ADDIS ABABA UNIVERSITY
SCHOOL OF GRAGUATE STUDIES
PLANT BIOLOGY AND BIODIVERSITY MANEGMENT PROGRAM UNIT

AN ETHNOBOTANICAL STUDY OF PLANTS USED IN TRADITIONAL MEDICINE AND AS WILD FOODS IN AND AROUND TARA GEDAM AND AMBA REMNANT FORESTS IN LIBO KEMKEM WEREDA, SOUTH GONDER ZONE, AMHARA REGION, ETHIOPIA

BY
GETNET CHEKOLE

JUNE 2011

ADDIS ABABA

ADDIS ABABA UNIVERSITY
SCHOOL OF GRAGUATE STUDIES
PLANT BIOLOGY AND BIODIVERSITY MANEGMENT PROGRAM UNIT

AN ETHNOBOTANICAL STUDY OF PLANTS USED IN TRADITIONAL MEDICINE AND AS WILD FOODS IN AND AROUND TARA GEDAM AND AMBA REMNANT FORESTS IN LIBO KEMKEM WEREDA, SOUTH GONDER ZONE, AMHARA REGION, ETHIOPIA

By

Getnet Chekole

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PLANT BIOLOGY AND BIODIVERSITY MANEGMENT

Approved Examining Board		**Signature**
Sebsebe Demissew (Prof.)	(Examiner)	_____
Sileshi Nemomissa (Prof.)	(Examiner)	_____
Zemede Asfaw (PhD)	(Advisor)	_____
Ensermu Kelbessa (Prof.)	(Advisor)	_____

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ERA	Ethiopian Roads Authority
IBCR	Institution of Biodiversity Conservation Research
IDA	International Development Association
IK	Indigenous Knowledge
IPK	Indigenous Plant Knowledge
LKWAHO	Libo Kemkem Wereda Animal Health Office
LKWAO	Libo Kemkem Wereda Agricultural Office
LKWEO	Libo Kemkem Wereda Educational Office
LKWISO	Libo Kemkem Wereda Information Source Office
LWCTO	Libo Kemkem Woreda Cultural and Turism Office
MPTS	Medicinal Plants
SCBD	Secretariat of the Convention on Biological Diversity
TM	Traditional Medicine

ACKNOWLEDGEMENTS

First and foremost; it is indeed a pleasure for this opportunity to express my special heartfelt gratitude to my advisors Dr. Zemede Asfaw and Prof. Ensermu Kelbessa for their consistent advice, suggestion, comments and follow up from the beginning to the end of this work. Without them, to shape this study was not realized.

My appreciation goes to the people of Libo Kemkem for their positive response, sharing their valuable knowledge and time as well as for their tremendous generosity and hospitality. I also thank the following offices: Wereda Rural Agricultural Development Office, Wereda Health Office, Wereda Administrative Office, and Wereda information affair office for their provision of data, information and supportive letter during data collection.

I am deeply indebted Ministry of education office for sponsoring my postgraduate study.
I am highly grateful for the t echnical staff of the AAU National Herbarium facilities for identifying and documenting plant specimens.

I also thank Department of Biology for its financial support to carry out this research.

Furthermore, I would like to thank my best and thoughtful sister Yeshiwaga Chekole, my mother Anchinalu Admaw, my father Chekole Walle, my brother Gete Chekole, and Birhanu Walle Maritu Chekole for their multidimensional support during in data collection and the entire academic journey.

ABSTRACT: *This study documents plant species used as medicinal and wild food along with the traditional knowledge on utilization plant resources by local people in and around Tara Gedam and Amba Forests in Libo Kemkem Wereda, South Gondar Zone, Ethiopia. The field study was conducted between November, and Juanuary 2010. A total of 106 informants were sampled from 13 study sites preferencially selected in and around the forests studied and a variety of ethnobotanical methods were applied including semi-structured interviews, field observations, preference ranking, direct matrix ranking, paired comparisons and informant consensus with traditional healers and elderly people of the user groups. A total of 175 plant species have been identified in and around the forests. Among these, 163 species are medicinal plants belonging to 145 genera and 67 families. Of these, 115 (70.6%) species are used to treat only human ailments, 14 (8.6%) species are used for livestock ailments only and 34 (20.9%) species are reported for both human and livestok ailments. These medicinal plants are used to treat about 60 types of human ailments, nine types of animal ailments and 10 types of both animals and human ailments. The family Asteraceae was represented by highest number of 14 (8.6%) of medicinal plants, followed by the Fabaceae with 13 (8%) and Solanaceae 10 (6.1%) species. Most of them have medicinal properties in their leaf, bark, root, stem, flower, seed and fruits. Medicine from these plant parts is prepared as fresh, dried and both fresh and dried state in the form of crushed, crushed and powdered, boiled, chewed and chopped plants material. Meanwhile, a total of 33 plant species distributed in 30 genera and 25 families were recorded as wild foods in the study area. Of these, 21 (63.6%) species serve the local community both as sources of food and traditional medicine (nutraceutical plants). Fruit is found to be the most edible plant part and mostly taken as raw. Elderly people and traditional healers of the areas possess vast knowledge on wild food plants and ethnomedicinal practices along with the ecological distribution of plants in comparison with the young generation. The knowledge transfer system is quite restricted within the family. Users were found less aware of conservation of medicinal and wild food plants and those of uses, plants which have multiple use value. Therefore, plants found in and around Tara Gedam and Amba forests are very important as medicinal wild foods for curing ailments as well as sources of food during normal times and when there is shortage of food. It is not only essential to conserve such a wealth of information hidden among the local people, but also to apply them to modern knowledge of science and technology to meet the ever increasing requirements of humankind.*

Keywords/Phrases: Ethnobotany, Tara Gedam and Amba Forests, Traditional Medicine, Wild Food plants

1. INTRODUCTION

1.1 Background and Justification

Ethiopia, situated in the Hom of Africa, has a total land area of 1.126 million Km^2 (Shibru Tedla and Kifle Lemma, 1998; Jonathan, 2007). Its estimated population is over 76.9 million with 3% annual growth rate (CSA, 2007). Most people (88%) live in the highlands (above 1500 m) that constitute 43% area of the country (Shibru Tedla and Kifle Lemma, 1998). The country's ecological setting is quite diversified in altitude, climatic and ecological features. Due to this reason Ethiopia is the fifth major country in tropical Africa in terms of the diversity of flora (Ensermu Kelbesa *et al*., 1992)**.** In addition**,** it is known worldwide as one of the global centers of biodiversity so that much of this biodiversity is associated with forest resource (Yonas Yemshaw, 2004). Further, Ethiopia had 40% forest coverage before the last three to four decades. Unfortunately, to date forest areas have dropped to 2.4% of which only about half is natural forest, and there is fast rate of decline (Shibru Tedla and Kifle Lemma, 1998; Yonas Yemshaw, 2004). A growing population needs, among other things, more food, fire wood, construction wood and arable land (Abera Worku, 2006). To satisfy these needs, farmers in Ethiopia have frequently been destroying the remnant forest all over the country. Currently, there are 10 national parks, 13 wild life resources and bird sanctuaries, and 14 controlled hunting areas (Ethiopia Country Report, 1995). There are also protected forest areas and proposed ones such as 54 forests in the Dry Evergreen Montane forest and grasslands of which Tara Gedam and Amba forests in the south Gondar zone are among these known forest resources (Taye Bekele *et al.,* 2001; ERA and IDA, 1997)**.** Hence, current management and conservation action is crucial to protect the existing forest resources from further deterioration. This ethnobotanical study is, therefore, very crucial to reveal the medicinal and wild food plant resource of the forests for better protection and sustainable utilization.

Documenting traditional medical knowledge is important to facilitate the discovery of new sources of drugs and promote sustainable use of natural resources (Dawit Abebe, 1986). One major constraint is that Africa has not been able to take advantage of its wealth of raw materials and traditional knowledge to invest in sustainable processing (Sebukeera, 2010). Studies reported that a significant proportion of the Ethiopian population still depends on TM for its health care services (Dawit Abebe and Ahadu Ayehu, 1993; Teferi Gedif and Hahn, 2003). Despite their significant

contributions, TM and edible plants, in particular in Ethiopia have far attracted very little attention in modern research and development, and less effort has been made to upgrade them (Abebe Demsie, 1996)**.** Medicinal plants utilized in Ethiopia are harvested mostly from the wild. However, these with the associated traditional knowledge are getting eroded due to natural and human made factors (IBC, 2005**)**.

Increasingly, scientists and pharmaceutical companies are also looking at traditional knowledge (TK) to identify new drug sources by means of bioprospecting and reverse pharmacology and ethnobotany is seen as playing a valuable role in this regard (Patwardhan, 2009). Many of the traditional methods and general knowledge of medicinal flora is being lost with time. As healers, shamans and tribal elder's age and die, their knowledge is dying with them (in areas where such knowledge has not been codified). For the most part, the potential for practitioners of traditional medicine to serve as partners in the process of drug discovery and in providing care services is not acknowledged (Lal and Junior, 2011).

In addition, wild edible plants are also widely distributed in the country; however there is scarcity of information concerning their taxonomy, genetic diversity, and uses, among other issues (IBC, 2005**)**. The literature on vulnerability, food security and ecosystem services has tended to emphasize the cultivated foods. However, there is substantial evidence that wild foods are an important part of the global food basket **(**Bharucha, and Pretty, 2010)**.** Especially, forest foods often provide essential vitamins, minerals, carbohydrates and proteins to which forest plants contribute a significant proportion. Even where people consume only small amounts of forest foods, they play an important role by adding variety and spice (Pimentel *et al.*, 1997).

Plant resources not only contain and provide materials for survival that is, economic, medicinal, forage values, but also possess and preserve cultural heritages, biological information and indigenous knowledge on their utility. For example, forests plant resources are homes to an estimated 60 million indigenous people, who are directly dependent on forest resources and the health of forest ecosystems for their livelihoods (SCBD, 2010). The cultural and spiritual identity of indigenous peoples is often linked to intact primary forests with their rich biodiversity (Gerard, 2005). There are approximately 400 million indigenous people across more than 70 countries, with a high percentage located in tropical areas where plants are more diversified (SCBD, 2010). In the

Amazon basin, for example, knowledge of the medicinal, nutritional and cultural uses of over 1,300 different forest plants is common in local indigenous communities. However, unwise use and over exploitation can slowly eliminate a plant species from the environment (Peter, 1996). As a plant species is lost from a locality, the information contained in it will also be slowly blurred and finally become lost forever. Cunningham (1996) pointed out that both saving plant species and documenting and preserving indigenous knowledge are fundamental urgent issues.

1.2 Statement of the Problem

The study area was selected because Amba and Tara Gedam forests in particular are being known for their high species composition in Amhara Region (ERA and IDA, 1997). Although the study area is protected and known by its rich plant species, it has been pressurized by the surrounding society (Taye Bekele *et al.,* 2001). It could be result an increasing threat and destruction of plant resources in and around the forests ecosystems. Understanding and taking conservation activities, however, should be based on ethnobotanical study of the area, which would be basic and useful for the forests as well as the surroundings.

According to Martin (1995), ethnobotanical data are basic for conservation and community development activities. Ethnobotanical data are useful to broaden our plant use knowledge (Mesfin Tadesse and Sebsebe Demissew, 1992; Ensermu Kelbessa *et al*., 1992). Research revealed that the urbanization process in Ethiopia has tremendous impacted on the traditional medicine as well as useful plants in general (Wondwosen Teshome, 2005). Similarly, Tara Gedam and Amba forests are adjacent to Addis Zemen Town and these risks are highly reflected. In addition, Tara Gedam and its surroundings are very critical areas for the surrounding resident people and animals as a source of medicine, water, food and for constructing their shelter, but, no ethnobotanical data documentating these resources exists and on the area in general. Currently, most of the natural vegetation of the area is decreasing and losing the physical and species composition as a result of different human activities. As the local people and communities encounter cultural changes, unless documented and conserved, the knowledge of the people on plant resource use could vanish forever (Bayafers Tamene *et al*., 2000)**.** In the study area, this vital information has been diminishing.

Therefore, collecting and documenting ethnobotanical knowledge before it is lost forever is a fundamental urgent task. Hence, documenting and conserving ethnobotanical information of the Tara Gedam and Amba forests and surrounding area would be crucial and a timely endeavor. For this reason, this study is initiated to gather, record and document indigenous knowledge of Tara Gedam and Amba forests and the dependence of the surrounding people on plant resources, to compile a checklist of ethnobotanically most important plants for medicinal and wild edible purpose and find how the local people try to conserve these habitats and the plant species of the area.

1.3 Research Questions

What are the medicinal and wild-edible plant species used by indigenous people living in and around Tara Gedam and Amba forests to treat various diseases and aliments as well as for foods?

What types of diseases are treated by these plant species? Is it for humans, animals or both?

What are the nutraceutical plant species and which parts are used?

What do the habits and habitat distribution of these plant species look like? Are the medicinal and wild edible plants found in the forest, homegarden or both?

How do the local people obtain and use these plant species to treat various diseases and ailments as well as for food at the required time? (Methods of cultivation, preparation, way of administration and dosage as well as storage)

How do the local people manage and conserve these medicinal and wild food plant species through their traditional practices?

What are the imperative problems facing medicinal and wild edible plants and associated knowledge and cultures of the local people in the study area?

1.4 Objectives of the Study

1.4.1 General objective

The main objective of this study is to conduct an ethnobotanical study of plants used as traditional medicine as well as wild food to record, compile and document the associated IK so as to assist in the proper utilization, management and conservation of useful plants and to get brief insight into their taxonomic aspects

1.4.2 Specific objectives

-To document plants of medicinal value for treating various human and livestock health problems as well as the wild-foods for human use.

-To identify plant parts used to treat diseases, as well edible ones, method of preparation and route of administration as adopted by the local people of the study area.

-To obtain information on the past, present and future trends of traditional medicine and wild food plants use as well as threats and preferences associated with each category in the study area.

-To provide first hand information on the taxonomic distribution and abundance of medicinal and wild–edible plants in and around the forests

-To document data for providing baseline information for future research activities in ethnobotanical, pharmacological, phytochemical and nutritional studies.

-To assess the role of traditional practices and indigenous knowledge in maintaining plants used for medicinal and as wild food in homegardens.

2. LITERATURE REVIEW

2.1 The Concept of Ethnobotany and its Role for Biodiversity Management

Ethnobotany is the study of the relationship between plants and people: From "ethno" - study of people and "botany" - study of plants. The focus of ethnobotany is on how plants have been or are used, managed and perceived in human societies (Choudhary *et al.,* 2008**;** Cotton, 1996). It mainly focuses on plants used for food, medicine, divination, cosmetics, dyeing, textiles, for building, tools, currency, clothing, rituals, social life and music (Gerique, 2006; Choudhary *et al.,* 2008).

The term 'Ethnobotany' was coined and defined by Harsberger in 1896, as 'the study of plants used by primitive and aboriginal peoples (cited in Cotton, 1996). Later, the science of ethnobotany was broadened and redefined by many ethnobotanists like Martin (1995)**.** In general, ethnobotany is a multidisciplinary science that contributes to analyzing interactions between plant resources and people (Khanal, 2006). In addition**,** this field of study also analyzes the results of indigenous manipulations of plant material together with the cultural context in which plants are used (Balick and Cox, 1996)**.** Being related with almost all branches of natural sciences, it tries to find the secret knowledge of people on plant resources, which can be the foundation of multipurpose development of the society (Aryal, 2009).

The historical dimensions of ethnobotany that were largely listings of plant names and uses play a role in contemporary approaches to traditional plant knowledge **(**Hinnawi, 2010). Most past researchers did not regard what the people thought about plants as important. The situation today is that researchers would like to include descriptive statements to a more analytical and quantitative approach of plants in their studies (Phillips, 1996).

Ethnobotany not only discovers the indigenous knowledge of plant resources, but also tries to deal with all aspects of plant conservation (Aryal, 2009). Ethnobotanical knowledge can tell which species are most significant to people's livelihood needs and useful to planners and extension workers in management planning. Ethnobotany can highlight vegetation or species of special importance to local people. This information should be used in formulation of management plans not only in communal areas, but also for national forest reserves used by rural communities (Khanal**,** 2006). Ethnobotany is just one of many inter-disciplinary tools necessary to integrate indigenous

knowledge in participatory management schemes (Theilade *et al*., 2007)**.** Proper identification and documentation of resources and reorganization of their traditional knowledge are important for formulation of effective policies and programs for better management of biodiversity (SCBD, 2010)**.** As a result, the study of indigenous knowledge about natural resources is becoming increasingly important in defining strategies and actions for conservation (Khanal**,** 2006)**.**

Ethnobotany has been developed over years from simple listing of useful plants into a new scientific field with appropriate methodology of, documenting and studying indigenous and accumulated knowledge on plants (Cotton 1996; Balik and Cox, 1996). Results of ethnobotanical research are used as a lead in development, sustainable utilization of plant resources and indigenous knowledge in particular and conservation of biodiversity in general (Debela Hunde, 2001). Zemede Asfaw (2004) also noted that the ethnobotanical studies have played a key role in revealing and promoting traditional practices that have been found useful in maintaining or enhancing biodiversity and sustainable use of biological resources. Saving plant species and documenting and preserving indigenous knowledge is the major issues to be accomplished in ethnobotany studies (Cunningham, 1996).

Work with communities to evolve improved methods of managing trees and other plants have many potential benefits for conservation and sustainable development (Hamilton *et al*., 2003). Ethnobotany is an indispensable tool to identify and document plant species that have been under utilization by human beings for centuries for various reasons (Martin, 1995; Balick and Cox, 1996; Tilahun Teklehaymanot and Mirutse Giday, 2007). This ethnobotanical study on diverse vegetation of forests as well as other vegetation types is very crucial in order to taking in to consideration such wealth application of ethnobotany during plant species conservation and usuasage.

2.2 Importance of Forest Resources in Relation to Ethnobotanical Research and Appplication

Forests are essential for human survival and well-being as well as for survival of two thirds of all terrestrial animals and plant species (Lal and Junior, 2011). They provide us with food, oxygen, shelter, recreation, and spiritual sustenance, and they are the source for over 5,000 commercially-traded products, ranging from pharmaceuticals to timber and clothing (SCBD, 2010).

Accordingly, ethnobotanical researches and applications are mostly done around natural ecosystems such as forests, grasslands, woodlands, and wetlands as well as in many other micro-habitats (Sebukeera, 2010)**,** from where the wealth of ethnobotanical knowledge are retrieved. Forest botanicals are used in the manufacture of a great many medicinal plant products and pharmaceuticals as well as nutritional supplements, while these products were obtained through a systematic ethnobotanical research. In addition, Hanazaki *et al.* (2006) point out the main aspect investigated from forest ethnobotany is the use and investigations of numerous medicinal plants as well as development of ethnopharmacological studies. Ibrar *et al,* (2007) and Colfer *et al., (*2006) added that a forest is a constant source of maintaining genetic diversity of plants and animals and these resources are available to humans, from which ethnobotanical researches would be applicable. Farmers and forest dwelling people possess a great deal of indigenous knowledge arising from their utilization of forest resources. This knowledge on plant species variation and consumption uses is valuable in ethnobotanical research and development. Forests are the source of many hidden treasures and a fertile ground for scientific research (SCBD, 2010).

Furthermore, forests serve as both a classroom and a source of raw materials for local health practitioners (Balik and Cox, 1996)**.** Thomas *et al.* (1989) stated that forests and the benefits they provide in the form of wood, food, income, and watershed protection have an important and critical role in enabling people to secure a stable and adequate food supply. Accordingly, ehnobotanical studies and applications were done on accumulated people's experiences on these different use categories**.** The Assessment of woody species for timber, medicine and other uses in the forests showed that species richness of medicinal species was highest (Hanazaki *et al.,* 2006; Bisht and Badoni, 2009). These medicinal richness situations are very important for the concentration of ethnobotanical research and applications about their values. Furthermore, forests have been increasingly seen as serving multiple functions **(**Hamilton *et al*., 2003;). for example; forests and woodlands of Ethiopia act as sources of raw materials for wood-based energy (70% of the total energy needed), construction, wood-based industries, farm implements, fuel-wood and employment opportunities (Demel Teketay, 2001; Getachew Desalegn *et al*., 2003) and other non timber forest products such as coffee, spices, honey medicinal products, animal fodder, wild-edible plants (fruits, seeds, leaves, roots, tubers) etc. (Demel Teketay, 2001). From these multiple use values of forest resources, different types of ethnobotanical useful values of plants in different parts of the

country have been taking place. But if the forest does not exist, ethnobotanical research as well as application might not be available. The reason that the present study has been taken place in and around the forests was by understanding such the above role of forests in ethnobotanical research and application.

2.3 Useful Plants and Use Categories

Plants are fundamental to almost all lives on the earth providing protection and nourishment for organisms ranging from bacteria to large mammals (Cotton, 1996). Humans derive food, medicines and a number of ecosystem services such as air purification, origin and recharge of water bodies, nitrogen fixation, cycling of nutrients as well as many more range of other products from plant biodiversity **(**Khanal, 2006). Tigist Wonndmu *et al.* (2006) in similar way expalined that, plants serve as sources of drinking water, which is part of food. But, the perception and relative importance of useful plants are related to cultural factors such as human behavior, social and economic constraints, and several other factors (Pelto *et al.* 1989 cited in Toledo *et al.,* 2007). In addition, patterns of plant use by human communities may depend on environmental constraints. For example, some patterns of plant use can be related to local species richness, or to the regional abundance of some useful plants (Toledo, 2007). While, the use of plants and plant products for different purposes such as food, wood, medicine, fiber, oil, fodder, aroma, ornamental and other miscellaneous uses could be traced as far back as the beginning of human civilization (Khanal, 2006). But, in this study overall focus is given for the useful plant sources provided mainly as medicine and wild foods.

2.3.1 Medicinal plant resources

A medicinal plant is a plant that at least one of its parts contains substances that can be used for therapeutic purposes **(**Sofowora, 1982 and Bruneton, 1995 cited in Hinnawi, 2010). On the other hand, traditional medicine is the sum total of all knowledge and practices used in diagnosis, prevention and elimination of health problems and relying exclusively on practical experience and observation handed down from generation to generation verbally and in writing (WHO, 2000).

The healing properties of plants have been developed through trial and error experimentation of time when during the course of primitive men and women struggled with the encountered health

problems such as the miseries of pains, sickness and sustained injuries **(**Teferi Flatie *et al.,* 2009**).** Presently, human beings have found remedies within their habitats, and have adopted different therapeutic strategies based on peculiar cultural and socio-structural typologies (Teferi Gedif and Hahn, 2003).

It is known that many countries in Africa, Asia and Latin America use traditional medicine (TM) to meet some of their primary health care needs (Kebede Deribe, *et al.,* 2006). More than 20,000 plant species are being used in various human cultures around the world for medicinal purpose (Lewington, 1993 cited Khanal, 2006). About 85% of population in the underdeveloped world does not have access to modern western style health care services (World Health Report, 2008) and rely on traditional medical system for their health care (Aryal, 2009). In China, for example, traditional herbal preparations account for 30%-50% of the total medicinal consumption (Bannerman *et al.,* 1993; WHO, 2003). In Africa, up to 80% of the population uses traditional herbal medicines for primary health care (WHO, 2003)**.** In Ghana, Mali, Nigeria and Zambia, the first line of treatment for 60% of children with high fever resulting from malaria is the use of herbal medicines at home (Bannerman *et al.,* 1993; WHO, 2003).

In Ethiopia, about 80% of human population and 90% of livestock rely on traditional medicine (Teshale Sori *et al.,* 2004*;* Endashaw Bekele, 2007). There are 6000 species of higher plants in Ethiopia out of which more than 14% is used as traditional medicines (Tesfaye Awas, 2004). Endashaw Bekele (2007) stated 1000 identified medicinal plant species are reported in the Ethiopian Flora. However, many others are not yet identified. In addition, Dawit Abebe (1986) indicated that more than 95% of traditional medical preparations are of plant origin. Therefore, medicinal plants or plant derived medicines have always played a key role in world health including the maintenance of health as well as in the introduction of new treatment (Khanal, 2006). Despite its existence and continued use over many countries, the quantity and quality as well as the safety and efficacy of data on traditional medicinal plants are far from sufficient to meet the criteria needed to support its use worldwide (WHO, 2000).

Medicinal plants are also seen as an economic commodity for some members of the society who make their livelihoods on their collection, trade or through use for treating patients as traditional

medical practitioners/healers (Sebukeera, 2010). In Ethiopia, of the existing medicinal herbs and spice plants only small percent is traded (Ethiopia Country Report, 1995; Endashaw Bekele, 2007).

2.3.2 Wild food plant resources

Wild edible plants are with one or more parts that can be used for food if gathered at the appropriate stage of growth, and properly prepared. Edible wild plants could be weeds growing in urban areas to native plants growing in deep wilderness (Hinnawi, 2010).

Plants have been the source of food materials from the dawn of human civilization (Arnold, 1995 cited in Khanal, 2006). For instance, about 300 million people obtain part or their entire livelihood and food from wild, forests in the world (DMP, 1982). Over 70% of the wild edible plants are consumed when food scarcity is high and at times of starvation (Cunnigam, 2001; Tilahun Teklehaymanot and Mirutse Giday, 2010). On the other hand Getachew Addis *et al*. (2005) stated that wild plants in Ethiopia are used as source of food both at times of plenty and of food shortage. Despite agricultural the fact that societies primarily rely on crop plants, the tradition of eating wild plants has not completely disappeared, their nutritional role and health benefits being reported in many surveys worldwide (Pardo-de-Santayana *et al*., 2007)**.** Thus, wild edible plants still play an important role in human nutrition especially in the time of starvation (Khanal, 2006). Globally, an estimated 1.02 billion people are undernourished (FAO, 2009). For many years the importance of wild plants in the developing world as a main food supplement and as a means of survival during times of drought and famine (Guinand and Dechassa Lemessa, 2000).

Wild food plants are of high nutritional content such as protein, vitamin B2, and vitamin C, which used as alternatives to conventional vegetables in the human diet **(**Fentahun Mengistu and Herbert, 2008). According to many sources, the amount of vitamins, minerals and other nutrients in wild food is on the average greater in wild foods (Hinnawi, 2010)**.** Research supports that some of these foods, as part of an overall healthful diet, have the potential to delay the onset of many age-related diseases (Arnold, 1995 cited in Khanal, 2006)

Ethiopia possesses one of the richest floras in Africa. Much of this florsitic wealth is reflected in the fact that it is one of the Vavilov's centres of origin and/or diversity for many domesticated plants and

their wild food plants (Bell, 1995 cited in Guinand and Dechassa Lemessa, 2000; Zewge Teklehaimanot, 2001). But, little has been systematically documented on wild food plants (Gidey Yirga, 2010). In addition, information on wild edible plants of Ethiopia is scattered in botanical monographs, glossaries and informal notes as well as in the rich oral tradition of different communities (Zemede Asfaw and Mesfin Tadesse, 2001). Zemede Asfaw and Mesfin Tadesse (2001) extrapolated their data showing that about 5% of the total plant species of Ethiopian plants serve as food for human beings. In addition, Kebu Balemie and Fassil Kebebew (2006) identified 66 wild edible plant species classified among 54 genera and 34 families.

2.4 Indigenous People and Indigenous Knowledge on Useful Plant

Indigenous people refer to who follow traditional, non industrial lifestyle in areas that they have occupied for generations (Balick and Cox, 1996). Indigenous knowledge refers to the accumulation of knowledge, rules, standards, skills, and mental sets, which are possessed by local people in a particular area (Quanash, 1998). It is the result of many generations' long years' experiences, careful observations and trial and error experiments (Martin, 1995). Ethnobotany is mainly focused on indigenous peoples since the relationships between plants and people are clearer in indigenous societies (Balick and Cox, 1996). Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility (Martin, 1995; Cotton, 1996; Khanal, 2006). Systematic application of this indigenous knowledge is important for sustainable use of resources and sustainable development (Thomas, 1995). Biodiversity and traditional knowledge of its various properties and uses have long provided and continue to provide vital resources for medicine discovery and health care (SCBD, 2010). In addition, **i**ndigenous knowledge can provide problem solving strategies for local communities, especially the traditional societies. For example, previous studies on medicinal plants (Kebu Balemie *et al.,* 2003; Mirutse Giday and Gobena Ameni, 2003; Tilahun Teklehaymanot and Mirutse Giday, 2007; Haile Yinger *et al.,* 2008**)** have shown that the traditional societies in Ethiopia have good plant use and management knowledge, which will have valuable contribution to conservation activities in the country. This knowledge is still underutilized resource in the development process of Ethiopia.But, Indigenous knowledge of medicinal plants in Ethiopia is unevenly distributed among community members (Zemede Asfaw, 2001). Therefore, special effort is needed to understand and disseminate this knowledge through ethnobotanical studies.

2.5 Condition of Medicinal and Wild Food Plants in Ethiopia

The bulk of the plant matter used for medicinal and wild food purposes is collected from natural vegetation (Melakeselam Dagnachew, 2001) especially wild (Mirtuste Giday, 1999; Tesfaye Awas, and Zemede Asfaw, 1999)**.** But, when time goes by the widely occurring medicinal plant species and the associated tradition knowledge are getting eroded (Mirtuste Giday, 1999)**.** In addition**,** the practice of using plant remedies by the community to treat different ailments has been dwelling from time to time mainly as a result of continued deforestation in the area. This in turns has brought about the local loss of important medicinal plants (Tesfaye Awas, 2004)**.** Furthermore, some medicinal plant species of Ethiopia are reported to have been threatened by the overuse and over harvesting for marketing (Endashaw Bekele, 2007). Besides these, the studies conducted on the traditional medicinal plants in Ethiopia are limited when compared with the multi-ethnic cultural diversity and the diverse flora of Ethiopia (Fisseha Mesfin *et al.,* 2009).

In addition, there are about 170 food plant species that are consumed in different parts of the country; including herbs, trees, shrubs, and climbers. But, most of the wild edible species are endangered due to genetic erosion (IBC, 2005). These phenomena are more pronounced in countries like Ethiopia where high rate of human population growth join up with insufficient documentation and conservation of biota, in particular safeguarding promising plant taxa (Zemede Asfaw and Mesfin Tadesse, 2001). With the routine underestimation of wild foods comes the danger of neglecting the provisioning ecosystems and supportive local knowledge systems that sustain these food chains (Grivetti and Ogle 2000; Mazhar *et al.,* 2007). Moreover, Getachew Addis *et al*. (2005) also stated that in spite of the role of edible wild plants in bridging periods of food shortages and providing dietary variety, very little attention has been given to the inventory and conservation of species.

.

Nevertheless, the rich indigenous knowledge on the medicinal use of wild plants has been relatively well documented, compared with the research concerning the socioeconomic, cultural, traditional, and nutritional aspects of wild-food plants still lacks adequate attention (Guinand and Dechassa Lemessa, 2000). Furthermore, in view of the substantial area, and immense social, cultural, and geographical

diversity of the country, documentation and preservation of local knowledge and assessments of the nutritional composition of wild plants as well as health problems caused by their consumption are very scanty

Similarly, the useful plants are currently lack of ethnobotanical coverage. Thus, to conserve both useful plants and IK, human activities on plant species should be properly known and assessed. In particular, in Ethiopia there is a situation where millions of rural people are still unable to feed themselves and are in need of food assistance, the need to promote utilization of climatically adapted and nutritious edible wild plants is of paramount importance. To address such problem, compiling, documenting and preserving IK is an important and urgent issue. This can be achieved through studying the relationship and interaction of local people with useful plants as well as the significance of plant species towards the wellbeing of local peoples (Martin, 1995; Cotton, 1996). Ethnobotanical investigation on the rest of the useful plants including forage/fodder, fuel food, material culture and miscellaneous uses should need further and extensive studies, this enables in order to document plants resources and their associated IK and practices, and hence for their sustainable utilization, conservation and management.

3. DISCRIPTION OF STUDY AREA

3.1 Geographical Location, Geomorphology and Climate

This study was conducted in Tara Gedam and Amba forests, located in Libo Kemkem Wereda in the south Gondar Zone of the Amhara Regional State of northwestern Ethiopia. It is very close to Addis Zemen and located in northeast of Lake Tana. Addis Zemen Town is the capital city of the Wereda, which is located at 12^{o} 06'59"-12^{0} 07'25" N and 37^{0}46'14"-37^{0}47'02" E, on Addis Ababa Gondar main road about 85 km north of Bahir-Dar and 95 km south of Gondar. The altitudinal range of Tara Gedam forest ranges between 2062-2496 m a.s.l and that of Amba 2011-2541 m a.s.l. with the highest peak at Mt. Deboch. The two forests are lying in chains in Tara Gedam and Agella Mantogera kebeles. Other five neighboring kebeles bordering the two kebeles are, Michael Debr, from the north, Ginaza and Yifag Akababi from the south, Addis Zemen, Tahra and Bira Abo from the East and River Arno from the west. The main Addis Ababa-Gondar main road passes through the forests (Figure 1).

Most of Tara Gedam, Amba forests and north part of them are characterized by chain of ragged mountains and hills whereas the south, east and west parts of the forests are characterized by diverse geographical features including plain, semi-plain, plateau and gorge areas. In addition, most of the areas are covered by light dark, grey, whitish, redditish or brown volcanic rock mainly basalts.

The study area is locally characterized by two agro-climatic zones: moist 'Weina Dega' (95.1%) and Dega (4.9%) (Tegegne Mekonen, 2009; LKWIS, 2010). The Wereda receives a uni-modal rainfall of approximately 1300 mm per year, the majority of which falls between June and August. The dry season extends from December to March. The climate data obtained from the national meteorological service agency for the study area showed that the mean annual maximum and minimum temperature are 32.8^{o}c and 8^{o}c respectively (Figure 2)

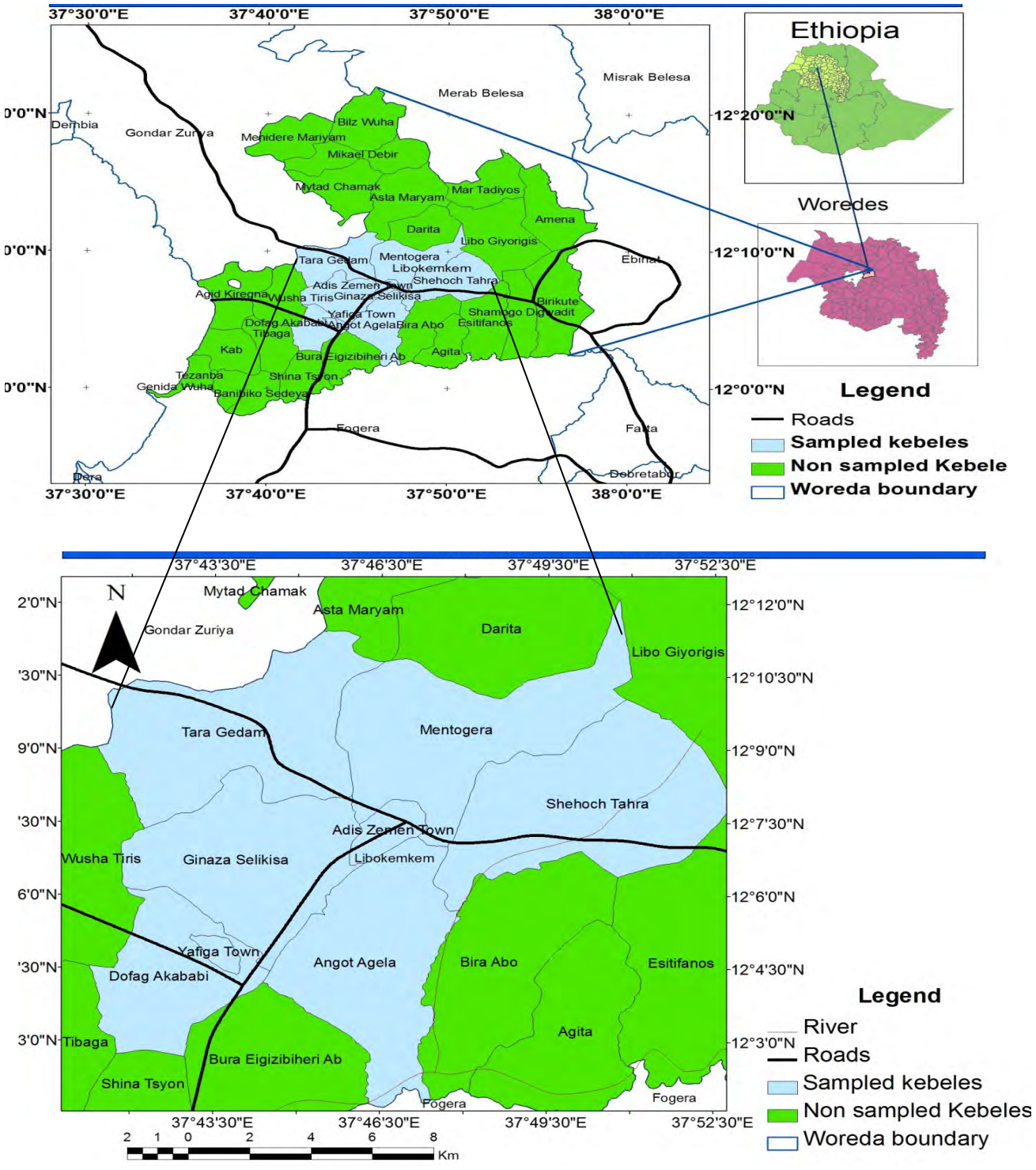

Fig. 1. Map of the study area

Table 1..Data collection sites in and around Tara Gedam and Amba forests

Town	Addis Zemen= 1938 m					
Nearby villages	Kualla Yihuans 2224 m	Kidanemhret =2226 m	Tibabosgie =2062 m	Washa-indiras =2480 m	Aguat-mafsesha =2541 m	Mantogera =2011 m
Distant villages	Abay =1991 m	Asiba mariam =2275 m	Yifag Akababi =1900 m	Lomiye =2011 m	Abuarra =1860 m	Agamoch =1995 m

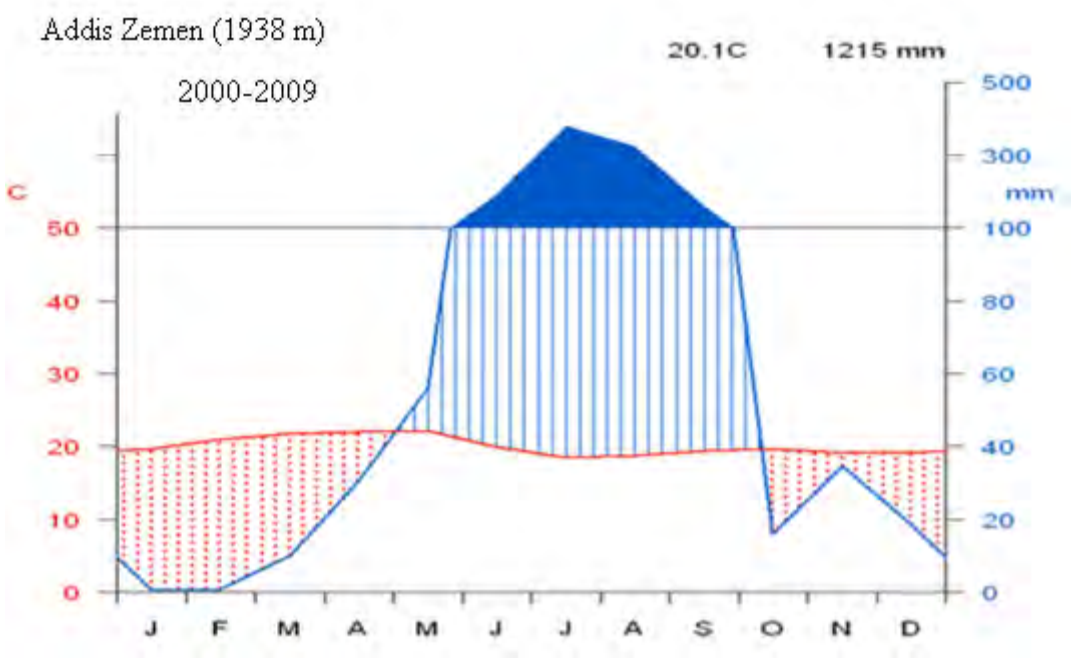

Fig. 2. Climatic diagram showing mean annual tempreture and rainfall from 2000-2009

Data source : National Metrological Services Agency, 2011

3.2 Soil, Land Use, Wildlife (fauna) and Vegetation Sources

The soils are mostly shallow and sandy and are characterized by low organic matter. The fertility of the area had deteriorated as a result of erosion and continuous cultivation. According to the Wereda Agricultural Office Report (LKWAO, 2010), 37,654.825 hectares of land the wereda is suitable for ploughing, 13,601.36 hectares is suitable for grazing, 4,429.5 hectare is forest land and 39,459.561 hectares are covered by other land systems.

The area around Addis Zemen was covered by continuous vegetation until recently. However, the vegetation in the area has been greatly destroyed by human activities, particularly agricultural expansion, excessive exploitation for products, and human settlements. The depletion of the vegetation has been very rapid and the area is now been left with remnant small patches of forests, bushlands and shrublands. According to Zerihun Woldu (1999), and Taye Bekele *et al., (*2001), these forests are included under dry evergreen montane and grassland vegetation type. The vegetation consists of forests, bushlands, shrublands and enrichment plantation interspersed with stands of natural vegetation. There is dense natural forest around the monastery and churches. These are consisting of different trees and shrubs inter spersed with climbers and herbs. According to Taye Bekele *et al*. (2001), the upper canopy of these forests is dominated by *Olea europaea* subsp.*cuspidata, Albizia schimperiana, Schefflera abyssinica, Croton macrostachyus, Acacia negrii Appodytes dimidiata, Dombeya torrida,* and *Ekebergia capensis*. Smaller trees in this forest included *Nuxia congesta* and *Schrebera alata.* The shrub layer was dominated by *Vernonia amygdalina, Calpurnia aurea, Carissa spinarum, Dovyalis abyssinica, Bersama abyssinica, Rhus glutinosa, Maytenus gracilipes, Clausena anisata, Osyris quadripartita, Maesa lanceolata* and *Myrsine africana.*

The area around Addis Zemen is gently poor in wildlife due to pronounced deforestation and high human interference. Tara Gedam and Amba forests are habitats for apes, monkeys, bushbuck, klipspringer, antelope, wild pig, common fox, leopard, hyena, serval, mangoose, genet cat, caracal, rock hyrax, rabbit, porcupine and various types of birds **(**LWCT, 2010). While due to various human activities such as collection of forest products particularly firewood, construction materials and timber for domestic consumption, forage for animals, beehive construction, income generation through selling as well as continuous predation and disturbance by local people led to the gradual decline of the vegetation and wildlife in the forest (LKWAO, 2010; Taye Bekele *et al.*, 2001).

3.3 Hydrology and Scenic Value of the Study Area

There are 95 rivers, 227 ponds, 59 springs and 94 other water sources in the wereda. Among these water resources, Shini and Arno are the major rivers nearest to the study forests. Most of their water sources and tributaries are obtained from this highland forest and they play great role in the cultivation of different crops, vegetables and fruits via irrigation. Consequently, a total 14649

hectares of land cultivated of with irrigation and most of this are found within the studied kebeles of the wereda (LKWAO, 2010).

Libo Kemkem Wereda in particular Tara Gedam has enormous potential as tourist attraction center. There are several recreational opportunities for tourists including Mt. Kualla, along with diverse geographical features of the forest and Tara Gedam Monastery and churches. In addition, ancient rthodox churches in the cave namely Washa Endiras, Woina-Washa as well as Lalibela's ancient churches namely Goza-Egiziaber, Yekahi-Mariam, Woin-Anba, and Dara-Giorgis are the main scenic and tourion attractive areas. Especially, the early human fossil in Washa-Endiras ancient church has been used for a long time as archaeological studies and tourist attraction **(**LWCT, 2010).

3.4 Demography, Socio-economic Background, Education and Health

The economies of the local people are predominately based on subsistence cultivation of crops and livestock husbandry. Livestock production includes cattle, chicken, sheep, goat, horse and donkey. According to the information from LKWAO (2010), there are 115,453 cattle, 36,448 goats, 17,939 sheep, 371 horses, 461 muels; 1,220 donkeys; 75,972 hens and 10,337 bee hieves in the wereda. Rain-fed subsistence farming of crops such as maize, fingure millet, teff, sorghum, bean and pea as well as irrigated paddy rice cultivation along the Ribb River remain the principal agricultural activities despite, poor soil fertility and highly variable rainfall in most areas of the wereda (Tegegne Mekonen, 2009).

The 2007 census report of the Central Statistical Agency (CSA, 2007) of Ethiopia, the wereda has an estimated total population size of 209,451, of which 106,564 are males and 102,887 females. About 25,011of the populations are urban residents and the remaining 184,440 are rular. The ethnicity of the wereda population belongs largely to the Amhara who speak the Amharic language. The majority of the people are Orthodox Christians and few are Muslims.

According to LKWEO (2010), there are 46 first cycle school (1-4), 22 elementary schools (5-8) and two secondary schools (9-10), one preparatory and technical and vocational education schools in the wereda. There are eight governmental clinics and forty one posts and nineteen private clinics in the wereda (LKWHO, 2010). Among the first top twenty diseases in the wereda are malaria, intestinal

helminithiasis, and pneumonia making the top three diseases (Appendix 5)**.** The major livestock ailments include pasteurllosis (ovine & bovine), anthrax, internal and external parasites, black leg, shop pox, trypanosomiasis, resparatory tract infection, rabies and coccidiosis (LKWAHO, 2010).

3.5 A Summary of Information about the Informants in the Study Area

Age group, gender, marital and educational status of informants

One hundred six Informants in the study area were represented in three age groups. They include the young (19-34), the middle age (35-50) and the elders (51-85). The highest numbers of informants were obtained in the age group between 51-85 (Table 2). About 51 of the total informants those who could not read and write, whereas the least number of informants were found in higher level of education (grade 11 and above) (Table 3). Most of the interviewed informants were married (Table 4).

Table 2. Summary of informant characterstics

Age group (in yrs)	**Number & Gender of informants**		**Total**
	Male	Female	
19-34	22	6	28
34-50	25	6	31
51-85	39	8	47
Total	86	20	106

Table 3. Summary of educational status of Respondents

Educational status		**Sex**		
		Male	Female	Total
Uneducated/ illutrate		37	14	51
Modern education	1-4	18	4	22
	5-8	6	1	7
	9-10	5	1	6
	11 -above	3	0	3
Religious education		17	0	17
Total		86	20	106

Table 4. Marital status of informants

Martal status	**Sex**		**Total**	**Religious**	**Sex**		**Total**
	Male	Female			Male	Female	
Single	9	8	17	Orthodox	83	19	103
Married	77	12	89	Muslim	3	1	4
Total	86	20	106	Total	86	20	106

4. MATERIAL AND METHODS

4.1 Materials

Plant press, plastic bag, note books, GPS and digital video photo camera were the materials used in the field study.

4.2 Methods

4.2.1 Site selection

Reconnaissance survey of the study area was done from November 2-15, 2010. Following Martin (1995), basic information was collected from Libo Kemkem wereda offices, leaders and members of traditional medicinal association, leaders of kebele administration, forest scout (forest guards), religious leaders and local people before conducting field study. This gave a general impression to identify the study sites. Following this, a total of 13 study sites were selected for data collection around Tara Gedam and Amba Forests based on relative distance and interaction of the community with the forests as well as, relative altitudinal differences. These study sites are; Addis Zemen Town, six surrounding and six relative far local villages in relatively distant rural villages. The names of the rural local villages are listed in Table 1(page 17).

4.2.2 Informant selection

After selection the study sites, a total of 106 informants (86 male and 20 female) aged of 19 to 84 were selected**.** A total of seven informants were selected from each study village. The minimum of 3-4 key informants were systematically selected from each study sites by using information and recommendations from the healers' association leader, Libo-Kemkem Wereda officials, local kebele administrators and kebele agricultural officials, forest scouts, knowledgeable elders and religious leaders as well as the local community. Accordingly, 45 key informants (42 males and three females) with age of 19 to 82 were selected. The remaining informants were selected randomly using lottery methods by using the lists of the inhabitants from the kebele administration. In addition, identified traditional practitioners were invited to suggest other traditional practitioners. The traditional association leaders, kebele security members, forest scouts and kebele agricultural officials facilitated and guided the process and served as key informants during field study. However, despite the effort only few women could take part in the study. This is due to the fact that

there were very few women practitioners. This is due to lack of permission from their family, husband or other socio-cultural reasons, which they refrain from describing.

4.2.3 Ethnobotanical data collection

Ethnobotanical data were collected between Novemenber-Juanuary, 2010, following the method by Martin (1995), Cotton (1996) and Cunningham (2001). Accordingly, semi-structure interview, guided field walk and group discussions and market survey with key informants were applied to obtain IK of the local people on medicinal and wild foods plants. All of the interviews were held based on check list of questions (Appendix 7) prepared before hand in English language and translated into Amharic, the language of the inhabitants. Following this, interviews and discussions were carried out with informants and key informants. In addition, the discussion were also covered the relevant issues raised about medicinal and wild food plants during the time. Informant consensus was considered and both quantitative and qualitative data were collected following the questions (Appendices 1 & 3). The place and time for discussion were settled on the interest of the informants.

4.2.3.1 Field observation/ guided field walk

During guided field walk, the interview was conducted, while walking through the study sites to collect the data on medicinal and wild food plants. Accordingly, a number of field observations were performed with the help of guidance and interviewed informants to collect plant specimens. Full notes about the mode of collection, land forms, soil type, the nature of human activities and major threats, altitude and grid reference using Geographical Positioning System (GPS), habit and habitat were recorded on site. Some of informants, study sites especially conservation and deforested areas and plant species were photographed in order to document ethnobotanical information. Most field observation applied only with single informant. This is due to most informants were disliked in the field with other third person in order to keep their knowledge a top-secret. Voucher specimen collection by this method was conducted both in the wild and in homegardens of the study areas (Appendix 1).

Fig. 3 Systematic field data collection with informants in different land types

4.2.3.2 Group discussion

Brief group discussions were made prior and during ethnobotanical data collection according to Martin (1995). These were done with traditional medicine association members, other local healers and knowledgeable members of the local people on specified time in each site. At the end of interview the contribution of each informant was appreciated, indicating the value of their knowledge in health care and biodiversity conservation.

Fig. 4 Group discussion with local community and association of healers

4.2.3.3 Informant consensus/ medicinal and wild food plant use reports

The informant consensus was done to confirm the validity and reliability of information given by the informants on the same topic. This was performed by contacted the informants more than twice. As result, if the responses of an informant were not in harmony with the original one, the information was rejected as it was unreliable. Only the response of an informant that is in harmony with each other was taken as relevant and used for data analysis.

4.2.3.4 Informal interview with herbalists

Some key traditional healers, genuine herbalists that were well-known by the local community own traditional home pharmacies derived from plant remedies. Informants stated that they greatly respect the herbalists they and that pacients frequently visited them especially when modern medical services are not affordable to them and when they become inefficient to cure particular ailments. These healers were asked to show their work at their home and field. Consequently, the information obtained through discussion was carefully recorded (Figures 5). This helped the researcher to confirm the effectiveness of their knowledge on the preparation of remedies and to cure health problems.

A **B** **C** **D** **E** **F**

Fig. 5 Informal interview with informants

Description: A=is chefly knowledgeable healers, was given information about the prepared remedies in his home pharmacist; B=the healer is showed the cured informants in secreted maner; C&D are showed the way how remedies are prepared and pacients serviced in the healer's keep secret working house; E= are showed the way that the healer treated eye problems using *Achyranthes aspera* and F= the observation of the plant species, which was used from E in her homegarden on the same time

4.2.3.5 Market survey

Market surveys were done carefully and with greater care as well as confidentiality to record the varieties and amount of herbal drugs and wild foods sold in the market.the formant used for this application were listed from appendix 8.

4.3 Plant Specimen Collection and Identification

Based on ethnobotanical information provided by informants, collected voucher specimens during guided field walk were pressed, numbered and given vernacular names on each sheets and dried.

Most of the family identification was performed in the field, whereas the species identification was conducted at the National Herbarium of Addis Ababa University, Ethiopia. Most of identification process was conducted by using taxonomic keys in published volumes of the flora of Ethiopia and Eritrea by aid of taxonomists and few were identified by comparing with authentic specimens. Finally, specimens were labeled and deposited there.

4.4 Ethical Consideration

Special ethical considerations were taken from the begnning to the end of data collection. These special ethical considerations were taken based on the cultural view of the local communities in the study area. In view of these considerations, approaching of the informants was very systematic. By telling the fact and convincing each informant following his or her culture strictly. They were also informed that the objective of the research is not for commercial purposes but for academic reasons. This was confirmed by showing different official documents from Addis Ababa University and different conserned secter offices of the study wereda. Finally, most informants accepted the idea and came to reach an agreement.

4.5 Data Analysis

Data were analyzed following survey and analytical tools for ethnobotanical methods recommended by Martin (1995), Alexiades (1996) and Cotton (1996). Accordingly, ethnobotanical ranking and scoring methods such as preference and direct matrics ranking, as well as pair-wise comparison techniques were employed to test consistency of responses and to obtain more rigorous results. Informant consensus was also computed.

4.5.1 Preference ranking

In this study a total of four Preference ranking activites were carried out following Martin (1995). These were for the most preferred medicinal and wild food and for the most threatened medicinal and wild food plants according to the report of key the informant. Accordingly, seven randomly selected key informants were asked to rank six medicinal plants which are used for treatment of wound based on high frequency of report disease by informants with several alternative plants as well as six wild food plants based on informant's preference on taste of food parts. Similarly, seven randomly selected key informants were selected for the preference ranking exercise of six the most threatened medicinal and five wild food plants based on the report of their threatened condition by

informants. The values given for this application ranged from six (for the highest important and most threatened) to one (for least important and threatened). Finally, total score were identified and the rank of each species was stated by integer values. These helped to indicate the most effective medicinal plants for wound, the most preferred wild foods for the community and the most threatened plant species in both categories.

4.5.2 Paired comparison

It was applied to determine the most important plant species for abdominal pain based on the information perceived by the informants. Martin (1995) described that the number of pairs was calculated by the formula, n (n-1)/2, where n is the number of items. After identifying five plant species which have high use value to abdominal ache treatment by preference ranking, paired comparison was carried out after randomizing both sequences of the pairs and other with in each pair. The sequence of pairs was randomized by numbering the pairs from 1-10 in alphabetical order and pulling numbered slips out of that, while the order with in each pair was done by flipping a coin. If the orginal order of the species was maintained for head, but the order was switch around for tails.finally, the numbers were added for all respondents giving on over all scors which was ranked for the species.

4.5.3 Direct matrix ranking

Direct matrix ranking was carried out following the method of Martin (1995) and Cotton (1996). Based on the information gathered from the informants and collected ethnobotanical data, six most widly utilized multi-purpose plant species that are seven uses were selected and identified. Following this, seven key informants were selected randomly to carry out direct matrix ranking of six most important multi-purpose medicinal and wild food plants. Similarly five most threatening factors commonly reported by key informants during the study were applied following Cotton (1996). Seven key informants were selected for both applications and scores from five to one were given based on the effectiveness in use and and six to one given based on the degree of factors. The final total scores obtained from the sum of individual informant helped to show the use diversity of medicinal and wild food plants as well as to identify the main cause for threatened plant species.

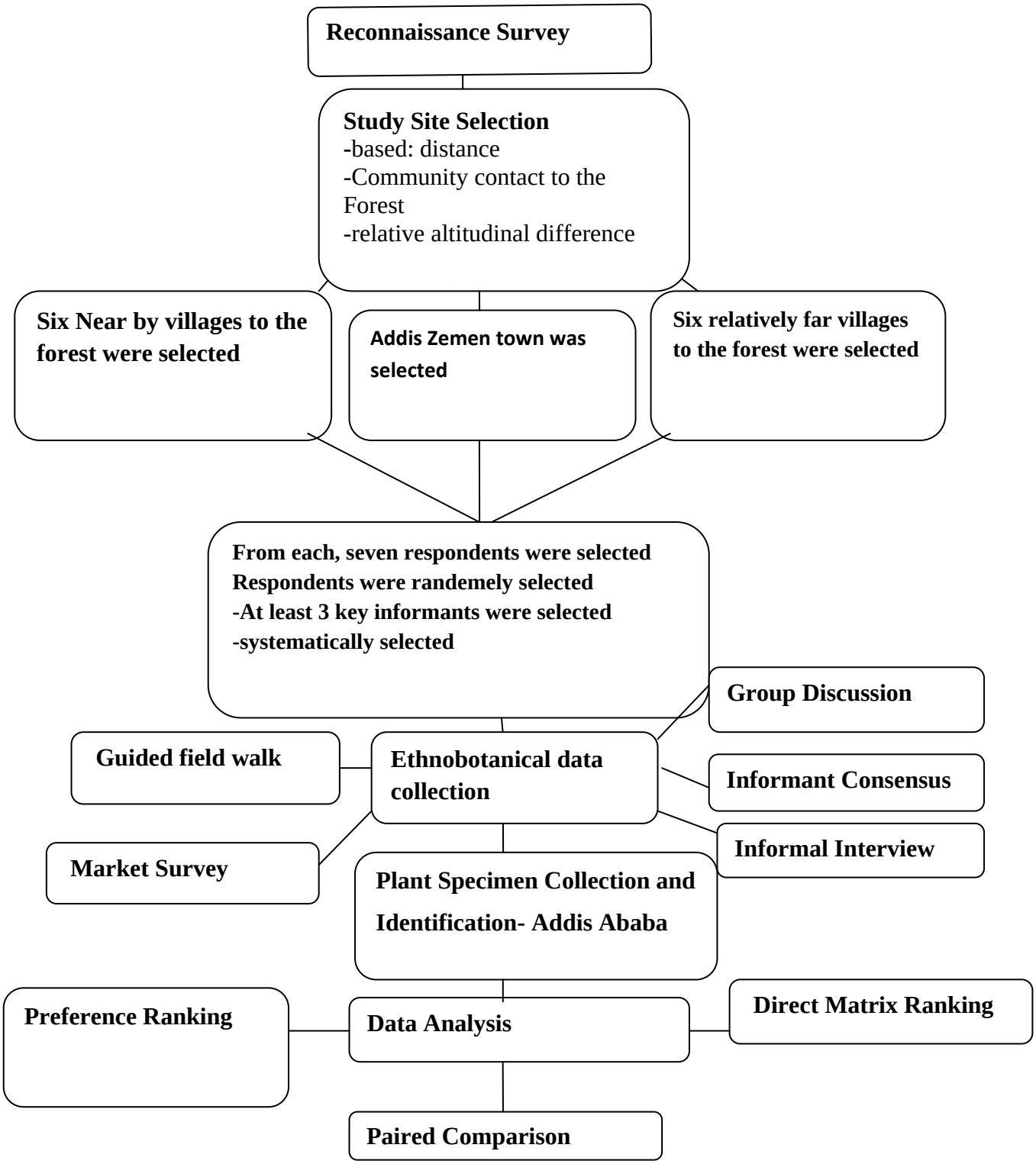

Fig. 6 Summary of the research design

5. RESULTS

5.1 Indeginous Knowledge of People on Landscape, Vegetation and Soil Classification in the Study Area

The results of the current study revealed that the inhabitants of the study area traditionally classified the land forms; vegetation and soil according to their long lasting accumulated IK (Table 5).

Table 5. Indigenous knowledge systems about landscape, soil and vegetation in the study area

Land scape		**Vegetation classification**		**Soil classification**	
Amharic	**English**	**Amharic**	**English**	**Amharic**	**English**
Wotageba	Up and douwn/ undulating	Kutquato	shrub	Keyatie	Red soil
Terrarama	Mauntaineous	Meda	Grass land	Walka	Black soil
Medama/mesk	Plain	Chaka	Forest	Serbola	Clay soil (red +balck)
Shelequama/ Godguada	Valley	Dene	Plantation	Chincha	Sandy soil
Korebta/ goba	Outcrop land	Chebecheb	Ever green gr ass	Borenk (white c olour)	Silt soil
Daget	Hilly				
Stony place	Sinkurkur				

5.2 Species of Useful Plants in the Study Area

In this study a total of 175 plant species were recorded that are used by the local communities as medicinal and wild food purposes (Table 6). These were distributed among 155 genera and 70 families. More than 95% of the medicinal and wild food plants were reported with their local names. There were also cases where two or three vernacular names were reported for a given plant by the informants in which cases the names were included in the main list (Appendix 1). Of the total collected and identified plant species, family Fabaceae contributed 15 (8.6%) species, followed by Asteraceae with 14 (8%) species and Solanaceae 12 (6.9) species. On the other hand, 39 families are contributed one species each and 22.3% of the total useful medicinal and wild food plant species in this study (Appendix 2).

Among the plant species recorded from this study, 69 (39.4%) were shrubs, 64 (36.6%) herbs, 25 (14.3%) trees, 15 (8.6%), climbers and 2 (1.1%) parasitics (Figure 7).

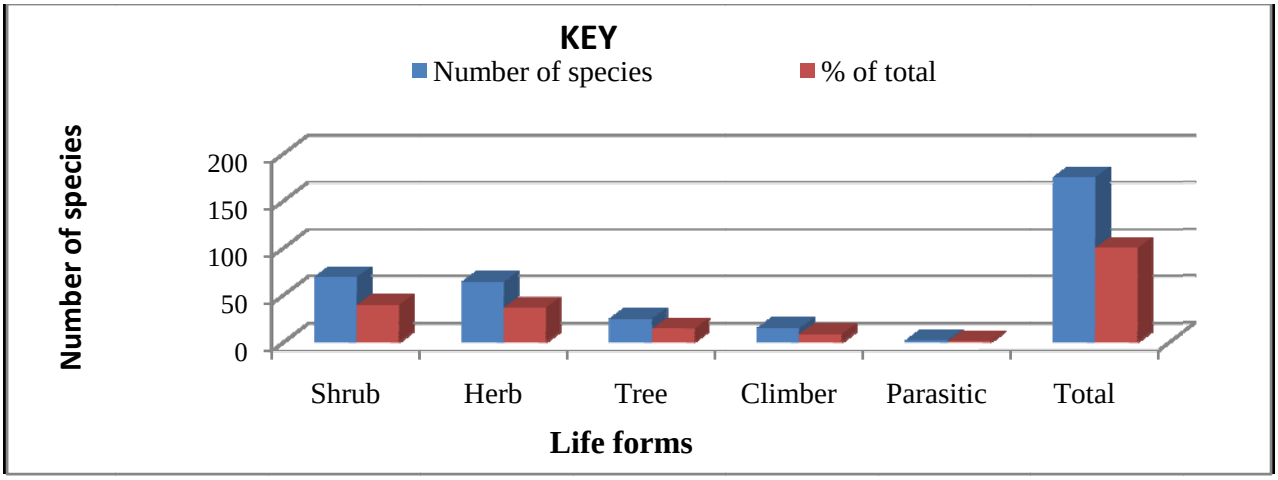

Fig. 7 Diversity of life forms of medicinal and wild food plants (% of total refers to total recorded plants or 175)

5.2.1 Ethnomedicinal plants used to treat human and livestock ailments

163 species of medicinal plant belonging to 145 genera and 67 families were identified from the study area (Table 6). Of these, 115 (70.6%), species represented by 103 genera and 54 families are reported as medicinal plants used to treat only human ailments, 14 (8.6%), species represented by 14 genera and 11 families are reported as medicine for livestock ailments only and 34 (20.9%) species represented by 32 genera and 22 families are reported for both human and livestoke ailments (Figure 8). These medicinal plants are used to treat about 60 types of human ailments only, nine types of animal ailments only and 10 types of both animals and human ailments (Figure 8). Family Asteraceae represented the highest number with 14 (8.6%) medicinal plants, followed by Fabaceae with 13 (8%) and Solanaceae 10 (6.1%) (Table 7).

Table 6. Source of Medicinal and Wild food Plants in the Study Area

Taxonomic rank	Total medicinal and Wild food plants reported	Plant uses catagories				
		Medicinal only	% of total	Wild food only	% of total	Both
Species	175	163	94.3	33	18.9	21
Genera	155	145	94.2	30	19.6	19
Families	70	67	95.7	25	35.7	19

Preference ranking of six most popular and widely used medicinal plants that were reported to treat wound indicated that *Cordia africana* ranked first followed by *Sida rhombifolia* (Table 8). Pair wise comparison of five most useful species used for stomach ache as perceived by seven key informants in the study area showed that *Stephania abyssinica* was the most reported and 1st ranked while, *Otostegia integrifolia* was the least ranked plant species (Table 9).

Table 7. List of medicinal plant families and their number of species with their percentage

Family	Number of species	Percentage (%)	Families	Number of species	Percentage (%)
Asteraceae	14	8.6	Oleaceae	3	1.8
Fabaceae	13	8	Poaceae	3	1.8
Solanaceae	10	6.1	Polygonaceae	3	1.8
Euphorbiaceae	8	4.9	Rhamnaceae	3	1.8
Lamiaceae	7	4.3	Apocynaceae	2	1.2
Malavaceae	6	3.7	Boraginaceae	2	1.2
Apiaceae	5	3.1	Cuppressaceae	2	1.2
Acanthaceae	4	2.5	Loganiaceae	2	1.2
Amarantaceae	4	2.5	Myrsinaceae	2	1.2
Asclepiadaceae	4	2.5	Myrtaceae	2	1.2
Cucurbitaceae	4	2.5	Ranunculaceae	2	1.2
Rubiaceae	4	2.5	Rosaceae	2	1.2
Rutaceae	4	2.5	Scrophulariaceae	2	1.2
Convolvulaceae	3	1.8	Urticaceae	2	1.2
Moraceae	3	1.8	The rest 38 families	1	0.6

Table 8. Results of simple preference ranking for six MPTS against wound

Plant species	Respondents								
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	Total	Rank
Brucea antidysenterica	5	5	1	4	6	5	3	29	3rd
Cordia africana	6	6	5	5	5	6	6	39	1st
Dodonaea angustifolia	3	2	6	1	4	3	1	20	4th
Ficus carica	2	1	3	3	1	2	2	14	6th
Plantago lanceolata	1	3	2	2	2	1	4	15	5th
Sida rhombifolia	4	4	4	6	3	4	5	30	2nd

Table 9. Results of paired comparison on five MPLT against stomach ache

Medicinal plant species	Respondents								
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	Total	Rank
Cucumis ficifolius	1	2	1	2	2	2	1	11	4th
Indigofera prieureana	2	2	3	2	3	3	2	17	2nd
Otostegia integrifolia	0	1	0	2	1	1	3	8	5th
Stephania abyssinica	4	4	4	4	1	3	2	22	1st
Verbascum sinaiticum	3	1	2	0	3	1	2	12	3rd

The agreement of people on the medicinal value of each species was tested by calculating informant's consensus factor value (Table 10). The medicinal plant use reports obtained during the study indicated that six medicinal plants are cited by more than 20 informants. These six top medicinal plants that have relatively higher percentages of informants' consensus were selected for further analysis (Table 10). Accordingly, *Zehneria scabra and Stephania abyssinica* were the most cited by informants respectively, while *Achyranthes aspera* is the least among the six top cited species (Table 10).

Table 10. The top six selected medicinal plants according to informant's citation

Scientific name	Total number of citation	Percentage (%)	Rank
Zehneria scabra	60	56.6	1st
Stephania abyssinica	55	51.9	2nd
Otostegia integrifolia	40	37.7	3rd
Verbascum sinaiticum	32	30.2	4th
Capparis tomentosa	27	25.5	5th
Achyranthes aspera	25	23.6	6th

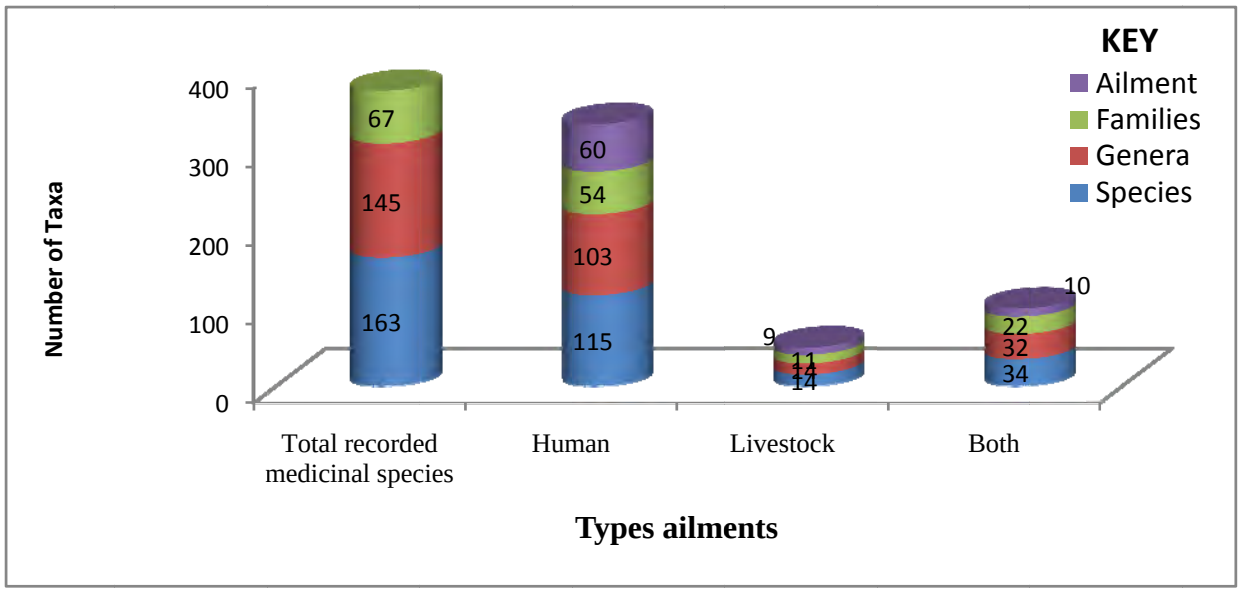

Fig. 8 The result of medicinal plants and their uses in the treatment of ailments

Habits, parts used and mode of preparation

Among 163 species medicinal plants recorded from the study area the highest were shrubs, which accounted for 62 (38.0%). The least, which accounted for 2(2.5%) is parasitic (Figure 9). The present study indicated that for about 110 (31.7%) species the parts used are leaves, for followed by root 108 (31.1%) and fruit 25 (7.2%) respectively (Table 11). The mode of preparation of these medicinal pants included plants crushed, chewed, pounded, chopped and juice form (Table 12).

Table 11. Frequency of plant parts used for the preparation of remedies

Plant parts used	Number of preparation	Percentage (%)
Leaf	110	31.7
Root	108	31.1
Fruit	25	7.2
Bark	15	4.3
Shoot	14	4.0
Latex	13	3.7
Seed	7	2.0
Stem	6	1.7
Bulb	5	1.4
Flower	4	1.2
Sap	1	0.3
Gum	1	0.3
All parts	10	2.9
Two parts	23	6.6
Three parts	5	1.4
Total	347	100

Table 12. Mode of preparation of medicinal plants

Types of Preparation	Number of Plant preparation	Percentages (%)
Crushed	118	36.6
Crushed and powdered	46	14.3
Boiled, heated, burnt & fumigated	29	9
Chewed, spit & absorb solution	23	7.1
Unproccessed	23	7.1
Pounded	23	7.1
Rubbed & sequeezed	16	5
Ground	13	4
Fluid/juice	9	2.8
Chopped	5	1.6
Rubbed	5	1.6
Poudered	4	1.2
Squeezed	3	0.9
Others	5	1.6
Total	322	100

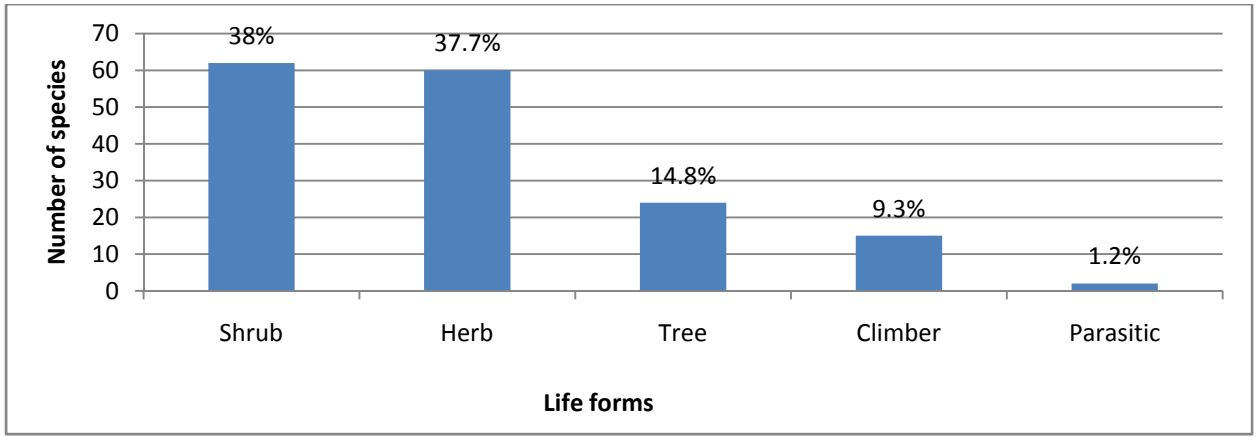

Fig. 9 Diversity of life forms of medicinal plants

Condition of preparation, route of administration and dosage of medicinal plants

They are prepared fresh, dry, mixed with water and other ingredients or alone. According to the study results, 58.9% of the medicinal plants are prepared as fresh forms, which is the highest number of preparation (Figure 10). It was found that the local people employed about 10 ways of administration routes with different frequency of usage in the community (Table 13). Of the total, 157 (44.9%) and 132 (37.7%) prescriptions were mainly taken orally and through dermal application, respectively (Table 13).

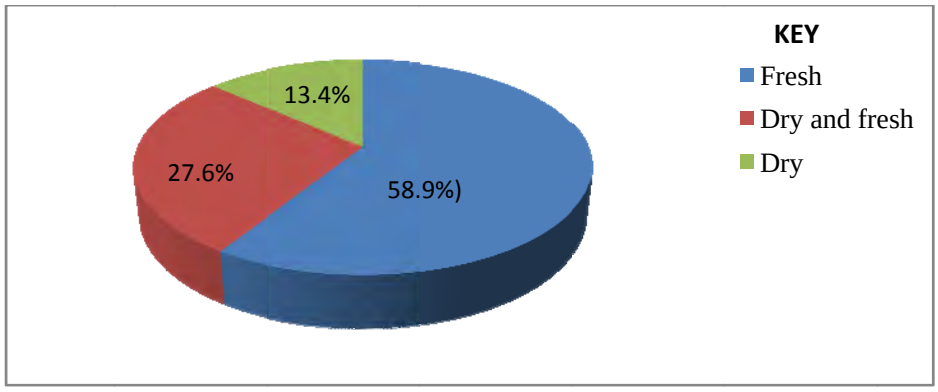

Fig. 10 Preparation condition of the medicinal plants

Table 13. Mode of administration of the plant remidies

Mode of administration	Number of medicinal plant parts preparation	% of total
Oral	157	44.9
Dermal	132	37.7
Dermal, nasal& oral	17	4.9
Dermal & oral	14	4.0
Optical	11	3.1
Nasal	9	2.6
Ear	6	1.7
Vaginal	2	0.6
Dermal & nasal	1	0.3
Nasal & ear	1	0.3
Total 10	350	100

The dosage varies between age and the capacity of the patients as judged by the healers. The local people of the study area adopted different traditional ways of determining dosage namely ATIK (referring to finger stribs/lines mostly small finger), TIFIR (referring to finger nail), FINJAL (referring to coffee cup) BIRCHIKO (referring to glass mostly tea glass), TASSA (referring to can), MANKIA (referring to spoon) and FAGA (referring to a container made of a small of bottle gourd fruit (*Lagenaria siceraria*) as well as the number, size and dropletes of plant parts are used to determine dosage.

Substances like water, milk, butter, honey, tea, coffee were mixed with the plant parts during the preparation of the remedices. Among these, coffee and milk are used as anticode for the patient when the patient uses remedies prepared from *Euphorbia abyssinica,* for malaria, and *Calpurnia aurea* for diarrhea and anesthesia application as well as, local beer (tella) when *Asparagus africanus*

is used for treatment of impotency. Some of the prepared and stored remedies were available for about one year i.e it used upto spetember one (new year (KIDUS YIHUANIES)) and new preparation is needed for next year. As well, the stored remedies would be buried (put under ground) for one day (still the holiday KIDUS YIHUANIS passes) then they continue the usage. The measurements used to determine the dosages are not standardized and doses given depend on the age, physical appearances and health conditions. Though such prescription difference was practiced, still the amount prescribed by healers for both children and adults might not conform to the standard prescriptions as in modern medical literature.

Most of the traditional knowledge of medicinal plants is passed along the family line from parents and other intimate family members based on matured thinking ability and applicability of the knowledge in practice (EJU YEMISEMRLET). This means localy the knowledgeable person choosen two or three family members and gave them equal information for the first time, But the knowledge continuously given the one who practiced the information in to application well.

5.2.2 Wild food plants

A total of 33 plant species distributed in 30 genera and 25 families. This accounted 19.6% species, 18.9% genera and 35.7% families of the total recorded plant species, genera and families in this study (Table 14). A highest number of wild food plants are reported in the families Fabaceae, Moraceae, Solanaceae, three species (9.1%) of each followed by Polygonaceae and Rosaceae, two species (6.1%) of each.The remaining 20 families contributed one species (3% percents) each. This study indicated that 48.5% of the total wild food plants are shrubs and the rest are trees, herbs and climbers (Figure 10). This study also showed that, 23 (69.7%) of the edible plant parts was fruit and the rests were listed in Table 14, what 31 (93.9%) of these edible plant parts are eaten as raw and very few are eaten as cooked without any further processing by local communities (Table 14). The preference ranking of six most important wild food plants indicated that *Cordia africana* scored the highest and ranked first followed by *Mimusops kummel* (Table 15).

Table 14. Plant parts used and mode of consumption of wild food plants

Plant part(s) used	Number wild food plant parts used	Percentage (%)	Mode of consuption	Number of consuption	Percentage (%)
Fruit	23	69.7	Raw	31	93.9
Gum	3	9.1	Cooked	1	3
Young stem	3	9.1	Rubbed	1	3
Fruit &gum	1	3			
Tuber	1	3			
Flower juice	1	3			
All parts	1	3			
Total	33	100		33	100

Table 15. Results of preference ranking on six most popular selected wild food plants based on their taste quality as perceived by respondents in the study area (6=most, 1=least preferred)

Wild food plants	Respondents								
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	Total	Rank
Mimusops kummel	6	3	6	3	5	3	2	28	2nd
Rosa abyssinica	3	5	4	1	3	2	3	21	4th
Cordia africana	5	4	5	5	6	6	5	36	1st
Syzygium guineense	4	1	3	6	4	5	4	27	3th
Ximenia americana	1	2	2	4	1	1	6	17	6th
Ficus sur	2	6	1	2	2	4	1	18	5th

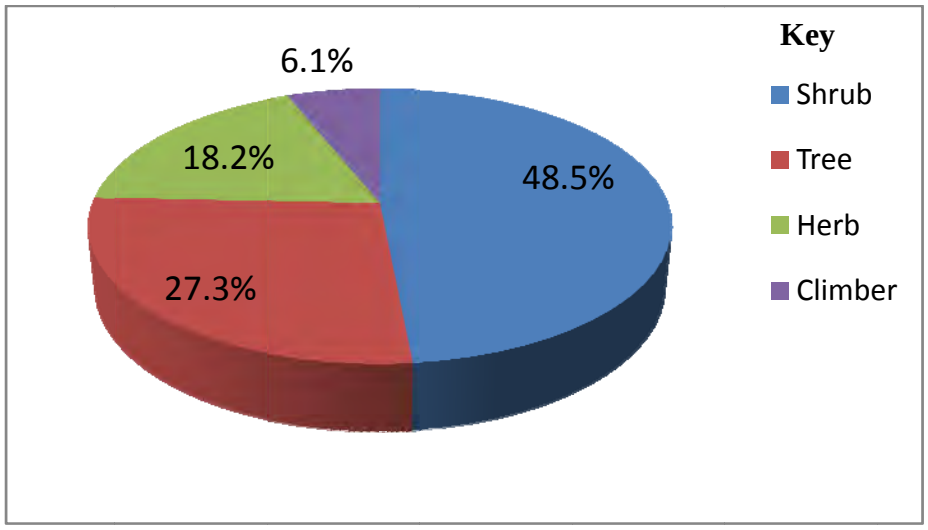

Fig. 11 Diversity of life forms of wild food plants

5.2.3 Nutraceutical plant species

Among the total medicinal and wild food plants recorded in this study, 21 species (63.6%) serve the local community both as sources of food and traditional medicine (nutraceutical plants). they accounted for 19 genera and 19 families. The nutraceutical plants recorded in this study are given in Appendix 1 and 4 along with medicinal and wild food plants.

5.3 Marketed Medicinal and Wild Food Plants

The local market surveys were conducted within two towns near the study sites namely Addis Zemen and Yifag to document the medicinal and wild food plants sold in local markets. However, there were no medicinal plants that are sold in the market legally. During the interview, the respondents explained that most healers prepared and sold TMPs in the home rather than selling in the market. They simply made a big notice that shows different kinds of diseases in front of their home. In any case, some medicinal plants were marketed, but only for other use values like for spices, food and fumigation (Figure 12). While among the reported wild food plant species only *Mimusops kummel* was availabled in the market. But, during the interview, the seller stated that the source of collection of it was as around Bair Dar (Figure 12).

Fig. 12 Market survey in Addis Zemen and Yifag Towns

6.4 Medicinal and Wild Food Plants and Their Multi-purpose Values in the Study Area

Direct matrix ranking of six most popular multi-purpose medicinal and wild food plants showed that *Cordia africana*, *Carissa spinarum* and *Olea europaea* subsp.*cuspidata* ranked 1st, 2nd and 3rd, respectively. In contrast, *Croton macrostachyus* was the least ranked (Table 16).

Table 16. Results of direct matrix ranking on six multi-purpose medicinal and wild food plants based on 7 key informants

(Use values given from 0 to: 5 = Excellent, 4 = Very good, 3 = Good, 2 = Less, 1 = least and 0= No use**)**

Plant species name	Medicine	Cash income	Feul wood	Food	Forage/ Foder	Constraction and building	Shade	Total	Rank
Carissa spinarum	5	4	5	4	4	2	1	25	2nd
Cordia africana	4	5	3	5	5	2	3	27	1st
Croton macrostachyus	4	1	2	0	1	2	5	15	6th
Ficus sur	2	3	2	5	4	2	5	23	4th
Mimusops kummel	2	4	1	5	2	2	5	21	5th
Olea europaea subsp. *cuspidata*	3	5	5	0	4	5	2	24	3rd

5.5 Variation of Indigenous Plant Knowledge

The number and uses of medicinal and wild food plant species that a given informant could list and report during semi-structured interview, guided fieldwork and individual discussion was used to determine if there was any difference in indgenous plant knowledge within and among the ages, informants respect to the forest and among the local kebeles in the study area.

Variation of indigenous plant knowledge with informant's ages

In the study area, three age groups were identified during data collection and compared their knowledge and experience in each interval with respect to the names of the plant species and their respective uses as medicinal and wild food purposes. Accordingly, the respondents whose age interval within the ranges of 50-84 years were reported 55.9%, 53.7%, and 47 % of the maximum in all three aspects of criteria respectively, while the age interval within the ranges of 19-34 years of old were the least reported and ranked (Figure 13).

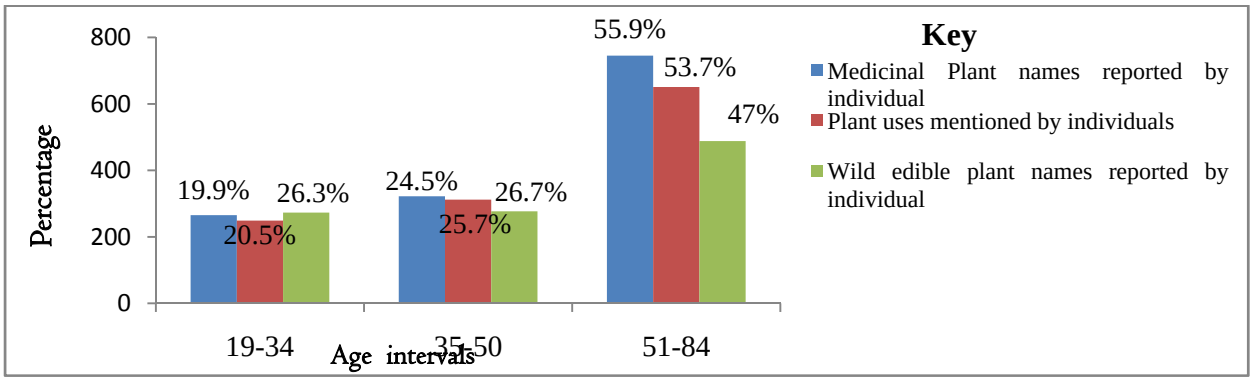

Fig. 13 Variation of medicinal and wild food plants knowledge among the age groups of informants

Variation of Ethnobotanical Knowledge of Informants Among the studied Local Villages

During the field study informants from 13 villages were sampled and the variation in their indigenous plant knowledge was assessed. Thus, informants from Washa (vicinity to Tara-Gedam Forest) village reported 17.3% and 15% medicinal plant names and uses, respectively, is the highest. 6.1% and 5.8 % medicinal and wild food plant names and their uses were reported by the informants from Yifag-Akababi, is the least in both respective criteria (Figure 14).

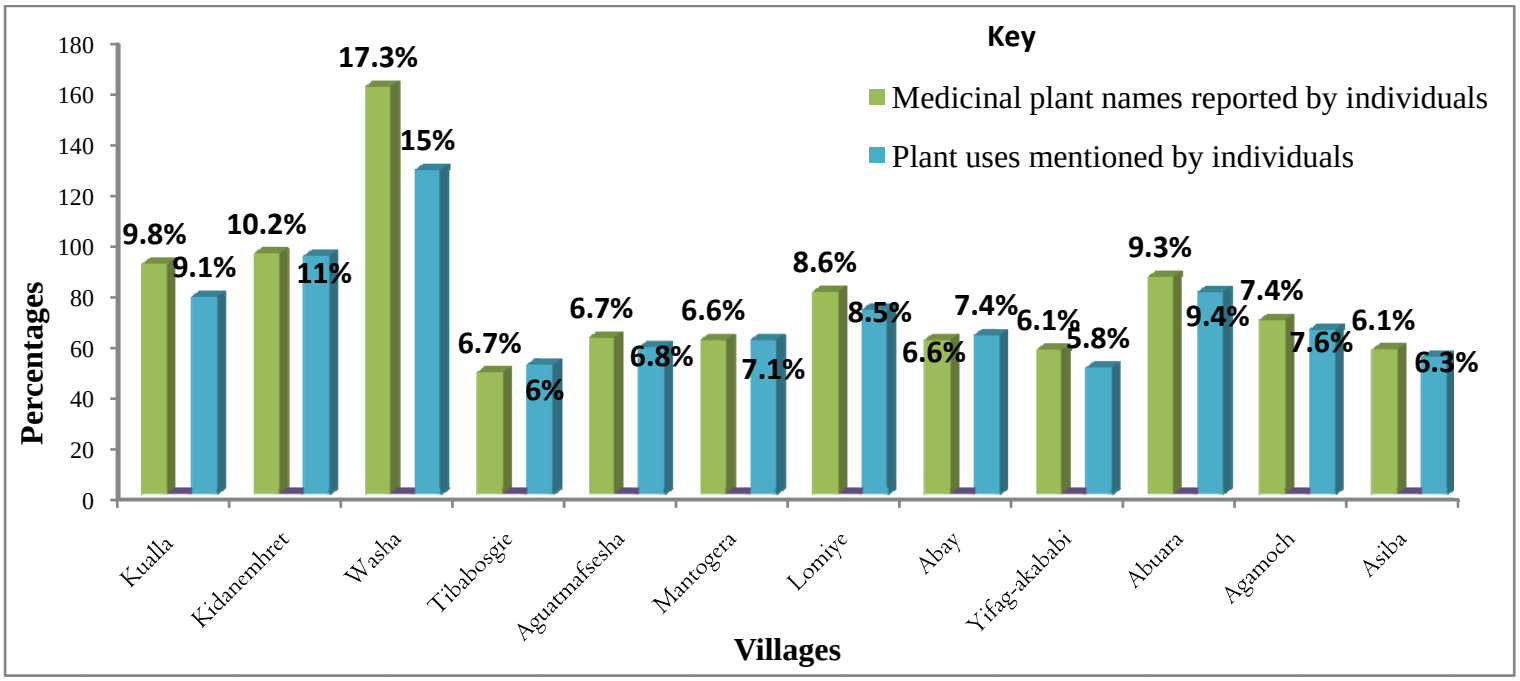

Fig. 14 The variation of medicinal plant knowledge among the local villages in the study area

Variation of indigenous plant knowledge between the Town dwellers and at varying distances from the forest

The result revealed that the nearest villages to the forests reported 38.9%, 38.5% and 50.1% number of medicinal plant species with their respective uses and of the total wild food plant species respectively and it is found to be the highest score. Meanwhile, relatively far away villager and the town were the second and third in all the three criteria (Figure 15).

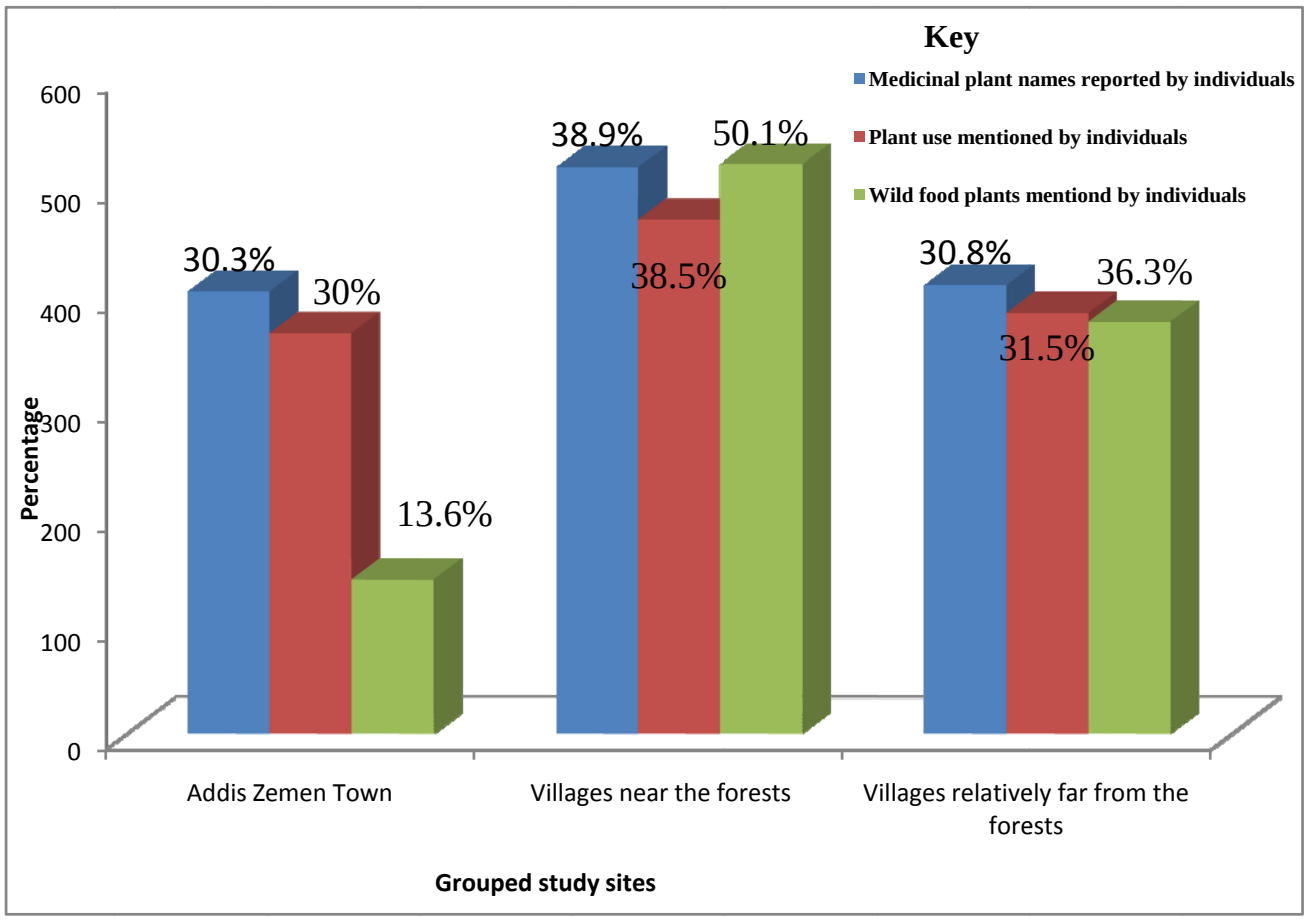

Fig. 15 Variation of indeginous knowledge among group of study sites

5.6 Distribution and Current Situations of Medicinal and Wild Food Plants

The medicinal and wild food plants in the study area are distributed in the wild, home garden and both home gardens and wild. The plant species in the wild are distributed in the forest, in and around farm land as weedsand live fense tree, roadside, around home, fallow land riverside. Accordingly, out of the 175 recorded plant species, about 124 (70.9%) of the species are obserbed to occur in the wild, 34 (19.4%) of the species obserbed to occur in the home garden and 17 (9.7%) in both home gardens and wild. Out of total recorded wild plant species, 56 (45.2%) are found from the Forests and 24 (19.4%) are from farm land. however, the least species were recorded from road side and all the wild habitats listed from this study (Figure 16). In addition, in this study, an open individual and group discussion was done concerning the current situation of wild food and medicinal plant species at time of field observation and group discussion with local informants and inhabitants in the study

area. Accordingly, the plants current situation and distribution were identified in the study area as 38.3% is rarely distributed, 37% is sparsely distributed and 2.9% is found particular area mostly in home gardens (Figure 17).

Similarly, the preference ranking of five most threatened medicinal plant species indicated that *Withania somnifera and Huernia macrocarpa* are the two conscotive most treating medicinal plant (Table 17). Likely, the ranking of the most treating six wild food plants species also indicated that *Rubus apetalus, Phoenix reclinata and Ximenia americana* are the 1st, 2nd and 3rd treating wild food plant species in the study area respectively (Table 18).

Table 17. Results of preference ranking of five most threatened medicinal plants (5=most treating, 1=least threatened)

Treating medicinal plant species	R E S P O N D E N T S								
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	Total	Rank
Cucumis ficifolius	4	1	4	1	2	2	3	17	3rd
Ficus carica	3	2	1	2	3	2	3	16	4th
Huernia macrocarpa	2	3	3	4	4	4	5	25	2nd
Solanum marginatum	1	2	2	3	1	3	2	14	5th
Withania somnifera	5	4	5	5	5	5	4	33	1st

Table 18. Result of preference ranking of five most treating wild edible plants 5=most treating, 1=least treating

Treating Wild food plant species	**R e s p o n d e n t s**								
	R_1	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**Total**	**Rank**
Embelia schimperi	1	6	4	5	1	3	4	24	3rd
Mimusops kummel	4	3	2	2	4	3	1	19	4th
Phoenix reclinata	6	1	5	4	6	5	5	32	2nd
Rosa abyssinica	2	2	3	1	2	2	3	15	6th
Rubus apetalus	5	4	6	6	5	4	6	36	1st
Ximenia americana	3	5	1	3	3	1	2	18	5th

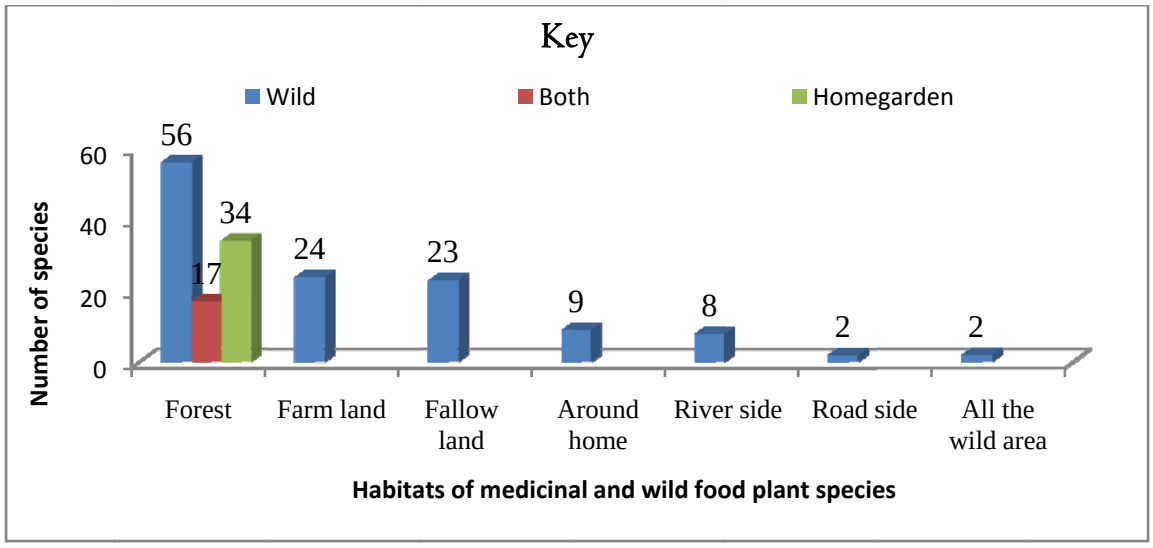

Fig. 16 Distribution of medicinal and wild food plants in the study area

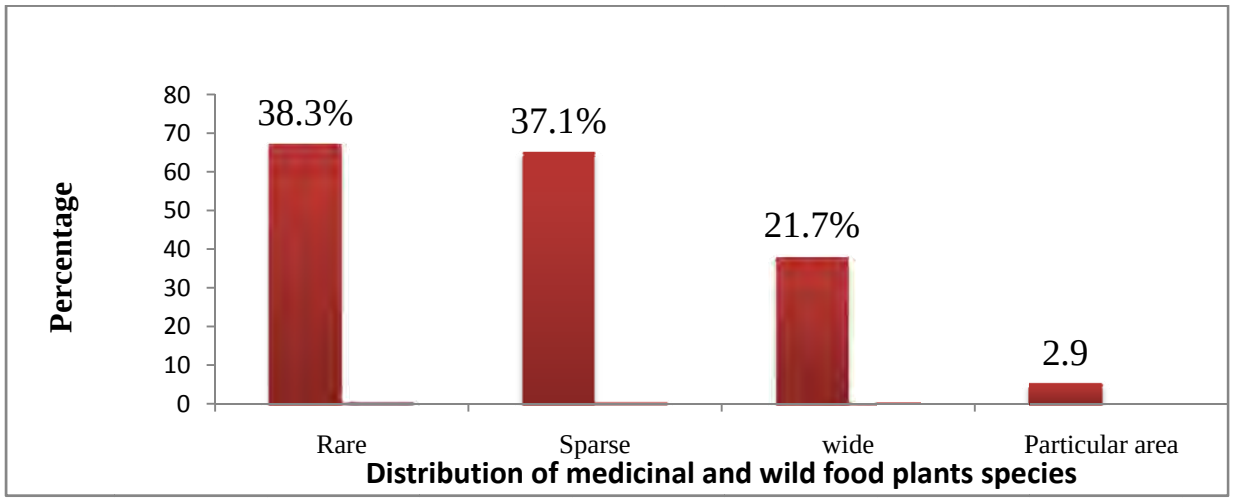

Fig. 17 Current condition of medicinal and wild food plant species

5.7 Problems and Conservation of Medicinal and Wild Food Plants and Associated Indeginous Knowledge

Local informants and elders in the Woreda claimed that long before the past ten to twenty years Tara Gedam and the surrounding area was full of natural vegetation around farm land, riverside and grazing land as well as wealth of plant species in number and diversity in the forest. Almost all the medicinal and wild food plants were easily accessible within appropriate time. Today, things are reversed and it is not an easy task to get medicinal and wild food plants in and around Tara Gedam and Amba forests. Besides, their situation is at an alarming rate aggravated by habitat modification.

Continuous cutting of trees for firewood and income generating via selling for the vicinity of Addis Zemen town and other major threats for such habitat modification of plants are identified during the course of the study (Table 19). Among the problems, most informants perceived that agricultural expansion (23 %) was considered the main threat to medicinal and wild food plants and relatively construction and building accounted for the least ones (9.1 %).

Concerning the conservation of medicinal and wild food plants there was no successfully available conservation efforts in the wereda. But, some of the medicinal and wild food plants are conserved for other values in governmental nursery and in the protected governmental and church forests. On the other hand, it was also observed that the local farmers make use of their indigenous knowledge in protecting important plants species on their farm lands, home gardens, or as life fence. In some cases, few traditional healers try to cultivate very rare species in their home gardens that cannot easily be found within areasonable time. The major problem associated with such conservation trails as claimed by the healers is the difficulty of cultivating species that cannot be propagated outside their natural habitats and the herbalists have to travel long distance for several hours to get the medicinal plants in need or to pay money for other people, who are living in the vicinity of the medicinal plants, to bring for them on appointed date. Concernig the wild food plants the informants reported that since less priority is given to them, there is less effort to conserve them in home gardens. The wereda administration is giving great priority to indigenous knowledge of the people by establishing association of traditione practitioners along with technical training and biodiversity conservation concepts. A good justification for the above scenario is the observation during field study in the area was the mutual exchange of knowledge and remedies at the time of monthly meetings.

Table 19. Direct matrix ranking results of seven respondents on six factors perceived as threats to medicinal and wild food plants (values: 1=least destructive, 6=most destructive)

Threating factor	**R e s p o n d e n t s**									
	R_1	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**Total**	**Percentage (%)**	**Rank**
Agriculture expanition	6	6	6	5	5	6	4	38	23	1st
Overgrazing	3	4	5	6	6	5	3	32	19.4	3rd
Drought	2	2	2	1	3	4	4	18	10.9	5th
Fuelwood collection	6	4	6	2	6	4	5	33	20	2nd
Collection of construction and building material	1	3	5	1	1	2	3	15	9.1	6th
Urbanization/Modernization	4	6	5	2	3	4	5	29	17.6	4th

6. DISCUSSION

6.1 Local Categories of Landscape, Vegetation and Soil and Associated Knowledge

Local people living in the study area have a long lasting experience of relationshinship and interaction with each other and with the natural resources that exist there. As well, they have well organised IK systems, which they use to classify vegetation based on habit, dominant tree species, and density of plant species as well as the location of plants that cover the land. Similarly, landscapes were classified based on their natural well being and land use systems. Soils were also classified based on colour, texture and suitability for crop cultivation. For example, 'Keyatie' is red soil with low fertility with finely course texture and poor for crop cultivation. While, Serbola (mixure of red and black soil), has high fertility and is good for crop cultivation according to the informants. 'Walka' is the black soil which is characterized with medium fertility and suitable for cultivation. Chincha has sandy soil character at most and is poor for cultivation of crops and it is generally designated as grazing place for animals. This is also indicated in similar studies elsewhere in Ethiopia (Zewdie Kassa, 2009, Tinsae Bahru, 2009; Moa Megersa, 2010). In addition**,** Emic classifications of the natural habitat are drawn from the way people perceive things through their own eyes and classify objects in their own language (Martin, 1995). Furthermore, Zemede Asfaw (2006) explained that, the people of Ethiopia are knowledgeable about the name and classification of their environment, plants in their surroundings, and their values for the local people, which they have gained orally from generation to generation. it was also observed that some of the names of landscapes, soils, vegetation and rivers are used as nomenclature of specific villages in the study area such as Kualla (standing straight) is given according to the long lasting standing rocky mountain, village Washa is given according to the long and remarkable historical cave which contains human remnant fossils. SHINIDIFA, ARNO and SILKISSA are named according to the rivers Shiniy, Arno and Silikissa respectively. This is also indicated by Martin (1995) as good way to start an ethnobotanical study is to understand how local people classified rivers, hills, valleys and other geographical feathers that dominant the landscapes.

6.2 Plant Species Used as Medicine and Wild Foods

The total number of plant species recorded as medicinal and wild food plant species indicated that the study area has substantial amount of IK about useful plants and diverse source of medicinal and

wild food plants (Table 6). The finding of the family Asteraceae and Fabaceae as the contributors of higher number of plant species of total recorded families might be the result of their diverse species distribution in nature in almost all ecological areas i.e. highlands, lowlands and middle lands of the study sites. These families are also known to have largest members of species in Ethiopia flora (Ethiopian flora volume 8). This accounts for the fact that familis Asteraceae and Fabaceae have a wealth of uses for community since long time ago. Similar finding was obserbed from Fisseha Mesfin *et al.* (2009) that, traditional concept about plants is tied up with use of plants. Among the recorded use categories namely, wild foods and medicinals, the larger number and diversity of plant species were those of medicinal uses. This might be related to the fact that less priority is given by the community to wild food plants than to medicinal.

6.2.1 Medicinal plant species used to treat human and livestock health problems

The number of reported medicinal plants and their uses by the local people of in and around the Taragedam and Amba forests indicate the depth of the local indigenous knowledge on medicinal plants and their applications. The collected IK on the medicinal plants revealed that the people of the the study area prevent different human and livestock ailments by using their surrounding natural vegetation untile presence times. But it showed that less number of livestock diseases and medicinal plants were reported compared with humans. This showed that, the people of the study area are more knowledgeable and give great attention about human ailments as compared to livestock diseases. This might be the presence of enough animal health centers, which might be causes for the gradual decline of IK systems in the area. In addition, local people of the study area found alternative medicines for their ailments first and then try to search for his livestock ailments. Similar finding were reported by Seyoum Getaneh (2009); Moa Megersa (2010).

The analysis indicated that the Family Astraceae has contributed the highest medicinal plant diversity followed by Fabaceae and Solanaceae. Finding of the family Fabaceae as the contributor of higher number of plant species used for medicinal purposes than other families is in line with similar studies elsewhere in Ethiopia (Abrha Tesfay, 2008; Haile Yineger *et al.*, 2008 and Seyoum Getaneh, 2009; and Behailu Etana, 2010).

The analysis of medicinal plants using preference ranking and paired comparison from Table 8 and 9 showed that *Cordia africana and Stephania abyssinica* are the most effective plants to cure wound and stomach ache respectively. Especially *Cordia africana* is reported for its different uses by informants. Hence, it is the most preferred plant by local people for various uses; it would be the most threatened species for future, which is evidently shown by its rarely distribution around the farm lands and some home gardens. This scarcity is due to over harvesting not only for medicinal, but also for other uses particularly for timber production. On the other hand, pair wise analysis showed that *Stephania abyssinica* is the most preferred and effective plant for the treatment of stomach ache. It is not the only effective plant for stomach ache, but also the most cited plant species for treatment of anthrax and other health problems (Appedix 3). All of the species particularly the top ranked ones by preference and pair wise needs special urgent conservation action and sustainable uses. In this regard the results agree with the findings of Behailu Etana (2010).

Habit, parts used and mode of preparation

The shrubs and herbes were the most harvested for medicinal purpose than other life forms recorded in the study area. This indicated that people rely more on shrubs and herbs because, they are relatively common in the area compared to other life forms. Even though herbs were found everywhere than shrubs, most of the times their existence are seasonal and water source based. That is why herbs were represented as the second highest life forms. On the other hand, a tree in one ecological area may exist as shrub in other ecological areas, largely based on ecology, habitat and conservation status of the area. The finding of shrubs as the contributor of higher number of plant species used for medicinal purposes than other life forms is inline with Mirutse Giday and Gobena Ameni (2003), Debela Hunde *et al.* (2004), Kebu Balemie *et al.* (2004), Fisseha Haile Yineger and Dilnesaw Yehuwalaw (2007) and Ermias Lulekal *et al.* (2008), Mesfin *et al.* (2009). In contrast the findings of Tizazu Gebre (2005), Mirutse Giday (2010) and on medicinal plants revealed that herbs were the most used ones.

From the results of the analysis indicated that leaves were the most commonly used plant parts for remedy preparations and this is consistent with Behailu Etana (2010). Meanwhile, it disagrees with the report of Endalew Amenu (2007) and Fisseha Mesfin *et al.* (2009), who found roots to be the most used parts. The preference of leaves than other plant parts could be due to ease of preparation,

the chemical constituents of leaf for the treatment of diseases and accessibility in the required time. Local communities in the study area make use of several methods of preparation for the harvested medicinal plants. Crushed plant material is reported by most informants. This is due to the ease of application. Most of the remedies are prepared as soon as the health problem occurrs using the available fresh forms. In such condition, crushed forms could be better at any place using stones at most. In addition, this could be most of the community members believed medicinal plant parts that crushed and immersed in water lead to extraction of active chemical substance easy and give immidiate response for their health problems. The highest report of crushed form was also stated in the work of Abrha Tesfay (2008).

On the other hand, some of the prepared remedies are taken with different additive substances (Appendix 3). These additives are added to minimize discomfort, improve the taste and reduce adverse effects such as, vomiting and diarrhea, and enhance the efficacy and healing conditions as explained by informants. Mixing and using some medicinal plants with common foods and drinks might be an easy way for effective treatment. Absence of any adverse effects of traditional medicines after administration were also more frequently mentioned by the traditional healers, but the traditional healers indicated that they use the antidotes for the adverse effects of remedies from *Calpurnia aurea* (for treatment of diarrhea and as anesthesia application at time of small surgery, wound treatment and bone fracture) and *Euphorbia abyssinica* (malaria). It might be used as dilution for over dose of the remedies.

The results showed that the majority of remedies were prepared from single plant species and few are prepared from combinations of more than two medicinal plants. The result is consistent with the findings of Etana Tolasa (2007) and Behailu Etana, (2010).

Condition of preparation, dosage and route of administration of medicinal plants

The results of the analysis about the condition of plant parts preparation showed that fresh dried and both fresh and dried forms are used in the preparation of the remedies. However, fresh form has highest prescription of all. This could be the result of the accessibility of medicinal plants near their home place without having to travel for long distance. The other reason is that most of the traditional medicine practitioners believed that fresh forms are the most effective for treatment of remedies than the dried forms. The last reason is that dried form is easily distorted and decayed as well as

culturally unacceptance when it lasts a long time in stored forms. As a result, preservation of remedies was reported by very few healers when the plants are seasonal or not ever green. This dependency on fresh materials has thrown the species to serious threat than use of dried forms, which can be stored for longer period of time. This finding is consistent with the finding of Endalew Amenu (2007).

The traditional healers use different measurements for dosage prescription. But, these measurements might not be accurate enough to determine the precise amount. Dawit Abebe (1986) has also discussed lack of precision and standardization as one drawback for the recognition of the traditional health care system. The association of healers and other some local community members reported about the effectiveness of traditional medicine, but there is fear about the amount taken particularly for human medicines, which are taken internally. In addition, they recommended that technical assistance and shycological support through training must be given to minimize the fear and effect of remedies dosage on patients.

6.2.2 Wild food plant species

The analysis results shown in Appendix 4 showed that Tara Gedam, Amba forestes and their surroundings were riched by wild food plants. This wild food species recorded in this study were edible in normal times as well as at times of food shortage so as to prevent starvation and sustain life during prolonged drought and social unrest. The part of one species, namely the root of *Coccinia abyssinica* is reported as consumed only during sever famine when preferred alternatives are not available.The role of wild food plants mainly during a unsustainable conditions were also explained by Cotton (1996), Cunningham (1996, 2001), Zemede Asfaw (1997) and Getachew Addis *et al*. (2005).

Shrubs, trees, herbs and climbers were found to be the sources of wild food plant species in this study. This indicated that the study area was riched with diversity of life forms due to long time protected forests. This led the community members to have accumulated IK on different life forms. This finding is similar with Hinnawi (2010). Meanwhile, fruits are the most important edible plant parts. This might be due to their taste they are, delicious and easily accessible and edible from the wild without any processing. As a result, fruits are important sources of essential vitamins and minerals for the communities in the study area. This agrees with Beyafers Tamene, (2000) and Tigist

Wondimu *et al.* (2006), where fruits were reported as the most utilized plant parts out of the total parts used. This study revealed that most of the recorded wild edible plant species or their parts are consumed as raw/fresh without further processing. Only one species is reported to be cooked before consumption. The high percentage of raw edibles may be due to not being given priority to collect and use the plant parts at their home compared with cultivated food plant products. This is due to the communities in the study area are dependent on subsistence agriculture with high production of cereal crops and the wild foods are consumed during starvation, when they are available. This is consistent with other findings including these of Kebu Balemie and Fassil Kebebew (2006**);** Tigist Wonidmu, *et al.* (2006); But, this is contrasted with the findings of Tilahun Teklehaymanot and Mirutse Giday (2010) studied in southern Ethiopia, who indicated that sixteen (41%) wild edible plants were used as vegetables by harvested their leaves,young twigs, upper parts (leaf and stem) Ali-Shtayeh *et al*. (2008) and Hinnawi (2010) in the abroad who indicated also that most of the edible plant part(s) were leaves which were consumed after cooking.

As stated in the results section very few wild food plants are sold in markets as sources of income generation. The justification of informants showed that, the limitation of marketable wild food plants were related to reduced accessibility of the sources due to of deforestation taking place from time to time. This was proved from the observation of markets and the discussion with merchants. in addition, the second reason reported by the informant is that wild food selling is culturally prohibited or considered shame by the family members, even children are not allowed to do so. The sources of the wild food found in the market were brought by young to medium aged group of female merchants who explained that they brought from other areas like Bahir Dar. A few numbers of wild foods sold in the market were also reported by other studies made in Ethiopia **(**Zemede Asfaw, 1997; Beyafers Tamene, 2000; Kebu Balemie and Fasil Kibebew, 2006**;** Tigist Wondimu *et al.* 2006**).**

Generally, most of the informants stated that the local people give less emphasis to wild edible plants, but highly over-harvested for different use purposes. Due to this reason, many wild edible plants are highly over-harvested for fuel wood, construction, medicine and agricultural land expansion and animal feed leading to habitat modification and deforestation. Due to these factors most of the wild edible plants were scarce. This was also pointed out by Beyafers Tamene (2000), Tigist Wondimu *et al.* (2006).

6.2.3 Nutraceuticeal plant species

Out of the total wild food plants collected, more than half numbers were nutraceutical plants. This indicated that absence of division in used between medicinal and food plants. In addition, it showed that the single species in role with more than one uses in the community. But, species involved in more than one use values may lead to threaten and especial attention could be given them. Stephen Defelice in 1989 (cited in Kalra, 2003) stated that nutraceutical was coined from nutrition and pharmaceutical. In addition, the definition of nutraceutical was summarized by Dillard and German, (2000) as any non-toxic food extract supplement that has scientifically proven health benefits for both disease treatment and prevention. Both some food and medicinal plants have interventional uses. Food can be used as medicine and vice versa (Tilahun Teklehaymanot and Mirutse Giday, 2010). Hinnawi (2010) additionally stated that certain wild edible plants are used because of their assumed health benefits and thus can be called medicinal foods. As a result, no clear dividing line between food and medicinal plants usually exists, especially in indigenous and local traditions (Etkin, 1994 cited in Hinnawi, 2010).

6.5 Species of Medicinal and Wild Food with High Conservation Value in the Study Area

The results of this study indicated that the recorded medicinal and wild food plant species have multiple uses. Thus, identification of such multi-purpose plant species in the study area is very crucial from the conservation and management point of view. This is because the most valued should be given priority in order to conserve and manage them before extinction takes them away (Cunningham, 2001). The results revealed that *Cordia africana*, *Olea europaea* subsp. *cuspidata* and *Carissa spinarum* are most popular multi-purpose plant species. They were relatively given the highest scores by informants. This means that these multi-purpose plant species have been used for the various major daily life activities of the local community to meet their basic needs. For example; *Cordia africana* is used as medicine and for cash income, fuel wood, food, forage/fodder and construction and building. Especially, *Cordia africana* is used to generate cash income through it use for timber production for furniture making. Similarly, *Olea europaea* subsp. *cuspidata* and *Carissa spinarum* are most preferred species as fuelwood in both rural and urban communities. Due to this reason, multi-purpose species are severely harvested for various purposes. Thus, the long-term survivals of the top-ranked species are underquestions, as the daily demand of the local society is

continuous with lesser rate of re-plantation. This is evidenced by the high rate of loss of *C. africana*, *O. europaea* subsp. *cuspidata* and *Carissa spinarum* in the area.

6.6 Variation of Indigenous Plant Knowledge

A progressively increasing result was obtained from analysis of IK variation in relation to the informant's age **(**Figure 13). This might be due to the fact elderly informants (51-85) have long lasting direct and regular contact with the forest and other natural plant resources. This helped them be more experienced and knowledgeable than the younger and medium aged informants. In contrast, the younger generation is more exposed to modern education and hence not interested in learning and practicing IK from their parents. Moreover, the current vegetation status difference within the study area is changed than before. This might affect assessment done by younger generations. Consequently, it could be affecting the continuity of IK from older to the younger generation of the future. Indigenous knowledge difference among the informants and aged informants were also stated with other studies including Cotton (1996), Debela Hunde *et al.* (2004), Kebu Balemie *et al.* (2004), Tizazu Gebre (2005),) Tilahun Teklehymanot *et al.* (2007) and Fisseha Mesfin *et al.* (2009). However, it is contrasted with Fentahun Mengistu and Herbert (2008), where children and youth are more knowledgeable than older people in case of wild food plant knowledge.

As the results showed from the data of Washa, Kualla, Kidanemret far more medicinal plant names with uses were recorded than other sites. In turn, informants from Washa village reported the highest plant names and uses, while, Yifag Akababi and Asiba are the least. This is because informants located far away from forests (like, Asiba, Agamoch and Yifag Akababi) tended to be familiar with relatively fewer species than those close to remnant forests (Washa, Kidanemret and Kualla). However, all community living nearby the forests were not given highest report compared with distant villages. For example, the village Tibabosgie is the nearest village to the forest, but the report from informants showed that relatively lower names and uses than the other villages found nearer to the forest (like Washa, Kualla, and Kidanemhret). This is because, the communities were more dependent on a few highly knowlegeable healers in and around their villages. On the other hand, Mantogera village is the other nearest village to the forest, but the result showed less than other nearby villages. This is because the village is nearby Addis Zemen Town and the local people have better access to modern medical systems than traditional, modernization has highly influenced them.

Further, Aguate-Mafsesha is the highest of all villages in terms of altitude (which is called locally Dega) and the population is concentrated within a specific compatible area and intensive cultivation is the norm. Here biodiversity is considerably reduced and the possibility of finding both medicinal and wild-food plants has been minimized. As a result, informants would be able to find only a few species to recall during interviewing. In general, the present study confirmed, variation exists in species preferences among sites, partly due to the wide array of ecological niches within short distances. This is in turn expected to bring about differences in IK among informants of different sites.Similar trends have been reported in studies conducted elsewhere in Ethiopia (Fentahun Mengistu and Herbert, 2008; Tinsae Bahiru, 2009).

On the other hand, other analysis was done on informants IK to see the indigenous knowledge differences dwellers in the town and rural community members in relation to forests. The result showed the existence of relative variation between town and local rural villages. But, it was not shown exaggerated IK variation between rural village groups in medicinal plant number and use knowledge. The reason for this is, the town is near the study forests, for the community and healers together and more accessible medicinal and wild food plant resources. Clear variation is observed between them in case of wild food plant knowledge (Figur 14). This might be related the fact that town consum less amount of wild foods. On the other hand, the highest IK is observed from the group living in villages located very close to the forest. In general, this study confirmed that plant resources are basic for the wealth of ethnobotanical plant knowledge. In addition, ethnobotanical knowledge is not limited to rural people, but also found in among in habitats of towns. Lack of correlation in the IPK between accessible villages relates to different level of consumption of plants. This is also stated in the findings of Fentahun Mengistu and Hager (2008), Leonard and Wilkie (2008) and Hinnawi (2010). In general, though wild fruits and perhaps the associated local knowledge are widely believed to be disappearing in several parts of Ethiopia. The present study provided additional evidence for this.

6.7 Distribution and Current Situations of Medicinal and Wild Food Plants

The present study also showed that indigenous people of the study area obtain medicinal and wild food plants from wild and home gardens. In addition, wild habitats especially forests are found to be the highest sources of medicinal and wild food plants. Zemedie Asfaw (1997) pointed out that

medicinal plants make 6% of the home garden plant diversity, among garden crops in Ethiopia. However, the study found that many threats facing medicinal and wild edible plants in their habitat. These threats resulted mainly from human activities such as agricultural land expansion and fuelwood collections are highly reported by many informants. This is because the communities in the study area depend more on agriculture as main economic activities under narrow land plough and over populated condition. This also stated in the work of Shibru Tedla and Kifle Lemma (1998) as agricultural production is the most serious environmental problem in Ethiopia. On the other hand, the study area, especially the forests are found nearby the town of Addis Zemen. This provides the opportunity to supplement household income through firewood collection and selling to the town community. The low living standard of people and the lack of alternatives are the major factors responsible for the decline in useful forest resources as was stated by Taye Bekele *et al*. (2001). Generally, the local people valued the forests as the ultimate source of their livelihood activities. This was explicitly reported by informant as the main treatening factor. Therefore, these need an urgent response for the endangered plants to be saved.

Fig. 18 Distribution of medicinal and wild foods plants in the wild (left) and homegarden (right)

From the results of preference ranking (Tables 17 and 18) also obtained that wild food plants namely, *Rubus apetalus Phoenix reclinata and Embelia schimperi* as well as medicinal plants like *Withania somnifera, Huernia macrocarpa and Cucumis ficifolius* are very threatened in the study area. For example, *Rubus apetalus* and *Embelia schimperi* grow in riverine vegetation, but the habitat is now deforested by overgrazing and browsing. The former vegetation situation has been changed drastically and the species are at risky condition currently. Furthermore, *Withania somnifera is* the most useful plant in the study area and only found in very few homgardens. To express how this species is essentiall to herbalists; the people say as MINEWA GIZIEWA

KOMESH KEDEGISHI LIGISH TAMEMEBISH which reflects the degree of importance *Withania somnifera* for child health problems. *Phoenix reclinata, Cucumis ficifolius and Huernia macrocarpa* were found from the wild, but grazing and over harvesting are threatening the existence of the species. It was also observed that not only the selected plant species are found to be at risk, but also most of the collected plant species and other useful plant species are getting eroded and disappearing both in the forests and the surroundings.

The different researcher justified that the useful plants mainly wild's are getting eroded at the present time. The World Conservation Union stated that over 8,000 useful plant species worldwide are threatened with extinction, and the number grows daily **(**cited in Farnsworth, 2007). In addition, Frankel *et al.* (1995) and IBC (2000) indicated that the medicinal plants are among the diverse category of useful plants which are directly obtained from wild useful plants species but these are highly eroded because of human activity. Demel Teketay and Tamrat Bekele (1995) stated that deforestation is occurring in Ethiopia at an alarming rate and this is threatening much of the country's unique biodiversity. The major reasons are the increasingly intensive use of land for agriculture and tree cutting for fuelwood and construction materials (Demel Teketay, 2001)**.** On the other hand, Zewge Teklehaimanot (2001) pointed out that new settlements in forests are increasing and hence resulted in the conversion of forestland into agricultural and other land use systems. Furethermore, threatened wild useful plants also reported in the findings of Zemede Asfaw and Mesfin Tadess (2001), Tesfaye Abebe (2005), Endalew Amenu (2007), Haile Yineger and Delenasaw Yewhualaw (2007), Fisseha Mesfin *et al.* (2009), and Hinnawi (2010).

6.8 Conservation and Management of Medicinal and Wild Food Plants in the Study Area

To reduce the threatening factors in the study area, there are conservation measures taken for forest and other natural plant resources in general. These natural forests are being protected by the local people in collaboration with the government. On the other hand, the healers collect and plant the most threatened medicinal species in their home gardens. Zemede Asfaw (2001) in his findings reported that, the home garden is a strategic and ideal farming system for conservation, production and enhancement of medicinal and wild food plants and for preservation of the valuable indigenous knowledge on them. Likewise, medicinal and wild edible plants which have additional uses in the area, such as ornamental, fuel, forage, spice, food and soil conservation were planted in home

gardens and farmlands. *Allium sativum, Foeniculum vulgare, Lepidium sativum, Ocimum gratissimum, Ruta chalepensis, Schinus molle* and few others were commonly planted (Appendix 1). The second conservation and manegement area was observed in the patches of remnant woody plants found in the Orthodox Tewahdo church forests. The sacred church and monastery lands of the Orthodox Tewahedo churches have, survived for many centuries as islands of natural forest biodiversity in the sea, forming different landscapes in much of the study area. For reasons related to the spiritual values attached to the churches, monasteries and their sacred lands, these biodiversity islands have survived until now. They provide the local community with food and minor forest products for construction purposes, medicinal uses, and architectural works as well as other essential human needs as was stated by Melakeselam Dagnachew **(**2001**).** Some of the medicinal and wild food plants obtained from these church forests were *Adiantum capillus-veneris, Clerodendrum myricoides, Juniperus procera, Millettia ferruginea, Schefflera abyssinica, Urera hypselodendron* and *Ziziphus spina-christi.* Today, many church and monastery yards are influenced because of many threatening factors such as fire and collection of wood for the construction.

The other conservation area used as germplasm for forest as well as the surrounding areas is governmental plant nursery in Addis Zemen Town. This grows and distributes seedlings, which are genetically, selected plants for reafforestation and afforestation activities. The informants informed that some the medicinal plants collected in the homegardens namely *Persea americana, Citrus aurantifolia, Citrus aurantium, Coffea arabica, Cordia africana, Ficus sur, Schinus molle* and *Punica granatum* have been taken from the nursery. These efferts indicate that the endangered species are the focus of ex-situ conservation based on the involvement of the communities. Nevertheless, it must be understood that taking the useful plants to homegarden is crucial, but conservation in their wild (in situ conservation) also must be considered since plants in their natural ecological area might give rapid growth and expected results. Therefore, it must be noted that sustainable medicinal plant management and conservation is not an option, but imperative for rural health and community well-being especially for primary health.

Fig. 19 Medicinal and wild food plants conservating areas

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The present study indicates that Tara Gedam and Amba forests harbour a high diversity of useful plants. These species are more abundant and accessible and culturally rooted in the area. Despite gradual socio-cultural transformation, the inhabitants have remarkable knowledge of these plants and their uses. Regarding the difficulties in knowledge transformation and ignorance of new generation towards traditional knowledge, there seems great danger of extinction. The results of the present study provide evidence that medicinal plants continue to play an important role in the health care system of these study sites. Knowledge and uses of herbal medicine for the treatment of various ailments among both rural and urban people are still a major part of their livelihood and culture. The traditional knowledge (TK) of using and preserving these plants is still being transferred from generation to generation, but seems to be aging. This shows that there is a problem in the transfer of knowledge from the elders to the young generation. The problem is perhaps arises due to the introduction of modern education, religious factors, spiritual and culture related problems. Therefore, it is not only essential to conserve such a wealth of information hidden among the local people but also to apply them to modern knowledge of science and technology to meet the ever increasing requirement of humankind. Furthermore, conservation of these biological resources is very important because the wise use of resources can generate much higher level of employment and income than what their are generating today.

7.2 Recommendations

Based on the results of the study, the following recommendations are forwarded.

- ✓ Local communities should be encouraged to cultivate the medicinal and wild food plants on their own land. Provision for technical as well as financial assistance should be made in this regard.
- ✓ Women's ethnobotanical knowledge is undervalued than males in the study area; special attention should be paid to the value of the ancestral knowledge possessed by women.
- ✓ As the study indicated, the high potential of using wild edible and medicinal plants for human benefits, it deserves further investigations pharmacological and nutritional screening should be done to prove the validity of traditional health care practices as well as wild foods.

- ✓ Since some of the highly valued medicinal plants are being over exploited due to their use for medicinal and wild food purposes, specific medicinal and wild food plant conservation strategy should be formulated and implemented for long term management of plants in the area.
- ✓ There is a need for identification of possible side effects of using these wild foods and medicinal plants.
- ✓ Attention should be given to standardization of measurements and hygiene of the medicines and foods made from plants by training both the healers and other members of the local community.
- ✓ Raising awareness of the young generation to avoid negative impacts on the medicinal and wild food plants and associated knowledge. So that the plants and the TK would be preserved.
- ✓ A long term research and monitoring on ethnobotany and its practices on other wealth of useful plants from the forests and surroundings is imperative.

REFERENCES

Abebe Demisse (2001). Biodiversity conservation of medicinal plants: conservation and sustainab le use of medicinal plants in Ethiopia. **In:** *Problem and Prospects*. pp.137, (Medhin Zewdu and Abebe Demissie, eds). IBCR, Addis Ababa.

Abera Worku (2006). Farmer's Indigenous Knowledge in Managing Agroforestry Practices in Lay-Gayint Woreda, South Gondar Zone, Ethiopia. M.Sc. Thesis, Hawssa University, Wondogent.

Abrha Tesfay (2008). Ethnobotanical study of Dessa Forest, North-eastern Escarpment of Ethiopia, with Emphasis on Use and Management of Forest Resources by the Local People. M.Sc. Thesis, Addis Ababa University, Addis Ababa.

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

Ali-Shtayeh, M.S.; Jamous, R.M.; Shafie, J.; Elgharabah, W.; Kherfan, F.; Qarariah, K.; Khdair, I.; Soos, I.; Musleh, A.; Isa, B.; Herzallah, H.; Khlaif, R.; Aiash, S.; Swaiti, G.; Abuzahra, M.; Haj-Ali, M.; Saif,i N.; Azem, H. and Nasrallah, H. (2008). Traditional knowledge of wild edible plants used in Palestine. *J. of Ethnobiol. and Ethnomed*. 4:13.

Amare Getahun (1974). The role of wild plants in the native diet of Ethiopians. *Agroecosystems* **1:** 45-56.

Amare Getahun (I976). *Some Common Medicinal and Poisonous Plants used in Ethiopian folk Medicine: Registrated in the Data Bank Prelude; Ref: vg 07***.** Addis Ababa University, Addis Abeba.

Andrews, T. (1982). *A Bibliography on* Herbs, *Herbal Medicine, Natural Foods and Unconventional Medical Treatment.* Libraries Unlimited, Inc. Littleton, Colorado.

Aryal, S.P. (2009). Ethnobotany of Tharu: Incorporation of Culture and Biodiversity Conservation: A case Study of Jayanagar Kapilvastu Woreda. M.Sc. Thesis, Tribhuvan University, Kathmandu.

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

Bannerman, R.H.; Burton, J. and Chien, W. (1993). *Traditional Medicine and Health Care Coverage*. World health Organization, Geneva.

Bayafers Tamene, Tamrat Bekele and Ensermu Kelbessa (2000). An Ethnobotanical Study of the Semi-wetland Vegetation of Cheffa. Page addresses: phe-ethiopia.org/pdf/Hujub%20Sacred %20Forests.pdf. *Accessed on: Oct. 18, 2010.*

Behailu Etana (2010). Ethnobotanical Study of Traditional Medicinal Plants of Goma Wereda, Jima Zone of Oromia Region, Ethiopia. M.Sc. Thesis, Addis Ababa University, Addis Ababa.

Bharucha, Z. and Pretty, J. (2010). The roles and values of wild foods in agricultural systems. Phil. Trans. R. Soc.B **365:** 2913–2926.

Bhushan P. and Mashelka R. A. (2009). *Traditional Medicine- Inspired Approaches to Drug.* Website addres: http://www.iaim.edu.in/pdf/Patwardhan&Mashelkar-DRUDIS-09.pdf. accessed on 16, September, 2010.

Bisht, C. and Badoni, A. (2009). Distribution and indigenous uses of some medicinal plants in Uttarkashi Woreda, Uttarakh and, India. *Researcher* **1:** 38-40.

Choudhary, K. K., Singh, M. and Pillai, U. *(*2008). Ethnobotanical survey of Rajasthan. American-Eurasian *J. Botany* **1:** 38-45.

Colfer, C. P.; Sheil, D. and Kishi, M. (2006). *Forests and Human Health: Assessing the Evidence*. Center for International Forestry Research, lndonesia.

Cotton, C.M. (1996). *Ethnobotany: Principles and Applications*. John Wiley and Sons Ltd, Chichester.

CSA (2007). *The 2007 Population and Housing Census for Ethiopia, Statistical Report Results at Country Level.* Central Statistical Authority, Addis Ababa.

Cunningham, A. B. (2001). *Applied Ethnobotany: People, Wild Plant Use and Conservation. People and Plant Conservation manual*. Earth scans Publication Ltd.

Cunningham, A.B. (1996). People, Park and Plants use recommendations for multiple use zones and development alternatives around Bwindi: Impenetrable National Park, Uganda. **In**: *People and Plants*: Working paper 4, pp.18-25. UNESCO, Paris.

Dawit Abebe (1986). Traditional medicine in Ethiopia: the attempts being made to promote it for effective and better utilization. *SINET* **9:**61-69.

Dawit Abebe and Ahadu Ayehu (1993). Medicinal *Plants and Enigmatic Health Practices of Northern Ethiopia*. Berhanina Selam Printing Press, Addis Ababa.

Debela Hunde, Zemede Asfaw and Ensermu Kelbessa (2004). Use and management of ethnovetarnary medicinal plants of indigenous people in `Boosat, welenchiti area, *Ethiop. J.Biol. Sci.* **3:**113-132.

Demel Teketay (2001). Deforestation, Wood famine, and environmental degradation in Ethiopia's highland ecosystems: Urgent Need for Action. *Northeast African Stewardship Council (FSC Africa)* **8:** 53-76.

Demel Teketay and Tamrat Bekele (1995). Floristic composition of Wof-Washa natural forest central Ethiopia: Implications for the conservation of biodiversity. *Feddes* **106:** 127-147.

Dillard, C.J. and German, J.B. (2000). Phytochemicals: nutraceuticals and human health. *Food Agric. Sci.* **80:** 1744-1756

DMP (1982). *Medicinal Plants of Nepal.* Department of Medicinal Plants, Nepal.

Endalew Amenu (2007). Use and Management of Medicinal plants by Indigenous People of Ejaji Area (Chelya Woreda), West Shoa, Ethiopia: An Ethnobotanical Approach. M.Sc. Thesis, Addis Ababa University, Addis Ababa.

Endashaw Bekele **(**2007). *Study on Actual Situation of Medicinal Plants in Ethiopia.* Page address: http://www.endashaw.com.assessed on Oct. 10, 2010.

Ensermu Kelbessa, Sebsebe Demisssew, Zerihun Woldu and Edwards, S. (1992). Some threatened endemic plants of Ethiopia. **In:** *The Status of Some Plant Resources in Parts of Tropical Africa, Botany 2000.* (Zemede Assfaw and Edwards. S. eds). NAPRECA, Addis Ababa.

Ermias Lulekal, Ensermu Kelbessa and Tamrat Bekele (2008). An ethnobotanical study of medicinal plants in Mana Angetu District, southeastern Ethiopia. *J.Ethnobiol. and Ethnomed.* **4:10**

Etana Tolasa (2007). Use, Treat and Conservation of Traditional Medicinal Plants by Indeginous People in Gimbi Woreda, Western Welegga. M.Sc. Thesis, Addis Ababa University, Addis Ababa.

Ethiopia Country Report (1995). Country Report to the FAO International Technical Conference on Plant Genetic Resources. Plant Genetic Resources Center, Addis Ababa. Ethiopia.

ERA and IDA (1997). *Environmental Impact Analysis of the Five Roads Selected for Rehabilitation and Upgrading: Debre Markos-Gondar Road.* Plancenter ltd, Helsinki, Finland.

FAO (2009). *The State of Food Insecurity in the World.* Food and Agriculture Organization, Rome.

Farnsworth, E. (2007). Conservation biology, wild life management and botany, in the encyclopedia of earth.

Farnsworth, N.R. (1994). *Ethnopharmacology and Drug Development in Ethnobotany and the Search for New Drugs.* John Wiley and Sons, UK.

Fentahun Mengistu and Hager, H. **(**2008**)**. Wild edible fruit species cultural domain, informant species competence and preference in three Districts of Amhara Region, Ethiopia. *Ethnobotany Research & Applications* **6:**487-502

Fisseha Mesfin, Sebsebe Demissew and Tilahun Teklehaymanot (2009). An ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia. *J. Ethnobio. and Ethnomed.* **5:**28.

Frankel, O.H.; Brown, A.H.D. and Burdon, J.J. (1995). *The Conservation of Plant Biodiversity*. Campridge University Press, Great Britain.

Gerard, B. (2005). *Medicinal Plant Biodiversity and Local Health care: Sustainable Use and Livelihood Development*: <http://www.cfc2010.org/2005/CFC%20pdfs/G%20Bodeker%20paper.pdf>. Accessed on January 20, 2011.

Gerique, A. (2006). *Integrative assessment and Planning Methods for Sustainable Agroforestry in Humid and Semiarid Regions: An Introduction to Ethnoecology and Ethnobotany Theory and Methods.* University of Giessen, Senckenbergstr.

Getachew Addis, Kelbessa Urga, and Dawit Dikasso (*2005).* Ethnobotanical study of edible wild plants in some selected Districts of Ethiopia. *Human Ecology.* **33:**1

Getachew Desalegn, Wubalem Tadesse, Worku Fekadu, Gemechu Kaba, Demel Teketay and Girma Taye (2003). Effectiveness of protection measures on timber species against subterranean termites and fungi at Zeway research station, central Ethiopia. *Ethiop. J. Biol. Sci*., **2:** 189-216,

Grivetti, L.E. and Ogle, B.M. (2000). Value of traditional foods in meeting macro and micro-nutrient needs: the wild plant connection. *Nutr. Res. Rev.* **13:** 31–46.

Guinand, Y. and Dechassa Lemessa (2000). *Wild-food Plants in Southern Ethiopia: Reflections on the Role of Famine-foods at a Time of Drought*. UN-Emergencies Unit for Ethiopia, Addis Ababa.

Haile Yineger, Ensermu Kelbessa, Tamrat Bekele and Ermias Lulekal (2008). Plants used in traditional management of human ailments at Bale Mountain National Park, Southeastern Ethiopia. *J. Med. Plant. Res*.**2:**132-153.

Haile Yineger and Delenasaw Yewhalaw (2007).Traditional medicinal plant knowledge and use by local healers in Sekoru Woreda, Jimma Zone, Southwestern Ethiopia. *Journal of Ethnob iol. and Ethnomed.* **3:**24

Hamilton A.C.; Kessy S.P.; Khan, J.A.A.; Lagos-Witte, S. and Shinwari, Z.K. **(**2003). *The Purposes and Teaching of Applied Ethnobotany People and Plants Working Paper 11*. WWF, Godalming, UK.

Hanazaki, N.; Souza, V. C. and Rodrigues, R. R. (2006). Ethnobotany of rural people from the boundaries of Carlos Botelho State Park, Sao Paulo State, Brazil. *Acta Bot. Bras*. **20:** 899-909.

Hinnawi, N. S. A. (2010). An Ethnobotanical Study of Wild Edible Plants in the Northern West Bank Palestine. M.Sc. Thesis An-Najah National University, Nablus, Palestine.

IBC (2000). Biodiversity conservation and strategic action plan for Ehiopia. Instituete of biodiversity conservation, Addis Ababa, Ethiopia

IBC (2005**).** Government of the Federal Democratic Republic of Ethiopia: Conservation National Biodiversity Strategy and Action Plan. *Institution of Biodiversity Conservation,* Addis Ababa.

Ibrar**,** M.; Hussain, F. and Sultan, A. (2007). Ethnobotanical studies on plant resources of ranyal hills, Woreda Shangla, Pakistan. *Pak. J. Bot*. **39:** 329-337.

Jonathan, M. (2007). *Ethiopia: Country Environmental Profile*. Addis Abeba, Ethiopia.

Karal, E.K. (2003). *Nuetraceutical Definition and Introduction.* Avaliable at http//www.Pharmsci.org on 10/02/2009. Accessed on May 20, 2011.

Kebede Deribe, Alemayehu Amberbir, Binyam Getachew and Yunis Mussema (2006). A historical overview of traditional medicine practices and policy in Ethiopia. *Ethiop.J.Health Dev.* **20:**127-134

Kebu Balemie (2006). Some ethnoveterinary plants used by Kereyu pastoralists in Oromia Regional State, Ethiopia. *Biodiversity newslette*r. Retrieved from, *http//www.ibc-et.org* 04 02.accessed on 16 April, 2011.

Kebu Balemie and Fassil Kebebew (2006). Ethnobotanical study of wild edible plants in Derashe and Kucha Woredas, South Ethiopia. *J. Ethnobiol. and Ethnomed.* **2:**53.

Kebu Balemie, Ensermu Kelbessa and Zemede Asfaw (2004). Indigenous medicinal plant utilization, management and threats in Fentalle area, Eastern Shewa, Ethiopia. *Ethiop. J. Biol. Sci.* **3:** 37-58.

Khanal, M. M. (2006). Non-Timber Forest Products (NTFPs) Use in two Villages in Lumbini Zone of Nepal. M.Sc.Thesis, University of Natural Resources and Applied Life Sciences, Vienna.

Lal, R. and Junior, W.F. (2011). Where Biodiversity, *Traditional Knowledge, Health and Livelihoods Meet: Institutional Pillars for the Productive Inclusion of Local Communities.* International Policy Centre for Inclusive Growth, Brazil.

LWCT (2010). *Diversity of of Animal Species in Tara-Gedam and Amba Forests, In Libo Kemkem Woreda.* Libo Kemkem Woreda Cultural and Turism Office, Addis Zemen.

Leonard, W. and Wilkie, D. (2008). *Indigenous Knowledge and Consumption of Wild Plants**:** A Comparative Study of Two Tsimane Villages in the Bolivian Amazon*. Victoria Reyes, Garcia

LKWAO (2001). *Types of lands and their Coverage in Libo Kemkem Woreda*. Libo Kemkem District Agricultural Office, Addis Zemen.

LKWAHO (2010). *Animal Related Information in Libo Kemkem Woreda.* Libo Kemkem Woreda Animal health organization, Addis Zemen.

LKWEO (2010). *The Number of Schools in Libokemkem District*. Libo Kemkem Woreda Educational office, Addis Zemen.

LKWHO (2010). Human Health related information. Libo Kemkem Woreda Health control office, Addis Zemen.

LKWIO (2010). Agro-climatic Zones of Libo Kemkem Woreda. Libo Kemkem Woreda information Desk, Addis Zemen.

Martin, G.J. (1995). *Ethnobotany: A Method Manual.* Chapman and Hall, London.

Mazhar, F.; Buckles, D.; Satheesh, P. V. and Akhter, F. (2007). *Food Sovereignty and Uncultivated Biodiversity in South Asia.* Academic Foundation, New Delhi.

Melakeselam Dagnachew (2001). *The Role of the Ethiopian Orthodox Tewahedo Church in Preserving Trees and Woodlands*. Ethiopian Orthodox Tewahedo Church, Addis Ababa.

Mesfin Taddesse and Sebsebe Demissew (1992). Medicinal Ethiopian plants: Inventory, identification and classification. **In**: *Plants Used on African Traditional Medicine as Practiced in Ethiopia and Uganda. (*Edwards, S. and Zemede Asfaw, eds). NAPRECA, Addis Ababa.

Mirutse Giday (1999). An ethnobotanical study of medicinal plants used by the Zay People in Ethiopia. M.Sc. Thesis. Uppsala, Sweden.

Mirutse Giday and Gobena Ameni (2003). An ethnobotanical survey on plants of veterinary importance in two Werdas of Southern Tigray, Northern Ethiopia, *SINET: Ethiop. J. Sci.* **26:**123-136.

Moa Megersa, (2010). Ethnobotanical Study of Medicinal Plants in Wayu Tuka Wereda, East Wollega Zone of Oromia Region, Ethiopia. M.Sc. Thesis, Addis Ababa University, Addis Ababa.

MSFG Project Report (2006). *Visceral Leishmaniasis Intervention in North West Ethiopia*. Medicines San Frontiers Greece, Addis Zemen, Ethiopia.

NMA (2011). National Meteorological Agency. Addis Ababa, Ethiopia.

Papadopoulos, R. and Lay, M.G. (2002). *Cultural Snapshots: A guide to Ethiopian Refugees for Health Care Workers. Research Center for Trans-cultural Studies in Health, Middle Sex University, London UK*. Available at: www.mdx.ac.uk/ www/rctsh/embrace.htm. Accessed on April 20, 2011.

Pardo-de-Santayana, M.; Tardío, J.; Blanco, E.; Carvalho, A. M. Lastra J.J. and Miguel E.S. (2007).Traditional knowledge of wild edible plants used in the northwest of the Iberian Peninsula (Spain and Portugal):A comparative study. *J Ethnobiol Ethnomedicine* **3:** 27.

Peter, C.M. (1996). *Selected Guide line for Ethnobotanical Research: Field Manual*. New York botanical Garden, Bronx, New York.

Phillips, O.L. (1996). *Selected Guideline for Ethnobotanical Research: Afield Manual*. New York Botanical Garden, Bronx, New York.

Pimentel, D.; Cooperstein, S.; Randell, H.; Filiberto, D.; Sorrentino, S.; Kaye, B.; Nicklin, C.; Yagi, J.; Brian, J.; O'Hern, J.; Habas, A. and Weinstein, C. (2007). Ecology of increasing diseases: population growth and Environmental degradation. *Human Ecology* **35:** 6653–668.

Quanash, N. (1998). Bicultural diversity and integrated health care in Madagascar. *Nature and Resource.* **30**:18-22.

SCBD (2010). *Sustainable Forest Management, Biodiversity and Livelihoods: A Good Practice Guide*. IUCN, Montreal.

Sebukeera, C. (2010). *Africa Environment Outlook 2: Forests and Woodlands*. Page Address: http://www.unep.org/DEWA/Africa/AEO2_Launch/. Accessed on 12 March, 2011.

Seyoum Getaneh (2009). Ethnobotanical Studies of Medicinal Plants in Debre Libanos Wreda, North Shewa Zone of Oromia Region, Ethiopia. M.Sc. Thesis, Addis Ababa Uiversity, Addis Ababa.

Shibru Tedla and Kifle Lemma (1998). *Environmental Management in Ethiopia Have the National Conservation plans worked: Environmental Forum Publications Series No.1*. OSSREA, Addis Ababa, Ethiopia.

Taye Bekele, Getachew Berhan, Sisay Zerfu and Kumlachew Yeshitela (2001). *Perspectives of the Ethiopian Orthodox Tewahido Church in Forest Biodiversity Conservation.* Institute of Biodiversity Conservation and Research, Addis Abeba.

Teferi Flatie**,** Teferi Gedif, Kaleab Asres and Tsige Gebre-Mariam (2009). Ethnomedical survey of Berta ethnic group Assosa Zone, Benishangul-Gumuz regional state, mid-west Ethiopia. *J. Ethnob. and Ethnomed.* **5:**14.

Teferi Gedif and Hahn, H. J. (2003). The uses of medicinal plants in self-care in rural central Ethiopia. *J. Ethno.pharmacol.* **87:**155-161.

Tegegne Mekonen (2009). Sustainability of rural water supply and sanitation services in Ethiopia: a case study of twenty villages in Ethiopia. M.Sc. Thesis.Cornell University, New York.

Tesfaye Abebe (2005). Diversity in homegarden agroForestry systems of Southern Ethiopia. Ph. D Dissertation, Wageningen University, Netherlands.

Tesfaye Awas (2004). Conservation of Medicinal Plant in Ethiopia. **In**: Urga Kelbessa, Asefa Ayale and Guta Merga (eds).Traditional Medicine in Ethiopia, Proceedings of the first national Workshop held in Addis Ababa, Ethiopia, on June 30-July 2, 2003, EHNRI, Addis Ababa.

Teshale Sori, Merga Bekana, Girma Adugna, Ensermu Kelbessa, (*2004).* Medicinal plants in the ethnoveterinary practices of Borana Pastoralists, Southern Ethiopia. *Intern. J. Appl. Res. Vet. Med*. **2:**3-7.

Theilade, I.; Hansen, H.H. and Krog, M. (2007). Ethnobotanical Knowledge: Implications for Participatory Forest Management. *J.Transdisciplinary Environmental Studies* **6:** 1

Thomas, D.W.; Thomas, J. M.; Bromley, W.A.; Mbenkum, F.T. (1989). Korup Ethnobotany Survey: Panda House, Weyside Park, Godalming, Surrey. World Wide Fund for Nature, U.K.

Tigist Wondmu, Zemede Asfaw and Ensermu Kelbessa (2006). Ethnobotanical study of food plants around deeraa town arsi, Ethiopia.*SINET:Ethiop.J.Sci*. **29:**71-80.

Tilahun Teklehaymanot and Mirutse Giday (2007). Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *J. Ethnobiol. and Ethnomed.* **3:**12.

Tilahun Teklehaymanot and Mirutse Giday (2010). Ethnobotanical study of wild edible plants of Kara and Kwego semi-pastoralist people in Lower Omo River Valley, Debub Omo Zone. SNNPR, Ethiopia. *J.Ethnobiol. and Ethnomed*. **6:**23.

Tilahun Teklehymanot, Mirutse Giday, Girmay Medihin and Yalem Tsehay Mekonnen (2007). Knowledge and Use of Medicinal Plants by People around Debrelibanos Monastery in Ethiopia. *J. Ethnopharmacol. and Ethnomed.* **111:** 271-283.

Tinsae Bahru (2009). An ethnobotanical study of plants used by the local people in and around the Semi-arid Awash National Park, Ethiopia. M.Sc. Addis Ababa University, Addis Ababa.

Tizazu Gebre (2005). An ethnobotanical study of medicinal plants in Konso Special Woreda, Southern Nations, and Nationalities and Peoples Regional State, Ethiopia. M.sc. Thesis. AddisAbaba University, Addis Ababa.

Toledo, B. A.; Olantonios. C, and Galetto, L. (2007). Knowledge and use of edible and medicinal plants in two populations from the Chaco Forest, Cordoba Province, Argentina. *J.Ethnobiol.* **27:** 218–232.

WHO (2000). *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva, Switzerland.

WHO (2002). *Traditional Medicine Strategy from 200-2005*. World Health Organization, Geneva.

WHO (2003). *Traditional Medicine*. World Health Organization, Geneva.

Wondwosen Teshome (2005). Impacts of urbanization on the traditional medicine of Ethiopia. J.*Anthro.* **8:** 43-52.

WBO (2001). *IK Notes on Ethiopia: Traditional Medicine and the Bridge to Better Health.*World Bank Organization.

World Health Report (2008). Primary Health Care Now more than ever. World Health Organization, Geneva, Switzerland.

Yonas Yemshaw (2004). The remnant Forests of Ethiopia. **In:** *proceedings of a national conference on Forest resource of Ethiopia: status, challenges and Opportunities*. Institution of Biodiversity Conservation (IBC), Addis Ababa, Ethiopia.

Zemede Asfaw (1997). A survey of Indigenous Food Crops, their Preparations and Homegardens in Ethiopia. United Nations Institute for Natural Resources in Africa. Series No. B6, ICIPE, Science Press, Nairobi.

Zemede Asfaw (2001). The Role of Home Garden in Production and Conservation of Medicinal plants. **In**: *Coservation and Sustainable Use of Medicinal plants in Ethiopia.* pp. 76-91, (Medhin Zewdu and Abebe Demissie eds). IBCR, Addis Ababa.

Zemede Asfaw (2004). The enset based Home gardens of Ethiopia. In: Home garden and agrobiodiversity. Pp.123-147, (Eyzaguire, P.B., and Linars, O.F.eds). Smithsonian Institution, Washington.

Zemede Asfaw and Mesfin Tadese (2001). Prospects for the sustainable use and development of wild food plants in Ethiopia. *Economic Botany* **55:** 47-62.

Zewdie Kassa (2009). An ethnobotanical study of medicinal plant biodiversity of trees and shrubs in Juldu Wereda, Western Shoa, Ethiopia. M.Sc. Thesis Addis Ababa University, Addis Ababa.

Zewge Teklehaimanot (2001). *Biodiversity Conservation in Ancient church and monastery yards in Ethiopia*. School of Agriculture and Forest Sciences, University of Wales, Bangor.

APPENDECES

Appendix 1. List of medicinal and wild food plant species in the study area

Use catagories (Md=Medicinal uses; Fd= wild food uses; Bh=Both). Habit/life forms (S= Shrub H=Herb T=Tree; Cl=Climber; P=parasitic); the scale of the distribution based on the status of the plants: Rare-very less distribution, sparse: less distribution

No	**Botanical name of species**	**Local Name (Amharic)**	**Family**	**Habit**	**Habitat**	**Distribution**	**Used**	**Collection number**
1	*Acacia abyssinica* Hochst. ex Benth.	Girar	Fabaceae	T	Forest	Sparse	Bh	GC097
2	*Acanthus polystachius* Del.	kucheshile	Acanthaceae	S	Farm land	Sparse	Md	GC031
3	*Acanthus sennii* Chiov.	kusheshilie	Acanthaceae	S	Forest	Widely	Bh	GC056
4	*Achyranthes aspera* L.	Telenj	Amaranthaceae	H	Both	Widely	Md	GC025
5	*Acmella caulirhiza* Del.	Kutcha-melk	Asteraceae	H	Homegarden	Particular area	Md	GC134
6	*Acokanthera schimperi* (A.DC.) Schweinf.	Merz/Mirez	Apocynaceae	S	Both	Rare	Md	GC047
7	*Adiantum capillus-veneris* L.	Joro-asfit	Adiantaceae	H	Forest	Sparse	Md	GC027
8	*Allium sativum* L.	Nech shinkurt	Alliaceae	H	Homegarden	Sparse	Md	GC011
9	*Aloe macrocarpa* Tod.	Eret	Aloaceae	H	Fallow land	Rare	Md	GC034
10	*Alternanthera pungens* Kunth	Midir akef	Amaranthaceae	H	Both	Rare	Md	GC146
11	*Alysicarpus quartinianus* A.Rich.	----------	Fabaceae	H	Fallow land	Rare	Md	GC142
12	*Argemone mexicana* L.	Yahya eshoh	Papaveraceae	H	Road side	Widely	Md	GC058
13	*Artemisia afra* Jack. ex Willd.	Chikugn	Asteraceae	H	Homegarden	Rare	Md	GC168
14	*Asparagus africanus* Lam.	Yesiet kest	Asparagaceae	S	Farm land	Sparse	Md	GC151
15	*Astragalus atropilosus* (Hochst.) Bunge	----------	Fabaceae	H	Farm land	Sparse	Md	GC152
16	*Bersama abyssinica* Fresen.	Azamir	Melianthaceae	S	All wild	Sparse	Md	GC107
17	*Bidens macroptera* (Sch Bip.) ex Chiov. Mesfin	Adey Abeba	Asteraceae	H	Farm land	Widely	Md	GC143
18	*Brassica carinata* A. Br.	Gomen	Brassicaceae	H	Homegarden	Widely	Md	GC176
19	*Bridelia micrantha* (Hochst.) Brain.	Yenebr tifir	Euphorbiaceae	T	River side	Rare	Md	GC089
20	*Brucea antidysenterica* Swiss Chard.	Waynos/yedaga abalo	Simaroubaceae	H	Farm land	Sparse	Md	GC086
21	*Buddleja polystachya* Fresen.	Anfar	Loganiaceae	S	Forest	Sparse	Md	GC062
22	*Calotropis procera (*Ait.) Ait.f.	Tobia	Asclepiadaceae		Road side	Sparse	Md	GC035
23	*Calpurnia aurea (*Ait.) Benth.	Zikita	Fabaceae	S	Both	Sparse	Md	GC020
24	*Capparis tomentosa* Lam.	Gimero	Capparidaceae	S	Forest	Widely	Bh	GC023
25	*Capsicum annuum* L.	Karia/keto	Solanaceae	H	Homegarden	Widely	Md	GC026
26	*Carica papaya* L.	Papya	Caricaceae	T	Homegarden	Sparse	Md	GC098
27	*Carissa spinarum* L.	Agam	Apocynaceae	S	Forest	Widely	Bh	Gc021
28	*Cavratica gracilis* (Guill.&Perr.) Suesseng	Aserkush	Vitaceae	Cl	Fallow land	Sparse	Md	GC052
29	*Celosia trigyna* L.	Lemlemcho	Amaranthaceae	H	Homegarden	Sparse	Md	GC132
30	*Chenopodium murale* L.	Amedmado	Chenopodiaceae	H	Homegarden	Rare	Md	GC136

Appendix 1 continued

31	*Cicer arietinum* L.	Shinbira	Fabaceae	H	Both	Widely	Md	GC115
32	*Cirsium englerianum* O. Hoffm.	Yahya kusheshilie	Asteraceae	H	Forest	Sparse	Md	GC050
33	*Citrus aurantifolia* Burn. f.	Lomy	Rutaceae	S	Homegarden	Sparse	Md	GC169
34	*Citrus aurantium* L.	komtatie	Rutaceae	S	Homegarden	Rare	Md	GC138
35	*Clausena anisata* (Willd.) Benth.	Limich	Rutaceae	S	Forest	Sparse	Md	GC178
36	*Clematis simensis* Fresen.	Azo areg	Ranunculaceae	Cl	Forest	Sparse	Md	GC043
37	*Clerodendrum myricoides* (Hochst.) Vatke	Misroch	Lamiaceae	S	Forest	Sparse	Md	GC016
38	*Clutia lanceolata* Forssk.	Fiyelefej	Euphorbiaceae	S	Fallow land	Widely	Md	GC135
39	*Coccinia abyssinica* (Lam.) Cogn.	Wushish	Cucurbiataceae	Cl	Around home	Rare	Fd	GC156
40	*Coffea arabica* L.	Bunna	Rubiaceae	S	Homegarden	Sparse	Md	GC161
41	*Commelina latifolia* Hochst. ex A Rich.	Yewuha enkur	Commelinaceae	H	River side	Sparse	Md	GC116
42	*Convolvulus arvensis* L.	Este-filastot	Convolvulaceae	Cl	Fallow land	Rare	Md	GC175
43	*Convolvulus sagittatus* Thunb.	----------	Convolvulaceae	Cl	Around home	Rare	Md	GC127
44	*Cordia africana* Lam.	Wanza	Boraginaceae	T	Both	Widely	Bh	GC133
45	*Crepis rueppellii* Scli-Bip.	----------	Asteraceae	H	Fallow land	Rare	Md	GC070
46	*Crotalaria karagulensis* Taub.	Yeayt ater	Fabaceae	H	Around home	Rare	Md	GC051
47	*Croton macrostachyus* Del.	Misana	Euphorbiaceae	T	All wild	Widely	Md	GC130
48	*Cucumis ficifolius* A. Rich.	Yemidir enbuay	Cucurbitaceae	Cl	Both	Rare	Md	GC139
49	*Cucurbita pepo* L.	Duba	Cucurbitaceae	Cl	Homegarden	Sparse	Md	GC166
50	*Cupressus lusitanica* Mill.	Yeferenge tid	Cupressaceae	T	Forest	Widely	Md	GC082
51	*Cyathula prostrata* (L.) Brume	Aregist	Amaranthaceae	H	Home Garen	Particular area	Md	GC145
52	*Cynodon dactylon* (L.)Pers.	Serdo	Poaceae	H	Both	Widely	Bh	GC173
53	*Cynoglossum coeruleum* (Hochst. ex A.Rich.) DC	Chegogit	Boraginaceae	H	Both	Widely	Md	GC114
54	*Cyperus dichroostathyus* A.Rich.	Giramta	Cyperaceae	H	Forest	Widely	Md	GC113
55	*Datura stramonium* L.	Astenagir/Badima tebaki	Solanaceae	H	Both	Widely	Md	GC124
56	*Dichondra repens* J.R.&G.Forst.	Afer kocher	Convolvulaceae	H	Fallow land	Rare	Md	GC180
57	*Diplolophium africanum* Turcz.	Zeger-awta	Apiaceae	H	Forest	Rare	Md	GC041
58	*Dipsacus pinnatifidus* Steud. ex A. Rich.	Ferezeng(kelem)	Dipsacaceae	H	Forest	Sparse	Md	GC102
59	*Discopodium penninervum* Hochst.	Almit	Solanaceae	S	Farm land	Rare	Md	GC071
60	*Dodonaea angustifolia* L.f.	Kitkita	Sapindaceae	S	Forest	Widely	Md	GC036
61	*Dovyalis abyssinica* (A. Rich.) Warb.	Koshim	Flacourtiaceae	S	Both	Rare	Bh	GC042
62	*Dregea rubicunda* Schum.	Kuandira	Asclepiadaceae	Cl	Forest	Rare	Md	GC044
63	*Dyschoriste radicans* Nees	----------	Acanthaceae	H	Fallow land	Rare	Md	GC093
64	*Embelia schimperi* Vatke	Enkoko	Myrsinaceae	S	River side	Rare	Bh	GC119
65	*Eragrostis tef* (Zucc.) Trotter	Tef	Poaceae	H	Homegarden	Widely	Md	GC040
66	*Erythrina abyssinica* Lam. ex DC.	Kuara	Fabaceae	T	Around home	Rare	Md	GC159
67	*Eucalyptus globulus* Labill.	Nech bahirzaf	Myrtaceae	T	Farm land	Rare	Md	GC167

Appendix 1 continued

68	*Euclea racemosa* Hiern	Dedeho	Ebenaceae	S	Forest	Sparse	Md	GC018
69	*Euphorbia abyssinica* Gmel.	Kulkual	Euphorbiaceae	T	Both	Widely	Md	GC164
70	*Euphorbia tirucalii* L.	Kinchib	Euphorbiaceae	S	Around home	Widely	Md	GC131
71	*Ferula communis* L.	Dog	Apiaceae	H	Forest	Widely	Bh	GC072
72	*Ficus carica* L.	Beles	Moraceae	S	Fallow land	Rare	Md	GC104
73	*Ficus sur* Forssk.	Sholla	Moraceae	T	River side	Sparse	Bh	GC090
74	*Ficus sycomorus* L.	Banba	Moraceae	T	Forest	Rare	Fd	GC099
75	*Ficus vasta* Forssk.	Warka	Moraceae	T	Farm land	Rare	Bh	GC162
76	*Foeniculum vulgare* Miller	Ensilal	Apiaceae	H	Both	Rare	Md	GC137
77	*Gardenia ternifolia* Schumach. & Thonn.	Gambillo	Rubiaceae	T	Both	Rare	Bh	GC087
78	*Gossypium barbadense* L.	Tit	Malvaceae	S	Homegarden	Rare	Md	GC096
79	*Grewia ferruginea* Hochst. ex A. Rich.	Lenquata	Tiliaceae	S	Forest	Widely	Bh	GC123
80	*Guizotia schimperi* Sch. Bip.ex Walp.	Mech	Asteraceae	H	Fallow land	Widely	Md	GC073
81	*Helinus mystacinus* (Ait.) E. Mey. ex Steud.	Esat abrid	Rhamnaceae	Cl	Forest	Sparse	Md	GC039
82	*Heteromorpha arborescens* (Spreng.) Cham. &Schldl.	Yegib-mirkuz	Apiaceae	S	Farm land	Rare	Md	GC015
83	*Hibiscus macranthus* Hochst. ex A.Rich.	Nacha	Malvaceae	S	Forest	Sparse	Md	GC064
84	*Huernia macrocarpa* (A.Rich) Sprenger	Yemidir kulkual	Asclepiadaceae	H	Fallow land	Rare	Md	GC100
85	*Hypericum quartinianum* A.Rich	Amujia	Hypericaceae	S	Forest	Sparse	Md	GC046
86	*Indigofera arrecta* Hochst. Ex A. Rich.	---------	Fabaceae	H	Farm land	Rare	Md	GC033
87	*Indigofera prieureana* Guill &Perr.	----------	Fabaceae	H	Farm land	Sparse	Md	GC125
88	*Jasminum abyssinicum* Hochest. ex DC.	Tenbelel	Oleaceae	S	Forest	Widely	Md	GC012
89	*Jasminum grandiflorum* L.	Ter-hareg	Oleaceae	Cl	Forest	Sparse	Md	GC085
90	*Juniperus procera* Hochst ex. Engl.	Tid	Cuppressaceae	T	Forest	Sparse	Md	GC185
91	*Justicia schimperiana* (Hochst. ex Nees) T.Anders.	Smiza	Acanthaceae	S	Around home	Widely	Md	GC154
92	*Kalanchoe laciniata* L.	Endahula	Crassulaceae	H	Fallow land	Widely	Md	GC084
93	*Lactuca intermis* Forssk.	Deme merarit	Asteraceae	H	Farm land	Widely	Md	GC118
94	*Laggera tomentosa (*Sch.Bip. ex A. Rich.) Oliv. & Hiern	Keskeso/Shetie	Asteraceae	H	Fallow land	Widely	Md	GC038
95	*Laggera crispata* (Vahl) Hepper & Wood	Keskesso/ alshasume	Asteraceae	H	Farm land	Widely	Md	GC075
96	*Lantana trifolia* L.	Argagifo	Verbenaceae	S	Forest	Rare	Fd	GC081
97	*Leonotis ocymifolia* (Burm.f.) Iwarsson	Ferezeng	Lamiaceae	S	Forest	Rare	Md	GC105
98	*Leucas martinicensis* (Jaq) R.Br.	----------	Lamiaceae	H	Forest	Rare	Md	GC053
99	*Linum usitatissimum* L	Telba	Linaceae	H	Farm land	Sparse	Md	GC184
100	*Lycopersicon esculentum* Mill.	Abafinjale	Solanaceae	Cl	Both	Rare	Fd	GC092
101	*Maesa laceolata* Forssk.	Kilabo	Myrsinaceae	S	Forest	Sparse	Md	GC068
102	*Malva verticillata* L.	Elit	Malvaceae	H	Around home	Rare	Md	GC103

Appendix 1 continued

103	*Melia azedarach* L.	Nim	Meliaceae	T	Homegarden	Sparse	Md	GC160
104	*Millettia ferruginea* (Hochst.) Bak.	Birbira	Fabaceae	T	Forest	Rare	Md	GC067
105	*Mimusops kummel* A.DC.	Eshe	Sapotaceae	T	River side	Rare	Bh	GC101
106	*Momordica foetida* Schumach.	Kura-hareg/Kura mechat	Cucurbitaceae	Cl	Forest	Sparse	Md	GC165
107	*Myrica salicifolia* Hochst. ex A. Rich.	Shinet	Myricaceae	T	River side	Rare	Md	GC106
108	*Nicandra physalodes* (L.) Gaertn.	Kassa	Solanaceae	H	Farm land	Sparse	Md	GC065
109	*Nicotiana tabacum* L.	Tinbaho	Solanaceae	S	Homegarden	Rare	Md	GC080
110	*Nuxia congesta* R.Br. ex Fresen.	Atquar	Loganiaceae	S	Forest	Sparse	Md	GC088
111	*Ocimum urticifolium* Koth	Dama kesie	Lamiaceae	S	Homegarden	Sparse	Md	GC129
112	*Olea europaea* subsp.*cuspidata* L.	Woira	Oleaceae	T	Forest	Widely	Md	GC079
113	*Opuntia ficus-indica* (L.) Miller	Beles/kulkual	Cactaceae	S	Around home	Sparse	Fd	GC182
114	*Ormocarpum pubescens* (Hochst.) Cuf.ex.Gillett	Murna	Fabaceae	S	Forest	Rare	Md	GC014
115	*Orobanche ramosa* L.	------	Orobanchaceae	P	Fallow land	Rare	Md	GC181
116	*Otostegia integrifolia* Benth.	Tunjut	Lamiaceae	S	Forest	Sparse	Md	GC141
117	*Oxalis latifolia* H.B.K.	Michamicho	Oxalidaceae	H	Farm land	Sparse	Fd	GC157
118	*Pentas Lanceolata* (Forssk.) Defl.	Ras faris	Rubiaceae	S	Forest	Rare	Md	GC066
119	*Periploca linearifolia* Quant. Dill. & Rich.	Moider	Asclepiadaceae	Cl	Forest	Sparse	Md	GC150
120	*Persea americana* Mill.	Avocado	Lauraceae	S	Homegarden	Rare	Md	GC183
121	*Phoenix reclinata* Jacq.	Seniel	Arecaceae	S	Fallow land	Rare	Fd	GC108
122	*Phyllanthus rotundifolius* Willd.	----------	Euphorbiaceae	H	Farm land	Rare	Md	GC019
123	*Physalis peruviana* L.	Komeydero	Solanaceae	H	Forest	Rare	Fd	GC063
124	*Phytolacca dodecandra* L'Herit.	Endod	Phytolaccaceae	S	Both	Sparse	Md	GC024
125	*Plantago lanceolata* L.	Wonberet/ Gorteb	Plantaginaceae	H	Farm land	Widely	Md	GC117
126	*Plectranthus tenuiflorus* (vatke) Agnew	Mutansa	Lamiaceae	S	Homegarden	Rare	Md	GC148
127	*Plumbago zeylanica* L.	Amera	plumbaginaceae	H	Fallow land	Rare	Md	GC128
128	*Premna schimperi* Engl.	Chocho	Lamiaceae	S	Forest	Sparse	Md	GC126
129	*Prunus persica* (L.) Batsch	Kok	Rosaceae	S	Homegarden	Rare	Md	GC049
130	*Pterolobium stellatum* (Forssk.) Brenan	Kentefa	Fabaceae	S	Forest	Widely	Fd	GC028
131	*Punica granatum* L.	Roman	Punicaceae	S	Homegarden	Particular area	Md	Gc022
132	*Rhamnus prinoides* L'Herit	Gesho	Rhamnaceae	S	Homegarden	Sparse	Md	GC094
133	*Rhus vulgaris* Meikle	kimmo	Anacardiaceae	S	Forest	Sparse	Fd	GC172
134	*Ricinus communis* L.	Chakima/ Gulo	Euphorbiaceae	**S**	Homegarden	Rare	Md	GC170
135	*Rosa abyssinica* Lindley	Kega	Rosaceae	S	Forest	Sparse	Bh	GC037
136	*Rubia coRareifolia* L.	Mencherer	Rubiaceae	Cl	Forest	Rare	Md	GC110
137	*Rubus apetalus* Pair.	Enzorgie	Rosaceae	S	River side	Rare	Fd	GC091
138	*Rumex abyssinicus* Jacq.	Mekmoko	Polygonaceae	H	Farm land	Sparse	Bh	GC076
139	*Rumex nepalensis* Spreng.	Tult	Polygonaceae	H	Fallow land	Sparse	Md	GC029

Appendix 1 continued

140	*Rumex nervosus* Vahl	Enbuacho	Polygonaceae	S	Farm land	Widely	Bh	GC177
141	*Ruta chalepensis* L.	Tenadam	Rutaceae	H	Homegarden	Rare	Md	GC186
142	*Sansevieria erythraeae* Mattei	Chiret	Dracaenaceae	S	Homegarden	Rare	Md	GC111
143	*Schefflera abyssinica* (Hochst. ex A. Rich.) Harms.	Getem	Araliaceae	T	Forest	Rare	Md	GC171
144	*Schinus molle* L.	Kundoberbere	Anacardiaceae	T	Homegarden	Sparse	Md	GC155
145	*Senna petersiana* (Bolle) Lock	Yeleba mar	Fabaceae	S	Forest	Rare	Fd	GC158
146	*Senna didymobotrya* (Fresen.) Irwin &Bameby	Serka Abeba	Fabaceae	S	Fallow land	Widely	Md	GC122
147	*Sida ovata* Forssk.	Yahya-nacha	Malvaceae	H	Farm land	Sparse	Md	GC032
148	*Sida rhombifolia* L.	Gorgegit	Malvaceae	S	Both	Sparse	Md	GC120
149	*Sida tenuicarpa* Vollesen	Chifrig	Malavaceae	S	Fallow land	Sparse	Md	GC153
150	*Solanecio gigas* Vatke	Yashikoko gomen	Astraceae	S	Homegarden	Particular area	Md	GC061
151	*Solanum anguivi* Lam.	Zerch enboy	Solanaceae	S	Forest	Sparse	Md	GC174
152	*Solanum incanum* L.	Yekolla enboy	Solanaceae	S	Fallow land	Sparse	Md	GC059
153	*Solanum marginatum* L.f.	Yedega enboy	Solanaceae	S	Forest	Rare	Md	GC095
154	*Solanum nigrum* L.	Awut	Solanaceae	H	Fallow land	Rare	Bh	GC140
155	*Steganotaenia araliacea* Hochst. ex A.Rich.	Endoka/Yefiyel chew	Apiaceae	T	Forest	Sparse	Md	GC083
156	*Stephania abyssinica* (Dillon & A. Rich.) Walp.	Chewchawit	Menispermaceae	H	Farm land	Sparse	Md	GC121
157	*Stereospermum kunthianum* Cham.	Zana	Bignonaceae	T	Forest	Sparse	Md	GC017
158	*Striga hermonthica* (Del.) Benth.	Gelmit	Scrophulariaceae	H	Farm land	Sparse	Md	GC144
159	*Syzygium guineense* (Willd.) DC.	Dokima	Myrtaceae	T	River ride	Sparse	Bh	Gc045
160	*Thalictrum rhynchocarpum* Dill. & A. Rich.	Sire-bizu	Ranunculaceae	H	Forest	Rare	Md	GC078
161	*Tragia brevipes* Pax.	Abelbalit	Euphorbiaceae	P	Forest	Rare	Md	GC013
162	*Urera hypselodendron* (Hochst.) ex A. Rich.	Lankusso	Utricaceae	Cl	Forest	Sparse	Md	GC060
163	*Urtica simensis* Steudel	Sama	Urticaceae	H	Forest	Rare	Md	GC179
164	*Verbasicum sinaiticum* Benth.	Kutitina	Scrophulariaceae	S	Forest	Sparse	Md	GC074
165	*Verbena officinalis* L.	Atuch	Verbenaceae	H	Farm land	Widely	Md	GC069
166	*Vernonia adoensis* Sch.Bip ex Walp.	Eras abera/ Est-musay	Asteraceae	S	Homegarden	Sparse	Md	GC147
167	*Vernonia amygdalina* Del.	Girawa	Astraceae	S	Homegarden	Rare	Md	GC055
168	*Vernonia myriantha* Hook.f.	Kotkoto	Astraceae	S	Fallow land	Widely	Md	GC057
169	*Vicia faba* L.	Bakela	Fabaceae	H	Homegarden	Sparse	Md	GC109
170	*Withania somnifera (*L.) Dunal in DC.	Giziewa	Solanaceae	S	Homegarden	Rare	Md	GC048
171	*Xanthium strumarium* L.	Gid-zemede	Asteraceae	H	Fallow land	Sparse	Md	GC112
172	*Ximenia americana* L.	Enkoy	Olacaceae	S	Forest	Rare	Bh	GC054
173	*Zea mays* L.	Mashilla	Poaceae	H	Homegarden	Widely	Md	GC030
174	*Zehneria scabra* (Linn. f.) Sond.	Hareg resa	Cucurbitaceae	Cl	Around home	Rare	Md	GC149
175	*Ziziphus spina-christi* (L.) Desf.	Gava	Rhamnaceae	T	Homegarden	Particular area	Bh	GC163

Appendix 2. List of the collected plant families and crosponding number of species in the study area

No	Family	Number of genera	Number of species	No	families	Number of genera	Number of species	No	Families	Number of genera	Number of species
1	Acanthaceae	3	4	25	Cyperaceae	1	1	49	Papaveraceae	1	1
2	Alliaceae	1	1	26	Dipsacaceae	1	1	50	Phytolaccaceae	1	1
3	Aloaceae	1	1	27	Dracaenaceae	1	1	51	Plantaginaceae	1	1
4	Amaranthaceae	4	4	28	Ebenaceae	1	1	52	Plumbaginaceae	1	1
5	Anacardiaceae	2	2	29	Euphorbiaceae	7	8	53	Poaceae	3	3
6	Apiaceae	5	5	30	Fabaceae	13	15	54	Polygonaceae	1	3
7	Apocynaceae	2	2	31	Flacourtiaceae	1	1	55	Punicaceae	1	1
8	Araliaceae	1	1	32	Hypericaceae	1	1	56	Ranunculaceae	2	2
9	Arecaceae	1	1	33	Lamiaceae	7	7	57	Rhamnaceae	3	3
10	Asclepiadaceae	4	4	34	Lauraceae	1	1	58	Rosaceae	3	3
11	Asparagaceae	1	1	35	Lineaceae	1	1	59	Rubiaceae	4	4
12	Asteraceae	11	14	36	Loganiaceae	2	2	60	Rutaceae	3	4
13	Bignoniaceae	1	1	37	Malavaceae	4	6	61	Sapindaceae	1	1
14	Boraginaceae	2	2	38	Meliaceae	1	1	62	Sapotaceae	1	1
15	Brassicaceae	1	1	39	Melianthaceae	1	1	63	Scrophulariaceae	2	2
16	Cactaceae	1	1	40	Menispermaceae	1	1	64	Simaroubaceae	1	1
17	Capparidaceae	1	1	41	Moraceae	1	4	65	Solanaceae	9	12
18	Caricaceae	1	1	42	Myricaceae	1	1	66	Tiliaceae	1	1
19	Chenopodiaceae	1	1	43	Myrsinaceae	2	2	67	Urticaceae	2	2
20	Commelinaceae	1	1	44	Myrtaceae	2	2	68	Vitaceae	1	1
21	Convolvulaceae	2	3	45	Olacaceae	1	1	69	Verbenaceae	2	2
22	Crassulaceae	1	1	46	Oleaceae	2	3	70	Adiantaceae	1	1
23	Cucurbiataceae	5	5	47	Orobanchaceae	1	1				
24	Cuppressaceae	2	2	48	Oxalidaceae	1	1				

Appendix 3: List of medicinal plants used against human and livestock ailments in then study area

Used (Li=Livestock; Hu= Human; Both=the same preparation and diseses), Condition of preparation (F=Fresh; D=Dried and FD=Fresh & dried). Pu=Ag-abave ground part.

Species Name	**Pu**	**Used**	**Disease treated**	**CP**	**Route**	**Preparation**
Acanthus polystachius	Root	Li	Rabies	F	Oral	Its root with the roots of *Dipsacus pinnatifdus, Justicia schimperiana and Diplolophium africanum* are pounded together and mixed with cold water is given to Dog as vaccine.
Acanthus sennii	Root	H	Evil eye	FD	Dermal oral and nasal	Its root with the roots of *Withania sommifera, Solanecio gigas, Carissa spinarum, Verbena officinalis, Capparis tomentosa, Asparagus africanus, Clausena anisata, Justicia schimperiana, Verbasicum siniaticum, Jusminum grandiflorum, Cucumis ficifolius,* and whole parts of *Artemisia afra, Ruta chalepensis,* Bulb of *Allium sativum* are crushed and powdered then sniffed, drink with coffee cup and fumigated.
	Root	Hu	Athritis/rheumatism	F	Dermal, oral	Crushed and tied; crushed and drunk with honey
	Root	Hu	Tape worm		Oral	Pounded is immersed in water for three days then drunk with fresh water
Acacia abyssinica	Bark	H	Scorpion poison	F	Dermal	Insider part of barks is tied the bited part / poisioned part of human
Achyranthes aspera	Leaf	H	Eye problem	F	Optical	The leaves is pounded and immersed to water and the squeezed is dropped in to eye with cotton
	Leaf	H	Wound	FD	Dermal	Crushed and powdered is tied
	Leaf	H	"Lifie"(wound)	F	Dermal	Crushed & tied at the problematic part (finger tip) with a piece of cloth.
	Root	H	Excessive menstrual flow	F	Oral	Crushed is mixed with water and the decanted is drunk
	Leaf	H	Tonsillitis	F	Dermal	Crushed and tied on neck with cloth
	Root	Li	Bleeding	F	Dermal	Crushed and tied on bleeding part of all animals.
	Root	B	Bone fracture	FD	Dermal	Its root with the roots of *Tragia brevipes, Justicia schimperiana, and Acanthus sennii* are crushed and mixed together & tied with cloth.
	Root	Hu	Bleeding	FD	Dermal	Its root with the root of *Solanum anguivi* are crushed and tied on the bleeding part
	Root	Hu	Tape worm	F	Oral	Crushed and mixed with water then drunk
Acmella caulirhiza	Leaf	Hu	Swelling	FD	Dermal	Crushed and powdered, mixed with honey & tied for three days then with butter same day.
Acokanthera schimperi	Leaf	Hu	Spider poison	D	Dermal	Crushed and powdered is mixed with butter and creamed on wound
	All part	Hu	Hepatitis	D	Dermal nasal and oral	Crushed, dried and the fumigated is took until recovery.
Adiantum capillus-veneris	Root	Hu	Antrax	F	Oral	Crushed is mixed water and drunk with half coffee cup.
	Stem	Hu	Ear wound	FD	Dermal	Stem is inserted to hole of ear until recovery

Appendix 3 continued

Allium sativum	Bulb	Hu	Evil eye	F	Dermal oral & nasal	The same as *Acanthus sennii and Croton macrostachyus*
	Bulb	Hu	Malaria	F	Oral	Crushed and mixed with honey then eat until recovery; Its fruit and the bulb of *Allium sativum* are chopped and smashed together in water for one day and drunk the decanted liquid every morning until recovery; the same as *Cicer arietinum*
	bulb	Hu	Infloenza vires	F	Oral	The fruit juice of *Citrus aurantifolia* mixed with the bulb of *Allium sativum* after crushed is drinking until recovery
	Bulb	Hu	Febril illness	F	Oral	The same as *Erythrina abyssinica*
	Bulb	Hu	Neumonia	F	Oral	Chopped and mixed with honey then eat until recovery
Aloe macrocarpa	Root	Hu	Impotency	F	Dermal	The root is crushed and powdered and mixed with butter and stained the whole part of penis
	Latex	B	Wound	F	Dermal	The latex is creamed on wound of human and cattle until recovery.
Alternanthera pungens	Leaf	Hu	Babies diseases	F	Dermal	The Rubbed and squeezed is creamed on all part of skin
Alysicarpus quartinianus	Root	H	Ascaris	F	Oral	Root is crushed and drunk with milk
Argemone mexicana	Root	Li	Rabies	F	Oral	Root is crushed and given with water to all animals
Artemisia afra	All part	Hu	Evil eye	FD	Oral, nasal &dermal	The unprocessed or crushed , powdered is sniffed; used as *Acanthus sennii*
Asparagus africanus	Root	Hu	Impotency, gonnoria ,& syphilis	DF	Oral	Crushed and infusion with honey for seven days then drunk
	Root	Hu	Iching (likft)	DF	Dermal	Crushed and powdered then creamed with freshed butter
	Root	Hu	Excessive manstrition	F	Oral	Chewed until the flow is stoped
	Root	Hu	Evil eye	DF	Dermal oral and nasal	The same as *Acanthus sennii and Croton macrostachyus*
Astragalus atropilosus	all part	Hu	Iching (likft)	D	Dermal	Whole part is dried and burnt. The ash is mixed with butter and creamed on problematic part of skin.
Bersama abyssinica	Leaf	Hu	Ascaris	FD	Oral	The twig part of leaf is crushed and powdered then boiled with tea and drunk.
Bidens macroptera	Flower	Hu	Brain cancer	D	Nasal	The flower is powdered and insert via nose to treat cancer from brain
Brassica carinata	Seed	Both	Stomach ache& Ant rax	D	Oral	Ground, and drunk mixed with water as well, given to cattle
Bridella micrantha	Bark	Li	Expel placenta	F	Oral	Crushed and give with water
Brucea antidysenterica	Leaf	Hu	Wound & Scabies	D	Dermal	Crushed, mixed with butter and creamed on wound until recovery
	Leaf	Li	Skin rash (Kitign)	D	Dermal	The leaves is crushed, mixed with butter and creamed on for cattle
Buddleja polystachya	Shoot	Hu	Tonsillitis	F	Dermal	Its and *Rhamnus prinordes* shoots are crushed and mix together then put on center of head
	Leaf	Hu	Intestinal parasite	D	Oral	The leaves are crushed in to powdered then mmersed few minuts with tej is drunk

Appendix 3 continued

	Leaf	Hu	Excessive menstrual	F	Vaginal	The leaves is rubbed, soft and take it with new cloth in vaginal until stopped
	Shoot	Hu	Wound	F	Dermal	Crushed and tied with cloth until recovery
Calotropis procera	Latex	Hu	Hemmorrhoids	F	Dermal	Crushed root is mixed with the latexs of *Euphorbia abyssinica & Calotropis procera are creamed;* Latexs of *Euphorbia abyssinica, Calotropis procera* are mixed with the crushed roots of *Cavratica gracillis* then creamed
	lex	Hu	Expel spine, wound	F	Dermal	The latex is creamed on affected part by spine
Calpurnia aurea	Leaf	Li	External parasites (kicham)	F	Dermal	Crushed is used to wash cattles and calves with water until it removed
	Seed	Hu	Diarrhea, Bilharziasis	D	Oral	The ground is pounded with honey and eaten very small amount
	Root	B	Bloody diarrhea (kumegna)	F	Oral	Root is crushed and drink very small amount with water considerably with age and power.
	Seed		Erthroblastosis (shotelay)	D	Oral & dermal	Grounded is drunk very small amount with honey; powdered is tied on neck when fetal reach 4 month up to birth; fruit of *Calpurnia aurea and* root of *Ferula communis* and *Gardenia ternifolia* are cruched & ground is mixed together then tied on neck.
	Leaf	Hu	To expel eye dest particle	F	Optical	The leaves of *Calpurnia aurea, Datura stramonium* and *Cynoglossum coeruleum* are crushed and sequeezed then inserted via ear tube with cotton.
	Root	Hu	Prolonged ebryo	DF	Dermal	The crushed roots of *Euclea racemosa* and *Calpurnia aurea* are tied on spinal column
Capparis tomentosa	Root	Hu	Evil eye	DF	Dermal oral and nasal	The same as *Acanthus sennii & Croton macrostachyus*
	Root	Hu	Diseases epidemic (worershign)	D	Dermal	Its and *Carissa spinarum* roots are burnt and fumigated is taken to prevent diseases epidemic.
Capsicum annuum	Fruit	Hu	Malaria	F	Oral	The same as *Allium sativum*
Carica papaya	Leaf	Hu	Malaria	F	Oral	Crushed is drunk with freshed milk until recovery
	Root	Hu	Cough	F	Oral	Crushed and boiled with tea then drunk
Carissa spinarum	Root	Hu	Evil eye	FDD	Nasal, ora & Dermal	The same as *Acanthus sennii*.and *Croton macrostachyus*
	Root		Diseases epidemic (worershign	D	Dermal oral & nasal	The same as *Capparis tomentosa*
	Root	Hu	Brain tention/stress	D	Nasal	Crushed and taking the fume via nasal
Cavratica gracillis	Root	Hu	Hemorrhoids	F	Dermal	The same as *Calotropis procera*
Celosia trigyna	Seed	Hu	Tape worm	D	Oral	Grounded and drunk with water
Chenopodium murale	Leaf	Hu	Wound	DF	Dermal	Crushed is creamed with butter
	Leaf	Hu	Ear problem	F	Dermal	Its and *Nicotiana tabacum* leaves are rubbed and sequeezed then insert via ear tube

Appendix 3 continued

Cicer arietinum	Seed	Hu	Malaria	D	Oral	Germinated and eaten with bulb of *Allium sativum* until recovery
Cirsium englerianium	Root	Li	Bitr (when hitted)	F	Oral	Crushed is immersed in water & given to cattle
	shoot	Hu	Scabies	F	Dermal	Crushed is roasted then creamed
	Fruit	Hu	Influenza Virus	F	Oral	The same as *Allium sativum*
Citrus aurantium	Flower	Hu	Hypertension	F	Oral	The juice is drunk once a day
Citrus aurantifolia	Fruit	Hu	Wound(kunchir)	F	Dermal	The mixture formed from latex of *Euphorbia tirucalii* , *Ficus vasta* and *Citrus lemon* juice is creamed together
Clausena anisata	Root	Hu	Evil eye	D	Nasal, oral and dermal	The same as *acanthus sennii*
Clematis simensis	Leaf	Hu	Hemorrhoids	F	Dermal	The crushed is tied on affected part
	Leaf	B	Wound	F	Dermal	The crushed is tied until recovery
	Leaf	Hu	Cancer	F	Dermal	Crushed and powdered is creamed with 'hatul'
Clerodendrum myricoides	Leaf, root & seed	Hu	Evil eye & evil sprit	FD	Oral & dermal	Crushed together and powdered is tie on the neck; the stem is used as tooth brush
Crotalaria karagulensis	Leaf	Hu	Iching (likft)	FD	Dermal	Crushed & powdered is creamed with butter
Clutia lanceolata	Root	Hu	Diarrhea	F	Dermal	Crushed is tied on neck region of babies until recovery
	Root	Hu	Bone fracture		Dermal	Crushed is tied on broken part
	Leaf	Li	Bitr(when hitted)	F	Oral	Crushed is mixed with water then given to Goat and Sheep
	Fruit	Hu	Expel ear mites	F	Ear tube	Ground is insert into ear tube until the insect expel out
Coffea arabica	Leaf	Hu	Common cold	F	Oral	Boiled is decanted then drunk
	Fruit	Hu	Diarrhea	F	Oral	Ground is mixed with honey & then eat about one- two spoons per a day until recovery
Commelina latifolia	Leaf	Hu	Wound(Gormit)	F	Dermal	Crushed is tied with cloth until recovery
	Leaf	Hu	Tinia scaplis	D	Dermal	Crushed and powdered is creamed mixed with butter
Convolvulus arvensis	Root	Hu	Impotence	DF	Oral	Crushed and powdered is drunk mixed with gin ('areki')
	Root	Hu	Antrax	F	Oral	Pilled root is chewed & juice is swallowed. It is continues until recovery
Convolvulus sagittatus	Root	Hu	Antrax	F	Oral	Pilled root is chewed & juice is swallowed. It is continues until recovery
Cordia africana	Leaf	Li	Eye- problem	DF	Optical	The burnt leaves's ash is inserted into cattle's eye with butter
	Leaf	B	Fire burn	DF	Dermal	Burnt and the ash is creamed on burnt part of humans, cattle, goat and sheep
	Leaf	Li	Antrax	F	Oral	Crushed is given to cattle mixed with water
	Leaf	Hu	Expel ear mites	F	Ear tube	The Rubbed then sequeezed is inserted through ear tube then cover cotton
Crepis rueppellii	Root	Li	Antrax	F	Oral	Crushed is given to cattle with one two little water
Croton macrostachyus	Leaf	Hu	Intestinal & abdominal problems	F	Oral	Boiled and ground is eaten with 'shirro' ' tef ingera'/ butter every morning until recovery
	Shoot	Hu	Stomach ache	F	Oral	Crushed together with the young leaves of *Justicia schimperiana* is decanted & given to

Appendix 3 continued

						humans especially babies
	Shoot	Li	Bloating	F	Oral	Crushed is given to cattle with water at time of bloating
	Sap	Hu	Ring worm	F	Dermal	The shoot is cutt and the sap is creamed on the problematic part of skin
	Root	Hu	Evil eye	DF	Dermal and oral	With bulb of *Allium sativum* and roots of *Asparagus africanus, Capparis tomentosa and Carissa spinarum* are crushed and powdered together then tied; to prevent the problem, sniffed and drunk small amount at time of problem.
	Root	Hu	Snake poison	F	Oral	Crushed is drunk with one little water
	Bark	Hu	Tape worm	F	Oral	Crushed and pound is decanted and drunk mixed with water
	Young leaf	Hu	Tape worm	F	Oral	Boiled and ground is made wote with butter then eaten with enjera
	Root	Hu	For paralised leg	DF	Dermal	Crushed With roots of *Carissa spinarum* and immersed in water for 10 days then washed all body
Cucumis ficifolius	Root	B	Bloody diarrhea	F	Oral	Crushed is given to humans cattles, goat and sheep mixed with milk.
	root	Hu	Evil eye	DF	Nasal, oral and dermal	The same as *Acanthus sennii*
	Root	Hu	Stomach ach, Antrax	F	Oral	The pilled is chewed and the juice is swallowed/Crushed and drunk with water.
	Root & Fruit	Hu	Evil eye	FD	Dermal, oral	Crushed and tied together with new cloth on neck region. It also used as *Capparis tomentosa* for evil eye
	Fruit	Hu	"Lifie" (wound)	F	Dermal	The affected nail is inserted into the fruits stay until recovery
	Shoot	Hu	Ear-mites	F	Ear tube	Crushed and seqweezed is inserted through ear tube
Cucurbita pepo	Fruit	B	Expel placenta	F	Oral	The fruit chopped and the flesh part is boiled and given to cattle, goat and sheep
		B	Heart and gastritis	F	Oral	The fruit chopped and the flesh part is boiled and ate it at morning without taking other foods before
	Root	Hu	Sterile Females	F	Oral	Chewed and juice is swallowed
Cupressus lusitanica	Leaf	Hu	Tooth ach	F	Oral	Boiled with salt and took it with teeth
Cyathula prostrata	Leaf	Li	Antrax	F	Oral	Rubbed and squeezed is given to cattle mixed with water
Cynodon dactylon	Ag	Hu	Snake poison	F	Oral	Chewed and absorbed
	Young leaf&stem	Hu	Tape worm	F	Oral	Shoots of *Justicia schimperiana, Dodonaea angustifolia, Prunus persica and* stem of *Cynodon dactylon* are crushed and immersed water for seven days then the decanted is drunk
Cynoglossum coeruleum	Leaf	Hu	Febril ilness	F	Dermal and oral	Rubbed and squeezed is creamed the body except heart
	Leaf	Hu	Expel eye dest	F	Optical	The same as *Calpurnia aurea*
	Leaf	Hu	Spider poison	F	Dermal	Crushed and pounded is creamed with butter

Appendix 3 continued

	Leaf	Hu	Wound	F	Dermal	Crushed is creamed
	Leaf	Hu	Eye problem	F	optical	Rubbed and squeezed is inserted one-two droplets
	Leaf	Hu	Ear-mites	F	Anal	Rubbed and squeezed is inserted into ear canal
Cyperus dichroostathyus	Flowers	Hu	Eye-tracomma	FD	Optical	The inflorescence is burnt and creamed with butter
Datura stramonium	Leaf	Hu	Scabies and ear wound	F	Dermal	Crushed and creamed on head
	Leaf	Hu	Expel eye dest	F	Optical	The same as *Calpurnia aurea*
Dichondra repens	Leaf	Hu	Febril ilness	F	Dermal	Rubbed and Squeezed part is creamed all part of body except heart
Diplolophium africanum	Leaf	Hu	Headache	F	Nasal	Unprocesed leaf is sniffed
	Root	Li	Rabies	F	Oral	The same as *Acanthus polystachyus*
Dipsacus pinnatifidus	Leaf	Hu	Rabies	F	Nasal	The same as *Acanthus polystachyus*
Discopodium penninervum	Shoot	Hu	Bitr(when hitted)	F	Nasal, ear	Crushed and given to cattle with water
Dodonaea angustifolia	Leaf	Hu	Scaplis(chiefie)	F	Dermal	Crushed and creamed with butter
	young Leaf & stem	Li	Bone fracture	F	Dermal	The twig part of stem with leaf is tied the broken part of bone of cattle, goat and sheep until recovery
	Root& leaf	Hu	Tape worm	F	Oral	Pounded together and immersed in water for three days then drunk it by diluted with water
	Young leaf&stem	Hu	Tape worm	F	Oral	The same as *Cynodon dactylon*
Dovyalis abyssinica	Fruit	Hu	Hemorrhoids	F	Dermal	The fruit is immersed in water in flat material and sat on it
Dregea rubicunda	Leaf	Hu	Rabies	F	Oral	Crushed and drunk with milk
	Leaf, Bark	Hu	Wound	D	Dermal	Crushed and dried, powdered then dropped until recovery
Dyschoriste radicans	All part	Hu	Somach ach	F	Oral	The whole part is chewed and swallowed
Embelia schimperi	Fruit	Hu	Tape worm	FD	Oral	Row eaten; crushed, is drunk mixed with 'tela difdif'
Eragrostis tef	Seed	Hu	Dandruff (forefor)	D	Dermal	The seed is ground, a dough is prepared then creamed on bare head
	Straw	Li	Bloating	D	Oral	The straw is given to cattle during bloating
Erythrina abyssinica	Bark	Li	Febril ilness	D	Dermal, oral	Crushed and Fumigated the hole body of cattle; powdered is drunk mixed with leaf of *Ruta chalepensis*, bulb of *Allium sativum* with water
Eucalyptus globulus	Leaf	Hu	Febril illness Common cold	F	Dermal nasal and oral	Boiled and fumited the whole body and took the fumes through nasal and mouth
Euclea racemosa	Root	Hu	Scorpion-poison	F	Dermal	The same as *Calpurnia aurea*
	Root	Hu	Gonorrhea	FD	Oral	Boiled, crushed and ate with honey or butter

Appendix 3 continued

	Root	Li	Eye problem	F	Optical	Pilled, creamed with butter for one night and butter is creamed cattle's eye
	Root b ark	Hu	Tootha ache	F	Oral	The root bark is taken with teeth until recovery
	Root	Hu	Prolonged ebryo	DF	Dermal	The crushed roots of *Euclea racemosa* and *Calpurnia aurea* are tied on spinal column
Euphorbia abyssinica	Root	Hu	Jaudice	F	Oral	crushed and immersed in water then drunk/ baked with bread and eaten it
	Root	Hu	Stomach and intesti nal (ejeseb)	F	Oral	Crushed, mixed with doro wotte then eaten by enjera
	Latix	Li	Rabies	F	Oral	Mixed with milk and given to dog
	Latix	Hu	Malaria	F	Oral	mixed with the prepared *Eragrostis tef* dough and backed together and eaten it
	Latix	Hu	Hemorroids	F	Dermal	Mixed with latex of *Calotropis procera* and *Euphorbia tirucalii;* The same as *Calotropis procera*
	Flower	Hu	Skin diseses	D	Dermal	Crushed , powdered and mixed with honey then creamed the affected skin
Euphorbia tirucalii	Latix	B	Wound	F	Dermal	Latex is creamed on the wound of human and donky
	Latex	Hu	Hemorroids	F	Dermal	The same as *Euphorbia abyssinica*
	Latix	Hu	Wound(Kunchir)	F	Dermal	The same as *Citrus lemon*
Ferula communis	Root	Li	Increase sexual need s	F	Oral	Pounded then given to cows with a creamed ingera with butter
	Root	Hu	Evil sprit	DF	Dermal	Crushed and fumigated the whole body
	Root	Hu	Blood flow (Serakia n)	F	Oral, der mal	Crushed and water diluted is spriy the house and given to new born mother to drink
	Root	Hu	Lung canser(TV)	F	Oral	Crushed and drunk mixed with water
	Root	Hu	Erthroblastosis (serakiyan	DF	Dermal	The same as *Calpurnia aurea*
	Root	Hu	Impotence	F	Oral	The same as *Verbena officinalis*
Ficus carica	Latix	Hu	Wound	F	Dermal	Creamed on the wound
Ficus sur	Bark	Hu	Toothache	FD	oral	Taken with teeth
Ficus vasta	Latix	Hu	Wound	F	Dermal	The same as *Citrus lemon*
Foeniculum vulgare	Ag	Hu	Cough,	F	Oral	Boiled with tea and drunk until recovery
	Leaf & stem		Asma	F	Oral	Crushed and immersed with milk then drunk
	Leaf& stem	Hu	Urinary retention	F	Oral	Boiled and cooked then drunk it.
Gardenia ternifolia	Root	Hu	Erthroblastosis (serakiyan	DF	Dermal	The same as *Calpurnia aurea*
Gossypium barbadense	Root	Hu	Snake bite	DF	Dermal, o ral	Took with hand or tied with neck and chewed absorbed in wards
	Fruit	Hu	Tonsilities	D	Oral	Ground and drunk the liquid with coffee cup

Appendix 3 continued

Grewia ferruginea	Bark	Li	Expel placenta	F	Oral	Pilled the insider part and chopped emilizifyed then given to cattle, gaot and sheep.
	Bark	Hu	Dandruf	F	Dermal	Washed with insider part of bark
Guizotia schimperi	Root	Hu	Stomach ache	F	Oral	Chewed and sallowed the liquid
	Ag	Li	Wound(Kobsh)	F	Dermal	Rubbed after removed the tik on cattle until recovery
Helinus mystacinus	Leaf	Hu	Fire burn	F	Dermal	Crushed and tied with cloth on the burnt part.
Heteromorpha arborescens	Root	Hu	Snake bite	F	Oral & de rmal	Chewed and absorb liquid and swallow ed/tied it on the neck to prevent bite.
Hibiscus macranthus	Leaf	Hu	Wound	F	Dermal	Chewed and creamed with cotton.
Huernia macrocarpa	Ag	Li	Undefined	F	Oral	Chopped and given to cattle/chopped, bake with blake barly then give to cattle for general health problem
Hypericum quartinianum	Root	Hu	Urinary problem	D	Oral	Crushed and powderd then eaten with honey.
	Young leaf	Hu	Stomch ache	F	Oral	Chewed and liquid is absorbed and residue is spitted
Indigofera arrecta	Root	Hu	Snake bite	F	Oral	Chewed and absorb the juice
Indigofera prieureana	Root	Hu	Antrax, Stomach ach	F	Oral	Chewed swallowed juice; well crushed and given with water
Juniperus procera	Fruit	Hu	Urinary retantion	DF	Oral	Boiled with tej then drink
	Gum	Hu	Scrotum swelling	F	Dermal	Creamed on swell scrotum and penise
Jasminum abyssinicum	Root	Hu	Tooth ache	F	Oral	Taken with teeth until recovery
	Shoot	Hu	Snake bite	F	oral	Finely crushed and drunk with water
Jasminum grandiflorum	Root	Hu	Evil eye	FD	Oral,derm al	The same as *Acanthus sennii*
Justicia schimperiana	Leaf	Hu	Wound(Gormit)	DF	Dermal	Crushed , powdered and creamed on wound(gormit until recovery
	Leaf	Li	External pararsit(kic ham)	F	Dermal	The leaf is directly used to wash cattle with water
	Shoot	Hu	Antrax	F	Oral	Well crushed and mixed with water then drink
	Leaf	B	Diarrhea	F	Oral	Smashed and mixed with water then drink. It is for humans and cattles
	Leaf	Hu	Common cold hasm a	F	Nasal	Rubbed or unprocessed is snaffed until recovery
	Leaf	Hu	Jaundice	F	Dermal, nasal	Boiled and fumigated the whole body and taken fumes through nasal. Repited untile recovery.
	Young leaf&st em	Hu	Tape worm	F	Oral	The same as *Cynodon dactylon*
	Root	Hu	Evil eye	DF	Nasal, ora l and derm al	The same as *Acanthus sennii*
	Root	Li	Rabies	F	Oral	The same as *Acanthus polystachyus*

Appendix 3 continued

	Youn leaf	Hu	Stomach ache	F	Oral	The same as *Croton macrostachyus*
Kalanchoe laciniata	Root	Li	Unspecified-awrd)	F	Dermal	The root is pilled and tied with piny ropes then inserted through skins around neck
	Ag	Li	Swelling (bilda)	F	Dermal	The stick is heated and emidatly applied on swell part of cattle
	Root	Li	Febril illnes	F	Oral	Crushed and given to cattle with water when the tite is in problem
	All parts	Hu	Tape worm	F	Oral	All parts are boiled with cotylodens of *Cicer arietinum* and the cotyledons are eaten after process/leaf is crushed and mixed with butter and drink it
Lactuca intermis	Root	B	Bone broken	DF	Dermal	The root is tied on the broken part of humans and cattle , sheep, goat
	Root	Hu	Amoeba	F	Oral	Chewed and swallowed and reapted application is done until recovery
	Latix	B	Tick bited wound	F	Dermal	Creamed after the ticke removed from the body of human and other animals
Laggera tomentosa	Leaf	Hu	Swelling	DF	Dermal	Rubbing and tied on swelled part or dry and crushed , mixed with honey lemone then half of the lemon fruit is tied
Laggera crispata	Leaf	Hu	Gastrics,stomach ac he	F	Oral	Chewed and swallowed the juice untile recovery
	Leaf	Hu	Tape worm	F	Oral	Crushed mixed with freshed water then drunk
	Root	Hu	Serakian(stop blood flow -new born mot her)	F	Dermal	Crushed and immersed in water then spriy on new born mother
	Leaf	Hu	Fire burn	F	Dermal	Rubbed and seqweezed the creamed with cotton
Leonotis ocymifolia	Root	Hu	Snake bite	F	Dermal	Crushed and tied on bited part part of the body
Leucas martinicensis	Ag	Hu	Prevent diseases relapsation	DF	Dermal	Fumigated the whole body of humans
Linum usitatissimum	Root	Hu	Wound(Gormit)	D	Dermal	Crushed , mixed with honey then creamed untile recovery
Maesa laceolata	Fruit	Hu	Woump	D	Vaginal	Roasted, ground and mixed with butter then creamed after washed quenscontly untile better
Malva verticillata	Ag	Hu	Scablis(lify)	DF	Dermal	Crushed , powdered and tied on the effected part
Melia azedarach	Leaf	Hu	Dandruf	F	Dermal	The crushed and creamed on bare infected head and feet untile recovery
	Leaf	Hu	Anti-insectiside	DF	Dermal	Crushed and powdered, mixed with water and sprited the house
Millettia ferruginea	Leaf	Li	leaches	F	Oral	Crushed and given with mixed water
	Young stem	Li	Rabies	DF	Dermal	Hited the right side cattle with stick of *Millettia ferrugineay and Brucea antidysenterica* for about seven days
Mimusops kummel	Fruit	Hu	Anti-hasma	F	Oral	Eaten raw fruit untile recovery
Momordica foetida	Leaf	Hu	Diarrhea, gonorrhea	F	Oral	The Pounded and sequeezed leaf is drunk
	Leaf	Hu	Tonsilities	F	Oral	The pounded is sequeezed and drunk
	Leaf	Li	Sun stroke	F	Oral	Crushed and given with water for donky
	Leaf&r oot	Hu	Evil sprit	F	Dermal	Boiled and fumigated the fume

Appendix 3 continued

Myrica salicifolia	Bark	Hu	Common cold, bleed ing	FD	Nasal	Crushed and powdered and sniffed untile recovery
	Bark	Li	Eye-problem	FD	Optical	Crushed and powdered and intered the powdered in to cattle eyes
Nicandra physalodes	Leaf	Hu	Fire burn	F	Dermal	Crushed and mixed with butter then creamed on affected part
Nicotiana tabacum	Leaf	Hu	Wound (bugige, bukiza)	D	Dermal	Crushed and powdered then apply on affected part of the body
Nuxia congesta	Shoot	Hu	Tonsilities	F	Oral and dearmal	Rubbed and seqeezed then drink. The sedments are put on center of head
Ocimum urticifolium	Leaf	Hu	Febril illness	F	Oral	Boiled with tea and drunk until recovery
	Leaf	Hu	Common cold	F	Oral	Boiled with tea and drunk until recovery
Olea europaea supsp. *cuspidata*	Leaf	Hu	Tonsilities	F	Oral	Three leaf are chewed and absorb inwards which is continued after recoverty
	Youn stem	Hu	Evil eye	F	Dermal	Hitted with it at time of diseases/ cases
	Leaf	Hu	Eye dieases	F	Optical	Leaf pounded and sequeezed then dropped with cotton.
	Leaf	Hu	Deafness(ear)	F	Ear	Its leaf and leaves of *Ruta chalepensis*, *Solanecio gigas* are crushed and powdered then little is dropped with food oil.
Ormocarpum pubescens	Leaf	Hu	wound	DF	Dermal	Crushed and powdered then tied on affected part
Orobanche ramosa	All parts	Li	Sunstroke	D	Dermal	Fumigated all body of donkey
Otostegia integrifolia	Ag	Hu	Diseases epidemic c ommon cold	D	Dermal	Fumigated the house with the leaf
	Ag	Li	Coccolida (hen)	D	Dermal	Fumigated the hens
	Shoot	Hu	Stomach ache	F	Oral	Rubbed and the seqeezed liquid is drunk
Pentas lanceolata	Leaf	Li	Tite problem	F	Dermal	Crushed, powderd and creamed the tite
Periploca linearifolia	Stem	Hu	Hemoroid	F	Dermal	Heated with fire then emidatly apply on affected organs
	Root	Hu	Hemmoroids	F	Dermal	Crushed and tied the leaf on affected organs
Persea americana	Leaf	Hu	Kidney infection	F	Oral	Boiled and the liquid portion is drunk until recovery
Phyllanthus rotundifolius	Latex	Hu	Ring worm(aguagot)	F	Dermal	Latex is extracted and creamed on the affected part
Phytolacca dodecandra	Leaf	Li	leaches	F	Nasal	Digested and insert through nasal for cattle until it expel
	Leaf	Hu	Jaundice	F	Oral	Digested and drunk half nail size with water
	Leaf	Li	External parasite(kic ham)	F	Dermal	Unprossed leaf used to wash cattles
	Root	Li	Rabies	F	Oral	Crushed, mixed with milk then given to dog in order to avoid contamination
	Leaf	Hu	Elephantiasis	F	Dermal	Crushed , decaned, and insert three drops in swelled leg
	Root	Hu	Malaria	F	oral	Crushed and sequeezed and drunk a little
	Shoot	Hu	Antrax	F	Oral	Shoot is crushed and mixed with water then drunk

Appendix 3 continued

	Root	Li	Coccinia(fen)	F	Oral	Crushed and immersed in water and leave it to drink in dunp
Plantago lanceolata	H	Hu	Wound &bleeding)	DF	Dermal	Crushed and powdered then creamed or dropped until recovery
Plectranthus tenuiflorus	All part	Hu	Weakenbabies (kisat), evilsprit	DF	Oral	Digested and powdered then given to babies and childrens with water
Plumbago zeylanica	Root	Hu	Wound	DF	Dermal	The crushed form of Its root and leaf of *Dodonaea angustifolia,* with latex of *Calotropis procera* are mixed together then creamed on wound.
	Leaf& root	Hu	Stomache ache, scorpion poison	F	Oral	Crushed and drunk with water
Premna schimperi	Leaf	Li	Eye problem	F	Optical	Chewed and spit in to the cattle's eye.
	Bark, Leaf	Hu	Chifie	D	Dermal	Crushed and powderd then creamed with butter or honey.
	Root	Hu	Toothache	F	Oral	Chewed and taken with teeth in mouth
Prunus persica	Leaf	Li	Diarrhea	F	Oral	Crushed and immersed in water for few minuts and then given to calf.
	Young leaf&st em	Hu	Tape worm	F	Oral	The same as *Cynodon dactylon*
Punica granatum	Fruit	Hu	Canser & skin disea ses	F	Oral	Crushed and eaten until recovery.
Rhamnus prinoides	Sh	Hu	Tonsilities	F	Oral	Crushed and drink mixed with water
	Leaf	Hu	Herpes (almaz-balec hira)	F	Dermal	Ground and creamed on wound
Ricinus communis	Fruit	Li	Calf diarrhea	F	Oral	Divided and pounded then creamed on teat of cow to used at time sucking
Rosa abyssinica	Fruit	Hu	**Dibrt**	F	Oral	Eaten the row fruit
Rubia cordifolia	Root, Leaf	Hu	Cough	F	Oral	Root and leaf are crushed and boiled with leaf of *Citrus lemon* then Drunk with tea or coffee
Rumex abyssinicus	Root	Hu	Hypertation	DF	Oral	Pounded and powdered then drunk with milk
Rumex nepalensis	Root	Hu	Tonsilities, diarrhea	DF	Dermal	Crushed mixed with water and drunk and small amount is tied on neck with out prosesing
	Root	Hu	Stomach ache	DF	Oral	Root is chewed and juice is swallowed
	Root	Li	Antrax	F	Oral	Crushed and given with water for cattles
Rumex nervosus	Leaf	Hu	Wart	F	Dermal	Rubbed, sequeeezed then creamed
	Leaf	Hu	Bleeding wound	F	Dermal	Pounded then tied
Ruta chalepensis	Leaf	Hu	Evil eye	DF	Oral, Der mal	The same as *Acanthus sennii*
	Leaf	Hu	Febril ilness	F	Oral	The same as *Erythrina abyssinica*
Sansevieria erythraeae	Stem	Hu	Ear wound	F	Ear hollo w	Heated, pounded, seqeezed and cooled is inserted via ear hollow
Schefflera abyssinica	Bark	Hu	Snake poison	F	Oral	Crushed and infusion is drunk
Schinus molle	Fruit	Hu	Cough	DF	Oral	Pounded, cooked in 'dorro wote' is eaten with tef engera

Appendix 3 continued

	Leaf	Hu	Wound	F	Dermal	Pounded leaf is tied on wound
Senna didymobotrya	Leaf	Hu	Bloating	F	Oral	Crushed and given with water
Sida ovata	Root	Hu	Fire burn	F	Dermal	liquid Pounded from root is held on wound with cotton
Sida rhombifolia	root	Hu	Impotence	F	Oral	The same as *Vernonia myriantha*
	Leaf	Hu	Wound	F	Dermal	Crushed and cover the wound
Sida tenuicarpa	Leaf	Hu	Wound	F	Dermal	Crushed and tied
	Root	Hu	Evil sprit &evil eye	DF	Oral, Dermal	Used as tooth brush; tied on neck
Solanecio gigas	Leaf	Li	Bloating	F	Oral	Pounded and given with water
	Root	Hu	Evil eye	DF	Nasal, oral and dermal	The same as *Acanthus sennii*
Solanum anguivi	leaf	Hu	Wound	DF	Dermal	Crushed and pounded is tied
	Fruit	Hu	Wart	F	Dermal	Juice from the fruit is creamed
	Root	Li	Hitted (Bitr(when hitted))	F	Oral	Crushed and infution is given to cattles
Solanum incanum	Root	Hu	Stomach ache	F	Oral	The crushed and chewed is absorbed and residue is spited
	Fruit	Hu	Ring worm(aguagot, chiret)	F	Dermal	The Brest heated fruit is creamed
	Fruit	Hu	Wart	F	Dermal	Juice from the fruit is cramed
	Leaf	Hu	Kumat	F	Dermal	Pounded and tied on symptematic part
	Fruit	Li	Leaches	F	Nasal	Juice is inserted in to cattle's nasal
	Root	Hu	Diabetic	F	Oral	Chewed and swallowed
	Root	Li	Febrile ilness	F	Oral	Pounded and given to cattle
	Fruit	Hu	Wound	F	Dermal	The juice is creamed
	Fruit	Hu	Scorpion poison	F	Oral	The juice is drunk mixed with water.
Solanum marginatum	Fruit	Li	Cough	F	Nasal	Teared and juice is geven to cattle with goat milk
Solanum nigrum	Leaf	Hu	Spider poison	F	Dermal	Crushed, squeezed and creamed
	All part	Hu	Hemmorroids	DF	Dermal	Pounded and tied
	Leaves	Hu	Diarrhea	F	Oral	Crushed, chewed & juice is swallowed. It is continues until recovery.with *Zehneria scabra*, *Solanum nigrum* is then drunk.
Steganotaenia araliaceae	Stem	Hu	hemmorroids	DF	Dermal	Pilled and the apex is heated and applied it on wound
Stephania abyssinica	Root	B	Antrax	F	Oral	Crushed and given to cattle and humans with water
	Root	Hu	Antrax;stomach ache	F	Oral	Chewed and swallowed
	Root	Hu	Rabies	F	Oral	Crushed and given to dogs and Cattles with milk and water
	Shoot	Hu	Tonsilities	F	Oral	Crushed and drunk with water; Craemed alone on neck region

Appendix 3 continued

Stereospermum kunthianum	Bark	Li	Eye	DF	Oral	Its bark and leaf of *Plantago lanceolata* crushed and powdered then Creamed the with butter cattle.
	Bark	Hu	Scorpion, snake poison	F	Dermal	Pounded, tied and chewed
Striga hermonthica	All parts	Li	Bloating	DF	Oral	Crushed and powdered and given to cattle
Syzygium guineense	Bark	Hu	Diarrhea	F	Oral	Crushed and drunk with water
Thalictrum rhynchocarpum	Root	Hu	Scrotum swelling	F	Dermal	Crushed and drunk with tella
	root	Hu	Impotence	F	Oral	*The same to Verbena officinalis*
Tragia brevipes	Root	Hu	Swelling	F	Dermal	Pounded and tied with picese of cloth
	Root	Hu	Impotence	F	Oral	The same as *Verbena officinalis* and *Vernonia myriantha*
Urera hypselodendron	Shoot	Li	Antrax	F	Oral	Crushed and given with water
Urtica simensis	Leaf	Hu	Gastrics	F	Oral	Roasted and ground is drunk
	Leaf	Hu	Chifie(wound)	F	Dermal	Ground and creamed with butter
Verbasicum sinaiticum	Root	Hu	Stomache ache	F	Oral	Pounded and drunk with honey or water or d butter
	Root	Hu	Diarrhea	F	Oral	Crushed and drunk with water
	Leaf	Hu	Evil sprit	F	Dermal	Boiled with new pot and fumigated the fume
	Root	Hu	Evil eye	DF	Nasal, oral and dermal	The same as *Acanthus sennii*
Verbena officinalis	Root	Hu	For bleeding	F	Dermal	Crushed and tied with pieces of cloth
	Ag	Hu	Evil sprit, 'egeseb'	DF	Oral	Crushed and drink with water
						The same as *Acanthus sennii*
	All part	Hu	Tonsilities	F	Oral	Crushed and drunk with water
	Root	Hu	Impotence	D	Oral	The crushed roots of *Verbena officinalis, Tragia brevipes, Withania sommifera, Thalictrum rhynchoarpumm* and *Ferula communis* are crushed and pounded the drunk with honey.
	Leaf	Hu	Deafness	F	oral	Pounded is inserted ear tube mixed with water
	Root	Hu	Stomach ache, Antrax	F	Oral	Chewed and swallowed
Vernonia adoensis	Root	Hu	'Likfit'	F	Deramal	The crushed and powdered root is creamed mixed with butter on the affected part
	Root	Hu	Amoeba, Snake poison, Gardiasis and Gastrics	F	Oral	Crushed and powdered root is drunk with water; root is chewed and juice is swallowed.
Vernonia amygdalina	Leaf	Li	Bloating	F	Oral	Crushed and given with water
	Leaf	Hu	Dandruf	F	Dermal	Pounded is creamed head and leg fungus
	Root	Hu	Impotence	F	Oral	The same as *Vernonia myriantha*
Vernonia myriantha	Root	Hu	Impotence	DF	Oral	Crushed, pounded and infution of form of *Tragia brevipes, Sida rhomlifolia and Vernonia amygdalina* are drunk with 'Tella'.

Appendix 3 continued

Vicia faba	Seed	Hu	Anema	D	Oral	Seed is roasted and infution is drunk
Withania somnifera	Leaf & root	Hu	Evil eye & evil sprit	DF	Oral	Crushed and drunk with water; Fumigate the fume
	Leaf	Hu	Tape worm, babies ilness	DF	Dermal	Fumigated is applied in a closed fashion
	Leaf	Hu	Cough	F	Oral	Crushed and drunk after boiled with milk
	Root	Hu	Impotence	F	Oral	The same as *Verbena officinalis*
Xanthium strumarium	Leaf	Hu	Dandruf	F	Dermal	The Rubbed and sequeezed leaf is creamed on head
Ximenia americana	Bark	Hu	Wound	DF	Dermal	Crushed, ground and creamed
Zea mays	Straw	Hu	Babies Dandruf	F	Dermal	Burn the the spadix and the ashe is creamed with Butter.
Zehneria scabra	leaf	Hu	Swelling	F	Dermal	Crushed and tied on swelled part
	Ag	Li	Wound	F	Dermal	Rubbed and creamed on the wound of cattle.
	Ag	Hu	Febril illness	F	Dermal	Boiled and the fume is taking in inclosed fashion
	Leaf	Hu	Diarrhea	F	Oral	The same as *Solanum nigrum*
Ziziphus spina-christi	Leaf	Hu	Dandruf	F	Dermal	Pounded and creamed on head until recovery

Appendix 4: List of wild food plants in the study area

No	**Scientific name**	**Parts used**	**Mode of consumtion**
1	*Acanthus sennii*	Flower juice	Raw, sucking
2	*Acacia abyssinica*	Gum	Raw, chewing
3	*Carissa spinarum*	Fruit	Raw, Chewing, rippen
4	*Coccinia abyssinica*	Tuber	Cooked
5	*Cordia africana*	Fruit	Raw, rippen
6	*Cynodon dactylon*	Gum	Raw, chewing
7	*Dovyalis abyssinica*	Fruit	Raw, rippen
8	*Embelia schimperi*	Fruit	Raw, rippen
9	*Ferula communis*	Stem (twig part)	Rubbing, pilled, and chopped is eaten alon or with the raw fruit of *Rhus vulgaris.*
10	*Ficus sur*	Fruit	Raw, rippen
11	*Ficus sycomorus*	Fruit	Raw, rippen
12	*Ficus vasta*	Fruit, gum	Raw, rippen; chewing
13	*Gardenia ternifolia*	Fruit	Raw, rippen
14	*Grewia ferruginea*	Fruit	Raw, rippen
15	*Lycopersicom esculentum*	Fruit	Raw, rippen
16	*Mimusops kummel*	Fruit	Raw, rippen
17	*Opuntia ficus-indica*	Fruit	Raw, rippen
18	*Oxalis latifolia*	All part	Raw
19	*Physalis peruviana*	Fruit	Raw, rippen
20	*Pterolobium stellatum*	Gum	Raw, chewing
21	*Rhus vulgaris*	Fruit	Raw, ripen alon or like *Ferula communis*
22	*Rosa abyssinica*	Fruit	Raw, rippen
23	*Rubus apetalus*	Fruit	Raw, rippen
24	*Rumex abyssinicus*	Stem-twig part	Raw, Pilled
25	*Rumex nervosus*	Stem-twig part	Raw, pilled
26	*Senna petersiana*	Fruit	Raw, absorbing
27	*Solanum nigrum*	Fruit	Raw, rippen
28	*Syzygium guineense*	Fruit	Raw, rippen
29	*Ximenia americana*	Fruit	Raw, rippen

Appendix 4 continued

30	*Ziziphus spina-christi*	Fruit	Raw, ripen
31	*Lantana trifolia*	Fruit	Raw, rippen
32	*Phoenix reclinata*	Fruit	Raw or after putting straw, rippen
33	*Capparis tomentosa*	Fruit	Raw, rippen

Appendix 5: list of twenty top diseases in audits at Libo-Kemkem Wereda in 2010

No.	**Type of diseases**	**No.of patients**	**% from 10 diseases**	**% from all diseases**
1	Malaria clinical without lob-confirmation	57755	48.7	44.5
2	Intestinal Helminithiasis	1019	6.4	5.8
3	Pneumonia	804	5.05	4.6
4	Other unclassified diseaese	800	5	4.59
5	diarrhea	656	4.12	3.76
6	AURTI (acute Upper R/T infection	627	3.94	3.6
7	Acute bronchitis	544	3.4	3.12
8	Dyspepsia	427	2.68	2.45
9	Infection of skin and sub cutanus	423	2.65	2.43
10	Other or unspecified Gasrruintina	393	2.47	2.26
11	Malaria clinical and lab confirmation	367	2.28	2.00
12	Tonsil pharyngifies	349	2.19	1.72
13	Diarrhea with blood dysentery	300	1.88	1.5
14	UTI (Urinary tract infection)	263	1.65	1.39
15	infection of muscle and ions	243	1.5	1.28
16	ear infection and Maturities	224	1.4	1.26
17	Eye infection other than tracomma	221	1.8	1.26
18	anemia	219	1.37	.88
19	Trachoma	154	.96	.72
20	Dental and Gum diseases	125	.78	.906
	total 20 diseases	15910	100	100
	Total of all diseases	17407		100

Source: LiboKemkem Woreda Health Office 2010

Appendix 6. List of key informants consulted during ethnobotanical study of medicinal and wild food plants in and around Tara-gedam and Amba Forests

No.	Name	Villages	Sex	Age	Marriage status	Religious	Educational status	Occupation
1	Takele Adafrie	Addis Zemen	M	40	Married	Orthodox	Diploma	Worker inA/z Kebele 03
2	Sheh Yenus Neja	Addis Zemen	M	51	Married	Orthodox	6th	Healer
3	Amare Asfaw	Addis Zemen	M	82	Married	Orthodox	Cherch education (diakon)	Healer
4	Dems Tegene	Addis Zemen	M	57	Married	Orthodox	Cherch education (diakon)	Healer
5	Tibebu Nega	Addis Zemen	M	31	Married	Orthodox	8th, Chrch education(merigieta)	Healer
6	Tesfaye Desie	Addis Zemen	M	46	Married	Orthodox	5th	Worker in preparatory school
7	Melese Asnakew	Addis Zemen	M	19	Single	Orthodox	8th	Constraction worker
8	Kindie Alem	Kualla	M	62	Married	Orthodox	4th	Farmer
9	Ewket Tigabu	Kualla	M	60	Married	Orthodox	Cherch education (diakon)	Farmer
10	Misganaw walle	Kualla	M	37	Maried	Orthodox	Could not write and read (illiterate)	Farmer
12	Gedefaw Molla	Mantogera	M	44	Married	Orthodox	4th	Farmer
13	Zewdie Bogale	Agamoch	F	54	single	Orthodox	Could not write and read (illiterate)	House wife
14	K/Mullualem Ante	Agamoch	M	73	Married	Orthodox	Cherch education (KES)	Farmer
15	Tadese Muche	Kidane-Mihret	M	55	Married	Orthodox	4th	Farmer
16	Nigus Mersha	Kidane-Mihret	M	60	Married	Orthodox	4th	Farmer
17	Firew Mollalgn	Kidane-Mihret	M	52	Married	Orthodox	4th	Farmer
18	Aba Welde Teklehaymanote	Tibabosgie	M	75	Single	Orthodox	Cherch education	Munk
19	Bimeraw Mekonene	Aguat-mafsesha	M	65	Married	Orthodox	Could not write and read (illiterate)	Farmer
20	Alemittu Mulatu	Aguat-mafsesha	F	27	Married	Orthodox	Could not write and read (illiterate)	House wife
21	K/ Biheyes Bisate	Aguat-mafsesha	M	48	Married	Orthodox	Cherch education	Farmer
22	Meharie Mesfin	Addis Zemen	M	50	Married	Orthodox	Cherch education	Healer
23	Baye Bogale	Mantogera	M	45	Married	Orthodox	Could not write and read (illiterate)	Farmer
24	k/ Adugna Miteku	Washa	M	70	Married	Orthodox	Cherch education (Kes)	Farmer
25	Asmra G/ Mariam	Washa	M	20	Single	Orthodox	Could not write and read (illiterate)	House wife
26	k/ Mebrate Mitku	Washa	M	75	Single	Orthodox	Church education (Kes)	Farmer
27	M/kidane Mariam Melaku	Addis Zemen	M	29	single	Orthodox	Cherch education (Merigieta)	Healer
28	Yeshambel Mulatu	Asiba	M	36	Married	Orthodox	Could not write and read (illiterate)	Farmer
29	Dagnew Getahun	Asiba	M	82	Married	Orthodox	Could not write and read (illiterate)	Farmer
30	Gebre medihne	Yifag-Akababi	M	80	Married	Orthodox	Cherch education (Merigieta)	Healer
31	Nigusie Achenef	Yifag-Akababi	M	65	Married	Muslim	Kuran	Healer

Appendix 6 continued

32	Yalganesh Ahmed	Yifag-Akababi	M	74	Married	Orthodox	Could not write and read (illiterate)	Healer
33	Tiget Beyene	Mantogera	F	48	Married	Orthodox	Could not write and read (illiterate)	House wife
34	Bihonegn Azeze	Agamoch	M	35	Married	Orthodox	2th	Farmer
35	k/ Alemu Birhane	Tibabosgie	M	75	Married	Orthodox	Cherch education (Kes)	Farmer
36	Simagn Ayalew	Tibabosgie	F	23	Married	Orthodox	3rd	House wife
37	Melkamu Endalew	Abuara	M	65	Married	Orthodox	4th	Farmer
38	Mihrate Endalew	Abuara	M	67	Married	Orthodox	Could not write and read (illiterate)	Farmer
39	Yohanes Molla	Abuara	M	25	Married	Orthodox	Cherch education (Merigieta)	Healer
40	Yirdew Wudu	Lomiye	M	56	Maried	Orthodox	Could not write and read (illiterate)	Farmer
41	Taklo Ferede	Lomiye	M	58	Married	Orthodox	Could not write and read (illiterate)	Farmer
42	Berie Beyene	Lomiye	M	72	Married	Orthodox	Could not write and read (illiterate)	Farmer
43	Wondifraw Negash	Abay	M	71	Married	Orthodox	Could not write and read (illiterate)	Farmer
44	Tadese Negash	Abay	M	74	Married	Orthodox	Could not write and read (illiterate)	Farmer
45	Bihonegn Wondifraw	Abay	M	40	Married	Orthodox	Could not write and read (illiterate)	Farmer

8. Appendix 7. Format for collecting ethnobotanical data using a checklist of questions to conduct Semi-structured interviews for Medicinal and Wild edible plants

General information

1. Date……residence area(village)……..Keble code…….
2. Name of respondent ……..sex……age……..serial no……

2.1 Marital status…….occupation (main Job)……..

2.2 Religion: orthodox……..protestant……..Muslim……others…..

2.3 For how long have you lived in the area? A. Since birth, B. for the last 20 years, C. for the last 10 years, D. for less than 10 years

2.4 Educational background (what is the last grade you attended?)……

Ethnobotanical data for medicinal plants

3. List the traditional way of classifying forests (vegetation), landscapes and the soils in your area: Vegetation, Landscape and Soil
4. What are the most common diseases of humans and livestock's in your area?
5. How do people prevent and control a given disease in the area?
6. Mention plants used to treat human, livestock and both human and livestock diseases as well as wild food in your area?
7. Where do these plants grow? (From where you obtain it?)
8. What is the habit of the plant? Tree (T), shrub(s), herbs(h),hemi parasite(hp), grass(g), Climber (CL), liana (LI)….. .
9. What is the most common habitats of a given medicinal and wild food plants?
10. What part/s of the medicinal and wild food plant(s) is/are used? leaf(l), roots (Tuber(Tu) Rhizome (r) and corms (co)), bark(K),Stem(St), Flower(Fr),Fruit(Fr), Seed(Sd), Sap(Sp) Latex(Lt), (Wp) Nectar(N) Twig(T), (Ri), Inflorescence(In) or Whole plant.
11. What is the method of preparation of the medicinal plants?
    Fresh (F), Dried (D), Crushed(c), Powdered (P), Used alone (Ua), Mixed with others or water (Mw), Exudation (Ex), Concoccation (Ca)
12. Would you explain the details for preparation of the remedies?
13. How are the prepared remedies taken by the patient(s)/ route of administration?
14. Dermal (D), Oral (O), Nasal (N), Ear (E), Anal (A), Vaginal (V)……

15. How is the mode of consumption of wild foods? Fresh, cooked, after putting in other some place for some times, after piling, washed with water, specify?
16. Dosages: does the medicine and wild food vary among age groups, sex? If yes, state for each_Are there conditions (example like pregnancy, menstruation…) forbids the patient taking the medicine and wild food?
17. Is there any side effect of the medicine and wild food? If yes, is there any antidote for the side effect?
18. Are there any taboos associated with medicinal and wild foods plant use and utilization of medicinal plants? (Time of collection, method of collection, sex, age, storage etc.). What do the taboos imply? (if any)
19. Which plant species are used to medicinal and as wild foods throughout the year? If so which part(s) uses
20. Are there any division of wild food plants like famine foods, non-famine foods etc. in your areas
21. Which members of the community use the medicinal as well the wild food plants frequently?Why?
22. Are the medicinal and wild food plants marketable? If so

22.1 Which age groups sell and exchange them most often?

22.2 Which plant species are more common on the market

22.3 Where are their sources?

23. What are their benefits?
24. Are the medicinal and wild food plants easily accessible? If not, why?
25. What do the trend of their accessibility look like as compared to past ten years? Why?
26. How is the knowledge of medicinal and wild food plants use to transfer in elders to the young generation
27. Is there any interference between modernization and traditional medicinal and wild food plant use in the area? If so how does the modernization interfere with traditional medicinal system?
28. Which plant species are the most preferred in their uses as medicinal /wild food and why?
29. Are there community members who frequently depend more on traditional medicinal and wild edible plants as compared to modern medicine and cultivated foods? Why?

30. Are there treats to medicinal and wild food plants? If so what are the major problems associated with them in the area? How the medicinal and wild food plants conserve/ preserved in the area? (If any)
31. Are there traditional medicinal and wild food plants conservation methods in the area? If so mention the management practices by the indigenous people.
32. Are there any plants used as both medicinal and wild foods and any other purpose in the area?

Appendix 8: Checklist of semi-structured interview question for collecting ethnobotanical data from local market place

I. General information

1. Information on vendor:

Date of interview_____ Kebele _____

Location of market place_____

Name of interviewer_____

Name of respondent_____

Gender: M _____ F_____, Age _____, Ethnicity _____

Religion: Orthodox _____ Muslim_____ Protestant_____ other_____

Educational level_____, marital status _____

Type of vendor_____, Permanent_____, Temporary_____

How often do they sell here? _____

II Ethnobotanical Data

2. Which medicinal plants species is commonly use to treats for both human diseases and animal diseases in study area?
3. Local name of medicinal plants _____
4. Where do plants grow? In wild_____, In home gardens_____
5. Plant part used_____
6. Number of medicinal plants species of collection in market place: Single_____, Mixture of other plants_____
7. Condition of medicinal plants: In Fresh _____, dried _____, powdered_____
8. Estimated quantity: Vendor_____, Whole market_____
9. Availability of medicinal plants species: In Sep_____ Oct_____ Nov____ Dec____ Jan__etc.
10. How much sold now compared to in past: More_____, Some_____, Less_____

Declaration

I declare that this thesis is my original work. It is entitled as “an Ethnobotanical Study of Plants Used in Traditional Medicine and as Wild Foods in and Around Tara Gedam and Amba Remnant Forests in Libo Kemkem Wereda, South Gonder Zone, Amhara Region, Ethiopia

”. Therefore, it has not been presented for a degree or diploma in any university. All sources of materials used in the thesis have been correctly acknowledged.

Name: Getnet Chekole

Signature ----------

Date ----------

Advisors: Zemede Asfaw (PhD)

Signature ----------

Date ----------

Ensermu Kelbessa (Prof.)

Signature ----------

Date ----------