Kharke Bhandari	M	67	No academic education	Local Healer/ Dhami
11	Baljit Kami	M	67	No academic education	Farmer
12	Bhim Bahadur Sunar	M	66	No academic education	Local Healer
13	Dande Budha	M	66	No academic education	Farmer
14	Nare Basnet	M	65	No academic education	Farmer
15	Nanne Kami	M	64	No academic education	Luhar
16	Khimi Sarki	F	64	No academic education	Local Healer
17	Dhane Bohora	M	62	No academic education	Local Dhami
18	Karnasingh Bhandari	M	61	No academic education	Local Dhami
19	Krishna Bdr Devkota	M	60	Secondary education	Panchayat Dithabichari
20	Dande Bdr Budha	M	60	No academic education	Local Healer
21	Bal Bahadur Batala	M	59	No academic education	Knowledge on medicinal

S. N	Name of Informent	Sex	Age	Education	Informants information
					plant use
22	Ananta Budha	M	58	No academic education	Farmer
23	Sete Jhakri	M	58	No academic education	Jhakri
24	Padam Pariyar	M	57	No academic education	Local Hailer
25	Manjit Bhandari	M	56	No academic education	Farmer
26	Gajerupe Bhandari	M	56	No academic education	Knowledge on medicinal plant use
27	Khale Nath	M	56	No academic education	Local Dhami
28	Laxmi oli	F	53	No academic education	Household mother
29	Lila Kumari Bhandari	F	52	No academic education	Local Healer
30	Man Bahadur Kaami	M	52	No academic education	Local Healer
31	Ran Bir Yari	M	50	Primary education	As a local Trader
32	Jok Bahadur Pun	M	48	No academic education	Local Healer
33	Tej Bahadur Budhathoki	M	48	Primary education	Knowledge on medicinal plant use
34	Bharine Kami	M	48	Primary education	Politician
35	Birman Bhandari	M	48	No academic education	Local Dhami
36	Prajit Kami	M	47	Primary education	Politician
37	Shivaram Bista	M	46	No academic education	Knowledge on medicinal plant use
38	Janga Bahadur Khatri	M	46	Primary education	Loacal Healer
39	Lal Bahadur Yari	M	45	No academic education	Knowledge on medicinal plant use
40	Ran bdr Thapa	M	42	No academic education	Farmer
41	Dhan Bahadur Basnet	M	41	Secondary education	Politician
42	Dev Bahadur Gharti	M	41	No academic education	Leader and Hailer

S. N	Name of Informent	Sex	Age	Education	Informants information
43	Dipak Bhandari	M	38	Primary education	Knowledge on medicinal plant use/ Dhami
44	Tilaram Serpali	M	38	No academic education	Knowledge on medicinal plant use
45	Lalita Budha	F	35	Secondary education	Household Mother
46	Sarjan Bhandari	M	34	Primary education	Knowledge on medicinal plant use
47	Man Bahadur Bhandari	M	34	Secondary education	Knowledge on medicinal plant use
48	Seturum Bk	M	32	No academic education	Traditional Healer
49	Gam Bahadur Jipal	M	31	No academic education	Luhar
50	Man Kumari Gurung	F	30	Primary education	Interested in medicinal plant use.
51	Maisari Yari	F	30	No academic education	Ward member
52	Dharma Raj Bohora	M	28	Bachelor education	Interested in medicinal plant use.

Appendix: V

List of useful plants recorded from Aathbiskot Municipality

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
1	RWN79	*Barleria cristata* L.	Acanthaceae		H	Ast, Fr	Md	Young shoots and leaves Paste are mixed with mustard oil and applied on snake bite wounds.
2	RWN77	*Justicia adhatoda* L.	Acanthaceae	असुरो	S	Lf, Rt	Md	Dry leaf and root powder are smoked to control asthma and cough.
3	RWN1	*Acorus calamus* L.	Acoraceae	बोझो	H	Rt	Md	The fresh rhizome is directly chewed to cure cough. Rhizome juice is used to cure diarrhea and dysentery. The whole plant is used as anti-insecticides.
4	RWN184	*Lycoperdon perlatum* Pers.	Agaricaceae	फुसफुसे च्याउ		Sp	Md	Spore powder is used to cure fire burnt wounds.
5	RWN47	*Achyranthes aspera* L.	Amaranthaceae	बिब्फेकुरो	H	Wp	Md	The whole plant is ground and mixed with hot water and drunk to control piles.
6		*Allium sativum* L.	Amaryllidaceae	लसुन	H	Tb, Lf	Md	Two - three pieces of the bulb are directly eaten every morning to control gastric. Bulbs are used in case of fever and cough. Partially burned bulbs are eaten for stomach disorders too.
7	RWN33	*Allium* stracheyi Baker	Amaryllidaceae	लसुन	H	Tb	Md	Two - three tuber pieces are eaten in the morning and evening time for gastritis.
8	KBR120	*Allium wallichii* Kunth	Amaryllidaceae	वन लसुन	H	Wp	Md	The whole plant is ground and mixed with hot water and given to control dyspepsia (Apach) and diarrhea.
9	RWN181	*Rhus punjabensis* J.L.Stewart ex brandis	Anacardiaceae	भागेचुक	S	Fr	Md	One teaspoon of fruit powder is mixed with hot water and given to control dysentery and

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
								fever.
10	RWN182	*Toxicodendron succedaneum* (L.) Kuntze	Anacardiaceae	भलायो	T	Lf, St	Ft, Rg	Leaves are used to make fertilizer. The milky latex is allergic and the whole plant has religious value.
11	RWN35	*Centella asiatica* (L.) Urb.	Apiaceae	घोडाताप्रे	C	Lf	Md	Leaf juice is used to control fever. Leaf powder is mixed with hot water and drunk to improve memory power.
12	RWN179	*Heracleum candicans* Wall. Ex DC.	Apiaceae	छतारे	H	Fr	Md	Fresh fruits are chewed for cough and diarrhea.
13	KBR118	*Calotropis procera* (Aiton.) Aiton fil.	Apocynaceae	आँक	S	Lf	Md	Dried leaves are smoked for asthma and cough.
14	RWN191	*Ilex dipyrena* Wall.	Aquifoliaceae	लिसो	T	Lf, St	Fdr, Tm	Fresh leaves are used as good fodder. Wood is used to make agricultural equipment.
15	RWN191	*Arisaema costatum* (Wall.) Mart.	Araceae	बाको	H	Ast, Lf	Vt	Young buds and leaves are used as vegetables.
16	KBR117	*Arisaema griffithii* Schott.	Araceae	ढोकायो	H	Arp	Vt, We	Dried or freshly cut plant is used as vegetables.
17	KBR116	*Phoenix acaulis* Roxb.	Arecaceae	थाकल	S	Lf	Fy	Leaf and stem fiber is used to make household equipment like Dalo, Dhakiya.
18	KBR116	*Agave americana* L.	Asparagaceae	केतुके	H	Lf	Fy, Md	Leaf juice is used to control toothache. It's the fiber used to make rope.
19	KBR115	*Agave cantala* (Haw.) Roxb.ex Salm-Dyck	Asparagaceae	केतुके	H	Lf	Md	Fresh leaf paste is kept in the teeth or two drops of leaf juice are kept in the ear to control teeth pain.
20	RWN77	*Asparagus filicinus* (Buch.-Ham.ex D.Don) Kamble	Asparagaceae	कुरिलो	H	Ast, Rt	Vt, Md	Apical shoots are cooked and eaten as a tonic to increase appetite. The root juice is used to reduce fever.
21	KBR114	*Polygonatum cirrhifolium* (Wall.) Royle	Asparagaceae	खिरौलो	H	Ast Tb,	Vt, Md	A rhizome is used as a tonic. Young apical shoots are eaten as vegetables.
22		*Aloe vera* (L.) Burm.f.	Asphodelaceae	घिउकुमारी	H	Lf	Md	Leaf juice is applied on fire burn wounds and is also used as a face wash.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
23	KBR112	*Ageratina adenophora* (Spreng.) R.M. King &H.Rob.	Asteraceae	बनमारा	H	Lf	Md	Juice from the ground leaf and apical shoot is applied on cut wounds.
24	RWN74	*Ainsliaea aptera* DC.	Asteraceae	एकडाले	H	Wp	Md	Whole plant juice is used to cure cut wounds.
25	RWN21	*Artemisia indica* Willd.	Asteraceae	तितेपाति	H	Ast, Lf	Md, Rg	Juice from leaves and apical shoot is applied on cut wounds. The whole plant has religious value.
26	KBR111	*Bidens pilosa* L.	Asteraceae	कालो कुर्रो	H	Ast,,Sd, Wp	Fdr, Md	Apical shoots and seeds paste is applied on cut wounds. Young leaves juice is applied on skin allergies like scabies.
27	RWN50	*Chrysanthemum mutellina* (Hand.-Mazz.) Hand.-Mazz.	Asteraceae	नर्कुफुल	H	Fl	Rg	Flowers are used to worship god.
28	KBR110	*Dahlia pinnata* Cav.	Asteraceae	लाउरेफुल	H	Tb	Rg, Md	Tuber juice is used to control fever. The whole plant has religious value.
29	RWN80	*Leibnitzia nepalensis* (Kunze) Kitam.	Asteraceae	झुलो	H	Lf	Md	Fiber obtained by rubbing dry leaves is flammable. Fiber is kept on cuts to control bleeding.
30	KBR109	*Saussurea* sp	Asteraceae	भुतकेश	H	Wp	Rg	The plant is assumed as bad luck if kept in the home. The plant is used to worship ghosts.
31	RWN174	*Athyrium strigillosum* (T. Moore ex E. J.Lowe)	Athyriaceae	कुथुर्के साग	H	Ast	Vt	Young apical shoots are eaten as vegetables.
32	RWN173	*Diplazium esculentum* (Retz.) Sw.	Athyriaceae	कुथुर्के साग	H	Ast	Vt	Young apical shoots are eaten as vegetables.
33	RWN172	*Diplazium stoliczkae* Bedd.	Athyriaceae	लिउरो साग	H	Ast	Vt	Young apical shoots are eaten as vegetables.
34	RWN171	*Impatiens balsamina* L.	Balsaminaceae	तिउरी	H	Ast, Lf	Md, Rg	Apical shoots and leaves paste is applied on the cut wounds. The paste is used as henna.
35	RWN29	*Begonia picta* Sm.	Begoniaceae	मगरकाची	H	St	Md	The young stem is directly chewed or its filtrate is drunk to control roundworm.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
36	KBR108	*Berberis angulosa* Wall.ex Hook.f.&Thomson	Berberidaceae	रातोमुसे चुत्रो	S	Ast, Br	Md	Bark juice is used to control roundworms.
37	KBR107	*Berberis aristata* DC.	Berberidaceae	चुत्रो	S	Ast, Br	Md	Young apical shoots are directly chewed or bark juice is used to control roundworm and blood pressure.
38	RWN53	*Berberis asiatica* Roxb.ex DC.	Berberidaceae	चुत्रो	S	Ast, Br	Md	Fresh apical juice is chewed or bark juice is used to control worms.
39	KBR106	*Alnus nepalensis* D.Don	Betulaceae	उत्तिस	T	Br	Md	The bark of this plant and *Prunus ceracoides* are boiled together for one to two hours and extracted gel is applied on the injured wound.
40	KBR105	*Betula utilis* D.Don	Betulaceae	भुजपात	T	Br, Tm	Md, St	Burnt bark is kept in Amkhora and Amkhora is stuck on the stomach and pulled back in to control Ganogola. The wood is used to make furniture and fuel wood. The bark is used in making Syagu (locally made umbrella).
41	KBR104	*Carpinus faginea* Lindl.	Betulaceae	गरा	T	Lf, Wd	Fdr, Tm	Leaves are fodder. Its wood is used as fuel wood and agricultural equipment.
42	KBR103	*Arnebia benthamii* (Wall.ex G.Don) Jhonston	Boraginaceae	महारंगी	H	Rt	Md	The dried root is mixed with oil and used for hair care.
43	RWN12	*Sarcococca hookeriana* Baill.	Buxaceae	तेलपारो	H	Fr	Ft, We	Ripen fruits are edible. Leaf debris or aerial part is used to make fertilizer.
44	RWN13	*Cannabis sativa* L.	Cannabaceae	भाँगो	H	Br, Inf, Sd	Md, Fy	The young inflorescence is rubbed in both hands to obtain latex which is applied on the cut wound. The fiber obtained is used to make ropes.
45	KBR102	N*ardostachys jatamansi* (D. Don) DC.	Caprifoliaceae	भुल्ते	H	Rt	Md	The plant is used as a tonic and to cure headache problems.
46	RWN03	*Valeriana hardwickii* Wall.	Caprifoliaceae	समयो	H	Rt	Md	The paste or powder obtained by grinding fresh or dry rhizome is mixed with hot water and filtered. The filtrate is used in an eye infection.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
47	KBR101	*Drymaria cordata* (L.) Willd.ex Schult.	Caryophyllaceae	अबिजालो	H	Lf	Md	The juice obtained by grinding fresh leaves is used to control fever and paste is applied on the cut wound.
48	RWN21	*Terminalia alata* Roth	Combretaceae	साज	T	Lf, Wd	Fdr, Tm	Leaves are used as fodder. Wood is used to make required furniture.
49	RWN14	*Cuscuta reflexa* Roxb.	Convolvulaceae	आकासेवेली	H	St	Md	The juice obtained after grinding leaves and stem is drunk to cure jaundice and diarrhea.
50	RWN14	*Coriaria napalensis* Wall.	Coriariaceae	मछाइनो	T	Br, Fr	Md, Tm, We	Fruits are edible but overconsumption may cause vomiting. Wood is used to make furniture. Bark paste is applied on the fracture.
51	RWN20	*Cornus capitata* Wall.ex Roxb.	Cornaceae	डिमर	T	Fr,Wd	Fe, Ft, Tm, We	Ripen fruits are edible and also used to make alcoholic beverages. Wood is used to make agricultural equipment and furniture. Its leaves are used as fertilizer.
52	RWN167	*Hellenia speciosa* (J. Koenig) S.R.Dutta	Costaceae	बेतलौरी	H	St	Md	Stem juice is used to control fever.
53		*Cucurbita pepo* L.	Cucurbitaceae	कद्दु, फर्सी	H	Fr	Md	The Seeds of this and *Solena heterophylla* are mixed and chewed to treat stomatitis.
54	RWN166	*Solena heterophylla* Lour.	Cucurbitaceae	ग्वालकाँक्रि	C	Fr	Md	Ground seed is used in stomatitis.
55	RWN73	*Trichosanthes tricuspidata* Lour	Cucurbitaceae	इन्द्रेनी लहारा	C	Fr, Lf, Rt	Md	Seeds are used to control vomiting. Leaf and root juice are used in mensuration disorder.
56	RWN93	*Juniperus* squamata Buch.-Ham.ex D.Don	Cupressaceae	धुपी	T	Lf, Wd	Rg,	Leaves are used to make incense. The plant is used as fuel wood.
57	KBR100	*Cyperus rotundus* L.	Cyperaceae	मोथे	H	Tb, Lf	Fdr, Md	Tuber juice is used to control typhoid, diarrhea, stomach disorder and dysentery. Fresh plants have fodder value.
58	KBR99	*Shorea robusta* C.F. Gaertn.	Dipterocarpaceae	साल	T	Wd	Tm	Timber is used to make furniture.
59	RWN09	*Elaeagnus kanaii* Momiy.	Elaegnaceae	गुहेला	T	Fr	We	Ripen fruit is edible and also used to make alcoholic beverages.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
60	RWN20	*Lyonia ovalifolia* (Wall.) Drude	Ericaceae	अयार	T	Ast, Lf, Wd	Md, Tm	Apical shoots and leaf paste are used to control scabies (Luto). Wood is used to make honey bee hives.
61	RWN2	*Rhododendron arboreum* Sm.	Ericaceae	बुरास	T	Fl	Md	Fresh flowers are chewed or dried flower powder is mixed with hot water and drunk to control diarrhea.
62	KBR158	*Euphorbia royleana* Boiss.	Euphorbiaceae	सिँउडी	S	Wp, St	Rg, Po	The milky latex is used for fish poisoning and is sometimes used to worship ghosts.
63	KBR98	*Falconeria insignis* Royle	Euphorbiaceae	खिर्रो	T	Br, Lf	Md, Tm	Decoction of bark is applied on baby's stomach to treat stomach disorder. The milky latex is harmful for the eyes. Crushed leaves are used for fish poisoning. Its wood is used to make musical instruments like Madal and Sarangi.
64	RWN156	*Jatropha curcas* L.	Euphorbiaceae	सजिवन	S	Fr	Md	Seed powder or oil is used to control fire burn wounds.
65	RWN65	*Macaranga denticulata* (Blume) Mull.Arg.	Euphorbiaceae	मल्यात	T	Ast, Lf, Wd	Md, Tm	Fluid obtained by breaking apical shoots or fresh petiole is applied on cut wounds. Wood is used to make furniture items. Plants are used as fuelwood. It is used to make musical instruments (Madal).
66	RWN64	*Ricinus communis* L.	Euphorbiaceae	अरिल	S	Fr, Lf, Ast	Md	Leaves and apical shoots of this, *Cannabis sativa* and Mustard oil are mixed and applied on snake bite wounds.
67	RWN63	*Bauhinia variegata* L.	Fabaceae	कोइरालो	T	Br, Fl, Fr	Fd, Md, Vt, We	Bark juice is used to cure diarrhea. Flowers are used as vegetables and fruits are edible.
68		*Dalbergia latifolia* Roxb.	Fabaceae	साल	T	Br, Wd	Md, Tm	Bark and wood are used as a tonic and also used to control worms. Wood is used to make furniture.
69	RWN58	*Desmodium oojeinense* (Roxb.) H.Ohashi	Fabaceae	सादन	T	Br, Lf, Wd	Fdr, Rg, Tm	Leaves are used as fodder and wood is used to make furniture. Red latex collected from the stem is used in religious activities.
70	RWn121	*Indigofera cassioides*	Fabaceae	सागिनु	T	Rt, Wd	Md,Tm	The root juice is used to control chronic

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
		DC.						diarrhea. Wood is used to make furniture.
71		*Macrotyloma uniflorum* (Lam.) Verdc	Fabaceae	गहत	H	Fr	Md, Vt	Seeds are soaked in hot water for more than 5 hours and drunk to cure kidney stones.
72	RWN49	*Phanera vahlii* (Wight & Arn.)Benth.	Fabaceae	मालुलहरा	S	Fl	Fd, Fdr,Fy, Md, Rg, We	The poisoning caused by *Aconitum spicatum* to cattle is treated by mixing its flower juice and water. Fruit is edible and fiber is used to make ropes. Leaves have religious value.
73	RWN151	*Senegalia catechu*(L.f.) P.J.H. Hurter & Mabb.	Fabaceae	खयर	T	Br, Wd	Md, Tm	Bark juice is used to control joint pain. The wood is used to make furniture products.
74		*Trigonella foenum-graecum* L.	Fabaceae	मेथी	H	Ast, Sd	Md, Vt	Seeds are fried with mustard oil and applied on the whole body to control swelling. Seeds are used as spices. Apical shoots and young leaves are eaten as vegetables.
75		*Castanopsis indica* (Roxb. Ex Lindl.) A.DC.	Fagaceae	कटुस	T	Lf, Fr, Wd	Fdr, We, Tm	Leaves are used as fodder and fruit is edible. Wood is used as fuel wood and to make agricultural equipment.
76	RWN122	*Quercus glauca* Thunb.	Fagaceae	फलाँट	T	Lf, Wd	Fdr, Dy, Tm	The plant is used as fodder. Leaf juice is used as ink in primitive times. Wood is used to make agricultural equipment and furniture products.
77	RWN123	*Quercus lanata* Sm.	Fagaceae	बाँझ	T	Hw	Fdr, Md, Tm	The juice of heartwood is used to control joint pain. Leaves are used as fodder and wood is used as fuel wood.
78	RWN124	*Quercus oblongata* D.Don	Fagaceae	रयाँज	T	Lf, Wd	Fdr, Tm	Wood is used to make furniture products. Leaves are used as fodder.
79	RWN124	*Quercus semecarpifolia* Sm.	Fagaceae	खर्सु	T	Lf, Wd	Fdr, Tm	Leaves are used as fodder and wood is used to make agricultural equipment and as fuel wood.
80	RWN125	*Ganoderma lucidum*(Curtis) P. Karst.	Ganodemataceae	रातो पुनिउ च्याउ		Wp	Md	The whole plant paste is applied on a cut wound. It has high trade value and is too expensive.
81	RWN81	*Swertia chirayita* (Roxb.) H.Karst	Gentianaceae	तिते	H	Wp	Md	Leaf juice is used to control blood pressure and cough. It is a highly traded medicinal

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
								plant.
82	RWN15	*Geranium* nepalense Sweet	Geraniaceae	रगतजरी	H	Rt	Md	Root juice is used to cure bacillary dysentery.
83	KBR95	*Hericium erinaceus* (Bull.) Persoon	Hericiaceae	ज्वारे च्याउ		Wp	Vt	The whole plant is eaten as vegetable.
84	KBR94	*Juglans regia* L.	Juglandaceae	ओखर	T	Br, Fr, Wd	Md,Tm, We	The bark is tied on fracture. Bark juice is used to make yellow dye. Seeds are eaten to increase memory power and wood is used as furniture.
85	KBR94	*Colebrookea oppositifolia* Sm.	Lamiaceae	धुल्सु	S	Lf, Sh	Md, Rg	Stem hairs are peeled out and applied on cut wounds. Leaf has religious value.
86	KBR96	*Elsholtzia blanda* (Benth.) Benth	Lamiaceae	बन सिलाम	H	Lf, Sd	Md, We	Leaf paste is applied on the body to prevent from leech. Seed is edible.
87	KBR93	*Mentha arvensis* L.	Lamiaceae	पुदिना	H	Lf	Md, Pk	Leaf juice is used to control fever and cough. Leaves are eaten as pickles.
88	KBR92	*Ocimum basilicum* L.	Lamiaceae	बामरीफुल	H	Inf, Lf, Wp	Md, Rg	Leaf juice is used to control headaches and fever. The whole plant has religious value.
89		*Ocimum tenuiflorum* L.	Lamiaceae	तुलसी	H	Lf, Wp	Md, Rg	Leaf is used to control cough and cold. It has a religious value too.
90	KBR90	*Stauntonia angustifolia* (Wall.) Christenh.	Lardizabalaceae	गोब्लो	C	Fr	We	Ripen fruits are eaten and are also used to make alcohol.
91	RWN107	*Cinnamomum tamala* (Buch.-Ham.) Nees &Eberm	Lauraceae	सुरकाउलो	T	Br, Lf	Md, Rg	Bark juice is used to control diarrhea. Bark and Leaf are used as spices. The leaves are used in religious activities.
92	RWN29	*Lindera megaphylla* Hemsl.	Lauraceae	काउलो	T	Lf, Wd	Ft, Tm	The leaves are used to make fertilizer. Wood is used to make agricultural equipment.
93	RWN30	*Lindera pulcherima* (Nees) Benth.ex Hook.f.	Lauraceae	किमेरी	T	Lf,Wd	Ft, Tm	Leaves are used to make fertilizer. Wood is used to make agricultural equipment.
94	RWN126	*Litsea monopetala* (Roxb.ex Baker) Pers	Lauraceae	कुटमिरो	T	Lf, Wd	Fdr, Tm	Leaves are used as fodder. Wood is used for furniture and agricultural equipment.
95	RWN125	*Lilium nepalense* D.Don	Liliaceae	तितेपिरालु	H	Tb	Md, We	Tuber paste is used on fire burn wounds. Fresh tubers are edible.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
96	KBR89	*Reinwardtia indica* Dum.	Linaceae	प्याउली	S	Lf, Ast	Fdr, Md	Apical shoots and leaves juice is applied on cut wounds. Its leaf and young stem are used as fodder.
97	RWN128	*Scurrula parasitica* L.	Loranthaceae	ऐझेरु	H	St, Fr	Md, We	Stem paste is used to cure fractures. Fresh fruits are edible.
98	KBR87	*Punica granatum* L.	Lythraceae	दारिम	S	Fr	We	Fruits are edible.
99	RWN129	*Woodfordia fruticosa* (L.) Kurz	Lythraceae	धायरो	S	Br, Fl	Md	Bark paste is applied on fire burn wound. Flower juice is drunk for dysentery and diarrhea.
100	KBR86	*Bombax ceiba* L.	Malvaceae	सिमल	T	Rt, Fr, Wd	Md, We	Root juice is used to control diarrhea and worms. Fruit is edible and wood is used to make a musical instrument (Madal).
101	RWN15	*Grewia serrulata* DC.	Malvaceae	भिमल	T	Br, Fl, Lf, Wd	Md, Fdr, Fy,We	Bark juice is used to control roundworms. Ripen fruits are edible. Fiber from annual branch bark is used to make rope and leaves are fodder.
102	KBR85	*Sterculia villosa* Roxb.ex Sm.	Malvaceae	ओदलपाट	T	Br, Fr,Lf	Fy, We	Fiber from the bark is used to make ropes. Fruit is edible. Leaves are fodder.
103	RWN16	*Paris polyphylla* Sm.	Melanthiaceae	सतुवा	H	Tb	Md	Tuber paste is used on cut wounds and juice is used to cure eye problems.
104	KBR85	*Melia azedarach* L.	Meliaceae	बकाइनो	T	Lf, Wd	Md	Seed powder is used to control goat worms. Leaves are fodder. Timber is used to make agricultural equipment.
105	KBR84	*Toona ciliata* M. Roem.	Meliaceae	टुनु	T	Wd	Tm	Wood is used to make furniture and agricultural equipment.
106	RWN153	*Cissampelos pareira* L.	Menispermaceae	बादलपाते	C	Lf,Rt	Fdr, Md	Root juice is used to control diarrhea. Leaves are fodder.
107	RWN150	*Tinospora cordifolia* (Willd.) Miers	Menispermaceae	गुर्जो	S	St	Md	Stem juice is used to control piles.
108	RWN152	*Ficus auriculata* Lour.	Moraceae	तिमिलो	T	Ast, Fr	Md, Rg, We	Apical shoots and young fruits are given to cure diarrhea. Ripen fruits are edible. The plant has religious value.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
109	RWN148	*Ficus benghalensis* L.	Moraceae	बर	T	Ml, Fr	Md, Rg,We	The milky latex is used to control fungal infection (Dag). Ripen fruit are edible. Whole plants have religious value.
110	RWN144	*Ficus lacor* Buch.-Ham.	Moraceae	काब्रो	T	Ast, Lf	Fdr, Pk, Rg,Vt	Apical shoots and young buds are used to make pickles. Leaves are used as fodder and the whole plant has religious value.
111	RWN147	*Ficus nerifolia* Sm.	Moraceae	दुदिलो	T	Fr, Lf, Rg, Wd	Fdr, Rg, Tm, We,	Ripen fruits are edible and leaves are used as fodder. Wood is used as fuel wood and the whole plant has religious value.
112	RWN03	*Ficus palmata* Forssk.	Moraceae	बेरुलो	T	Lf, Fr	Md, Rg, We	Milky latex is used to control furuncle (Pilo). Ripen fruit is edible and the whole plant has religious value.
113	KBR82	*Ficus semicordata* Buch.Ham.ex.Sm.	Moraceae	खनियो	T	Fr, Lf	Fdr, We	Leaves are good fodder for animals and fruits are eaten.
114	KBR81	*Morus australis* Poir.	Moraceae	तुथो	T	Fr, Lf, Wd	Fdr, Tm	Fruits are edible and leaf used as fodder. Wood is used to make agricultural equipment.
115	KBR80	*Morus serrata* Roxb.	Moraceae	किम्मु	T	Fr, Lf, Wd	Fdr, Tm, We	Fruits are edible. Leaves are used as fodder. Wood is used to make agricultural equipment and household equipment.
116	RWN04	*Morchella esculenta* Fr.	Morchellaceae	गुच्ची च्याउ		Wp	Md	The plant juice is used to cure headache and fever. The whole plant is edible.
117	KBR70	*Musa balbisiana* colla	Musaceae	केरा	H	Fr, Lf	Md, Rg, We	Fruit is edible. Young fruits are taken to cure diarrhea. The whole plant has religious value.
118	RWN05	*Myrica esculenta* Buch.-Ham.ex D.Don.	Myricaceae	काफल	T	Fr, Wd	Md, Tm, We	Fruit is edible. Dried fruits are taken to cure diarrhea. Wood is used as fuel wood and to make agricultural equipment.
119	RWN06	*Syzygium cumini* (L.) Skeels	Myrtaceae	जामुन	T	Fr, Lf, Sd, Wd	Fdr, Md, Tm	Fruits and seeds are chewed to control diabetes. Leaves are used as fodder and wood is used to make household and agricultural equipment.
120	RWN07	*Nephrolepis cordifolia* (L.) K. Presl	Nephrolepidaceae	पानिअमला	H	Tb	Md	Tuber juice is used to control malarial fever.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
121	RWN75	*Fraxinus floribunda* Wall.	Oleaceae	लाकुरी	T	Br, Wd	Dy, Md,Tm	The bark is tied on fracture. Bark juice is used to make green dye. Wood is used to make agricultural equipment.
122	RWN08	*Ophiocordyceps sinensis* (Berk.) G.H. Sung, Hywel-Jones & Spatafora	Ophiocordycipitaceae	जीवन बुटी		Wp	Md, Fd, We	The whole plant is taken as tonic. Fungal parts are eaten as vegetables.
123	RWN34	*Ophioglossum reticulatum* L.	Ophioglossaceae	जिब्रेसाग	H	Wp	Vt	The whole plant is eaten as vegetable.
124	KBR60	*Coelogyne cristata* Lindl.	Orchidaceae	पानीपखाडा	H	Tb	Md	Pseudobulbs are used as aphrodisiacs and treat constipation.
125	KBR68	*Dactylorzia hatagirea* (D.Don.) Soo	Orchidaceae	पाचौंले	H	Tb	Md	Tuber paste is applied on cut wound.
126	RWN108	*Oxalis corniculata* L.	Oxalidaceae	चर्मिलो	H	Lf	Md	The fresh leaf is eaten to cure piles.
127	RWN107	*Meconopsis paniculata* (D.Don) Prain	Papaveraceae	चोते	H	Rt	Md	Root paste is applied on cut wounds.
128	RWN18	*Phyllanthus emblica* L.	Phyllanthaceae	अमला	T	Sd	Md, We	Fruit powder is one of the constituents of Triphala Churna.
129	KBR67	*Abies Pindrow* Royle	Pinaceae	गोब्रेसल्लो	T	Br, Wd	Tm	The peeled bark is used as a tent. Wood is used to make furniture, agricultural equipment and household equipment.
130	RWN86	*Abies spectablilis* (D.Don) Mirb.	Pinaceae	ठिगो	T	Wd	Tm	Wood is used to make furniture, agricultural equipment and household equipment.
131	RWN13	*Cedrus deodara* (Roxb. Ex D.Don) G.Don	Pinaceae	ध्यार	T	Oil, Wd	Md, Tm	Oil extracted from wood is used to control scabies (Luto). Wood is used to make furniture.
132	KBR66	*Picea smithiana* (Wall.) Boiss	Pinaceae	झुलेसल्लो	T	Wd	Tm	Wood is used to make household and agricultural equipment.
133	KBR65	*Pinus roxburghii* Sarg.	Pinaceae	सल्लो	T	Rn	Md, Tm	Resin is used to cure physical pain. Wood is used to make furniture.
134	KBR64	*Pinus wallichiana* A.B. Jacks.	Pinaceae	काँरे सल्लो	T	Wd	Tm	Wood is used to make household, furniture and agricultural equipment.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
135	RWN92	*Tsuga dumosa* (D.Don) Eichler	Pinaceae	ठिङग्रेसल्लो	T	Wd	Tm	Wood is used to make furniture, agricultural and household equipment.
136	RWN80	*Neopicrorhiza scrophulariiflora* (Pennell) D. Y. Hong	Plantaginaceae	कटुवा	H	Rt, Tb	Md	Rhizomes and roots are used to treat high blood pressure, fever, bile and other intestinal pain.
137	RWN113	*Plantago major* L.	Plantaginaceae	कानेझार	H	Lf, Rt	Md	Fresh 5-6 fresh leaves are chewed every day to control piles. Root juice is used to treat roundworms.
138	KBR63	*Cynodon dactylon* (L.) Pers.	Poaceae	दुबो	H	Ast, Lf	Md	Apical shoots and leaf juice is used to treat nosebleeds and cut wounds. The whole plant has religious value.
139	RWN26	*Desmostachya bipinnata*(L.) Stapf	Poaceae	कुश	H	Lf	Rg	The whole plant has religious value.
140	RWN72	*Drepanostachyum* sp	Poaceae	निगालो	H	Ast, Lf, St	Fdr, Fy We,	Young apical shoots are eaten as vegetables. Leaves are fodder. Stem is used to make household equipment and local products like Mandro, Doko.
141	KBR62	*Eulaliopsis binata* (Retz.) C.E. Hubb.	Poaceae	बाबियो	H	Wp, Lf	Fdr, Fy, Rg	Leaves are fodder. Fiber are used to make ropes. The whole plant has religious value.
142	KBR61	*Imperata cylindrica* (L.) P. Beauv.	Poaceae	सिरुघाँस	H	Lf, Rt	Fdr, Md	The fresh root is chewed or root juice is used to treat roundworm. It is used as fodder.
143	KBR60	*Saccharum officinarum* L.	Poaceae	उखु	H	St, Wp	Md, Fd, Rg	Stem juice is used to control jaundice and high energetic source of food. The whole plant has religious value.
144	KBR59	*Thysanolaena latifolia* (Rox.ex Hornem) Honda	Poaceae	अमलिसो	H	Arp, Rt	Fdr, Md	Juice obtaind by crushing its root and *Cuscuta reflexa* is used as an anthelmintic. The aerial part is fodder. The inflorescence is used to make brooms.
145	RWN79	*Fagopyrum dibotrys (D.Don) H.Hara*	Polygonaceae	भारे साग	H	Ast, Lf	Fdr, Vt	Apical shoots and young leaves are eaten as vegetables and also used as fodder.
146	KBR58	*Rheum australe* D.Don.	Polygonaceae	पदमचाल्लो	H	Tb, St	Md, Pk	Root paste is used to control physical pain. Stem and petiole juice is used to control fever. Fresh stems and petiole are eaten as

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
								pickles.
147	RWN34	*Rumex hastatus* D.Don	Polygonaceae	कापो	H	Rt, Lf	Md	Leaf juice is applied against sticky *Sapium insigne* latex. Leaves are edible.
148	KBR56	*Rumex nepalensis* Spreng.	Polygonaceae	हले	H	Ast, Rt	Md, Vt	Paste from root of this plant and Rheum austral root is applied to cure the sprain (Markeko laagi).
149	RWN78	*Myrsine africana* L.	Primulaceae	कालो हारी	S	Fr	Fe,We	Ripen fruits are edible. Fruits are used to make alcoholic beverages.
150	KBR52	*Myrsine semiserrata* Wall.	Primulaceae	हारी	S	Fr, Wd	Fe, We, Tm	Fruits are edible and also used to make alcoholic beverages. Wood is used as fuel wood and to make agricultural equipment.
151	RWN134	*Cheilanthes albomarginata* C.B. Clarke	Pteridaceae	डनसिन्की	H	Wp, St	Md	Burned ash is used to cure ear problems.
152	RWN21	*Aconitum spicatum* (Bruihl) Stapf	Ranunculaceae	विख	H	Tb	Po, Rg	Tuber powder is mixed with fried wheat flour and used to kill mice. Seed and roots have religious value.
153	RWN32	*Delphinium vestitum* Wall.ex Royle	Ranunculaceae	अत्तिस	H	Rt	Md	Root powder is used as an anthelmintic.
154	KBR51	*Thalictrum foliolosum* DC.	Ranunculaceae	टिकुली झार	H	Rt	Md	Root juice is used to control joint pain.
155	KBR38	*Fragaria nubicola* (Hook.f.) Lindl.ex Lacaita	Rosaceae	भुईकाफल	H	Fr	We	Fruits are edible.
156	KBR36	*Potentilla indica* (Andrews) Wolf	Rosaceae	भुईकाफल	H	Fr	We	Fruits are edible.
157	KBR422	*Prinsepia utilis* Royle	Rosaceae	डोट्यालो	S	Sd	Md, Rg, We	Oil is used to cure allergic problems. Ripen fruits are edible and plant has religious value.
158	KBR31	*Prunus cerasoides* D.Don	Rosaceae	पैयुँ	T	Br, Fr	Fdr,Md, Tm,We	Decoction obtained by cooking the bark of this plant and *Alnus nepalensis* bark is used to cure wounds. Fruit is edible and leaves are used as fodder. Wood is used as agricultural equipment.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
159	KBR24	*Prunus persica* (L.) Stokes	Rosaceae	आरु	T	Fr, Sd	Md, We	Fruits are edible. Seed oil is applied on skin allergies.
160	RWN119	*Pyracantha crenulata* (D.Don) M. Roem.	Rosaceae	घँगारु	T	Fr, Wd	Tm,We	Fruits are edible. Wood is used to make stick and agricultural equipment.
161	KBR23	*Pyrus paschia* Buch.-Ham. Ex D.Don	Rosaceae	मेहल	T	Fr	Fe, Md, We	Dried fruits are eaten to balance dehydration. Fruits are used to make alcoholic beverages.
162	KBR22	*Rosa macrophylla* Lindl.	Rosaceae	केसर, ऐरी	S	Fr	Md	Fresh fruits are chewed or fruit powder juice is used to control asthma.
163	KBR21	*Rubus acuminatus* Sm.	Rosaceae	ऐसेलु	S	Fr	We	Fruits are edible.
164	KBR20	*Rubus biflorus* Buch.-Ham.ex Sm.	Rosaceae	जोगिऐसेलु	S	Fr	We	Fruits are edible.
165	KBR19	*Rubus ellipticus* Sm.	Rosaceae	रातिऐसालु	S	Fr	We	Fruits are edible.
166	KBR18	*Rubus nepalensis* (Hook.f.) Kuntze	Rosaceae	ऐसेलु	S	Fr	We	Fruits are edible.
167	KBR16	*Rubus paniculatus* Smith.	Rosaceae	कालोऐसालु	S	Fr	We	Fruits are edible.
168	KBR14	*Rubia manjith* Roxb.	Rubiaceae	मच्चेटो	H	Rt	Md	Root juice is used to control malarial fever.
169	KBR13	*Aegle marmelos* Corr.	Rutaceae	बेल	T	Fr, Lf, Rt	Md, Rg	Ripen fruit juice is given to treat constipation and dyspepsia. Root juice is used to control diarrhea. The whole plants have religious value.
170	RWN37	*Boenninghausenia albiflora* (Hook.) Rchb.ex Meisn	Rutaceae	छरुवाझार	H	Inf,Lf	Md	The fresh leaf is fried in mustard oil and applied on the skin to control skin allergies.
171	RWN101	*Zanthoxylum armatum* DC.	Rutaceae	टिमुर	S	Br, Fr,	Md, Rg	Fruit powder is applied on fire burn wounds and is also used as spices. The whole plant has religious value.
172	RWN71	*Zanthoxylum oxyphyllum* Edgew.	Rutaceae	सिल्टिमर	S	Fr	Md, Rg	Fruits are used to relieve toothache. The whole plant has religious value.
173	RWN45	*Viscum* Sp	Santalaceae	ऐङ्यारु	S	Fr, St	Md, We	Stem paste is applied on the fracture and fruits are edible.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
174	RWN08	*Aesculus indica* (Colebr.ex.Cambess) Hook.	Sapindaceae	पाँङग्रो	T	Fr, Lf Wd	Md, Tm,	Seed powder paste is used to cure furuncles (pilo) and wood is used to make furniture.
175	RWN27	*Diploknema butyracea* (Roxb.) H.J.Lam	Sapotaceae	चिउरी	T	Fr, Lf, Sd,Wd	Fdr, Md, Rg, Tm,We	Seed oil is used to cure cold injuries. Oil is edible. Wood is used to make furniture. Leaves are used as fodder and plant has religious value.
176	RWN89	*Astilbe rivularis* Buch.Ham..ex D.Don	Saxifragaceae	न्याउलीपाति	H	Rt	Md	Rhizomes powder is used as a tonic in pre and post-pregnancy.
177	RWN64	*Bergenia ciliata* (Haw.)Sternb.	Saxifragaceae	सिल्पारी	H	Inf, Tb	Md, Vt	The fresh tuber is directly chewed to control cough. Rhizome juice is used to cure gastritis and kidney stone. Inflorescence and flowers are used to make pickles.
178	KBR12	*Schisandra propinqua* (Wall.) Baill.	Schisandraceae	सिवल्टा लहरा	C	Fr, St	Fy, We	Fruits are edible. Fibers are used as rope.
179	RWN66	*Selaginella biformis* A. Braun ex Kuhn	Selaginellaceae	काल्लेझार	H	Wp	Md	Leaf juice is applied on cut wounds.
180	KBR13	*Nicandra physalodes* (L.) Gaertn	Solanaceae	धतुरो	H	Fr, Lf	Md, We	Leaf juice is used to control amoebiasis. Fresh fruits are edible.
181	KBR11	*Nicotiana tabacum* L.	Solanaceae	काचो, सुर्ति	H	Lf	Md	Leaf juice is used to kill insects in the ear. Stem and leaf powder are used to smoke as tobacco.
182	RWN142	*Solanum lycopersicum* L.	Solanaceae	गोलभँडा	H	Fr	Md	Ripen fruit paste is used to treat the fire burn wound. Fruits are edible.
183		*Solanum nigrum* L.	Solanaceae	कालीगेडी	H	Ast Fr,	We	Fruits are edible.
184	RWN141	*Solanum pseudo-capsicum* L.	Solanaceae	रातिगेडी	H	Ast Fr,	Vt, We	Fruits are edible. Apical shoots and young leaves are eaten as vegetables.
185	RWN55	*Taxus contorta*Griff.	Taxaceae	लैँटो	T	Br, Wd	Md, Tm	Bark juice is used to control chest pain. Wood is used to make houses, furniture and agricultural equipment.
186	RWN46	*Daphne bholua* Buch.-Ham.ex D.Don	Thymelaceae	बरुलो	S	Br, Fr	Fy, We	Fruits are edible and bark is used to make paper.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
187	KBR10	*Daphne papyracea* Wall.ex G.Don	Thymelaceae	बरुलो	S	Br	Fy	Bark is used to make paper.
188	RWN59	*Debregeasia longifolia* (Burm.f.) Wedd.	Urticaceae	तुसारो	S	Fr, Lf, Wd	Fdr, We	Fruits are edible. Leaves are fodder. Wood is used as fuel wood.
189	KBR09	*Elatostema platyphyllum* Wedd.	Urticaceae	गोल्फेझार	H	Rt	Md	Root juice is used to cure Ganogola. Leaves are fodder.
190	KBR08	*Girardinia diversifolia* (Link.) Friis	Urticaceae	पुवा	H	Ast, Br	Fy, Vt	Apical shoots are eaten as vegetables. Bark fiber is used to make clothes.
191	KBR07	*Urtica dioica* L.	Urticaceae	सिस्नो	H	Ast, Lf, Rt	Md, Vt	Root paste is applied to cure sprain (Markinu). Apical shoots and young leaves are eaten as vegetable.
192	RWNR WN11	*Pouzolzia rugulosa* (Wedd.) Acharya &Kravtsova	Urticiaceae	गिठो	T	Br, Lf, Wd	Fdr, Md, RgTm,We	Bark is used to control constipation. Bark powder is eaten as vegetable. Leaves are fodder. Wood is used to make furniture, household equipment and wooden pots. Wood has religious value.
193	RWN76	*Usnea florida* (L.) Weber ex F.H. Wigg.	Usneaceae	लहरे स्याली		Wp	Md	Burned ash is used in cut wounds.
194	RWN73	*Usnea thomsonii* Stirt.	Usneaceae	स्याली		Wp	Md, Rg	Plant paste prepared from this plant and *Impatiens balsamina* is used to control cut wounds. It has cultural value.
195	RWN71	*Viburnum cotinifolium* D.Don	Viburnaceae	बन्ठुरा	S	Fr, Wd	We	Fruits are edible. Wood is used to make agricultural equipment.
196	RWN69	*Viburnum mullaha* Buch-Ham.ex D.Don	Viburnaceae	मलेवा	S	Fr	Md, We	Fruit juice is used to cure asthma. Fruits are edible. Wood is used as fuel wood.
197	KBR)06	*Ampelocissus latifolia* (Roxb.) Planch.	Vitaceae	जालपुरिनु लहरा	H	Fr	We	Fruits are edible.
198	KBR05	*Ampelocissus rugosa* (Wall.ex Roxb.) Planch	Vitaceae	पुरिना	C	St	Md, We	Stem juice is used to control the eye wound as well as Phulopareko. Fruits are edible. Whole plant is fodder.
199		*Amomum sabulatum* Roxb.	Zingiberaceae	अलैंची	H	Fr	Md	Seeds are fried in mustard oil and applied on body swelling. Seeds are used as spices.

S.N.	Col. No.	Botanical Name	Family	Local Name	Life form	Parts Use	Use category	Mode of use
200		*Curcuma longa* L.	Zingiberaceae	बेसार	H	Tb	Md	Tuber paste is applied on wounds. Boiled juice is used to cure tonsilltis. Powder is used as spices.
201		*Zingiber officinale* Roscoe	Zingiberaceae	अदुवा	H	Tb	Md	Tuber powder is used to cure stomach disorders and is also used as spices.

Legends: Life form; H: Herbs, S: Shrubs, T: Tree, C: Climber **Part use:** Ast: apical shoot, Fr; fruit Wp; whole plant, Tb; tuber, Lf; Leaves, Rt; root, St; stem. **Use category:** Md; Medicinal, We; Wild edible, Tm; Timber, Fd, Food, Fdr; Fooder, Vt: vegetable, Fy; Fiber yielding, Po; Poision, Ft; Fermentation, AL; Agricultural implements, Rg; Religious cultural.

Appendix:VI Photo Plates

Photo plate 1: A. *Taxus contorta*. **B.** *Xanthoxylum armatum*. **C**. *Abies spectabilis* **D.** *Acorus calamus* **E.** *Allium wallichii* **F.** *Paris polyphylla* **G**. *Rheum australe* **H.** *Nardostachys jatamansi* **I.** *Populus ciliata.*

Photo plate 2: J. *Satyrium nepalense* **K.** *Aconitum spicatum* **L.** *Morina longifolia* **M.** *Leibnitzia nepalensis* **N.** *Saussurea graminii* **O.** *Ampelocissus rugosa* **P.** *Viburnum mullah* **Q.** *Girardinia diversifolia* **R**. *Hericius erinaceus*

Photo plate 3: Some photo taken at the time of data collection