

# 1. INTRODUCTION

## 1.1 Background

Traditional use of plant and plant resources for medicinal purposes has a long history in Nepal and its use is rapidly spreading due to having no side-effects, easily available at affordable prices and sometimes the only sources of the health cure to the poor. The ethnic communities have significant customary knowledge on utilization of plant and plant parts and there is a long tradition of transferring this indigenous knowledge from generation to generation. The indigenous knowledge on medicinal plants is gaining recognition worldwide. In Nepal, Nepal Biodiversity Strategy has also highlighted its importance for proper conservation of Himalayan Biodiversity(NBS,2002). The plant and plant resources for medicinal use were collected from various habitats. At present, most of these habitats with useful species are under threat due to habitat destruction, unsustainable harvesting and over-exploitation (Chaudhary,1998) and many species are already threatened from collection pressure (Ghimire,2002). So, priority should be given to documentation of indigenous knowledge and conservation of existing species and habitats before some of these are eliminated from the area (Joshi *et al* 2003).

Nepal is rich in biodiversity. The variation in the topography is the prime factor which reflects contrasts in the climate, habit, vegetation, flora and fauna (Chaudhary,1994). According to Dobremez (1975), Nepal is covered by and divided into 114 ecosystems with distinct biological communities each with their associated flora and fauna. Similarly, Stainton (1972) divided Nepal into 5 different ecozones ; they are Tropical, Sub-tropical, Temperate, Sub-alpine and Alpine .

It has been estimated that the Himalayan region harbors about 12,000 species of medicinal and aromatic plants, supporting the livelihood of about 600 million people living in the area(Pie Shengji 2001). Nepal's rich biodiversity is a reflection of its unique geographical position as well as altitudinal and climatic variation. The people living in rural area generally depend on plants and its products in a traditional way to

fulfill the basic requirements for continuing their daily life. They obtain food, fodder, fuel wood, timber, building materials and medicines from plants. The country comprises about 10,000 species of higher plant. Species diversity in Nepal can be well known from the fact that over 15,00 species of medicinal plants have been discovered and described from the Nepalese flora among which more than 300 species are endemic to the country. The list of the Nepalese medicinal plants exceeds over 20% of the known Vascular plant species of the country (Manandhar and Aasae, 2003).

The universal role of plants in treatment of various human and veterinary ailments is evident since time immemorial and even today large bulk of people rely on plant based remedies for their basic health care requirements. The traditional medication systems viz. Ayurveda, Homeopathy, Tibetan and Chinese medicines, Kampo medicines, Unani and Siddha medication systems are based on the historical evidences about the use of plants for various medicinal purposes which now became well established practice of health care system. These traditional medication systems are popularly recognized for their excellence and serving complementary or some times superior role over modern medical system. Thus, even in modern medicine traditional ethnomedicinal folklores and the medicinal plants are serving as the inspirations and universal resources for the discovery and development of new drugs. It is the blessing of nature that large numbers of plants are endowed with medicinal values for both human and veterinary ailments. Although present days' drug market is dominated by synthetic drugs, it is supposed that about 25 percent or more potential drugs throughout the world are solely obtained from plants (Tripathi; 2004). There are about 72,000 plants having some sort of medicinal properties all over the world.(Schippmann et. al. 2006).

The Himalayan kingdom Nepal is well known for her superb collection of medicinal and aromatic herbs. There are about 1,950 medicinal and aromatic plants (MAPs) reported from Nepal (Ghimire, 2008). Besides, about 700 medicinal plants have been found in common traditional medicinal uses (Singh; 2006) and about 165 MAPs are found in international trade of crude drugs from Nepal (Bhattarai; 2006). Joshi and Joshi (2001) documented about 268 medicinal and aromatic plants which are common among different ethnic societies of Nepal as

ethnomedicinal requirements. Thirty percent medicinal plant species of the country occurs in the western part of the country (Manandhar,1998) and about 50% of the plants used as ethano-medicine in Nepal Himalaya have been documented (Kunwar et al.2008).

Moreover, there is outstanding assemblage of cultural and anthropological diversity in the country with more than 60 ethnic societies and more than 75 language groups (Shrestha; 1997). The ethnic people residing in different geographical belts of Nepal depend on wild plants to meet their basic requirements and all the ethnic communities have their own pool of secret ethnomedicinal and ethnopharmacological knowledge about the plants available in their surroundings which has been serving rural people with its superiority. These MAPs are flourished well in virgin himalayan as well as in damp tropical forests but there are scientifically virgin and geographically remote tropical forests which are still awaiting to disclose their many secrets. Unfortunately large numbers of wild plants are in the verge of disappearance due to extreme exploitation and ecological disturbances but detailed information about their economic potential still meager. Moreover, the practice and dependence of aboriginal societies in folk medicines is in rapid decline owing to changing in their life style, extreme secrecy of traditional healers and negligence of youngsters. Therefore the management of medicinal and aromatic plants and knowledge of utilization of the resources is of great importance and it can be promoted by considering and documenting the diversity of the plant resources and their indigenous knowledge of utilization (Kunwar et al. 2006).

## **1.2 Objectives of the Study**

The study will explore the following objectives:-

1. To document the plant resources used by the local community of the study area.
2. To collect the information about the medicinal species, fodder species, fuel wood species, fruit and other miscellaneous use of plants.
3. To identify the most exploited species for the specific purposes.

### **1.3 Justification**

Kanchanpur district is rich in indigenous plant resources which are used by the local people. By incorporating indigenous knowledge and use in the process of scientific research, new hypotheses for the sustainable conservation of the resources can be developed. Indigenous knowledge and use have to be analyzed to develop appropriate management measures that build on both scientific and local knowledge. Due to changing perception of the local people, and the ever increasing influence of global commercialization and socio-economic transformation, indigenous knowledge on plant resource use is constantly diminishing. Due to the lack of organized sustainable and scientifically monitored cultivation and harvesting, proper management techniques, and lack of awareness of social factors, the number of useful plant resources is decreasing at an alarming rate. Furthermore, the indigenous knowledge on the use of lesser-known plants is also rapidly declining.

This study will help in the conservation of indigenous plant resources along with their knowledge about uses realizing their importance and also document the species of that area.

### **1.4 Limitation**

The gathering of local people at the same time for group discussion was difficult due peak season of harvesting of crop. There was a problem of communication within the ethnic community.

## **2. LITERATURE REVIEW**

### **2.1 Ethnobotany**

Ethnobotany, a branch of science that includes the benefits, tradition, religion and culture of the particular community or area, refers to the relationship between people and plants. The term ethnobotany was first used by Harsburger (1896) who defined it as the study of plants used by primitive and aboriginal people.

Presently, ethnobotany has become increasingly valuable in the development of health care and conservation programs in different parts of the world. Mankind has been using plants since time immemorial for purposes such as food, fodder, and as medicinal remedies. Worldwide out of some estimated 4,22,000 plant species about 72,000 are used as medicinal and aromatic plants (Schippmann et. al. 2006).

Traditional use of plant and plant resources for medicinal purposes has a long history in Nepal and its use is rapidly spreading due to having no side-effects, easily available at affordable prices and sometimes the only sources of the health cure to the poor. The indigenous knowledge on medicinal plants is gaining recognition worldwide. In Nepal the study of ethnobotany started with the publication of a paper on medicine and food plants by Banerji in 1955. In this study, he documented the various food and medicinal plants of eastern Nepal. After his work, the workers continued the study of the ethnobotanical work.

Schultes (1967) defined ethnobotany as the study of relationship that exists between man and his ambient vegetation. In Nepal, Nepal Biodiversity Strategy has also highlighted its importance for proper conservation of Himalayan Biodiversity (NBS, 2002). Nepal is rich in biodiversity. The variation in the topography is the prime factor which reflects contrasts in the climate, habit, vegetation, flora and fauna (Chaudhary, 1994).

It has been estimated that the Himalayan region harbors about 12,000 species of medicinal and aromatic plants, supporting the livelihood of about 600 million people living in the area (Pie Shengji, 2001). The country comprises about 10,000 species of higher plants. Species diversity in Nepal can be well known from the fact that over 15,00 species of medicinal plants have been discovered and described from the

Nepalese flora among which more than 300 species are endemic to the country (Manandhar and Aasae, 2003).

It is the blessing of nature that large numbers of plants are endowed with medicinal values for both human and veterinary ailments. Although present days' drug market is dominated by synthetic drugs, it is supposed that about 25 percent or more potential drugs throughout the world are solely obtained from plants (Tripathi, 2004). The list of the Nepalese medicinal plants exceeds over 20% of the known Vascular plant species of the country (Manandhar and Aasae, 2003).

Medicinal Plants were assumed to be a free commodity in Nepal and were mainly collected from wild since ancient past, which can make a significant contribution to the livelihood, health care and income for those people who residing forest and pasture fringer and in rural areas (Kunwar, 2002). Joshi and Joshi (2001) documented about 268 medicinal and aromatic plants which are common among different ethnic societies of Nepal as ethnomedicinal requirements. Thirty percent medicinal plant species of the country occurs in the western part of the country (Manandhar, 1998). Therefore it is necessary to document the plant species of the tropical region to conserve and known the status of the biodiversity. Paudel (2000) studied the ethanobotany of Tharu of Bardia district .He documented the indigenous knowledge of 213 plant species used by Tharu people of the study area as medicine, food, fodder and many other useful items. Similiarly, Chaudhary (1994) studied medicinal plants and traditional medicinal practices in terai and Dun valley of Nepal, Altogether, 66 plant species have been documented which were found being used as folk medicine by the Tharu tribe of this region. The local name, family, place of collection and chemical composition have been provided. Similialry, Chapagain et al. (2004) recorded 213 medicinal plants used by Tharu community in the southern buffer zone of Bardiya National Park.

At present, most of these habitats with useful species are under threat due to habitat destruction, unsustainable harvesting and over-exploitation (Chaudhary,1998) and many species are already threatened from collection pressure (Ghimire,2005).If this trends of utilization of plant and plant resources remain same, we are in a danger of losing them forever(Manandhar,2002). So, priority should be given to documentation

of indigenous knowledge and conservation of existing species and habitats before some of these are eliminated from the area (Joshi *et al* 2003).

## **2.2 Role of the traditional medicinal plants**

Medicinal plants have played a maintenance of health as well as in the introduction of new treatment. Traditional medicine is widespread throughout the world. It comprises those practices based on beliefs that were in existence and which are still in use today. Today according to the World Health Organization (WHO, 1998) as many as 80% of the world's people depend on the traditional medicine for their primary health. WHO has listed over 21,00 plant species that are used around the world for medicinal purposes and estimated that at least 80 percent of all the global inhabitants rely on plant based traditional system of medicine for their primary health needs (Singh *et al.*, 2002). Malla and Shakya (1984-85) compiled a list of 630 medicinal plants species of Nepal including ecological distribution of the plant.

A significant portion of Nepalese people depends on agriculture and animal husbandry for survival. They rely mostly on the plant and animal resources of forests, wetlands, cultivated lands, and common lands. These resources are harvested and used in many ways, for example, as food plants, fodder plants, wild vegetables, spices, condiments, and fruits and also for constructing huts and houses, buildings, animal sheds, as wild genetic resources for improving crop plants, etc. Therefore, it is also necessary to know the information of the plants used and their proper utilization. Shrestha (1988) document 100 species used to fulfill various basic human needs of the Tamang of the Kathmandu Valleys. Similarly, Paudel (2000) studied the ethnobotany of Tharu of Bardia district. He documented the indigenous knowledge of 213 plant species used by Tharu people of the study area as medicine, food, fodder and many other useful items. This is very useful to the cure health of the local people and meets the various need of the community.

## **2.3 Conservation of ethnic knowledge**

All the traditional healers and local people were agreed with the sharp decrease in medicinal plants in their locality due to forest destruction and unsustainable harvesting but there was less awareness about the documentation and preservation of ethnomedicinal knowledge and medicinal plants among them. Chaudhary (1989)

presented information about the medicinal plants and traditional medicinal practices in Nepalese context. The report emphasizes the scope of medicinal plants and its importance, which fill the gap of knowledge between of the existing plant wealth and uplift the economy of the country.

The extreme secrecy of traditional healers and negligence of youngster along with decreasing biodiversity due to rapid forest destruction are the major challenges for conservation of traditional knowledge and medicinal plants (Dhami N.R., 2009). So, extensive ethanobotanical survey of the ethnic societies and detailed ethnopharmacological analysis of ethnomedicinal plants is recommended for documentation and authentication of ethnomedicinal knowledge and medicinal plants respectively. The documentation of plants is also a one of the measure of conservation of resources. Dangol and Gurung (1999) documented indigenous knowledge of 141 species used as fodder, medicine and food by Darai Tribe of Chitwan district.



### 3. STUDY AREA

#### 3.1 Site Description

Kanchanpur extends over 1,61,741 ha area of the Mahakali Zone of the Far-Western Development Region of the country. The latitude and longitude of the district, range from 28°32' to 29°8' N and 80°03' to 80°33' E respectively. The elevation from the mean sea level extends from 160 m to 1528m (The Siwalik Hills). The average annual rainfall of the district is 1771.5 ml. i.e. the average rainfall of the district is 1775 mm. There are various major river and streams of which major one is Mahakali River, Chaudhar River, Dodha River and Mohana river system & other so many seasonal rivers. Due to all these factors there is a wide variation in climatic and micro climatic conditions and thus wide variety of forest types. Kanchanpur district is surrounded by boundaries of district, Dedeldhura in North, Kailali in East & the border of India in both south and western direction i.e. U.P & Uttrakhand in the west respectively. The total area of the Kanchanpur is 1, 61,741 ha. Out of which about 59,532 ha. is suitable for agriculture and 88,200 ha .is covered by forest, Pasture, Rivers etc. The average maximum temperature of the Kanchanpur is 43°C & summer the average minimum temperature is 3°C in winter. The humidity recorded is about 71.16%. Out of 88,200 ha forest area (54%), about 19,511 ha (12.6%) belongs to churia hills forest, & 30,500 ha (18.9%) is protected or conserved forest. (District Profile of Kanchanpur, District Development Committee, 2010)

The district is rich in both floral and faunal diversity.

**Table 1**  
**Floral diversity of the Plant species in district**

S.N	Plant diversity	Number of Species
1	Pteridophytes	19
2	Gymnosperms	1
3	Dicotyledonae	506
4	Monocotyledonae	166

Sources: NBIP(2010) & DNPWC(2010).

**Table 2**  
**Faunal diversity of the Plant species in district**

S.N	Faunal diversity	Number of Species
1	Mammals	46
2	Birds	352
3	Herpeto	11
4	Fishes	29

Sources: NBIP(2010) & DNPWC(2010).

The economically valuable species of are mostly found in the Churae hills of the Kanchapur district. The forest type of Kanchapur district has been classified based on the ecological conditions and species composition in 3-major groups, namely.(Operational Forest Management Plan, District Forest office, 2010 ).

### **1. Sal Forest**

In this types of forest *Shorea robusta* is the main dominating species along with its associated species like *Terminalia tomentosa*, *Terminalia belirica*, *Mallotus philippensis*, *Pterocarpus marsipium* etc. This forest type covers the maximum areas of the district.

### **2. Terai Mixed Hard Wood Forest**

In this forest type all the species are mixed, major species found in mixed forms are *Acacia catechu*, *Bombax ceiba*, *Adina cardifolia* etc. This forest type covers the second largest forest apecies of the district.

### **3. Sissoo, Khair Forest**

These types of forest are mainly found in areas like Bank of rivers and hilly areas of Kanchapur. This forest types has been extended in lesser areas, but is very important from the conservation and developmental point of view.

### 3.2 Socio-economic Situation

Kanchanpur is one of the plain district of Mahakali Zone of Far Western Developmental region of the country, is still facing the problems of transportation, communication, drinking water as well as illiteracy in most of its remote villages. The economic opportunities of these people are only livestock, farming NTFP's trade and vegetable cultivation.

The total population of Kanchanpur is 3,77,899 of which male and female population percentage is 50.87% and 49.23% respectively. The average household size is 6.28 people, the population density is 235 per square kilometer. However the per capita agricultural land and population growth rate is 0.68 and 3.2 respectively and the literacy rate is 60.1%.

**Table 3**  
**Demographic & other information.**

S.N.	Characteristics	Quantity
1	Population	3,77,899
	% Contribution	
	Male	50.87% → 1,91,910
	Female	49.23% → 1,85,989
2	House hold number	60.158
3	House hold size (avg.)	6.28
4	Literacy rate (%)	60.1%
5	Population density (Per sq. km)	235/sq.km
6	Per capita agriculture land (ha)	0.68
7	Population growth rate	3.2

Source: District Profile of Kanchanpur , District Development Committee 2010

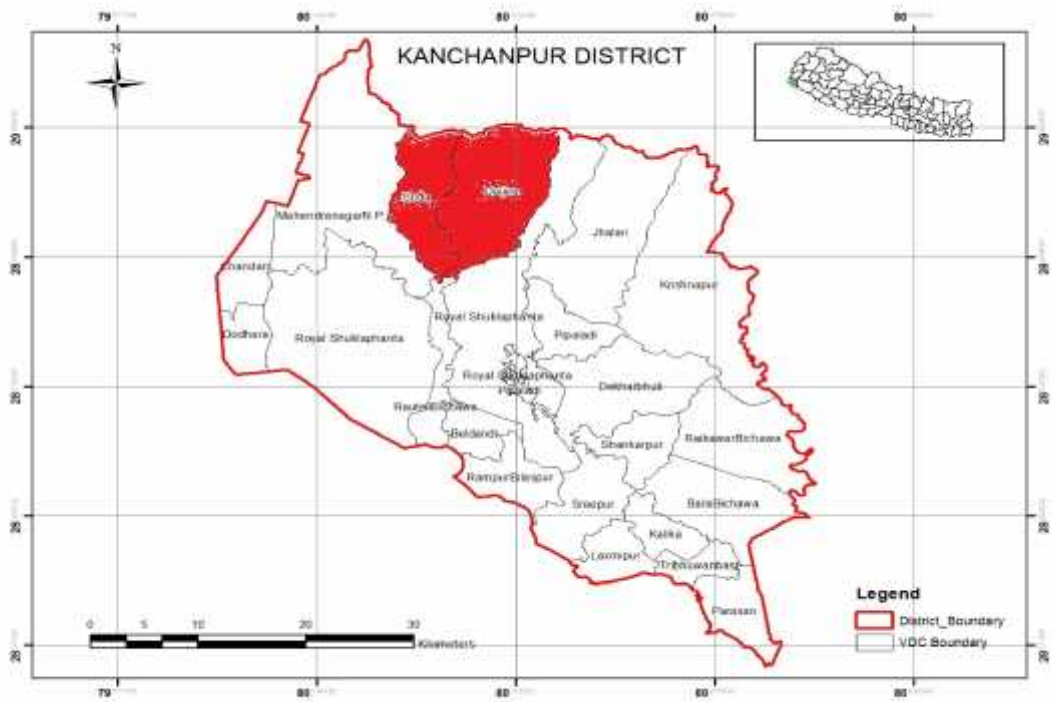
As the population density is high, the pressure on the natural resources is obviously more. This is because of low productivity of the agricultural lands (Lack of sufficient irrigated land) mostly in the northern and eastern part of the district .The forest plays the significant role for the sustenance of the people's livelihood. The major indicator of the socio-economies characters of the farmer is their land ownership.

**Table 4**  
**Land holding household of the district.**

<b>S.N.</b>	<b>Land holding (ha)</b>	<b>Percentage (%)</b>
1	Greater than 1 (> 1)	35%
2	Less than 1 (<1)	64%
3	Land less	1%

Source:- District Profile of Kanchanpur , District Development Committee 2010

The community forests, and their user group, other government managed forests NTFP's collectors, village level collector, traders and producers of Daijee and Suda VDC of the Kanchanpur district were selected as study sites and respondents for this study. Documentation of ethnomedicinal knowledge and ethnomedicinal plants was conducted in the Suda and Daijee villages of Kanchanpur district which lies about 4km and 10km respectively east from the district headquarter Mahendranagar. The Suda VDC comprises of about 2909 households with a total population of 18061(51.25% male 48.75% female) and Daijee VDC comprises of about 3712 households with a total population of 11,578 (52.15% male and 47.85% female).(CBS, 2010 ).



Source: District Profile of Kanchanpur, District Development Committee 2010

**Map showing study area.**

## **4. MATERIALS AND METHODS**

This Study has been carried out during October-December 2009 in order to document the traditional Knowledge of ethanobotanical species used by the local people of the area. The methodology applied during the present study is described below under the following topics.

### **4.1 Field Visit to the Study Area**

Field survey was conducted to document the ethnomedicinal information about the plants. During field visit group discussion, field observation, questionnaire survey, cross checking and key informant surveys were major tools as participatory appraisal. Group discussion were held as informal interaction, meetings, formal discussion etc and they were organized within community forest user groups. Traders, collectors, traditional healers locally called Baidhya, Guruwa, Bharra etc. senior person of the community, teachers, students etc were individually asked. A total of 325 respondents including 175 men and 150 women were asked for data collection from both villages. The study cover the 5 wards of the study area. Checklists were made for cross checking and key informant survey. The respondents for surveys were carefully selected based on gender caste, occupation, seniority and ethnicity. Field survey was conducted taking traditional healers as a guide and voucher specimens of important medicinal plants used in traditional medicine were collected. The local names and traditional medicinal uses of medicinal plants were determined with the help of traditional healers and local people. The information so obtained was cross checked by asking the information given by previous Baidhya to the next. The voucher specimens were identified with the help of relevant taxonomic literatures viz. Manandhar; 2002, Press et al.; 2000, Rajbhandari; 2001, Shrestha; 1998, Rao; 2004, Ross; 1999, Sharma et al.; 2002, T.U Herbarium, National Herbarium Godawari, Department of Plant Resource, Dhangadi, Kailali and related web databases ([www.efloras.org](http://www.efloras.org)).

## **4.2 Nature and Source of Data**

### **4.2.1 Nature of Data**

The quantitative and qualitative data were collected for the completion of the study. The data were collected in following ways..

### **4.2.2 Source of Data**

The survey of method consists of mainly two approaches, i.e. primary and secondary. Most data was collected form primary source, which included reconnaissance visit, transect walk, CFUG's meeting, PRA, exercise, secondary sources include the review of the literature i.e. journals, articles, books & published documents and government documents. Finally the data were checked and verified by different methods, which were collected form different sources.

#### **4.2.2.1 Primary Data**

The primary data required for the study were taken from the following sources:

- (1) Field survey using interviews.
- (2) Structured questionnaires.
- (3) Semi-structured open interview and direct observations.
- (4) PRA (Participatory Rural appraisal)
- (5) Group discussion with rural CFUG's, local healers, Traders, Teachers, and other knowledgeable persons using checklist.
- (6) Other information were taken from social workers, NGO's & GOs.

## **4.3 Data Collection Procedure**

### **4.3.1 Listing of Major Species**

Transect walk and interviews techniques using checklist with key informants, respondents were used in preparing the list of species with common name and their diagnostic characteristic in the study site. The detail information of the listed species

was prepared using secondary information. The plants were arranged alphabetically according to their scientific name which is followed by family, part used & use value.

### **3.3.2 Collection of Information on Use of Species**

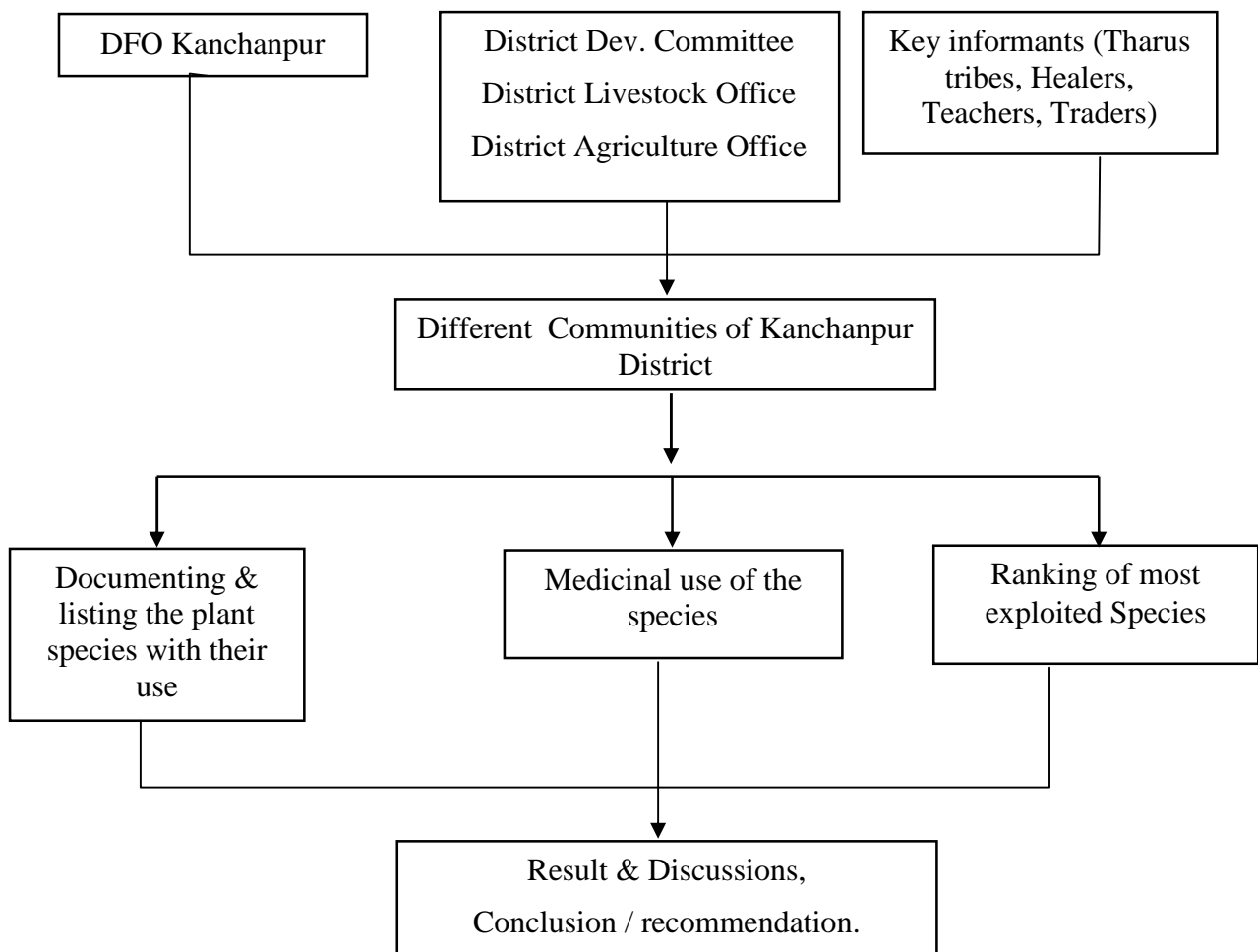
The information of the local use of the listed species was taken from the key informants including CFUG members, local healers, teachers and secondary information.

### **4.3.3 Ranking of Ethnomedicinal Species Based on Socio-economic Values**

The ranking exercise was carried out in each CFUG group discussion. Out of total listed species local people were asked to select only 20 most valuable species in their respective area. The selection may be on the basis of multiplicity of uses based on the ethno-botanic perspective, ease of cultivation, market price and demand of the products, parts of use, social acceptance for the cultivation and promotion, rate collection, Bulkiness etc The value for those species varied from 20 for highly valuable species and 1 for the least valuable species. 20 species were selected from each CFUG group from the group discussion and exercise, like wise 20 species were selected from each group, teachers, healers, & traders. A total of 43 species were selected from the exercise, out of total 20 species of high economic potential were selected for the further promotion and development in the study area. For the selection of species of higher economic valued and potential, a list of criteria has been developed from participatory discussion with local people, traders, healers, teachers, & researchers.



## 4.5 Method of Data Collection



## 5. RESULT

The study area is rich in vegetation, the forest pasture and even the agriculture land support a number of plant species most of which have useful values.

In present study a total of 154 species of plant belonging to 58 families and 133 genera have been recorded including their detailed information during field visit.

Among 58 families Leguminous(12species), Graminaceae (12species) and Moraceae (12species) are the most dominant families followed by Euphorbiaceae (8 species), Liliaceae (6 species), Zingiberaceae (4 species), Umbellifereae (4 species), Solanaceae (4species), Labiateae (4species), Cucurbitaceae (4species), Combretaceae (3 species ) and other families have 2 or one number

**Table 5: List of Plant Species found in study areas with their botanical name, Family, parts used and their Uses value.**

S.N.	Nepali name	Botanical name	Family	Parts in use	Use value
1.	Ratigedi	<i>Abrus precatorius</i> Linn.	Leguminosae	Leaf, seed, root	Leaf juice are used to treat soar throt, seed paste as rube facient in sciatica, stiff, shoulders leucoderma & seed as such in purgative & emetic.
2.	Babool	<i>Acacia arabica</i> (Lam.) Willd	Mimosceae	Leaf	Very good fodder.
3.	Khair	<i>Acacia catechu</i> Willd	Leguminosae	Bark, wood	Dyes & Kattha making, and fuelwood
4.	Sikakai	<i>Acacia regulate</i> (Lam) voigt.	Leguminosae	Leaf	Soap and shampoo making.
5.	Bojho	<i>Acorus calamus</i> Linn.	Araceac	Root	Antihelmenthis, used in cough & fever
6.	Haldu	<i>Adina cordifolia</i> H. f. et Benth.	Rubinaceae	Leaf	Mainly used as Fuel Wood and fodder.
7.	Bel	<i>Aegle marmelos</i> Corr.	Rutaceae	Fruit, leaf	Used in constipation, & juice making, dysentery & leaves have religious value.
8.	Rambas	<i>Agave americana</i> L	Agavaceae	Fiber, root	Used in rope making & soil conservation live fencing.
9.	Gane	<i>Ageratum conyzoides</i> L	Asteraceae	leaf	The juice of leaves sed in fresh cut and wound.
10.	Titapar	<i>Ajuga parviflora</i> Benth.,	Lamiaceae	Whole plant	Used in jaundice, ascariasis, fever, born, boils and stomachache
11.	Payaj	<i>Allium ceipa</i> L.	Liliaceae	Tuber	Vegetable spices, juice are used in ear

					painkiller.
12.	Jambu	<i>Allium strachegi</i>	Amarylsidaceae	Whole plant	Its decotion is used for body massage and bulb is used is pectoral disease, piles & also used is spices.
13.	Lashun	<i>Allium wallichii</i> Kunth	Liliaceae	Tuber	Spices, used in stomach anchaе & bleeding
14.	Ghau Kumari	<i>Aloe barbadensis</i> Mill	Liliaceae	Juice of leaf	Used in constipation, burn & facial.
15.	Chattiwan	<i>Alstonia scholaris</i> (L)R.Br	Apocynaceae	Bark	The sun dried powdered of bark is mix with water to make paste and applied to the body for 3 days to cure skin disease.
16.	Eliachi	<i>Amomum aromaticum</i> Roxb.	Zinziberaceae	Fruit/seed	Preparation of sweet meats for flavouring.
17.	Sitaphlal	<i>Anona squamosa</i> Linn.	Moraceae	Fruit, seeds	Edible, seed used for oil extraction.
18.	Arberry	<i>Arctostaphylos uva-ursi</i>	Ericaceae	Leaf	Dried leaves are used for tea in health food outlets. The leaf preparation is used in the disease of kidneys, Bladder & urethra.
19.	Supari	<i>Areca catechu</i> (L. f.) Willd.	Araceae	Fruit, Nuts	Edible.
20.	Pati	<i>Artemisia dubai</i> Wall.ex besser	Asteraceae	leaves	The leaves are collected and crushed in between palm of hand in treating cut and wound.
21.	Kurilo	<i>Asparagus reacemosus</i> Willd. var.	Liliaceae	Root/Tuber	Roots are antidiarrhetic & diuretic which are used in fever. Tonic, Gastritis & milk production.

22.	Kathar	<i>Atocarpus heterophyllus</i>	Moraceae	Fruit	Vegetable and fruit.
23.	Neem	<i>Azadiracta indica</i> A.Juss	Meliaceae	Bark, leaf, fruit, seed	Used in typhoid, wound & insecticide
24.	Kat Bans	<i>Bambusa arundinacea</i> Willd.	Gramineae	Whole plant	Basket making and stick
25.	Tanki	<i>Bauhinia purpurea</i> Linn.	Leguminaceae	Bark, flower	Antidiarrhetic & Anti-dysentric, fodder
26.	Malu	<i>Bauhinia vahlii</i> W. et A..	Leguminosae	Leaf & bark	Leaf used as a plate / Doona making & fibres are used as rope making.
27.	Koiralo	<i>Bauhinia variegata</i> L.	Leguminosae	Leaf, flower	Fodder & used as vegetable, pickle & medicine
28.	Kubindo	<i>Benincasa hispida</i> (Thunb.) Cogn.	Cucurbitaceae	Fruit	Used in jundice, vegetable & listed in sweet making.
29.	Khasreto	<i>Boehmeria ternifolia</i> D. Don	Urticiceae	Root	Used in retained placenta for livestock.
30.	Simal	<i>Bombax ceiba</i> L.	Bombaceae	Flosses, flower	Mainly used as Fuel Wood. Flowers are used in rillow making, Flowers are taken as vegetable & medicine and fuelwood.
31.	Bet	<i>Calamus latifolius</i> Roxb.	Palmae	Whole plant	Used in furniture i.e. making Doko, suppa etc, Dala making.
32.	Ank	<i>Calotropis gigantea</i> (L)Dryand	Asclepiadaceae	Root, leaf	Dysentery, cough & Asthma & wounds
33.	Bhang	<i>Cannabis sativa</i> L.	Cabanaceae	Bark, leaf, seed	Fibers are used as thread making & clothaned & seed used in pickle making.
34.	Khursani	<i>Capsicum frutescens</i> L.	Solanaceae	Fruit	Making chilly sauces.

35.	Mewa	<i>Carica papaya</i> L.	Caicaceae	Fruit	Edible, used in jaundice.
36.	Rajbriksha	<i>Cassia fistula</i> Linn.	Legumimosae	Fruit, leaf	Used in dysentery, and leaf pest is used for curing allergy.
37.	Barhamase phool	<i>Catharanthus roseus</i> (L.) G. Don	Apocynaceae	Leaves	The leaves are emetic & diaphoretic plant infusion is gargled is said to be relieve sore throat laryngitis & chest complaint.
38.	Ghorlapre	<i>Centella asiatica</i> ( L.) urb.	Umbleferaceae	Whole plant	Used in constipation, blood purity.
39.	Gupibanes	<i>Cephalostachyum capitatum</i> Munro	Gramineae	Whole plant	Basket making.
40.	Bethe	<i>Chenopodium album</i> L.	Chenopodiaceae	Tender shoot	Plant laxative & Anti-helmentics & eaten as vegetable.
41.	Safed musli	<i>Chlorophytum arundinaceum</i>	Liliaceae	Roots, tubers	Roots are tonic, Aphrodisiac and are used to general debility tubers are boiled with milk and taken twice a day.
42.	Gurzo lahara	<i>Cissampelos pareira</i> Linn.	Menispermacea	Stem	Used in diabetes Mellitus & incresly milk production of cows/buffaloes
43.	Kharbujo	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai,	Cucurbitaceae	Fruit, root	Used in ulcer, Asthma
44.	Kagati	<i>Citrus aurantifolia</i> (Christ.) Swingle	Rutaceae	Fruit	Edible, rickle making, good source of Vit. 'C'
45.	Poir	<i>Coleus forskahlii</i> Briq.	Labitae	Root	The leaves & bark of this plant are used to

					treat syphilis.
46.	Ghar pidalu	<i>Colocasia esculenta</i> (L.) Schott	Araceae	Corn & leaves	Leaf juice is styptic, stimulant, rebeфициant & used in utrinal hemrage, corn juice is laxative.
47.	Gol Kakari	<i>Coocinea grandls</i>	Cucurbitaceae	Tuber/Fruit	Used in stone.
48.	Bhorla	<i>Cordia vestita</i>	Ethretiaceae	Fruit	Fruit is demulcent exporant and astringent.
49.	Dhaniya	<i>Coriandrium satirum</i> L.	Umbleferaceae	Whole plant	Aromatic, Flavouring, spices, etc.
50.	Jira	<i>Cuminum Cyminum</i> L.	Umbleferaceae	Seed	Spices & condiments
51.	Ban haledo	<i>Curcuma angustifolia</i> Roxb.	Zingiberaceae	Root (Tuber)	Spices, Abdominal problem, customary.
52.	Haldi	<i>Curcuma longa</i> L .	Zingiberaceae	Root/Tuber	Used as spices and turmeric.
53.	Aakeshi beli	<i>Cuscuta reflexa</i> Roxb.	Convolvulacea	Seed, stem	Seed are antihelminitics , stem used as caring of bilious disorder & jaundice.
54.	Leamon grass	<i>Cymbopogon citratus</i> (DC.)Trin.	Liliaceae	Leaves	Used in extraction of essential oils.
55.	Palmrosa	<i>Cymbopogon martinii</i> (Roxb.) W. Watson	Gramineae	Whole plant	Used in essential oil production.
56.	Citronellla	<i>Cymbopogon winterianus</i> Jowitt ex Bor, Oesterr. Bot. Z.	Gramineae	Whole plant	Used in essential oil production.
57.	Dubho	<i>Cynodon dactylon</i> Pers	Poaceae	Leaf	Antiseptic, Menstrual disorder and used in marriage ceremony.
58.	Mothae	<i>Cyperus rotundus</i> L.	Cyperaceae	Stem	Anti-helmetics & catheterization
59.	Sati Sal	<i>Dalbergia latifolia</i> Roxb.	Leguminosae	Leaf	Fuel wood and Fodder.

60.	Sisoo	<i>Dalbergia sissoo</i> Roxb. ex DC.	Leguminosae	Leaf	Fuelwood and Fodder.
61.	Dhatura	<i>Datura metel</i> L.	Solanaceae	Leaves, fruit and seeds	Used in perkinisis, used in gonorrhoea & used in tooth pain.
62.	Gulmohar	<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Fabaceae	Flower	Ornamental.
63.	Bans	<i>Dendrocalamus strictus</i> (Roxb.) Nees	Gramineae	Rhizome, stem, leaf	Used in vegetable making used in making baskets, Doko, etc & fodder value.
64.	Tama	<i>Dendrocalamus hamiltonii</i> Nees & Arn. Ex.Munro.	Gramineae	Rhizome	Used as vegetable
65.	Kush	<i>Desmostachys bipinnata</i> (L.) Stapf	Gramineae	Whole plant	Worship & religious purposes.
66.	Dhaturo	<i>Dhatura metal</i> L.	Solanaceae	Root,seed	Narcotic in action, dysentery, rheumatism
67.	Githa	<i>Dioscorea deltoidea</i> Wall.	Discoraceae	Stem, tuber	Used in fracture & wounds & edible
68.	Chiuri	<i>Diploknema butyracea</i> (Roxb.)H.J.Lam	Sapotaceae	Fruit (seed) & leaf	Seed:- oil used as cooking, oniomentin rheumatism unollient for chapel hand in winter & leaf as fish position.
69.	Neuro	<i>Dryopteris cochleata</i> Ham,ex K.Kon.	Aspidiaceae	Tender Leaves	Vegetable, Pickles
70.	Nigalo	<i>Drepanostachyum falcatum</i> (Nees) Keng f	Gramineae	Stem, tender short	Used in basket making & young shoot as a vegetable.
71.	Phalado	<i>Erythrina arborescens</i> Roxb.	Moraceae	Fruit, leaves	Fruits are edible, and had a great medicinal value , Leaves are used as fodder.



72.	Babio	<i>Eulaliopsis binata</i> (Retz.) C. E. Hubb.,	Gramineae	Whole plant	Used in rope making & thatching / roofing.
73.	Seudi	<i>Euphorbia royalina</i> Boiss. Milk	Euphorbiaceae	Leaf, Root	Used in live fencing & soil conservation.
74.	Dudhe jhar	<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	Whole plant	Used in medicine
75.	Bar	<i>Ficus bengalensis</i> L	Moraceae	Bark, leaf	Used in fracture & fodder & religious
76.	Sami	<i>Ficus benjamina</i> L. Mant	Moraceae	Leaf	Ornamental & has a religious value.
77.	Kabro	<i>Ficus lacor</i> Buch.-Ham.	Moraceae	Leaf, fiber	Used in rope making & fodder
78.	Dudhilo	<i>Ficus neriifolia</i> Sm.	Moraceae	Leaf, Gum	Fodder & Gum used in fracture.
79.	Dumri	<i>Ficus racemosa</i> L.	Moraceae	Fruit, leaf, gum	Leaf used as very good fodder, fruit are used as medicine, and gum as local flammation.
80.	Pipal	<i>Ficus religiosa</i> L.	Moraceae	Leaf	Religious value & fodder.
81.	Timla	<i>Ficus roxburghii</i> L.	Moraceae	Fruit & leaf	Fruits are edible & medicinal value & leaf as a fodder & are used in religious perpressed & doona making..
82.	Khanyo	<i>Ficus semecordata</i> Buch.-Ham. ex Sm.'	Moraceae	Root, leaf, fruit	Cooling and used in gonorrhoea, jaundice, leaf as a fodder & fruits are edible.
83.	Sauf	<i>Foeniculum vulgare</i> Mill.	Umbleferaeen	Leaf, whole plant	Leaves are used in fish sauce & Granishing leaf
84.	Dabdabae	<i>Garuga pinnata</i> Roxb.	Burseraceae	Bark	Used in fracture.
85.	Khamari	<i>Gmelina arborea</i> Roxb.	<u>Verbenaceae</u>	Stem	Wooden pot and fuelwood
86.	Ban pidalu	<i>Gonatanthus pumilus</i> (D. Don)	Araceae	Leaf, Root	Root are used in boils scores wounds & leaves

		Engler & Krause			have medicinal value.
87.	Vimal	<i>Grewia optiva</i> J. R. Drumm. ex Burret	Tiliaceae	Leaf, fruit	Fodder, edible fruit with medicinal value
88.	Besar	<i>Hedychium densiflorum</i> Wall.	Zingiberaceae	Root, Tuber	Used as spices.
89.	Bankhirro	<i>Helarrhena pubescens</i>	Aploynaceae	Bark, seed	Ani-helmentics & fever & diarrhea
90.	Khar	<i>Imperata cylindrica</i> (L.) P. Beauv.	Gramineae	Whole plant	Roofing & making papers.
91.	Jacaranda	<i>Jacaranda ovalifolia</i> R. Br.	Bignoniaceae	Flower	Ornamental.
92.	Khiro	<i>Jatropha curcas</i> L	Euphorbiaceae	Root, sap, seed	Anti-helmentics, live fence, sap used in Anti-ailergy & seeds used for making non edible oil (Bio-diesel)
93.	Bot Dhamiro	<i>Lagerstroemia parviflora</i> Roxb.	Lytheraceae	Leaf	Fodder.
94.	Dhaicho	<i>Leucaena leucocephala</i> (Lam.) de Wit	Leguminosae	Leaf, Roots	Very nutritive fodder & soil conservation
95.	Kurkurae Jhar	<i>Lippia nodiflora</i> (L.) Rich.	Verbenaceae	Root	Abdominal burn, jaundice, Gonorrhea.
96.	Litchi	<i>Litchi chinensis</i> (Gaertn.) Sonn.	Sapindaceae	Fruit	Edible.
97.	Mahuwa	<i>Madhuca longifolia</i> (Koenig)macbribe	Sopotaceae	Bark, fruit, flower	Used in wine making, Diabetes & oil seed.
98.	Sindurae	<i>Mallotus philippensis</i> (Lam.) Mull. Arg.	Euphobiaceae	Root, fruit, leaf	Mainly used as Fuel Wood. Anti-helmenthis & scabies & making red sindur & Fodder value

99.	Aamp	<i>Mangifera indica</i> L.	Anacardiceae	Fruit, Bark	Used in gano gola, edible, juice very nutritive.
100.	Ban Kasyo	<i>Mara monturo</i>	Myrsinaceae	Leaf	Fuelwood and Fodder
101.	Kaulo	<i>Mechilus duthiei</i>	Lauraceae	Bark	Used in delivery, Menstruation cycle, uterus problem.
102.	Bakaino	<i>Melia azedarach</i> , Linn.	Meliaceae	Leaf	Anti-helminthes & fodder and fuelwood
103.	Mentha	<i>Mentha arvensis</i> L.	Labiatae	Whole plant	Used in Dysentery, & Juice making.
104.	Lajjawati	<i>Mimosa pudica</i> L.	Leguminoase	Root	Used in furuncle/boils & ornamental
105.	Tite Karela	<i>Momordica charantia</i> L.	Cucurbitaceae	Root, fruit	Anti-helminthics, & piles, diabetes, a vegetable stomach disease.
106.	Kimbu	<i>Morus alba</i> Bureau	Morauae	Fruit, leaf	Edible, leaf as a fodder & sericulture.
107.	Bankera	<i>Musa balbisiana</i> Colla	Musaceae	Fruit	Edible
108.	Parijat	<i>Nyctanthes arbor-tristis</i> L.	Aleaceae	Flower	Used in jaundice, fever & ornamental.
109.	Tulsi	<i>Ocimum sanctum</i> L.	Labiatae	Whole plant	Used in cough gastritis, used in tea? Religious purposes.
110.	Seudi	<i>Opuntia monacantha</i> (Roxb).	Cactaceae	Branch, Fruit & root	Flat branches and frunt to situate the dry flal fucculend.
111.	Kurkure	<i>Osbeckia stellata</i> Buch.-Ham. ex D. Don	Melastomataceae	Leaf and stem	Fuelwood and Fodder.
112.	Charoamilo	<i>Oxalis corniculata</i> L.	Oxalidaceae	Whole plant	Used as to remove the wart from the body.
113.	Bhangiri	<i>Perilla frutescens</i> (L.) Britton	Lamiaceae	Whole plant	It is sedative, antispasmodic, antiseptic, antidote, used in cephalic, headache, influenza

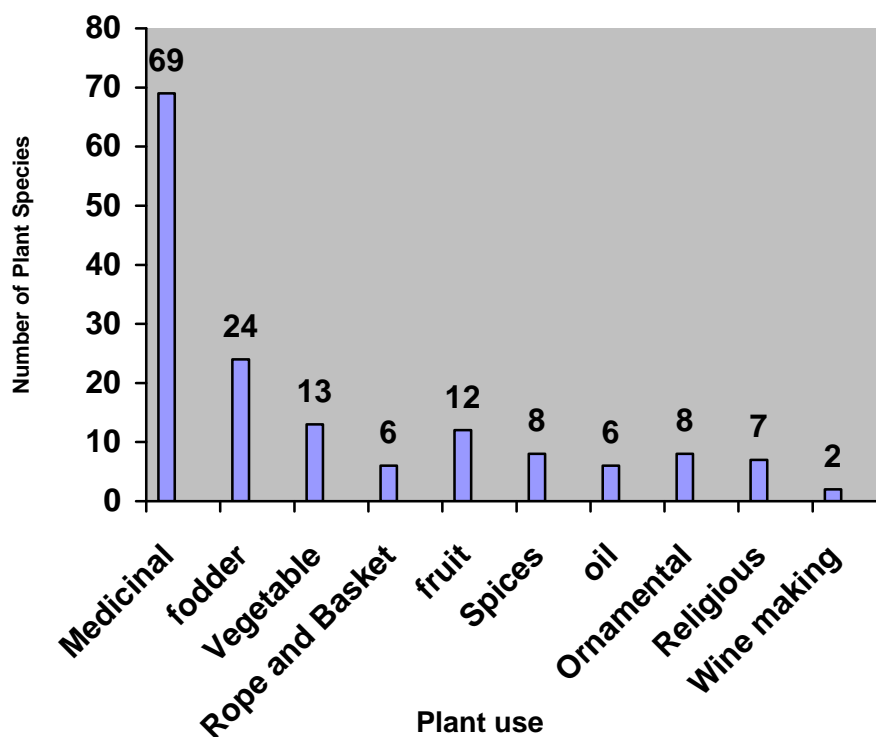
114.	Amala	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Fruits, leaves	Used in Aayurvedic medicines, Triphala, Pickle, making & leave as a fodder.
115.	Serthi	<i>Phyllanthus urinaria</i> L. ;	Euphorbiaceae	Whole plant	Plant is bitter & acrid, sour, diuretic, cooling sweetish, used in gonorrhoea, fish poison.
116.	Sallo	<i>Pinus roxburghii</i> Sarg.	Pinaceae	Resin/khoto	Used in fractures and boils and fuelwood.
117.	Pipla	<i>Piper longum</i> Linn.	Piperaceae	Fruit	Used in cough & fever & spices.
118.	Bankakro	<i>Podophyllum hexandrum</i> Royle	Berberidiaceae	Fruit	Edible and used salad.
119.	Rudilo	<i>Pogostemon benghalensis</i> (Burm. f.) Kuntze	Labiatae	Leaf juice	Used in cough & fever.
120.	laharay Pipal	<i>Populus ciliata</i> Wall. ex Royle	Moraceae	Leaf	Mainly used as Fuel Wood, and furniture and Fodder.
121.	Kulfa saag	<i>Portulaca oleracea</i> L.	Fabaceae	Whole plant	Used is ornamental
122.	Aru	<i>Prunus persica</i> (L.) Batsch.	Rosaceae	Fruit	Edible
123.	Ambha	<i>Psidium guajava</i> L.	Myratecae	Fruit	Edible
124.	Bijay Sal	<i>Pterocarpus marsupium</i> Roxb.	Leguminosae	Leaf, gum	Leaves used as good fodder, and the tree gum is used as blood purifier and helps in menstruation cycle.
125.	Anar	<i>Punica granatum</i> L.	Punicaceae	Fruit	Edible & juice used in reducing blood pressure
126.	Naspati	<i>Pyrus cummunsis</i>	Rosaceae	Fruit	Edible

127.	Sarphaganha.	<i>Rauwolfia serpentina</i> ( L.) Bentha ex Kurz	Apocynaceae	Rhizome/Root	Antihypertensive, sedative.
128.	Ander	<i>Ricinus communis</i> L.	Euphorbiceae	Seed	The seed produces a types of oil, used in various purpose (not edible)
129.	Halhale Sag	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Leaf	Edible as vegetable
130.	Kans	<i>Saccharum spontaneum</i> L.	Gramineae	Whole plant	Used in roofing & Religious purpose
131.	Ritha	<i>Sapindus mukorossi</i> Gaertn	Spindaceae	Fruit	Soap and shampoo making
132.	Khirro	<i>Sapium insigne</i> (Royle) Benth. ex Hook. F	Euphorbiaceae	Leaf	Leaf was powered and juice was use in curing various aliment and bark was used in wound to dispel worm and germs.
133.	Ashok	<i>Saraca asoca</i> (Roxb.)De wild	Leguninosae	Bark	Help conceive woman who I have no child
134.	Kushum	<i>Scheleria oleosa</i>	Sapindaceae	Leaf and fruit	Mainly used as Fuel Wood. Fodder and seeds are edible.
135.	Sal	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Leaf, bark, Sal dups. seed oil	Mainly used as Fuel Wood.Bark is used as dyes, and leaves are used plate/Doona making seed oil used as cooking.
136.	Junagali bihee	<i>Solanum nigrum</i> L.	Solanaceae	Fruit, and leaves	Food and inflammation, ringworm, ulcers,
137.	Kantkari	<i>Solanum virginium</i>	Solanaceae	Fruit	Used in common cold, headache, asthma, fever
138.	Odal	<i>Sterculia villosa</i> Roxb. ex Sm.	Streculiaceae	Leaf	Fodder

139.	Bhali Jamun	<i>Syzygium Cerasloides</i> Raizada	Myrtaceae	Fruits and branches	Fruits are used for juice, jam and jelly preparation
140.	Jamun	<i>Syzygium cumini</i> (L.)Skeels	Myrateceae	Fruit	Mainly used as Fuel Wood. Aayurvedic medicine, used in Blood purifying dysenteric
141.	Hazari phool	<i>Tagetes erecta</i> L.	Asteraceae	Flower, whole plants	Flowers are pungent & bitter, acrid, astringent, carminative stomachic, blood purifier & used in fever, ulcer, piles & muscular pain.
142.	Saipatri	<i>Tagetes minuta</i> L.	Compositae	Flower	Used in decoration, ornamental
143.	Teak	<i>Tectona grandis</i> L.f	Vevrinaceae	Leaf, root	Soil amelioration furniture.
144.	Barro	<i>Terminalia bellerica</i> ( Gaertn.) Roxb.	Combretaceae	Fruit, seed	Used in triphala churn in curing cough.
145.	Harro	<i>Terminalia chebula</i> Retz.	Combretaceae	Fruit, seed	Used in Triphala chur, in cough, cold
146.	Asna	<i>Terminalia tomentosa</i> (Roxb.) Wight & Arn.	Combretaceae	Bark, leaf	Mainly used as Fuel Wood. Used in fracture & leaves are used as good fodder.
147.	Amriso	<i>Thysanolaena maxima</i> (Roxb.) Kuntz	Gramineae	Whole plant	Soil conservation, Broom & Fodder.
148.	Tooni	<i>Toona ciliate</i> M. Roem.	Meliaceae	Fruit, Bark, leaf	Used in tonic & good fodder and furniture
149.	Gutel	<i>Trewia nudiflora</i> L.	Euphorbiaceae	Leaf	Mainly used as fodder
150.	Simali	<i>Vitex negundo</i> L.	Verbeaceae	Leaf	Used in cold
151.	Ashwa	<i>Withania somnifera</i> Dunal	Solanaceae	Whole plant	Used as medicine.

	gandha				
152.	Aduwa	<i>Zingiber officinale</i> Rosc.	Zingiberaceae	Root, tuber	Used an spices & used in cold.
153.	Kul	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Fruits and branches	Used as Fuel Wood and fruits are used for candy making
154.	Bayar	<i>Zizyphus jujuba</i> Lam.	Rhamnaceae	Fruit	Edible, pick up making.

The total recorded plant species are categorized on the basis of used pattern 69 medicinal, 24 fodder, 13 vegetable, 6 rope and thatch making, 12 fruit, 8 Spices , 6 oil, 8 ornamental, 7 religious, 2 wine making.(Fig1)



**Fig.1** Number of plant species in different uses in the study area.

The mostly used medicinal plant of that area are *Acorus calamus*, *Rauvolfia serpentine*, *Piper longum*, *Asparagus racemosus*, *Terminalia belirica*, *Withienia somnifera*, *Azadiracta indica*, *Parmelia nepalensis*, *Pterocarpus marsipium* and *Emblca officinalis*.

On the other hand *Trewia nudiflora*, *Morus alba*, *Acacia aribica*, *Sterculia villosa*, *Mora monturo*, *Ficus neriifolia*, *Dalbergia latifolia*, *Populus ciliata*, *Grewia optiva* and *Ficus racemosa* are specially used as fodder.

Similarly, the species used for spices are *Coriandrium sativum*, *Cuminum cyminum*, *Allium ceipa*, *Allium strachegi*, *Zinzeber officinalis*, *Piper longum*, *Capsicum frutescens*, *Amomum aromaticum*, and *Curcuma domestica*



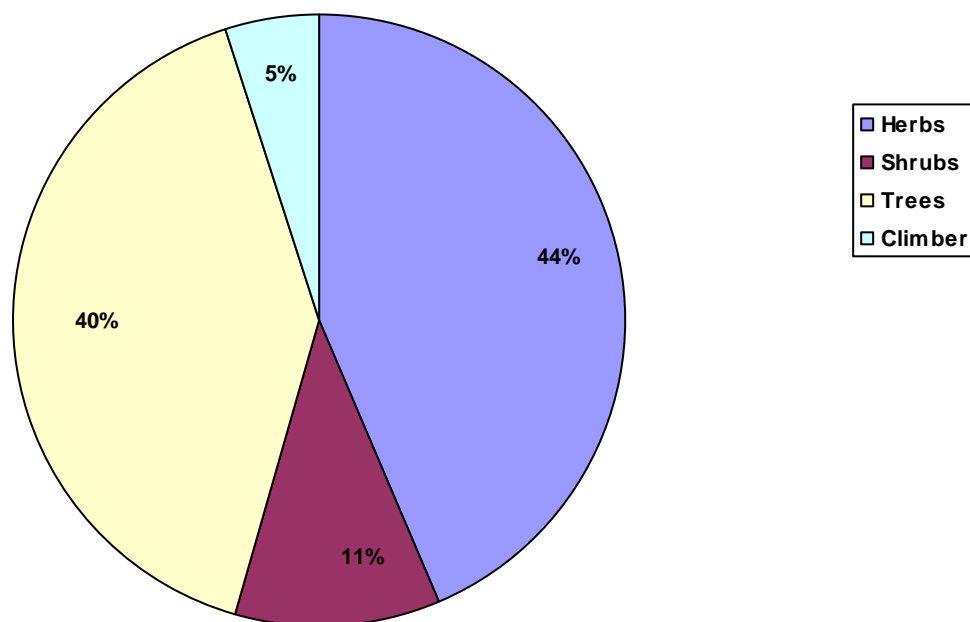
Similarly, the mostly used fruits are *Erythrina arborescens*, *Annona squamata*, *Podophyllum hexandrum*, *Litchi chinensis*, *Carica papaya*, *Prunus persica*, *Zizyphus jujube*, *Syzygium cumuni*, *Agele marmelos*, *Scheleria oleosa* and *Punica granatum*.

The species used for the rope and basket and roofing are *Agave americana*, *Culapiopsia binnata*, *Calamus latifolia*, *Ficus locor*, *Dryothyrium boryannum*, *Saccharum spontanum*, *Imperata cylindrica*, *Bambusa arundinacea*, and *Cephalostachylum capitatum*.

Similarly the *Shorea robusta* and *Acacia cathechu* are used in dyes and *Ficus bengalensis*, *Desrrostachy binnata*, *Ficus religiosa*, *Oscimum sanctum*, *Aegle marmelos*, *Ficus benamina* and *Saccharum spontanum* are used in religious purposes.

The mainly used species for vegetables of that area are *Bauhnia variagata*, *Lactiporus sulphureus*, *Colocasia esculanta*, *Dendrocalamus strictus*, *Atrocarpus heterophullus*, *Chenopodium album* and *Rumex hepolsis*.

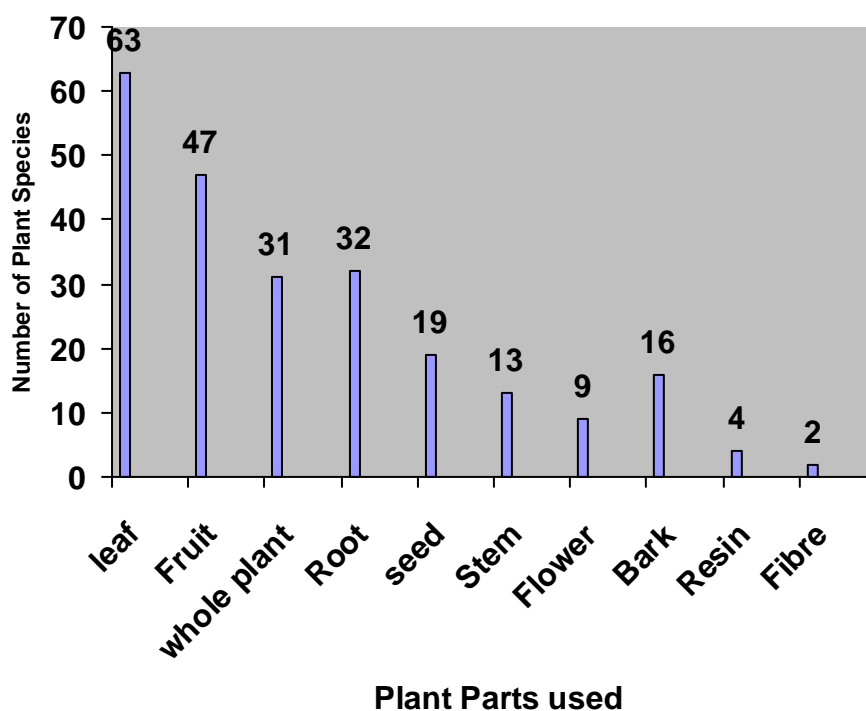
Similarly based on the habit these plants are grouped as herbs, shrubs, trees, climber, with 68, 15, 63, 8 species respectively. (fig2)



**Fig2. Total Plant species based on Habit.**

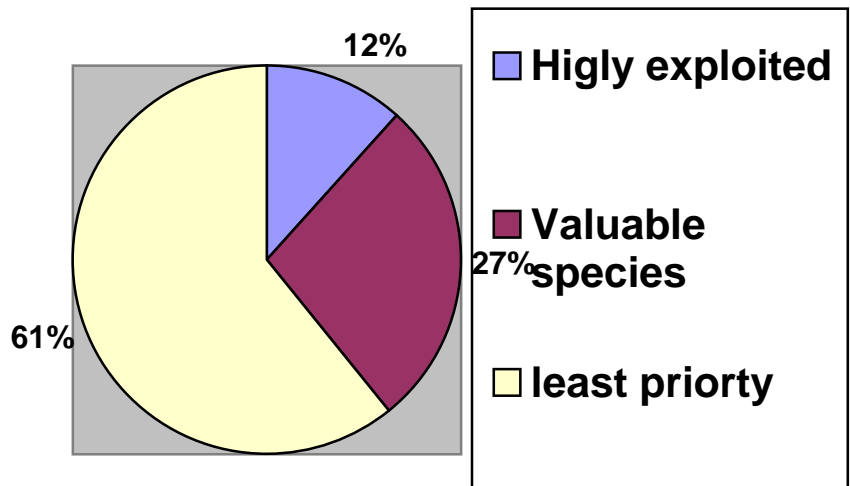
## 5.1 Parts Used Categories

Among all the collected plants species maximum plants parts used were leaf 61 cases, fruit 44 cases, whole plant 31 cases, root 31 cases, seed 18 cases, stem 13 cases, flower 9 cases, bark 15 cases, resin 4 cases, fibers 2 cases each.(Fig 3)



**Fig. 3 Utilization Pattern of different parts of plant species.**

Out of total 154 species 20 mostly exploited species were identified. Here the highest score 20 is given to the most preferred and important species and the least score 1 is given to the least preferred species. 20 most exploited species, which were given maximum priority based on score, they obtained during various focus group discussions are *Asparagus racemosus*, *Acorus calamus*, *Raulvolfia serpentine*, *Piper longum*, *Emblica officinalis*, *Terminalia belerica*, *Aegle marmelos*, *Withenia somnifera*, *Bambusa vulgaris*, *Acacia catechu*, *Cympobogon lehusas*, *Cordia vestita*, *Atrocarpus heterophyllus*, *Acacia regulata*, *Azadirchta indica*, *Tinospara sinensis*, *Pterocarpus marsipium* and *Shorea robusta*. These species are mainly exploited for medicinal, fuel wood, fodder and furniture purposes. There are 43 valuable species (Annex 2) and other remaining species are in least priority. (Fig4)



**Fig.4 Rate of Exploitation of Species**

## 6. DISCUSSION

Forest is the major source of the cash income of the people living particularly in the remote areas of the country. The people collect as much as medicinal plants and try to get the maximum amount of wages from the contractors and /or middle persons. The records of the collection of medicinal plant in the last decades shows that there is an increasing trend in the harvesting of the natural resource as a result of which most of the medicinal species are in the verge of extinction.

In present study a total of 154 species of plant belonging to 58 families and 133 genera have been recorded including their detailed information during field visit. On the basis of use the plant have been categorized into different group viz. medicinal, fodder, fruit, vegetable, rope and basket making, spices and other miscellaneous uses.

Among 58 families Leguminous (12species) Graminaceae (12species) and Moraceae (12species) are the most dominant families followed by Euphorbiaceae (8 species) Liliaceae (6 species) Zingerbiaceae (4 species) Umblefereceae (4 species) Solanaceae (4species) Labiateae (4species) Cucurbitaceae (4species) Combreteace (3 species )and other families have 2 or one number.

Out of 69 medicinal plants documented here, 19 species have been described by Manandhar (1989a) in his study medicinal plants used by Chepang Tribes of Makawanpur district. Out of the 19 species 8 species seemed nearly similar observation *Aegle marmelos* in diarrhea, *Ageratum conyzoides* in cut and wound, *Lagerstoemia parvifolia* in fever, *Mallotus philippinensis* in diarrhoea *Woodfordia fruticosa* in diarrhoea, *Centella asiatica* in muscular pain and swelling, *Cynodon dactylon* in malarial fever, *Zizyphus mauritiana* in malarial fever.

Out of 69 medicinal plants documented, 9 species have been described by Manandhar (1990a) in his study Traditional Phytotherapy of Danuwar tribes of Kamalakhong in Sindhuli district. *Mimosa pudica* was used in furuncle and boil in both cases. Similiarly, *Euphorbia hirta* in cut and wound. Remaining 7 species different in their uses. They were *Jatropha curcas* antidote and in cut and wound in contrast to toothache, *Ricinus communis* in fever and leprosy in contrast to crack and fissure, *Colebrookia oppositifolia* in urinary problems in contrast to typhoid, *Wodfordia*

*fruticosa* in stomachache in contrast to dysentery, *Zizyphus mauritiana* in extreme hot in contrast to fever, *Centella asiatica* in fever and *Solanum nigrum* in headache in contrast to fever.

Out of 69 medicinal plants documented, 10 species have been described by Manandhar (1998) in his study Native Phytotherapy among the Raute tribes of Dadeldhura district. *Oxalis corniculata* has the same use to remove warts from the body *Terminalia bellirica* in cold and cough, but remaining 8 species have different uses. *Jatropha curcas* in allergy in contrasts to boils, *Phyllanthus emblica* in diarrhoea in contrasts to body ache, *Mallotus philippensis* in Anti-helminthes & scabies in contrasts to indigestion, *Riccinus communis* in fever and oil in contrast to gout, *Woodfordia fruticosa* in stomachache in contrasts to boils on the tongue, *Syzygium cumini* as blood purifier in contrasts to fever.

Joshi and Joshi (2000) documented indigenous Knowledge and use of medicinal plants by local communities of Kali Gandaki watershed area, Nepal and found some of the common plant species have different use i.e. *Cannabis sativa* for thread making, clothed & seed used in pickle making, *Chenopodium album* for intestinal worms and vegetable *Cymbopogon martini* for essential oil production, *Jatropha curcas* for antihelminthics.

Out of 69 medicinal plants documented, 4 species have been described by Bhattarai (1992) in his study medical ethnobotany in karnali zone. In these two ecozones, there were contrasts in use of all 4 species *Asparagus racemosus* in toxic in contrast to fever *Centella asiatica* in gastritis in contrast to fever, *Chenopodium album* in vegetable intestinal worm and in contrasts to dyspepsia, *Oxalis corniculata* in anthelmintic, anti-inflammatory, in contrasts to removing effect of alcohol.

Out of 69 medicinal plants documented 4 species have been described by the Ripu .M. Kunwar and et. at (2008) in his study Diversity, Utilization and management of Medicinal Plants in Baitadi and Darchula districts, Far West Nepal, and found some common plants have different uses i.e. *Asparagus racemosus* in antidiarrhetic and diuretic in contrasts to increase memory power, *Bahunia valli* in leaf plate and rope making in contrast to skin diseases, *Jatropha curcas* in astringent in contrasts to

inflammation ,scabies and wound and *Phyllanthus emblica* in diarrhoea in contrast to anemia jaundice .

As the animal husbandry is one of their occupations, altogether 24 species are used as fodder. Out the 7 species were good quality, 9 species were low quality and remaining 8 were satisfactory. Local people categorized fodder according to preference by their domestic cattles and rate of lactation. The low quality fodder species were feed to their cattles at the scarce of fodder.

They mainly used *Bauhinia variagata*, *Lactiporus sulphureus*, *Colocasia esculenta*, *Dendrocalamus strictus*, *Atrocarpus heterophyllus*, *Chenopodium album* and *Rumex hepolsis* as vegetable.

The species used for the rope and basket and roofing are *Agave americana*, *Eulaliopsis binata*, *Calamus latifolia*, *Ficus locor*, *Dryothyrium boryannum*, *Saccharum spontanum*, *Imperata cylindrica*, *Bambusa arundinacea*, *Cephalostachylum capitatum* .

They used *Coriandrum sativum*, *Cuminum cyminum*, *Allium ceipa*, *Allium strachegi*, *Zonzerber officinalis*, *Piper longum*, *Capsicum frutescens*, *Amomum aromaticum* and *Curcuma domestica* as spices.

They used *Erythrina arborescens*, *Annona squmata*, *Podophyllum hexandrum*, *Litchi chinensis*, *Carica papaya*, *Prunus persica*, *Zizyphus jujuba*, *Syzizyum cumuni*, *Agele marmelos*, *Scheleria oleosa*, and *Punica granatum* as edible fruits.

They used *Aegle marmelos*, *Oscimum sanctum* *Ficus bengalensis*, *Ficus religiosa* *Desrrostschy binnata*, *Saccharum spontaneum* and *Ficus benamina* as religious purposes.

A total of 154 species have been documented and listed during the study. Out of 154 species about 43 species were identified as important and valuable for that area on the basis of focus group discussion (Annex1). Out of the 43 species only 20 species(Annex 2) were selected as much valuable and much potential species for the promotion and further research and development in the study area The Northern and Western belt of the study area were found to be more fertile for the production of the

ethnomedicinal species of high economic value. On the basis of focus group discussion highly exploited species for trade in the area were found to be *Piper longum*, *Embllica officinalis*, *Asparagus racemosus*, *Terminellia chebula*, *Teminalia belerica*, *Acorus calamus*, *Azadirchta indica*, *Cordita vistata*, *Rauwolfia serpentina*, *Acacia catechu*, *Cinnamomum tamala*, *Zinzeber officinalis*, *Withenia somnifera*, *Pterocarpus marsipium* and *Shorea robusta*.

The highly valuable species for market value were found to be *Asparagus racemous*, *Rauwolfia serpentina*, *Embllica officinalis*, *Piper longum* and *Acorus calamus* on the basis of focus group discussion.

Some much valuable species of the study site like *Pterocarpus marsipium*, *Acacia catechu*, *Bombax ceiba*, *Cassia fistula* and etc are in the verge of extinction slowly and gradually, so a need to conserve such species.

The highly prioritized species of the Suda and Daijee VDC were *Asparagus racemosus*, *Acorus calamus*, *Rauwolfia serpentine*, *Piper longum*, *Embllica officinalis*, *Terminelia belerica*, *Aegle marmalos*, *Withenia somnifera*, *Bambusa vulgaris*, *Acacia catechu*, *Crymbopogon flexous*, *Zingiber officinalis*, *Cordia vestita*, *Atrocarpus heterophyllus*, *Azadirchta indica*, *Pterocarpus marsipium* and *Tinospora sinensis* on the basis of focus group discussion.

Only few CFUG's had started cultivation of the MAP's commercially in the CFUG's land. In most of the CFUG's there is a lack of authorized institutions on management, so the management aspect on medicinal plant by CFUG's is very poor which is the also main cause of much exploitation of medicinal plant among the study area.

## 7. CONCLUSION

Following conclusion have been made from the present study.

- The study area was rich in indigenous knowledge about uses of plant resources. Altogether, 154 species of plant were found being used by indigenous people for the fulfillment of daily requirements.
- Out of 154 species of plant documented 69 species were medicinal plant which is used for health care of local people. The most commonly used are *Acorus calamus*, *Raulwolfia serpentine*, *Asparagus racemosus*, *Terminalia belirica*, *Withenia somnifera*, *Azadirchta indica*, *Pterocarpus marsipium*, *Aegle marmelous* *Emblica officinalis* and *Artemisia dubai*.
- Out of 154 species of plant documented 24 species are used as fodder for their domesticated cattle. The best quality was reported to be *Trewia nudiflora*, *Morus alba*, *Ficus neriifolia*, *Dalbergia latifolia*, *Populus celiata*, *Grewia. optiva*, *Ficus racemosa* according to preference by their domestic cattles and rate of lactation.
- Out of the 154 species of plant documented, highly exploited plant species of in Kanchanpur were found to be *Piper longum*, *Emblica officinalis* , *Asparagus racemosus*, *Terminellia chebula*, *Terminellia belerica*, *Acorus calamus*, *Azadirchta indica*, *Cordita vistata*, *Raulwofia serpentina*, *Acacia catechu* *Cinnamomum tamala*, *Zinzeber officinalis*, *Withenia somnifera* and *Pterocarpus masipium*.
- Out of the 154 species documented highly used species in various purpose by the local community areas were *Bambusa vulgaris*, *Terminelia tomentosa*, *Bauhnia vehlii*, *Eulalpsis binata*, *Alsotonia scholaris* and *Tinospora sinensis*.
- Most of the wild plants such as *Asparagus racemosus*, *Piper longum*, *Acorus calamus*, *Azadirchta indica*, *Cordita vistata*, *Raulwofia serpentina*, *Pterocarpus masipium* used by the Tharus hasn't been cultivated yet, so that their availability was gradually decreasing.



## **8. RECOMMENDATION**

Since forest resources are closely linked with the survival of local people, it is very difficult to solve the problem of their conservation. The following are some recommendation for conservation of plant resources and for the upliftment of local people's economic status:

- The indigenous Knowledge of the people on the utilization of Plant resources as food, medicine and others should be documented and preserved before they disappear.
- The forest user group should encouraged to the cultivate the medicinal species commercially on the bare part and all possible and available land of the CFUG that significantly help to raise the fund's of the CFUG's.
- As the most of the CFUG's and Local villagers of the study area were staying without any income generating activities and without cultivation of the medicinal plant in their own CFUG land and on their own private land, so they should be motivated/promoted for doing so.
- The forestry operational plan should be strengthened by incorporating the ethanomedicinal plant management processor.

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## Annex 1

### Lists of 20 most exploited Plants species in the study area.

S.N.	Local Name	Scientific Name	Total Rank	Type of Product
1	Kurilo	<i>Asparagus racemosus</i>	135	Tuber
2	Bojho	<i>Acorus calamus</i>	122	Rhizome
3	Sarphagandha	<i>Raulvolfia serpentina</i>	120	Roots
4	Pipla	<i>Piper longum</i>	115	Dry fruit
5	Amala	<i>Emblica officinalis</i>	103	Fruit pulp
6	Barro	<i>Terminallia belerica</i>	100	Fruit pulp
7	Bel	<i>Aegle marmelos</i>	94	Fruit pulp
8	Ashwagandha	<i>Withenia somnifera</i>	82	Root and Fruits
9	Bamboo/Bans	<i>Bambusa vulgaris</i>	76	Whole plant
10	Khair	<i>Acacia catechu</i>	68	Kattha
11	Leamon grass	<i>Cymbopogaon lexusas</i>	67	Whole plant
12	Bijaysal	<i>Pterocarpus marsipium</i>	63	Wooden glass
13	Bhorla	<i>Cordia vestita</i>	60	Bark
14	Sal	<i>Shorea robusta</i>	55	Wood
15	Rukh kathar	<i>Atrocarpus heterophyllaus</i>	48	Fruit
16	Sikakai	<i>Acacia regulata</i>	46	Whole plant
17	Neem	<i>Azadirchta indica</i>	42	Leaf Bark and fruit
18	Mentha	<i>Mentha arevensia</i>	40	Whole plant
19	Bijayasal	<i>Pterocarpus marsipium</i>	63	Gum and fruit
20.	Barro/Barrar	<i>Terminallia belerica</i>	40	fruit

## Annex 2

### List of the valuable species on the basis of socio-economic value by focus group discussion :

S.N.	Common Name	Botanical name	Rank obtained in different focus group discussion							Total score
			A	B	C	D	E	F	G	
1	Amala	<i>Emblica officinalis</i>	20	10	15	16	12	10	20	103
2	Harro	<i>Terminallia chebula</i>	20	-	20	20	-	20	20	100
3	Barro	<i>Terminallia belerica</i>	-	2	15	-	3	20	-	40
4	Kurilo	<i>Asparagus racemosus</i>	20	20	18	20	17	20	20	135
5	Pipla	<i>Piper longum</i>	20	16	10	15	16	18	20	115
6	Gurjo	<i>Tinospora sinensis</i>	10	-	8	-	-	-	8	26
7	Bijayasal	<i>Pterocarpus marsipium</i>	10	10	16	10	-	-	16	62
8	Amaltash	<i>Cassia fistula</i>	-	-	-	-	10	-	5	15
9	Sal	<i>Shorea robusta</i>	-	-	-	-	-	10	-	10
10	Mentha	<i>Mentha arvensis</i>	20	-	20	-	-	-	15	55
11	Bel	<i>Aegle mermoles</i>	14	-	10	18	16	20	16	94
12	Jamun	<i>Sizigium cumini</i>	-	-	-	-	4	-	-	4
13	Kushum	<i>Scheleria oleosa</i>	-	-	-	7	-	6	-	13
14	Malu	<i>Bahunia vehlii</i>	-	6	-	6	-	6	-	18
15	Babiyo	<i>Eulalips binnata</i>	7	6	-	-	5	-	-	18
16	Amriso	<i>Thysanalaena maxima</i>	7	4	-	-	-	4	-	15
17	Aaduwa	<i>Zinziber officinalis</i>	10	-	10	11	10	10	12	63
18	Rudilo	<i>Pogostemom bengalensis</i>	-	-	-	1	-	-	-	1
19	Bojho	<i>Acorus calamus</i>	20	20	20	10	2	20	20	122
20	Sarphagandha	<i>Rawulfia serpentina</i>	20	20	10	18	16	20	16	120
21	Neem	<i>Azadirchta indica</i>	20	-	-	10	-	12	-	42
22	Mahuma	<i>Madhuca longifolia</i>	20	-	-	-	20	-	-	40
23	Ghuikumari	<i>Aleo bera</i>	2	-	-	5	-	3	7	17
24	Chattiwan	<i>Alstonia scholaris</i>	-	5	-	-	-	-	10	15
25	Churi	<i>Diplokenima butyraceae</i>	10	-	-	-	4	-	5	19



S.N.	Common Name	Botanical name	Rank obtained in different focus group discussion							Total score
			A	B	C	D	E	F	G	
26	Aakashibeli	<i>Cuscuta reflexa</i>	15	-	-	-	-	-	-	15
27	Khair	<i>Acacia catechu</i>	10	18	-	15	-	20	-	68
28	Sindurae	<i>Melotous phillipinsis</i>	-	-	-	-	-	-	-	3
29	Tulsi	<i>Ocimum scantum</i>	-	-	-	-	-	-	12	12
30	Kagati	<i>Citrus reticulata</i>	8	-	-	-	7	-	-	15
31	Kalohaledo	<i>Curcuma longa</i>	-	16	-	-	-	1	-	17
32	Koiralo	<i>Baunnia verigata</i>	-	-	15	-	-	-	-	15
33	Citronella	<i>Citronella Spp</i>	-	-	-	-	11	-	-	11
34	Bans	<i>Bambusa vulgaris</i>	13	-	18	15	14	16	-	76
35	Leamon grass	<i>Crymbopogaon lexusas</i>	15	10	12	-	8	12	10	67
36	Ashwagandha	<i>Withenia somnifera</i>	10	5	15	10	16	10	16	82
37	Jatropha/Khiro	<i>Jatropha coracus</i>	-	-	-	-	2	-	8	10
38	Mango	<i>Mengifera indica</i>	5	-	2	-	8	1	2	18
39	Rukh kathar	<i>Atrocarpus heterophyllaus</i>	-	20	-	8	10	-	10	48
40	Rambas	<i>Agave Americana</i>	-	-	-	10	-	-	-	10
41	Kera	<i>Musa paradica</i>	10	-	-	-	5	-	-	15
42	Ritha	<i>Sapindus mukorosa</i>	-	-	-	13	-	-	-	13
43	Sinduray	<i>Mallotus philippensis</i>	-	-	-	13	-	-	-	13

**Note : The symbol A, B, C, D, E, F, G represents the following i.e.**

- A = Bedkot CFUG -4- Daijee, Kanchanpur
- B= Amar CFUG -6,7,9- Suda, Kanchanpur
- C= Siddha Baijnath CFUG-4- Daijee,Kanchanpur
- D= Aadishakti CFUG-6-Suda, Kanchanpur
- E= NTFPs knowledgeable teachers
- F= Village level traders.
- G= Healers

**Annex 3**

**Field Questionnaire for Field Survey**

**A) General information:**

1. Name of Resource person.....
2. Name of the CFUG:.....
3. Address ..... VDC/Municipality..... Ward No.....
4. Position of resource person.....
5. Address.....
6. Educational status.....
7. Ranking of occupation:  
a) Farmer                                  c) Politician                                  e) Service  
b) Social worker                                  d) Business                                  f) Others
8. Caste ..... Sex .....Age.....

**B) What are the various forest resources that are available in your CFUG?  
Please mention them according to the following points:**

9. What are the Species used for constructional purposes  
1.                  2.                  3.                  4.                  5.
10. What are the species used for fuel wood  
a)                  b)                  c)                  d)                  e)                  f)
11. What are the species used for fodder.  
a)                  b)                  c)                  d)                  e)                  f)
12. What are the species used for medicinal purpose.  
a)                  b)                  c)                  d)                  e)                  f)
13. What are the species used for small scale industry and basket making.  
a)                  b)                  c)                  d)                  e)                  f)

**14.** Which species are found in maximum quantity in your community forestry land? Please enlist the names.

a)    b)    c)    d)    e)    f)

**15.** Do you have practice the trade of ethanomedicinal and timber forest product form your community forest? If so, please mention the species and quantity according to the following table:

S. No.	Timber species	Quantity/year	Ethanobotanical species	Quantity/year

**16.** How many times you have been suffered from any types of diseases last year? Which medicine you prefer for cure? Homeopathic/Allopathic. If homeopathic than mention the species you have used for curing.

a)    b)    c)    d)    e)    f)

**17.** Do you have started cultivation of ethanobotanicals speices commercially in your community forest lands? If so, please mention the name.

a)    b)    c)    d)    e)    f)

**18.** What are the possibility and probability of ethanomedicinal species cultivation commercially in and around your community forest lands? If so, mention the name of such species.

a)    b)    c)    d)    e)    f)

**19.** Do you have got any training from either District Forest Office or such other Non Governmental organizations for the management of ethanomedicinal species? If so, mention the name of training & training providing organizations.

a)    b)    c)    d)    e)    f)

**20.** In your opinion what provision should be there in forest, so that local and poorest people of the community will get sustained income and employment opportunities easily and locally eg. Bee keeping, Sericulture etc.

a)    b)    c)    d)    e)    f)

If any others then suggest in the following points.

- 1)
- 2)
- 3)
- 4)

Thanks for your suggestion and cooperation

Researcher Name.....

Date.....

## PHOTOPLATE



Nursery bed of *Emblica officinalis* prepared by the Bedkot community forest user group



Siddha Baijnath Community forest Suda Kanchanpur



Participatory listing of most exploited species by the Bedkot CFUG by group discussion



A nursery bed of *Rauwolfia serpentina* prepared by Aadishakti CFUG-6-Suda, Kanchanpur.



Woman participating in Focus group discussion



Cattles Grazing on the Bedkot community Forest