ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF BIOLOGY

Ethnobotanical Study of Medicinal Plants in Wayu Tuka Wereda, East Wollega Zone of Oromia Region, Ethiopia

By

Moa Megersa

June 2010
Addis Ababa

I

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF BIOLOGY

Ethnobotanical Study of Medicinal Plants in Wayu Tuka Wereda, East Wollega Zone of Oromia Region, Ethiopia

By

Moa Megersa

A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Masters of Science in Biology (Botanical Science)

June 2010
Addis Ababa

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF BIOLOGY

Ethnobotanical Study of Medicinal Plants in Wayu Tuka Wereda, East Wollega Zone of Oromia Region , Ethiopia

By

Moa Megersa

A thesis presented to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Masters of Science in Biology (Botanical Science)

Approved by Examining Board:

June 2010

Addis Ababa

Table of contents

Contents

LISTS OF TABLES

LISTS OF FIGURES

LISTS OF APPENDICES

ACKNOWLEDGEMNETS

ABSTRACT

An ethnobotanical study of medicinal plants used by local people of Wayu Tuka Wereda was carried out from September 2009 to June 2010. The study focused on the investigation of the traditional uses of various plants, of the study area. The data were gathered from indigenous people, local healers and knowledgeable elders of the study area. A total of 63 informants (41 male and 22 female) aged between 19-102 years were randomly selected from nine Kebeles. Relevant information were collected by using semi-structured interview, market survey, field observation and discussion. Preference ranking, paired comparison, and direct matrix ranking were used for data analysis. Based on visual classification, 6 communities were identified; natural and the other 3 from homegardens. Out of the 202, 126 were studied for their medicinal uses. Medicinal plant species are distributed in 108 genera and 56 families. Fabaceae consisted of 15 species while Solanaceae, were recorded 8 species. A large number of medicinal plants was collected from natural habitat 86(68%), whereas 33(26%) from homegardens and 7(5.5%) occur both in the homegardens and natural habitat. About 78(62%) of medicinal plants were reported for treatment of human, while 23 (18.2%) were for livestock ailments. In addition, 25(20%) were reported for treatment of both human and livestock ailments. In the study area, leaves (43%) and roots (18.5%) were the two frequently utilized plant parts for preparation of remedies. Crushing which accounted for 29% was a widely used method of preparation of traditional medicine in the study area. This is followed by powdering (28%) whereas; large numbers of the medicinal plants were cited to be used in fresh form, few were used dry. The most common mode of administration was found to be oral (64%). Analysis of preference ranking showed, Acmella caulirhiza was the most preferred medicinal plant by people of the study area to treat tonsillitis. Paired comparison showed that Cucumis ficifolius was found to be the most preferred plant to treat blackleg. Some medicinal plants are popular than others in treating various diseases. For instance, Allium sativum and Ocimum urticifolium were found to be the most popular since each medicinal plant was reported 55 times (8 %.). Concerning informant consensus factor, the highest ICF values were linked to problems associated with Malaria and Headache (0.85) followed by Fibril illness, Swelling and Evil eye (0.79). The lowest ICF value was linked with Rabies (0.25). Deforestation (agricultural expansion, construction and wood material for fire) urbanization and over collection were reported to be the major threats to medicinal plants. In addition, the apparent disinterest of the young generation in traditional medicine has become a profound problem for the continuity of the knowledge of medicinal plants. The effort of local people in conserving medicinal plants is minimal since much of medicinal plants have been gathered from the wild. To tackle the depletion of knowledge from ever loss, awareness of young generation on the usage of traditional medicine is recommended.

Key words: Conservation, Deforestation, Ethnobotany, Medicinal plants Traditional medicine, Wayu Tuka Wereda

1. Introduction

1.1 Background

Since ancient times, plants have been indispensable sources of both preventive and curative traditional medicine preparations for human beings and livestock. Historical accounts of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000 to 4000 BC in China, and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians (Dery *et al.,* 1999). Considerable indigenous knowledge system, from the earliest times, is linked to the use of traditional medicine in different countries (Farnsworth *et al.,* 1994). Evidence obtained from observations of animals shows that even chimpanzees use a number of plant species for their medicinal value (Huffman and Wrangham, 1994).

Traditional medicine comprises therapeutic practices in existence for hundreds of years before the development of modern scientific medicine and is still in use today without much documented evidence of adverse effects (Okigbo and Mmeka, 2006). In Africa, traditional medicine is a part of the people's culture despite the fact that this form of medicine is not as well organized as, for example, in India and China. Practitioners include herbalists, bonesetters, village midwives or traditional birth attendants (TBAs), traditional psychiatrists, herb sellers, and other specialists (Sofowora, 1996). In Ethiopia, the use of traditional medicine is widely practiced. Ethiopia is the land of vegetation as well as livestock. The size of the Ethiopian flora is estimated at 6,000 taxa of vascular plants of which about 10% are believed to be endemic (Friis, 2009). Of these, about 1000 species of plants are used in the traditional health care system to treat nearly 300 mental and physical disorders (Unpublished database of N. H).

According to Dawit Abebe (2001), traditional remedies are the most important and sometimes the only source of therapeutics for nearly 80% of the population and 95% of traditional medicinal preparation in Ethiopia is of plant origin.

Ethnoveterinary medicine refers to traditional animal health care knowledge and practices comprising of traditional surgical and manipulative techniques traditional immunization, magico-religious practices and beliefs, management practices and the use of herbal remedies to prevent and

1

treat a range of disease problems encountered by livestock holders (Tafesse Mesfin and Mekonnen Lemma, 2001). The knowledge of medicinal plants is normally passed orally from one generation to the next. Traditionally, herbalists usually passed on their knowledge only to their first born sons or to other trustworthy person and such a knowledge is normally transmitted when the father is getting old or just about to die. The son or other person inheriting the knowledge will normally take an oath not to reveal the secrets to anybody else. Instructions are generally given in the field, where the son is shown the plant, told the vernacular name, and told how to prepare the drug from the plant or plant part for a specific disease (Kokwaro, 1976).

Like other places in Ethiopia, people of Wayu Tuka Wereda have traditional practices which they accumulated for generations to treat both human and livestock ailments. They use different parts of plants to prepare remedies (root, bark, leaves, and other plant structure). The elders, who know more about medicinal plants, may die without sharing their traditional knowledge to the young generation. Since the knowledge of traditional medicine is transferred orally from generation to generation, basic information may be lost. Basic information that could be lost by oral transfer includes how to prepare the drug, disease treated by medicinal plants, part used and other important information may be discarded. Therefore, documentation of medicinal plants and the knowledge associated with them are important. In order to pass the knowledge to the next generation since the plant material and the indigenous knowledge can be basis for the invention of modern drugs.

1.2 Statement of the Problem

The main focus of this study is to investigate the traditional uses of various plants which are used by Wayu Tuka Wereda people. The finding of the study will try to answer the following research questions.

- ❖ Are there medicinal plants, which local people use to treat their own health problem and livestock ailments?
- ❖ What are medically important plants species used by indigenous people of the Wereda?
- ❖ How do the local people obtain and use the plant species to treat various diseases?

❖ How is the current status of the medicinal plants?

❖ How do local people conserve medicinal plants?

❖ Which part of the medicinal plants is useful to treat ailments?

1.3 Significance of the Study

Until this time, no research on ethnobotany of medicinal plants studied in Wayu Tuka Wereda. The finding of this study, which will be the first of its kind in the area, will help people of the study area to be aware of problems associated with medicinal plants and give attention for the threatened medicinal plants. In addition, the documentation of the indigenous knowledge on medicinal plants can be part of the information source for those who want to conduct a further research in ethnobotany and the development of modern drugs.

1.4 OBJECTIVES OF THE STUDY

1.4.1General Objective

To investigate and document traditional uses of plants by local people of Wayu Tuka Wereda as a remedy for various human and livestock ailments and other aspect of the indigenous knowledge of the people in the study area.

1.4.2 Specific Objectives

The specific objectives of the study are to:
- Make inventory of medicinal plants used by the people of Wayu Tuka Wereda to treat human and animal health problems.
- Assess the current status and existing threats of medicinal plants.
- Document plant parts used, for medicinal purposes, methods of preparation and ways of administration.
- Collect voucher specimens of medicinal plants that are used by local people to cure human and livestock health problems.
- Assess the role of local people in conservation of medicinal plants.

2 LITERATURE REVIEW

2.1 Origin and Development of Ethnobotany

Since time immemorial, people have used plants as medicine. The investigation of plants and their uses is one of the most primary human concerns and has been practiced by all cultures for tens, if not hundreds, of thousands of years, though it wasn't called 'Ethnobotany' (MacDonald, 2009). Perhaps as early as Neanderthal human, plants were believed to have healing powers (Connive and Steven, 1996). The earliest recorded uses are found in Babylon about 1770 BC and in the code of Hamurabian ancient Egypt about 1550 BC. In the early 1500's, Indian fever bark was one of the first medicinal plants to find appreciative consumers in Europe which taken from the cinchona tree (*Cinchona officinalis*), the bark was used as an infusion by native people of the Andes and Amazon highlands to treat fevers. Jesuit missionaries brought the bark back to Europe. By the early sixteenth century, this medicine was known as "Jesuit fever bark," quite a transformation. (Connive and Steven, 1996).

Christopher Columbus initiated this in 1492 when he discovered the use of tobacco plant (*Nicotiana* sp*.)* by local people of Cuba. Around 1858, a British explorer, R. Spuce, noted for the first time the psychoactive properties of the vine plant (*Banisteriopsis cappi*) (Cotton, 1996). Harshberger, who was an American botanist, coined the term ethnobotany in 1895, to mean the study of plants used by native communities. During the century which has intervened, considerable attention has focused not only on how plants are used, but also how they are perceived and managed, and on the reciprocal relationships between human societies and the plants on which they depended (Cotton, 1996). As a result, ethnobotany has been repeatedly redefined and no definitive agreement in its interpretation has been reached (Yen, 1993; cited in Cotton, 1996). In 1941, Shultes redefined ethnobotany as the study of the relationship, which exists between humans and their ambient vegetation (Castetter, 1944; cited in Cotton 1996). Since then various definitions have been given for ethnobotany even if, the idea is similar.

For Martin (1995), ethnobotany is the study of people's classification, management and use of plants. Pande (2000) also defined ethnobotany as it deals with the direct relationships of plants with human kind. According to Cotton (1996), ethnobotany encompasses all studies that concern the mutual relationships between plants and traditional people. Among the relationships of humans

with plants, indigenous knowledge on traditional medicine is one. Thus, people depend on plants not only for food but also for preparation of remedies. Ethnobotancal research documents the knowledge on cultural interaction of people with plants, and figure out how local people have traditionally used plants for various purposes and how they incorporate plants into their cultural tradition and religion (Balick and Cox, 1996). Clement (1998; cited in Davidson, 2000) has identified three stages in the history of ethnobotanical research, which he terms the preclassical, classical and postclassical. Both the preclassical and classical stage included an interest in documenting the economic use, vernacular nomenclature, and systematic classifications of plants as well as broader interests such as the knowledge of resources and how to manage them.

Ethnobotany is a rapidly growing science, attracting people with widely varying academic background and interests (MacDonald, 2009) and nowadays ethnobotany has tended to become more analytical, quantitative, cross disciplinary, and multi institutional (Hamilton, *et al.,* 2003). This can be categorized under postclassical ethnobotanical research stage.

According to Martin (1995), ethnobotanists often have to work without the support of colleagues in order to establish close relationships with communities. However, in order to achieve more detailed and reliable results, ethnobotanical studies need involvement of various disciplines such as plant taxonomy, anthropology, linguistics, economic botany and others. Ethnobotanist has the role of ''explorer'' and ethnobotanists have a great responsibility to share the information they collect from the local people with the great collection of human knowledge (Arihan and Mahin, 2007). Application of ethnobotany can lead to a strengthening of cultural diversity conservation, greater sustainability in the exploitation of plant resources, and the development of new plants products (Hamilton, *et al.,* 2003).

2.2 The Role of Traditional Medicinal Plants in Human Health Care Services

Like any other developing and list developed nations, the available modern health care services of the country are not only insufficient but also inaccessible and unaffordable to the majority (Haile Yineger *et al*., 2008). This problem along with the rapidly increasing human population and cultural resistances towards the use of modern medicines means that the majority of the people in Ethiopia are dependent on traditional medicines of mainly plant origins to manage various human ailments (Dawit Abebe, 2001).

Various definitions have been given for traditional medicine. Cotton (1996), defined traditional medicine as it refers to any ancient, culturally based healthcare practice different from scientific medicine and it is commonly regarded as indigenous, unorthodox, alternative or folk and largely orally transmitted practice used by communities with different cultures. According to WHO (1991), traditional medicine comprises therapeutic practices that have been in existence, often for hundreds of years before the development and spread of modern scientific medicine and are still in use today. These practices vary widely, in keeping with the social and cultural heritage of deferent countries. Traditional medicine includes a diversity of health practices, approaches, knowledge, and beliefs incorporating plant, animal, and/or mineral-based medicines; spiritual therapies; manual techniques; and exercises, applied singly or in combination to maintain well-being, as well as to treat, diagnose, or prevent illness (WHO, 2001).

WHO redefined traditional medicine in 2008 as it is the sum total of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses. Traditional medicine covers a wide variety of therapies and practices which vary from country to country and region to region (in some countries, it is referred to as alternative or complimentary medicine (CAM). Complementary/alternative medicine often refers to traditional medicine that is practiced in a country but is not part of the country's own traditions. As the terms "complementary" and "alternative" suggest, they are sometimes used to refer to health care that is considered supplementary (WHO, 2001). Traditional medicine represents an alternative, an option, for people in modern countries (Arihan and Mahin, 2007). Hamilton (2004), categorized traditional system into three. (1) Traditional medicinal systems, with written traditions of documentation of knowledge, pharmacopies for doctors and institutions for training doctors; (2) Traditional medical knowledge (folk medicine), which is orally transmitted and associated with households, communities or ethnic groups; and (3) Shamanistic medicine, with a strong spiritual element and which can only be applied by specialist practitioners (Shamans).

Traditional medicine has been used for thousands of years with great contributions made by practitioners to human health, particularly as primary health care providers at the community level and has maintained its popularity world wide (WHO, 2008). Further research, clinical trials and evaluations are needed (WHO, 2001).

According to Sofowora (1982), about 60-85% of the population in every country of the developing world has to rely on traditional medicine. The practice of traditional medicine is widespread in China, India, Japan, Pakistan, Sri Lanka and Thailand. In china, about 40 % of the total medicinal consumption is attributed to traditional tribal medicines (Lucy and DaSilva, 1999). Ethiopia is also a country, which uses traditional medicine. Plants have been used as a source of medicine in Ethiopia from time immemorial to treat different ailments due to its long history, and traditional medicine has in fact become an integral part of culture (Pankhurst, 1965). In Ethiopia, traditional medical practices and remedies are recorded in oral tradition and in early medico-religious manuscripts and traditional pharmacopoeias, which, according to the estimates of some historians, date back to the 15th century AD (WHO, 2001).

In the early 16th century, a European traveler called Francisco reported the use of herbs as purgatives in Ethiopia. Another British traveler, James Bruce, who stayed in Ethiopia from 1769 to 1771, also reported the wide use of a plant locally known as 'wagnos' that was later named *Brucea antidysenterica* (Simaroubaceae), as a remedy against dysentery. Medical text books written in Geez or even in Arabic in Ethiopia between the mid 17th and beginning of 18th century imply that plant have been used as a source of traditional medicine in Ethiopia from time immemorial to combat different ailments and human sufferings (Belachew Wassihun, 2008).

Dawit Abebe (2001) emphasized that there is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefit. Haile Yineger and Dilnesaw Yehwalawu (2007) in their study on Sokoru District added that traditional medicines are useful for poor people who have little access and could not afford the cost of modern medicine.

In addition, traditional systems are also more culturally acceptable and meet the physiological needs in a way modern medicine does not (Fassil Kibebew, 2001). Indeed, there is growing recognition that revitalization and promotion of traditional health practices alongside modern health services is the most promising means for ensuring affordable and sustainable health care for poor communities throughout Africa (Cunnigham, 1993). The study conducted by Teferi Flatie *et al.* (2009), on Bertha community revealed that herbal remedies remain important component of

7

public health care there, as they are the only option for some illnesses and the next alternative when modern medicine fails. Traditional medicine can save foreign exchange. Moreover, the development of medicinal plants in primary health care not only will save the foreign exchange but also will aid in conserving our national heritage (Abiot Birhanu *et al.,* 2006).

According to Jansen (1981), in Ethiopia, even though the traditional medicinal partitions are the best source of information about the knowledge of medicinal plants, it was found very difficult to obtain their traditional medicinal information as they considered their indigenous knowledge as a professional secrete, only to be passed orally to their elder son at old age. The study of Fisseha Mesfin (2009), on ethnobotanical study of medicinal plants in Wonago Wereda, agrees with the above result. According to Amare Getahun (1976), practitioners do not want to tell the use of medicinal plants because they believe the healing power of the plant losses its curative and healing virtues; therefore it should be secrete (that is, the name of the plant and its reputed use should not be disclosed).

More over, the high degree of secrecy surrounding ethnomedicinal knowledge among the traditional healers could be attributed to the fact that traditional healers derive a sort of 'income monetary or in-kind compensation for treatments they provide (Haile Yineger *et al*., 2008). Traditional medicine has also drawbacks as various authors stated (Amare Getahun, 1976; Sofowora, 1982 and Dawit Abebe, 1986) lack of precision in standardization is one drawback for the recognition of the traditional healthcare system.

2.3 The Role of Traditional Medicinal Plants in Ethnovetarnary Medicine

Livestock disease has often been described as a serious constraint to both macro-level economic development in Africa and the well-being of millions of poor livestock keepers (Andy, 1999). The document also stated that disease related economic losses have been estimated at 4 billion US dollars annually for Africa as a whole**.**
Ethiopia is one of the leading countries of Africa in livestock population (Mirutse Giday and Gobena Ameni, 2003). Although Ethiopia is rich in its livestock population, it is one of the countries in the world with the lowest unit out put. The poor health condition and of its livestock has partially been responsible for the low productivity (Mirutse Giday and Gobena Ameni, 2003).

The ever declining provision of animal health services has resulted in the appearance of a number of epizootic diseases reducing the economic efficacy of livestock production in Africa (Mirutse Giday and Gobena Ameni, 2003). An Ethnovetarinery medicine involves the use of medicinal plants surgical techniques and livestock management practices to prevent and treat a range of animal diseases (Mathias, 1996). The study conducted by Wirtu *et al.* (1997) revealed as animal health care was, provided by the owners, traditional healers, and veterinary professionals. Besides, most modern drugs are expensive and as a result, not affordable by the majority of Ethiopian farmers and pastoralists, most of them rely on their traditional knowledge practices and locally available materials (mainly plants) in the control of diseases of their domestic animals (Mirutse Giday and Gobena Ameni, 2003). The finding of Kebu Balemie (2008) indicated that some livestock problems are treated by more than one medicinal plants species. The study conducted by Wirtu, *et al.* (1997) on Central Ethiopia stated that healers and farmers use similar methods in diagnosis of livestock disease they assessed the body temperature by introducing the fingers into the rectum or the oral cavity (e.g., *abbaa sangaa, arraba jalee)*. They conducted physical examinations such as skin palpation for formations under the skin or in the muscle (e.g., blackleg). They observed in feces and dead animals and were able to describe different types of worms in lungs, stomach, intestines or liver

According to McCorkel and Mathias (1996), like other kind of local technical knowledge, ethnovetarinary medicinal practice and skills are built on over time empirical observation, mainly through trial and error and sometimes through deliberate or, even desperate experimentation and innovation. Therefore, for many livestock holders in rural areas where there are relatively few veterinarians and shortage of other facilities traditional remedies are the only choice for many ailments (Tafesse Mesfin and Mekonnen Lemma, 2001). In spite of its paramount importance as livestock health care system, the various traditional veterinary practices remained undocumented both in Africa as a whole and Ethiopia (Dawit Abebe and Ahadu Ayehu, 1993). Therefore, proper documentation and understanding of farmers` knowledge, attitude, and practices about the occurrence, cause, prevention and control of various ailments is important in designing and implementing successful livestock production (Tafesse Mesfin and Mekonnen Lemma, 2001).

9

2.4 Ethnobotanical Studies of Medicinal Plants Conducted in Ethiopia

Although plants have been used as source of medicine to treat both human and livestock ailments in Ethiopia, research and documentation on medicinal plants have been started only very recently (Mesfin Tadesse and Sebsibe Demissew, 1992).

According to Tsige Gebremariam and Kaleab Asres (2001), research programs in traditional medicine must be realistic and be based on the primary health care needs of the country, with an objective of developing safe, effective and quality phytotherapeutic preparation, which can supplement and or replace modern chemotherapy.

Among the research conducted on ethnobotanical study of medicinal plants in Ethiopia, Ermias Lulkal *et al.* (2008) collected the highest number. Ethnomedicinal uses of 230 plants species were documented from Mana Angetu District, which is found in Bale Zone of Oromia Region. Of these, 181 (78.70%) were used as human medicine, 27 (11.74%) as livestock medicine and the remaining 22 (9.7%) were for treating both human and livestock ailments.

A similar study by Mirutse Giday (2001), on Zay people indicated as herbs stood first in which Zay people derive their medicine (55%), followed by trees and shrubs (33%). Whereas, the study conducted by Debela Hunde *et al.* (2004), in Boosat around Welenchiti area, stated that shrubs rank first with 59% followed by herbs 14% by which indigenous people of Boosat derive theirs and their livestock remedies.

Different parts of plants are being used for medicine in order to cure human or livestock diseases in Ethiopia. However, roots and leaves are the most widely utilized plant parts. According to Tizazu Gebre (2005), roots are the most used plant part (35.7%), followed by leaves (32.9%). Moreover, the study explained that 68.6% of herbal remedies were applied orally and 31.4% were applied externally. Further, swelling, rheumatism, spasm, snakebite, tooth pain and eye pain were among the human ailments treated with medicinal plants. However, the finding of Debela Hunde *et al.* (2004), indicated that leaves are the most widely used plant part (33%) followed by roots (28%). The findings of Mirutse Giday *et al.,* (2009) was in line with the above as the majority (71%) of the Bench medicinal plants were sought for their leaf part. Anthrax, wounds, lymphatic

swelling and bloody urine in cattle, were among livestock diseases treated by medicinal plants in Boosat, Welenchiti area (Debela Hunde *et al.,* 2004).

People use medicinal plant parts, to treat human or livestock ailments while they are fresh, dried or both. The study of Gidey Yirga (2010) on Central Tigray revealed as some of medicinal preparation were used fresh or in dried state, as these plants are used in both forms, the chance of using the medicinal plants under different seasons of the year is increased and traditional healers preserve the plant that they could not find in dry season in different ways like hanging the plant material.

Various studies conducted on ethnobotany stated that most medicinal plants are being obtained from the wild.

The study of Ethiopian medicinal plants has not been realized as fully as that of India or other traditional communities elsewhere (Iwu, 1993). Nowadays, researchers have given attention on medicinal plants. The following authors documented the knowledge of indigenous people on medicinal plants from different parts of Ethiopia. These include: (Amare Getahun, 1976; Dawit Abebe, 1986; Mesfin Taddese, 1986; Dawit Abebe and Ahadu Ayehu, 1993; Mirutse Giday, 2001; Belachew Wassihun *et al.,* 2003; Debela Hunde *et al.,* 2004; Kebu Balemi, *et al.,* 2004; Tizazu Gebre, 2005; Haile Yineger and Delnasaw Yehwalaw, 2007; Endalew Amenu., 2007; Tilahun Teklehaymanot and Mirutse Gidey, 2007; Etana Tolessa, 2007; Haile Yineger *et al*., 2008; Fisseha Mesfin, 2009; Mirutse Giday *et al*., 2009; Mirutse Giday *et al*., 2009; Tesfaye Hailemariam *et al.,* 2009; Teferi Flatie *et al.,* 2009 and Gidey Yirga, 2010. The first four Authors did not apply sufficient ethnobotanical methodologies in their studies they simply listed medicinal plants and their use to human and livestock diseases. Haile Yineger and Delnasaw Yehwalaw (2007), Haile Yineger *et al*. (2008) and Gidey Yirga (2010) focused on local healers, which could not explore indigenous medicinal plant knowledge of local communities. In present study, sufficient ethnobotanical methodologies were applied, and similarities of medicinal plant knowledge of local people of the study area were assessed with other parts of Ethiopia. In addition, the data was collected from indigenous people, local healers and knowledgeable elders of the study area unlike other studies which participated only local healers.

2.5 Medicinal Plants as the Base for Development of Modern Drugs

The number of higher plant species (angiosperms and gymnosperms on this planet is estimated to be between 250,000-500,000 (Mahesh and Satish, 2008)**.** Of these, only about 6% have been screened for biologic activity, and a reported 15% have been evaluated phytochemicaly (Fabricant and Farnsworth, 2001).

Ethno-pharmacology is a highly diversified approach to drug discovery involving the observation, description, and experimental investigation of indigenous drugs and their biologic activities. It is based on botany, chemistry, biochemistry, pharmacology, and many other disciplines (anthropology, archeology, history and linguistics) that contribute to the discovery of natural products with biologic activity (Vlietink and Vanden, 1991). In addition, Taxonomy and the newer discipline ethnobotany have now become an integral part of drug discovery from plants (Jachak and Sakalani, 2007). Searching new drug from traditionally used medicinal plant can be the shortest path to success (Berhanemeskel Weldegerima, 2009) and indigenous people remain the ultimate resource for retrieving this information for the purpose of application, particularly in modern medicine (MacDonald, 2009).

According to Kokwaro (1976), Drug plants may be broadly classified into three major categories, first, botanically, according to the species from which drugs are obtained, secondly, according to the purpose for which species are used and finally according to the chemical nature of plants.

Medicinal plants play a key role in the development and advancement of modern studies by serving as a starting point for the development of novelties in drug (Wright, 2005). An average of 25% of modern drugs contains one or more active principles obtained from plants (Medhin Zewdu, *et al.,* 2001). Medicinal plants are the roots of medical practice, of the 12, 807 species used in traditional Chinese medicine, for example, 11,146 are plant species (Zhao 1980; cited in Cunningham *et al.,* 2008). Plant based drugs provide outstanding contribution to modern therapeutics (Samy and Gopalakrishnakone, 2007).

Various modern drugs were extracted form medicinal plants through the use of plant material as indigenous cure in folklore or traditional system of medicine (Verma and Singh, 2008) and it is

believed that half of the top 25 best selling medicine in the world originate from natural materials including plant materials (Ohigashi, 2008). In the United States, of the top 150 prescription drugs, at least 118 are based on natural sources (Roberson, 2008).

For instance, Quinine, which used to treat malaria was derived from the bark of the cinchona tree, has long played a major role (Rocco, 2004). Among the most popular extracts used in Europe are garlic (*Allium sativum*, antimicrobial blood cholesterol lowering), Ginkgo (*Ginkgo biloba*, circulatory insufficiency) and others. A new plant species, *Ancistrocladus ko-rupensis* (Ancistrocladaceae), was described from Cameroon and found to contain a new alkaloid, Michelamine B, which has a wide spectrum of antiviral activity and is currently being developed for its use in combating AIDS (Sofowora, 1996). *Cryptolepis sanguinolenta,* which is used for treating urinary infections in traditional medicine, has been shown to be strongly antimicrobial. Cryptolepine was identified as the active alkaloid (Sofowora, 1996). Serpentine isolated from the root of Indian plant *Rauwolfia serpentina* in 1953, was a revolutionary event in the treatment of hypertension and lowering blood pressure (Verma and Singh, 2008).

Artemisinin, which is a recently extracted anti malarial drug, is also derived from a plant. It is derived from the leaves and flowers of *Artemisia annua* L. Resprspine, extracted from the root of the Serpant-root. Ephedrine, a decongestant, is derived from Chinese shrub *Ephedra sinica* (BGCI, 1998) and L-Dopa, from a tropical legume *Mucuna deeringiana,* used for treating Parkinson's Disease; Picrotoxin, derived from *Anamirta cocculus*, a tropical climbing plant from South-east Asia, is used as a nervous system stimulant and in cases of barbiturate poisoning (BGCI, 1998). Asiatocoside, which is active on vulnerary, was isolated from *Centella asiatica*. (Fabricant and Farnsworth, 2001). Compothecin, irenoteccan and topotecan were extracted from *Mappia foetida* Miers, which has been used against Lung, Ovarian and Cervical cancer (Samy and Gopalakrishnakone, 2007).

Ethiopia is a rich source of medicinal plants. However, the knowledge and use of plant is an integral part of many ethnic rural cultures, the extent of which has not yet been studied in depth (Abbink, 1995). Perhaps the best-known species is *Phytolaca dodecandra*. Extracts of the plant, commonly known as endod, are used as an effective molluscicide to control shistomiasis (Aklilu Lemma *et al.,* 1984) and Maytansine, an active principle against cancer was isolated from *Maytenus* species (Sebsebe Demissew and Ermias Dagne, 2001), which was collected and studied

by the National Cancer Institute (NCI) USA. The authors indicated that the result was hidden after 1972.

Some plants having similar uses elsewhere can be taken as indication of their pharmacological effectiveness having been tested in different areas by different cultures (Tesfaye Hailemariam *et al.,* 2009). Therefore, development of new drug is important research in order to alleviate the health problems. In United States of America, plant derived anti-cancer drugs save at least 30,000 lives per year (Roberson, 2008) and even drug for deadly diseases like HIV/AIDS could be discovered by ethnobotanical approaches, by taking indigenous knowledge as a base.

2.6 Marketability of Medicinal Plants

Medicinal plants trade has been practiced in the world. In 1998 the global market of phytomedicine, was estimated to be 250 million US dollar (Brower, *et al.,* 1998; cited in Samy and Gopalakrishnakone, 2007). However, Andy (1999), estimated the international market of herbal products to be 62 billion US dollars, of which China's share in world herbal market is 6 billion US dollars and India's share is One billion US dollars (Verma and Singh, 2008). There are medicinal plants exported from various countries. China takes the lead by importing the highest number of herbal drugs for drug preparation (Table 1).

Table 1: Percentage of herbal drugs imported by various countries for drug preparation

Country	Percentage of herbal drugs imported
China	45.0%
USA	15.6%
Australia	10.5%
India	3.7%
South Korea	1.4%
Taiwan	1.7%
Indonesia	8.1%

Source: Samy and Gopalakrishnakone (2007).

During 1950-1970 approximately 100 plant-based new drugs were introduced in US drug market (Verma and Singh, 2008). Many African phytomedicines are well known in the international markets and Africa is one of the main world producers of the plant medicines (Okigbo and Mmeka, 2006). Africa has made considered progress in the export of medicinal plants. For example, Cameroon is the source for the world market of *Prunus africana* bark (Medhin Zewdu, *et al.,* 2001) and Nigeria is the source for the world market of *Zingiber officinale* (ginger) (Okigbo and Mmeka, 2006).

Ethiopia is not legally known in exporting and importing medicinal plants and the only medicinal plants export from Ethiopia is *Catha edulis* (Desalegn Dessisa, 2001). Medicinal plants are also on sell in domestic markets; for instance, it accounts for an average of 5000 plant species (40%) of the medicine market in China (Medhin Zewdu, *et al.,* 2001) and in South Africa, between 400 to 550 plant species are currently sold for use in traditional medicine (Boadker, 2005). India uses about 7000 plant species (Verma and Singh, 2008).

Little was known about the patterns of local medicinal trade. The survey of (Desalegn Dessisa, 2001) indicated as medicinal plants trade in Ethiopia involves traditional medicinal practitioners, street vendor and collectors. He recorded 45 plant species in local markets and the amount of plant material in the market depends on the availability of plants near the area, the demand and condition of the use. The document also showed that *Hagenia abyssinica, Embelia schimperi, Ximenia americana, Jatropha curcas, Glinus lotoides* and *Tamarindus indica* are among the most commonly sold medicinal plants by vendors in the country. The finding of the study on Bench community by Mirutse Giday, *et al*., (2009), revealed that there are three medicinal plants, which were available for sale at market *Aframomum corrorima, Carica papaya* and *Ipomoea batatas*. They are mainly sold for their uses as spice and food. Various researchers have reported medicinal plants that are on trade and most of the local trade of open market is dominated by a few species including *Hagenia abyssinica*, *Embelia schimperi* and *Glinus lotides* (Endashaw Bekele, 2007).

2.7 Threats to medicinal plants

Although, plants play vital role in treating various human and livestock ailments, they are currently under pressure. Indigenous knowledge on usage of medicinal plants as folk remedies is getting lost through various reasons. According to Ensermu Kelbessa *et al.* (1992), habitats and species are being lost rapidly because of environmental degradation, agricultural expantion, deforestation and urban development.

According to Zemede Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting. Root and bark collection may kill the plant in harvest (Dawit Abebe and Ahadu Ayehu, 1993). In a study made by Kebu Ballemie *et al.* (2004) the order of importance of the threat factors on medicinal plants in Fentalle area were harvest of medicinal plants for firewood, charcoal, drought, agriculture, house use and trade.

Decline in the knowledge and utilization of medicinal plants of Zay people is due to environmental degradation and intense deforestation (Mirutse Giday, 2001). Debela Hunde *et al.* (2004) also asserted that modern education as having an impact on the medicinal plant knowledge. They pointed out that those students who attended modern schools are showing unwillingness to learn from their parents, which is an evidence for the gradually disappearing traditional knowledge.

The study conducted by Tesfaye Hailemariam *et al.* (2009), showed that elders who are 41-50 years old have handled most of the knowledge on herbal remedies.

This hints at the fact that ethnomedicnal knowledge is concentrated in the elderly members of the community and the relative difficulty in its transfer from the elders to the young generation. The finding of (Mirutse Giday *et al*. (2009), revealed as acculturation of the young generation become a major threat to the continuation of traditional medicinal knowledge and practice.

Ethnomedicinal knowledge diminishes with the death of elderly knowledgeable members of society since only a few young people are willing to acquire the knowledge. In addition, invasion of alien weeds like *Parthenium hysterophorus* has adverse impact on medicinal plants and climate

change e.g., increase temperature year by year and severe drought lead to difficulty to survive the more water consuming medicinal plants in the future (Muthuswamy and Solomon, 2009).

2.8 Conservation of Medicinal Plants

Although various threats have profound effect on medicinal plants, local people attempt to grow medicinal plants in homegarden though the effort is minimal. The result of a study by Haile Yineger *et al.,* (2008), revealed that the effort of traditional healers in conserving ethnomedicinal plant species in Bale Mountain National Park was so minimal. Various authors gave their suggestion on how to conserve medicinal plants based on the threat they observed in their study. Homegardens are central target for in-situ and ex-situ conservation of traditional medicinal plants (Zemede Asfaw, 2001). Some traditional medicinal plants may have to be conserved in–situ in their natural habitats due to the difficulty for domestication and management or failure to produce the desired amount and quality of the active principle under cultivation (Franz, 1993; cited in Zemede Asfaw, 2001). By ex-situ methods, traditional medicinal plants can be conserved in gene banks, botanic gardens and field gene banks (Zemede Asfaw, 2001). In addition, tissue culture technique is also important in ex-situ conservation of traditional medicinal plants (Abebe Demissie, 2001). Moreover, conservation measures should be taken by government officers and NGOs to reduce the existing medicinal plants on threat (Seyoum Getaneh, 2009).

Kebu Balemie (2006) suggested that, raising awareness and enhancing conservation along side urgent collection of germplasm for the severely declining of some species is important. Awareness on the contribution of traditional medical practice towards fulfilling the primary healthcare needs should be created among the youth (Mirutse Giday, *et al*., 2009). It was pointed out that young generation has no interest to know about medicinal plants and efforts should be made to incorporate traditional medicine in school curricula so that younger people appreciate its usefulness (Mirutse Giday, *et al*., 2009).

The finding of Zemede Asfaw (2006), also pointed out that, the dynamic indigenous knowledge practice for the optimization of the uses and management of plant resources particularly in Ethiopian dryland is among the key recommendations for the conservation, use and management of biodiversity. Documentation of indigenous knowledge and making herbaria for future use is also recommended to ensure conservation of the declining medicinal plants (Muthuswamy and Solomon, 2009).

3 MATERIALS AND METHODS

3.1 DESCRIPTION OF THE STUDY AREA

3.1.1 Geographical Location

Wayu Tuka Wereda is situated at 990000 UTM N and 1010000 UTM N ($8^0 56$' N and $9^0 7$' N) and 230000 UTM E and 260000 UTM E ($36^0 32$'E and $36^0 48$'E). It is located at about 322 km west of Addis Ababa, in the East Welega Zone of the Oromia National Regional State. Gute is the capital town of the Wereda, which is located at a distance of about 12 kilometers from the zonal capital Nekemte. Wayu Tuka Wereda is borders with Sibu Sire in the north and east, Leka Dulacha in the south, and Guto Gida in the west. The Wereda possesses a total area of 28,952.795 ha and comprises 12 Kebeles, 10 rural and 2 urban centers (Fig. 1).
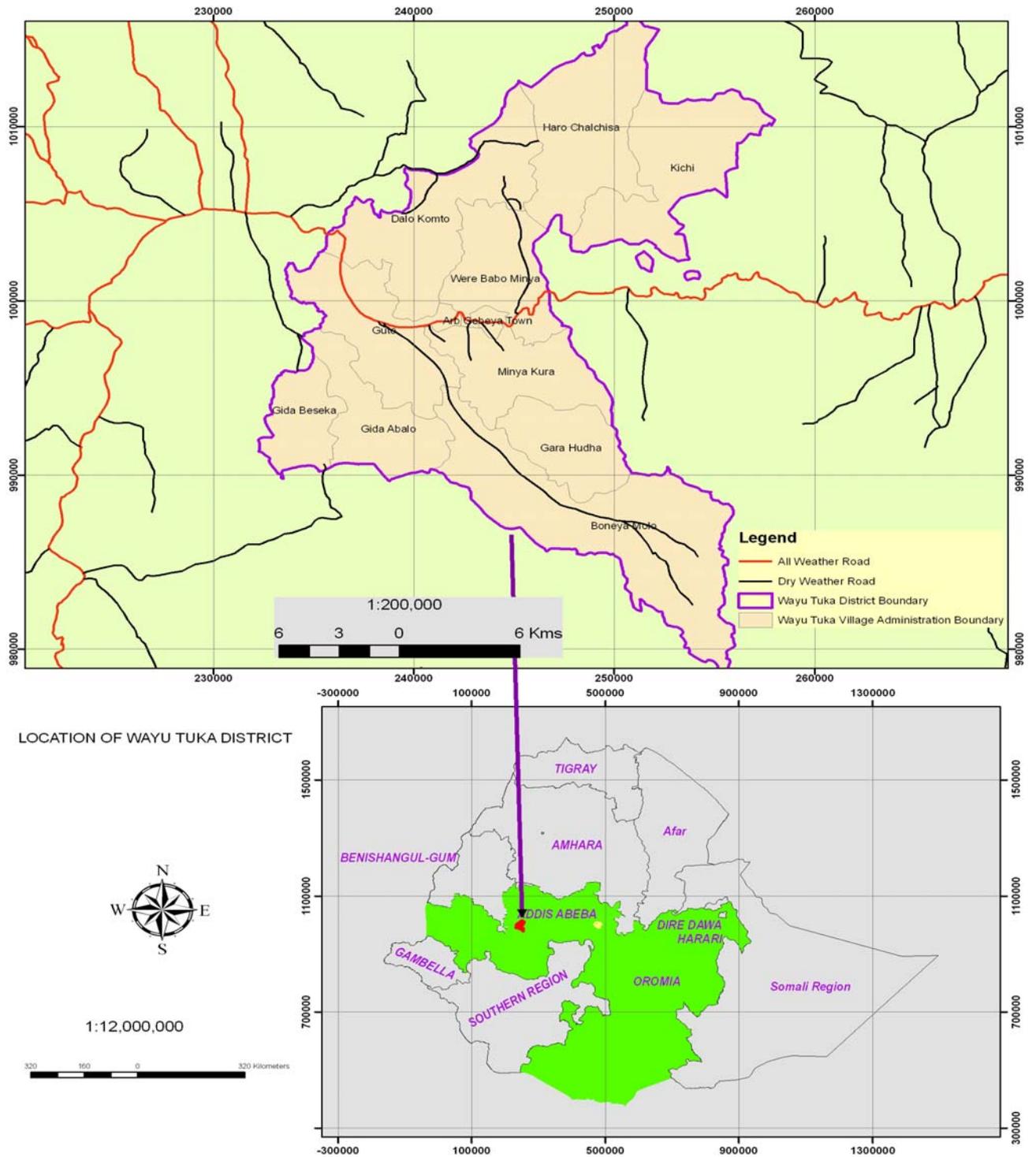
Fig 1 Map of the study area

3.1.2 Landscape and Soil

According to WTWAO (2007), the altitude of the study area is ranging from 1300-3140 and the Wereda has various topographic feature, that means 62% (17,950.8445ha) of the land area is plain, 17% (4,922.00575ha) hilly areas, and mountain and clifts account 13% (3,763.88675 ha) and 8% (2,316.238ha) respectively. Regarding soil type, the major soil types Clay loom its spatial coverage of the district is 17371.68ha (60%). On the other hand, sandy covers an area of 10133.49 (35%) and clay 1447.64 ha (5%) the latter two soil types are suitable for agriculture such as cereal crops, Maize, Sorghum and teff production in the Wereda.

3.1.3 Climate

According to WTWAO (2007), the climate of the area is classified traditionally into three main agro climatic zones that mean, Gammoojjii, Baddaa and Baddadaree. Of the total land mass of the Wereda, about 49.23% (14,249 hectare) fall under Badadaree while 37.665 (10,704.73 hectare) categorized under Baddaa and 13.16% (10,704.73 hectares) fall under Gammojjii.

The rainfall distribution of the wereda is unimodial. The rainy season is locally called `Ganna` that extends from May to August with the highest peak in June and August (Fig. 2). The highest average monthly rainfall was recorded in June (402.67 mm) and the lowest in January (9.99 mm). March to October is the hottest months of the year. The maximum mean temperature was recorded in February and March (27.9^{o}C). November to January is the coldest months of the year by which lowest temperature was recorded in December and January 12.2^{o}C. In general the mean annual temperature and mean annual rainfall of the Wereda is (18.8^{o}C) and (2067 mm), respectively.

Nekemete (2140 m)
[10]   18.8C   2067 mm
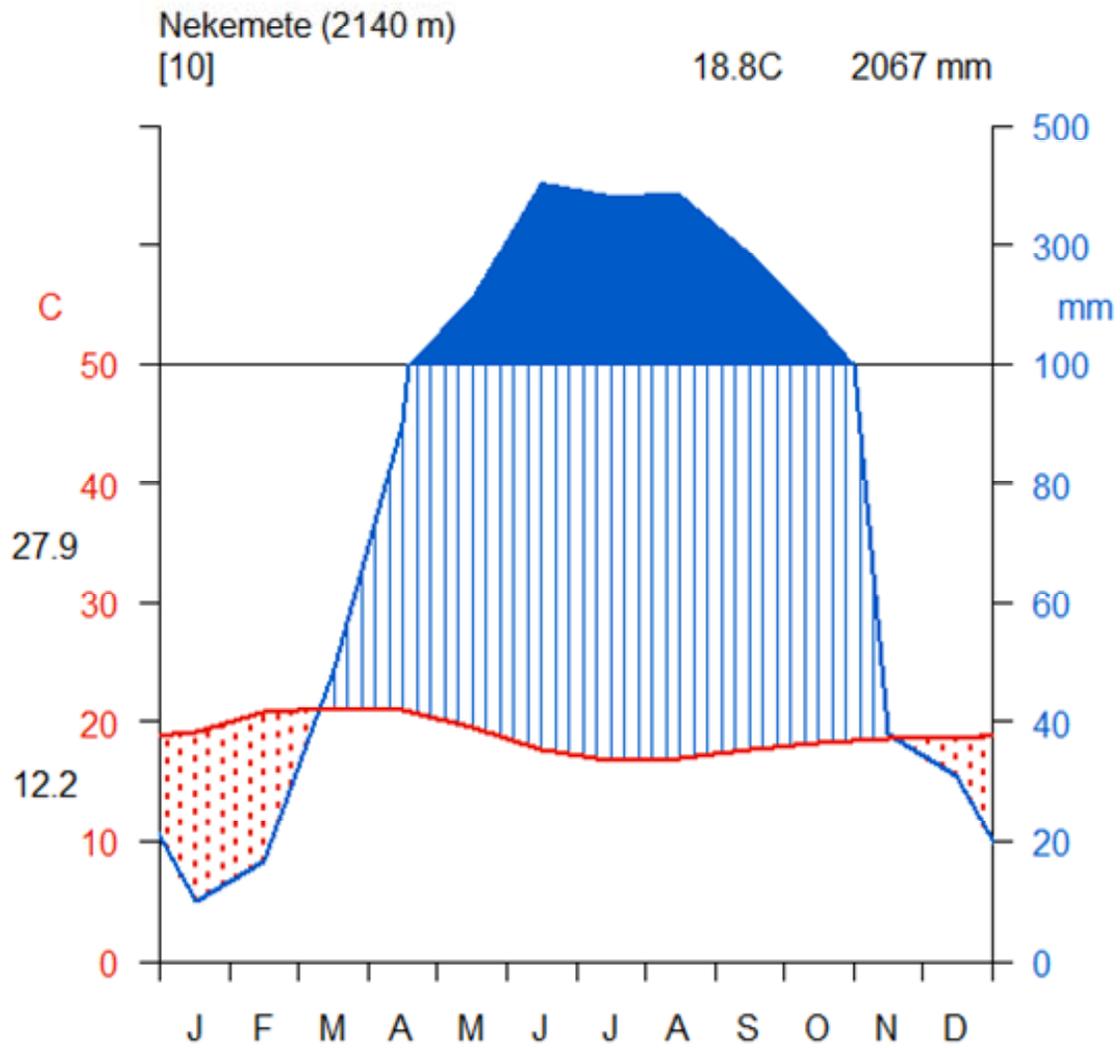
Data Source: National Meteorological Service Agency.

Fig 2 Climadiagram of the study area from 1998-2007 at Nekemte Station.

3.1.4 The People

Wayu Tuka is one of the recently established Weread from the previously known district Guto Wayu in 2007. The 2007 population and housing census result is the base of population projection all over the district. Based on this census result, the population of Wayu Tuka Wereda is projected to be 66394. From the total population in the Wereda, 63325 (95.4) is the rural population, which directly sustains his life and the neighboring urban dwellers by the agricultural and similar activities. Whereas the rest number occupied by population who dwell in urban areas (Gaba Jimata and Gute). The ethnicity of the Wereda people is the Oromo. Afaan Oromo is the widely spoken language in the area. Local people of the Wereda have knowledge on medicinal plants and surrounding environment. For example, they have mechanism how to classify vegetation, soil seasons and landscapes.

3.1.5 Land Use Pattern in the Wereda

Agriculture is the dominant livelihood in the study area. Out of the total land of the Wereda 28952.795ha, 25, 592.83ha are suitable for plough. Of this, 25, 348.78ha are ploughed. Major crops produced in this district are cereals under private peasant holdings in the `meher' season of agricultural calendar. Area covered by cereal crops; especially Maize, wheat, sorghum and teff.

3.1.6 Medical and Educational Services

The Wereda has two urban and ten rural centers. Gute (Wereda capital) and Geba Jimata are the two urban centers of the Wereda. Majority of people live in rural area and lead their life on dairy farming and cropping.

The Wereda possess 3 governmental clinics and 4 governmental posts and 1 nongovernmental health posts. In the wereda, the leading 10 diseases are internal parasites (Intestinal), Rheumatism, Upper respiratory diseases, Skin diseases, Diarrhea, Malaria, Gastritis, and Fever of unknown diseases, Ear diseases and Anemia.

Regarding education service, the wereda has 7 1st cycles, 12 Junior, and 1 high school. About 12,117 students are attending their education of these, 6,383 (52.7%) are males whereas, 5734 (47.3%) females.

3.1.7 Livestock and Their Diseases

The Wereda consists of various livestock. The following table (Table 2) shows the number of livestock found in the Wereda.

Table 2 Number of livestock found in Wayu Tuka Wereda

Bovine	No.	Shoats	No.	Equines	No.	Hens
Cow	21340	Sheep	1318	Horse	3582	34658
Ox	14716	Goat	7256	Mule	598	
Young bull	9635			Donkey	3252	
Heifer	8545					
Calves	9363					

Source: WTWAO (2007)

There are two Veterinary clinics in the Wereda. One is found in Gute town and the other is in Geba Jimata. The number of cattle and the number of clinics are not balanced. Therefore, there is no doubt that people of the wereda use Ethnoveterinary medicine to cure their livestock ailment. The top ten livestock diseases in the wereda are Trypanasomiasis, Internal parasite, External parasite, Pasteurollosis, (Ovine and bovine), Blackleg, Anthrax, African horse sickness, Sheep and goat pox, New castle disease, Babeosis and Mastits.

3.1.8 Vegetation of the Study Area

The area is characterized as moist evergreen montane forest. The moist evergreen montane forest of southwest Ethiopia occurs in Welega, Ilubabor and Kefa (Zerihun Woldu, 1999). The common species in the area include *Poutenia adolfi-friederici, Trilepisium madagascariense, Morus mesozygia, Mimusops kummel, Podocarpus falcatus, Coffea arabica Galiniera saxifraga.*

3.2 Selections of Study Sites

A reconnaissance survey of the study site was carried out from September 15 to 30, 2009 and resulted in identification of 9 study sites. The study area is found within altitudinal range of (1300-3140m) asl. These study sites are Boneya Molo, Gaba Jimata, Gara Hudha Gute, Gute Badya, Kichi, Komto, Migna kura and Wara Babo Miya.

3.3 Sampling of Informants

A total of 63 informants (41males and 22 females). These informants are comprised of seven individual from each study site aged between 19-102 were randomly selected from 9 kebeles. From the nine study sites 20 key informants were selected, 2-3 individual from each study site. Key informants were systematically selected based on the recommendation of knowledgeable elders, local authorities and developmental agents. Moreover, they were selected based on the explanation that particular informants gave during an interview. Local healers were also considered as key informants since they are expected to have intensive knowledge of medicinal plants.

3.4 Ethnobotanical Data Collection

Ethnobotanical investigation were carried out to collect data on medicinal plants used to treat human and livestock ailments in Wayu Tuka Wereda as described by Martin (1995) and Cotton (1996). The techniques used were semi-structured interviews, field observation, market survey, group discussion and guided field walk. Ethnobotanical data were collected from October 1, 2009 to December 15, 2009 and March 26, 2010 to April 06, 2010. Interviews and discussions were taking place based on checklist of questions prepared before hand in English translated to Afaan Oromo. During an interview, local name of medicinal plants, part used, disease treated, dosage, methods of preparation, adverse effect, use other than medicinal uses and conservation methods were recorded.

Field observations were performed with the help of local guides, as well as interviewees in the study area and the status, habit, habitat and characteristics of the plants were recorded on site.

Discussions were conducted with 5 to 14 informants and dwellers on threats to medicinal plants effectiveness of the drug and how the knowledge transfers in the community. Before

collecting the data, written permission from the office of the district and permission from the kebele administrators was given before entering any kebele.

Market survey was done on two markets in order to see medicinal plants in trade based on Martin (1995). Two markets were encountered in the study area. One is found in Gaba Jimata in which the town named based on the market and held at Friday and Gaba Fecase, found in Boneya Molo, the market is held once a week in Tuesday.

3.5 Specimen Collection and Identification

Medicinal plants and other associated plants were collected from wild and cultivated areas. The local names, habits and associated plants were collected. Preliminary identification was done in site (field). The collected voucher specimens were taken to the National Herbarium of Ethiopia (Addis Ababa University). The identification was done from January to April by using taxonomic keys and various volumes of, The Flora of Ethiopia and Eritrea. Finally, the identified specimens confirmed by my advisor Prof. Ensermu Kelbessa and stored at the National Herbarium.

3.6 Vegetation Description

Two approaches were employed in describing vegetation of the study area. The two techniques were emic and etic categorization. In emic categorization, local people classify vegetation of their surrounding by using their indigenous knowledge whereas in etic categorization, vegetation of the study area was classified through repeated visual observation following Martin (1995).

3.7 Data Analysis

The collected ethnobotanical data were entered into Excel spreadsheet 2007 and summarized using the following tools.

3.7.1 Descriptive statistics

Descriptive statistical methods such as frequency, percentage were employed and graphs and tables showing the results generated.

3.7.2 Importance of different medicinal plants used by the local people

The degree of importance of medicinal plants was checked by conducting various exercises including Preference ranking, paired comparison and direct matrix ranking

Preference ranking

It was conducted following Martin (1995), for 5 important medicinal plants used to treat tonsillitis. Ten randomly selected informants participated in this exercise order to identify best preferred medicinal plants for treatment of tonsillitis. The informants were given the plants and asked to arrange the medicinal plants based on their preference of efficacy by assigning the highest value (5) for plant species most preferred and the lowest value (1) for the least preferred plant. The values were summed up and ranked.

Paired comparison

In paired comparison, 9 informants were selected and asked to choose the best item from every pair according to personal perception in treating Blackleg. The total number of possible pairs (21) was obtained by applying the formula **n (n-1)/2**, where **n** is the number of medicinal plants being compared. A total rank of paired comparison was obtained by summing the number of times each item was chosen. An item with highest frequency of choices had the highest score.

Direct matrix ranking

Direct matrix ranking exercise was employed following Martin (1995) and Cotton (1996) in order to compare multipurpose use of a given plant species based on information gathered from informants, number of multipurpose species were selected out of the total medicinal plants and use diversities of these plants were listed for 8 randomly selected key informants to assign use values to each species. Each chosen key informant was asked to assign use values (5=best, 4=very good, 3=good, 2=less used, 1=least used and 0= not used). The values (average score) of each species was summed up and ranked.

3.7.3 Informant consensus

Informants were contacted two times for the same ideas in order to confirm the information he/she has given is correct. Accordingly, if the information of the informant were not harmony with the previous one, the information he has given was rejected because of irrelevancy.

3.7.4 Informants consensus factor (ICF)

ICF was calculated for each category to identify the agreements of the informants on reported cures for the group of ailments. The ICF was calculated as follows (Heinrich, *et al.,* 1998).

ICF=   nur-nt/ nur-1
Where,
ICF= Informants Consensus Factor

 nur= number of use citation in each category

 nt= number of species used

3.7.5 Description of frequently reported medicinal plants

Medicinal plants, which had the highest informant consensus, were described. Their habitat, habit, and the medicinal use in the study area together with other important pointes.

3.7.6 Similarity in medicinal plant knowledge with other parts of Ethiopia

Jaccard`s coefficient of similarity

Jaccard`s Coefficient of Similarity (JCS) was carried out in order to assess species composition similarity, among eight different Weredas. It was computed between the present study area and other areas, which were studied by other authors in different parts of the country. JCS was calculated as follows (Kent and Coker, 1992)

JCS= $\dfrac{c}{(c+b+a)}$

Where, JCS= Jaccard`s Coefficient of Similarity

a= Number of species which is found in habitat A

b= Number of species found only in habitat B and

c= Number of common species found in habitat A and B

Accordingly, a= Number of species found only in Wayu Tuka Wereda

b= Number of species found only in Other Wereda and

c= Number of species found in Wayu Tuka Wereda and Other Wereda

4. RESULTS

4.1 General Information of Informants

4.1.1 Sex and age of informants

Forty-one (65%) male and twenty-two female informants (35%) were take part in this study. Out of the collected medicinal plants males could mentioned all of medicinal plants whereas, females explained the use of 40 medicinal plants.

Out of 63 informants, twenty-seven (43%) of the informants are found between the ages 19-39, 22 (35%) informants were between the ages 40-59, eleven informants were between ages 60-79 (17.5%) and the remaining 3 (5%) of informants were between the ages of 80-102. Much of knowledge of traditional medicine obtained from elder informants they reported the use of 111 (88%) plant species and informants reported that young people have no interest to use traditional medicine and unable to mention large number of medicinal plants compared with the elders. This was evidence that informants between the ages 19-39 mentioned 15 (24%) medicinal plants out of the total medicinal plant species.

4.1.2 Religion and educational status of informants

Among 63 informants, the highest number (28) of them were Protestants followed by orthodox (26) and the rest were Catholics (6) and Muslims 3 and the highest number of medicinal plants were mentioned by informants from Orthodox religion (Table 3).

Concerning educational status, majority of informants were illiterate nine informants have completed elementary level courses and eight informants attended up to high school level (Table 4).

Table 3 Religion of informants

Religion	Number of Informants	Percentage of Informants	Number of medicinal plants reported	percentage
Catholic	6	9.5	14	6.5
Muslim	3	4.7	50	23.0
Orthodox	26	41.0	121	56.0
Protestant	28	44.4	30	14.0
Total	63	100	215	100

Table 4 Educational status of informants

Educational status	Number of Informants	Percentage of Informants	Number of medicinal plants reported	percentage
Illiterate	40	63.5	100	60.0
Elementary	9	14.0	40	24.0
High school	8	12.7	17	10
College level	6	9.5	10	6.0
Total	63	100	167	100

4.2 Indigenous Knowledge of Local People

4.2.1 Indigenous knowledge on vegetation classification

People of the study area classify vegetation of their surrounding, based on density of plant species that cover the land. The following are their classification:

'**Caffee'**: means marshy vegetation. Plant species of mostly Poaceae and Cyperaceae family grow. The place is unsuitable for plough but is suitable for grazing.

'**Luugoo-lagaa'**: is to mean that reverine forest which is found at the banks of river. Plant species like *Syzygium guineense* subsp. *guineense* and *Ficus sycomorus* grow.

'**Bosona'**: Is a type of forest with densely populated plant species and various larger plants also occur. It is a home of larger wild animals too. E.g. Bosona Komto, which is found in Komto Kebele.

'**Daggala':** It refers to seasonal plants.

4.2.2 Classification of soil by indigenous people

People of the study area; classify soils based on texture, color and fertility and valuably for cropping of the soil.

'**Biyyoo Kooticha/Gurraacha:** to mean, black soil due to its color and the most fertile. Mostly it is found in 'Bonya Molo and 'Gara Huda' in this soil type mostly oil crops grow. It includes *Linum ustitatissimum, Guizotia abyssinica, Helianthus annuus* and *Cicer arietinum*

'**Cirracha'**: means sandy soil. Local people separate it from others soil by its texture having fine sand soil. Few crops grow on it but it has low in fertility. E.g. *Eleusine coracana*.

'Biyyoo baaldimmee/diimaa': clay loam soil, it is named 'diimaa' because of its red color. It is less fertile than Biyyoo 'Kootichaa.' This type of soil is dominating one as it is found in every study area. Various plant species grow on it, of these, *Cucurbita pepo, Ipomoea batatas,* Vicia *faba* and *Eragrostis tef*.

'**Biyyoo wal makaa'**: mixed soil type containing Diimaa, Cirracha and kooticha.

'Suphee': clay soil with grey color and not suitable for cropping rather it helps for production of traditional house materials like pot.

4.2.3 Topographic land classification of local people of the study area

People of the study area classify landscapes based on elevation and suitability of the land for agriculture and grazing. Accordingly, they classify landscapes into five categories. Namely, 'Gaara', 'Tabba', 'Qilee', Lafa diriiraa and 'Dachaa'

'Gaara': refers to Mountain with high elevation and it can be seen easily from far. It is covered with larger trees, shrubs and grasses. The land is not suitable for plough and grazing. E.g. Gaara Komto

'Tabba': refers to Small Mountain. Less elevated than 'Gaara'. It is ploughable land. For example 'Tabba Jaboo' and 'Tabba Guliso'.

'**Qilee':** to mean gorges. The land is useful neither for plough nor for grazing.

'Lafa diriiraa': refers to plain land. Agricultural practice, grazing and settlement are practiced in a land.

'Dachaa': is a land, which is found between 'tabba'. The land is suitable for agricultural practice and grazing. Mostly river is found in this area and suitable to grow *Saccharum officinarum*.

4.2.4 Seasonal classification
Indigenous people classify seasons into four main categories based on amount of rain. (Table 5).

Table 5 Seasonal classification of the study area

Emic category	Etic category
Birraa	Spring
Bona	Summer
Arfaasaa	Autumn
Ganna	Winter

4.3 Description of Vegetation of the Study Area

4.3.1 Visual vegetation classification in natural habitat
According to Martin (1995), plant community can be defined as the collection of plant species or vegetation growing together in a particular location that shows a definite association. Six community types were identified by visual inspection naming then by the dominant species and described below.

1. **Eucalyptus dominated plantation.** This type of plant community dominates mainly along the main asphalt road from Gute to Nekemte. Plants like *Juniperus procera* observed.

2. *Syzygium guineense* **subsp.** *guineense* **plant community**. This vegetation occurs along rivers banks. *Syzygium guineense* subsp. *guineense, Clausena anisata, Croton macrostachyus, Pycnostachys meyerii, Isodon schimperii, Ehretia cymosa, Thalictrum rhynchocarpum, Aframomum corrorima, Colocasia esculenta* characterized this community.

3. *Dodonea angustifolia* **and** *Carissa spinarum* **plant community**.
This type of plant community is mainly found in 'Boneya molo and Gara huda'. The associated species are *Spathodea campanulata* subsp. *nilotica, Clutia abyssinica, Grewia bicolor, Grewia ferruginea, Maytenus arbutifolia, Euclea divinorum, Acacia persiciflora, Premna schimperi* and *Combretum molle*.

4. *Millettia ferruginea* **and** *Ficus vasta* **plant community**. The major plant species observed and recorded include, *Millettia ferruginea, Ficus vasta, Capparis tomentosa, Buddleja polystachya, Ficus thonningii.*

5. *Schefflera abyssinica* **and** *Maytenus undata* **plant community**. This type of plant community is found in 'Komto', associated plant species include, *Hagenia abyssinica, Periploca linearifolia, Asparagus africanus, Euphorbia ampliphylla, Bersema abyssinica, Maesa lanceolata, Teclea nobilis, Dracaena afromontana, Dracaena steudneri, Embelia schimperi, Solanecio gigas* and *Pouteria adolfi-friedrici.*

6. *Croton macrostachyus* **and** *Albizia gummiffera* **plant community.** This vegetation type occurs in almost all of the study area. The major species obtained from this vegetation are *Senna occidentalis, Senna petersiana and Girardinia diversifolia.*

4.3.2 Visual Vegetation Classification of Homegardens

Coffea arabica **and** *Rhamnus prinoides* **dominated homegardens.** This type of homegardens is mainly found in Komto. The major plant species observed and recorded include, *Coffea arabica* and *Rhamnus prinoides.* Homegarden owners mainly plant cash crops and associated plant species such as, *Catha edulis, Eucalyptus globules, Ocimum urticifolium and Ruta chalepensis.*

Euphorbia tirucalli **and** *Mangifera indica* **dominated homegardens.** This type of homegardens is mainly found in Gara Huda and Bonya Molo, where plant species like *Phaseolus lunatus, Ocimum urticifolium, Carica papaya, Musa x paradisiaca, Citrus aurantium, Citrus limon*, *Citrus reticulata, Colocasia esculenta, Gossypium barbadense* and *Ruta chalepensis.*

Dovyalis caffra and Justicia schimperiana **dominated homegardens.** This is found in Gute, Gaba Jimata, Migna Kura and Wara Babo Migna. Mostly they are serving as lively fence. However, there are plant species, which they grow in this community. Those species are *Foeniculum vulgare, Beta vulgaris Lycopersicon esculentum, Ocimum urticifolium Solanum tuberosum, Ruta chalepensis*, *Coriandrum sativum* and *Morus alba.*

4.4 Medicinal Plants of the Study Area

Two hundred two plant species were collected and identified. Of these, 126 species were used by local people of the Wereda to treat various livestock and human ailments. Medicinal plants were distributed across 108 genera and 56 families (Appendix 3). The family Fabaceae was represented by 15 species (12%), Solanaceae 8 species (6.3%), Asteraceae 7 (5.6%), and other 44 families consist of 1-2 representative species 57 (45%). (Table 6).

Table 6 Taxonomic diversity of medicinal plants

Family	percentage	Number of species (genera)	Percentage of species
Fabaceae	10.0	15 (11)	12.0
Solanaceae	3.7	8 (4)	6.3
Asteraceae	4.6	7 (5)	5.6
Lamiaceae	4.6	6 (5)	4.7
Poaceae	5.5	6 (6)	4.7
Cuccurbitaceae	4.6	5 (5)	4.0
Rutaceae	3.7	5 (4)	4.0
Euphorbiaceae	4.6	4 (5)	3.0
Rubiaceae	2.7	4 (3)	3.0
Boragnaceae	2.7	3 (3)	2.3
Malvaceae	2.7	3 (3)	2.3
Rosaceae	2.0	3 (2)	2.3
Other 44 families	48.0	57 (52)	45.0
Total	100	126 (108)	100

4.4.1 Growthforms (habit) of medicinal plants

Herbs constitute the highest species representative by 55 species (43.6%), trees 34 species and lianas 3 species (2%) (Fig. 3).
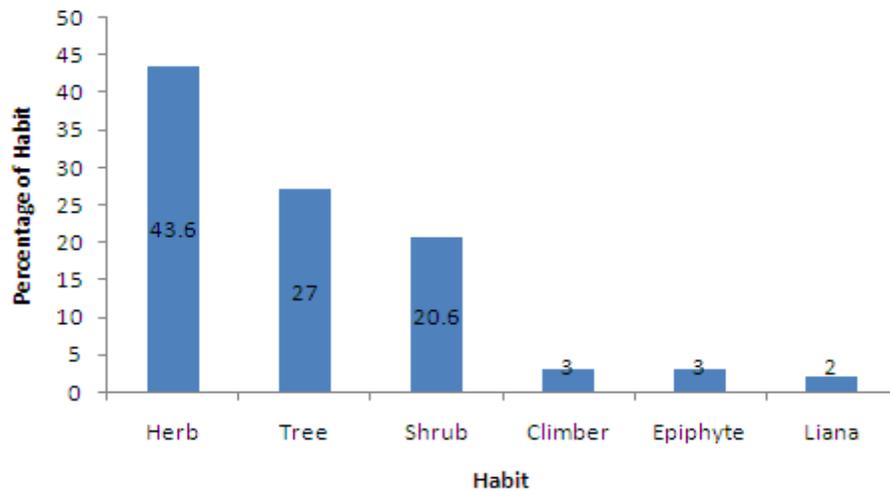
Fig 3 Habit of medicinal plants in the study area

4.4.2 Plant parts used to treat human and livestock ailments

People of the study area harvest different plant parts for preparation of traditional drugs (e.g. leaves, roots, seeds, barks and fruit). In the study area, the highest number of species 70(43%) were harvested for their leaves followed by roots 30(18.5%), seed and bark 18 each (22.2%) and the remaining percent 26 others covered (16%) like, bulb, tuber, stem, fruit and flower (Fig. 4).
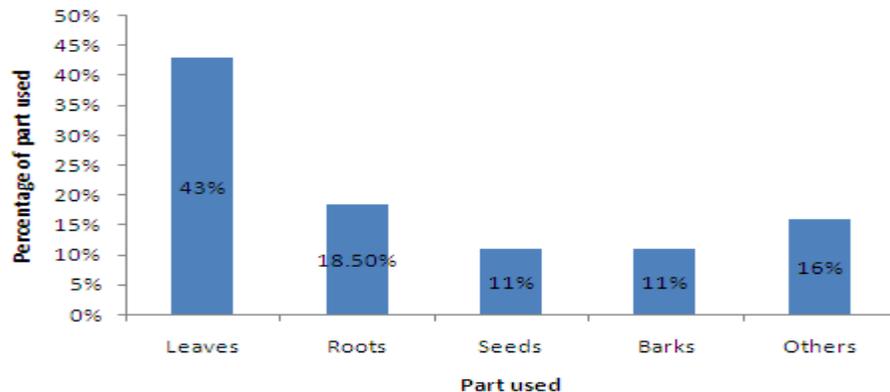
Fig 4 Plant parts used for the treatment of Human and Livestock ailments

4.4.3 Medicinal plants used to treat human ailment only, livestock only and both human and livestock ailments

Among the collected 126 medicinal plants**,** 78(62%) used to treat Human disease, 23 (18.2%) used to treat livestock ailments and 25(20%) used to treat both human and livestock ailments (Table 7).

Table 7 Number of medicinal plants treat human, livestock and both human and livestock disease

Category	Number of plant	Percentage
Human	78	62.0
Livestock	23	18.2
Both	25	20.0
Total	126	100

4.4.4 Route of administration

People of the study area mostly administer traditional medicine orally. It accounts (64%) followed by dermal (27.3%) and others like nasal, anal, optical, Ear accounts (8.3%) (Fig. 5). Local people also reported that various additives were given during administration of traditional medicine.
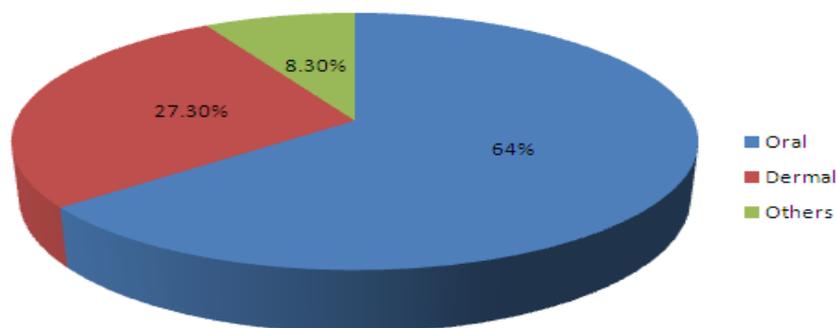
Fig 5 Route of administration of traditional medicine in the study area

4.4.5 Condition of preparation, dosage and effectiveness of traditional medicine in the study area

Local people of the study area prepare their remedy for ailments while medicinal plants are in fresh form, dried or fresh and dried. Large numbers of medicinal plants were reported to be used in fresh form (74.2%). About 20.7% of medicinal plants were used in dry form and very few medicinal plants were reported to be used either in dry or in fresh form (5%) (Fig. 6).

Most of the surveyed medicinal plants preparations involved the use of single plant species or a single plant part (85%) and different plants or plant parts (15%) were rarely used in the study area. Healers prepare remedies by mixing various plants or plant part (Fig. 7). Local people of the study area used various measurement of remedy. Such as finger length, cup and bottle. There were also reported medicinal plants that had no side effect and have limited dose (taken according to personal preference). About 49 (78%) of informants reported that traditional medicines are very effective for treatment of human and livestock ailments.
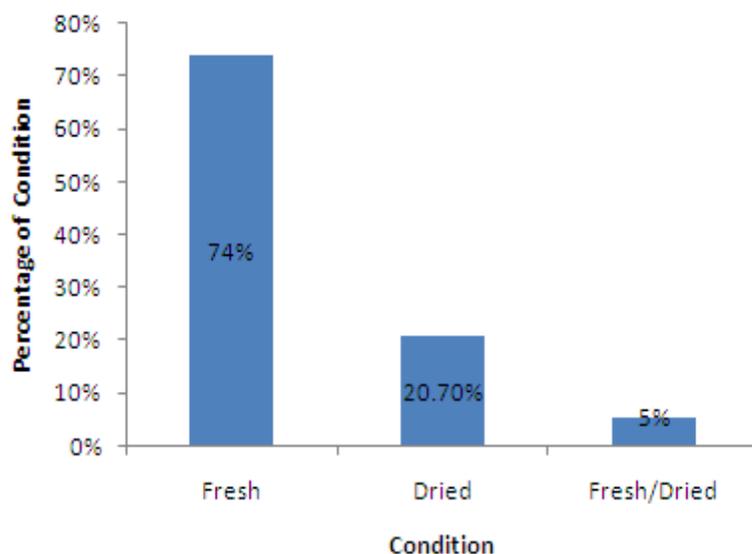
Fig 6 Condition of plants during preparation of remedy

**Fig 7 Preparation of traditional medicine by a local healer
(Photo taken by Moa, 2009)**

4.4.6 Diversity of medicinal plants in homegarden and wild

One hundred twenty six species of medicinal plants were collected from the study area either wild or homegarden or both homegarden and wild. As various researchers reported much of medicinal plants were collected from wild. The same is true in this study that, 86 (68%) medicinal plants of the study area were collected from wild whereas, 33 (26%) from homegarden and 7 (5.5%) from both homegarden and wild (Appendix 4).

4.4.7 Methods of preparation of traditional medicine

In the study area, popular method of preparation of traditional medicine is crushing. It accounts for 29% followed by powdering 28%, chewing 14% and concoction, decoction, and others account for 12.6%, 8%, 10% respectively. Here all other methods can be used for human and livestock problem except chewing which is used only for humans (Table 8)

Table 8 Method of preparation of traditional medicine in the study area

Method of preparation	Preparations	Percentage
Chewing	19	14.0
Concoction	17	12.6
Crushing	39	29.0
Decoction	11	8.0
Powdering	38	28.0
Others	13	10.0

4.4.8 Number of medicinal plants reported by informants from each study site

Informants from different study sites reported different number of medicinal plants. For instance, informants reported large numbers of medicinal plants from rural areas (Boneya Molo, Gara Huda and Kichi). Whereas, informants from urban areas could not report large number of medicinal plants as the rural ones (Table 9) and the study also found that as the study site goes far from towns (Gute and Gaba Jimata), informants tend to tell higher number of medicinal plants.

Table 9 Number of medicinal plants reported by each study site

Study sites	Number of medicinal plants reported by informants
Kichi	96
Gara Huda	90
Boneya Molo	85
Migna Kura	77
Wara Babo Migna	66
Komto	43
Gute Badya	39
Geba Jimata	35
Gute Magala	30

4.4.9 Informant consensus

Of 126 reported medicinal plants in the study area, not all were equally important. Some medicinal plants were well known than others. Informants were frequently cited those medicinal plants for treatment of certain diseases. For instance, *Allium sativum* and *Ocimum urticifolium* were cited by 55 informants followed by *Ruta chalepensis* 54, *Croton macrostachyus* by 52 and *Cucumis ficifolius* 50 (Table 10). The number is higher than 63 because there was repetition in citation of medicinal plants.

Table 10 Informant consensus

Scientific name	Frequency of citation
Allium sativum	55
Ocimum urticifolium	55
Ruta chalepensis	54
Croton macrostachyus	52
Cucumis ficifolius	50
Lepidium sativum	45
Justicia schimperiana	39
Brucea antidysentrica	34
Acmella caulirhiza	31

4.4.10 Informant consensus factor (ICF)

The result of the study showed that, diseases that are frequent in the study area have higher Informant Consensus Factor. Medicinal plants that are effective in treating certain disease and well known by community members also have higher ICF (Table 11). Malaria and headache had the highest ICF value (0.85) due to the high incidence of the disease in the area but now it is reduced whereas, Rabies had the lowest (0.25) this is may be due to the rare occurrence of the disease and the disease is mainly treated by healers.

Table 11 Informant consensus factor by category of diseases

Category	No. of spp.	No. of use citation	ICF
Malaria and Headache	7	42	0.85
Fibril illness, Swelling and Evil eye	9	40	0.79
Intestinal parasite, Diarrhea, Amoeba and stomach ache	17	60	0.72
Ear, Eye and Tooth ache (Organ)	7	23	0.71
Cattle ailments (Blackleg, Anthrax, Leech and External parasite	14	30	0.55
Common cold and Cough	8	16	0.53
Snake bite, Spider poison and Bat poison	16	28	0.44
Skin diseases, Skin cut and wound	25	41	0.40
Lung, Kidney and Liver Diseases (Organ)	8	12	0.36
Gonorrhea and Menstruation	3	4	0.33
Rabies	7	9	0.25

Malaria and Headache- This category had the highest ICF value (0.85). Seven species were reported with 42 use citations. Plant species used in the treatment of this disease are *Allium sativum, Canarina eminii, Carica papaya, Croton macrostachyus, Cynoglosum lanceolatum. Lepidium sativum and Vernonia amygdalina Allium sativum, Croton macrostachyus*, and *Lepidium sativum* have higher informant consensus in the study area.

Fibril illness, Swelling and Evil eye- This category had the highest ICF value (0.79) next to the above category. There were 40 use citations for 9 plant species. Informants reported that, they would not need modern drug for those disease treatments rather they treat by using traditional medicinal plants. Medicinal plants reported for those diseases were, *Echinops hispidus, Guizotia, Malva verticillata*, *Ocimum lamiifolium*, *Ocimum urticifolium, Securidaca longepedunculata* and *Stereospermum kunthianum* and *Ocimum urticifolium* have the highest informants' consensus.

Intestinal parasite, Diarrhea and Stomachache- This category includes Tapeworm, Amoeba, Ascaris and other intestinal problems. The category had the third highest ICF value (0.72). There were 60 use citations for 17 medicinal plants. Among, medicinal plants reported in the study area, 14% were linked with this category. Even if the ICF value was not as previous, it is the leading health problem in the study area. Plant species used in this category include *Ruta chalepensis, Brucea antidysentrica*, *Calpurnia aurea, Carissa spinarum*, *Clematis simensis*, *Coffea arabica* and others (Appendix 7). Of these, Ruta *chalepensis* and *Brucea antidysentrica* had the highest Informant Consensus.

The lowest ICF value is for Rabies had a value of 0.25, Gonorrhea and Menstruation problem 0.33. This is because those were ailments mainly cured by local healers and rarely occurrence of the diseases in the study area.

4.5 Ranking of Medicinal Plants in the Study Area

4.5.1 Preference ranking

Preference ranking was carried out on medicinal plants used to treat tonsillitis. Among the five selected medicinal plants used to treat tonsillitis, *Acmella caulirhiza* stood first, followed by *Schinus molle, Solanum dasphylum, Rhamnus prinoides* and *Zingiber officinale* (Table 12).

Table 12 Preference ranking of medicinal plants used to treat tonsillitis in the study area

Medicinal plants used	Respondents (R1-R10)										Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10		
Acmella caulirhiza	4	5	3	5	4	4	5	4	3	3	40	1st
Rhamnus prinoides	3	1	2	4	2	2	3	1	3	4	25	4th
Schinus molle	5	5	4	3	2	3	3	3	3	5	36	2nd
Solanum dasphylum	5	4	3	5	3	3	2	3	4	3	35	3rd
Zingiber officinale	2	2	3	1	2	4	3	1	1	2	21	5th

4.5.2 Paired comparison

For medicinal plants that were identified by the informants to be used in treating blackleg (Livestock disease), a paired comparison was made among seven medicinal plants. Nine informants participated in this activity. Accordingly, *Cucumis ficifolius* stood first followed by, *Lepidium sativum*, *Rumex nepalensis*, *Thalictrum rhynchocarpum*, *Kalanchoe laciniata*, *Clematis simensis* and *Cyphostemma cyphopetalum* (Table 13).

Table 13 Paired comparison of medicinal plants used to treat blackleg

Medicinal plants used	Respondents (R1-R9)									Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9		
Clematis simensis	1	1	1	1	1	0	1	0	1	7	6th
Cucumis ficifolius	5	5	5	4	6	4	6	4	5	44	1st
Cyphostemma cyphopetalum	0	1	1	0	0	2	0	1	0	5	7th
Kalanchoe laciniata	3	4	2	2	4	3	2	5	2	27	5th
Lepidium sativum	3	4	5	5	3	4	5	4	5	38	2nd
Rumex nepalensis	3	3	4	4	4	4	4	5	4	35	3rd
Thalictrum rhynchocarpum	6	3	3	5	3	4	3	2	4	33	4th

4.5.3 Direct matrix ranking for multipurpose medicinal plants

In the study area, there are plants species surveyed which had multiple uses. Key informants selected eight plant species that had multiple uses. The common uses include medicinal, firewood, charcoal, construction, food, fence and forage (Table 14).

Table 14 Direct matrix ranking of medicinal plants with different uses (Average score of 8 key informants)

Plant species	Use categories							Total	Rank
	Medicine	Firewood	Charcoal	Construction	Food	Fence	Forage		
Acacia abyssinica	2	4	5	4	0	2	0	17	4th
Cordia africana	3	4	5	5	3	2	0	22	1st
Croton macrostachyus	5	4	3	4	0	2	0	18	3rd
Eucalyptus globulus	4	5	3	5	0	2	0	19	2nd
Justicia schimperiana	5	2	0	1	0	4	3	15	6th
Prunus africana	2	3	4	4	0	3	0	16	5th
Rhamnus prinoides	4	1	1	0	0	3	3	12	7th
Ricinus communis	3	1	0	0	2	3	1	10	8th

4.6 Jaccard`s Coefficient of Similarity (JCS)

Jaccard`s Coefficient of Similarity (JCS) revealed that the study area has the highest similarity with 51 common species (32%) with the study conducted around Gimbi Wereda, followed by 47 common species (28%) similarity with Chelya Wereda. The least similarity was linked with the study conducted on Bale Mountain National Park (Table 15).

Table 15 the JCS of Wayu Tuka Wereda, with Chelya, Debre Libanos, Wonago and others

Sample area	a	c	JCS%	Sources
Wayu Tuka Wereda	126	-	-	
Bale Mountain National Park	101	15	7.0	Haile Yineger, *et al.,* 2008
Chelya Wereda	89	47	28.0	Endalew Amenu, 2007
Debre Libanos Wereda	90	41	23.4	Seyoum Getaneh, 2009
Gimbi Wereda	85	51	32.0	Etana Tolessa, 2007
Konta Special Wereda	120	33	15.5	Tesfaye Hailemariam, *et al,* 2009
Wonago Wereda	58	36	24.3	Fisseha Mesfin, 2007
Zay people	33	15	10.4	Mirutse Giday, 2001
Zegie	67	30	18.4	Tilahun Teklehaymanot and Mirutse Giday, 2007

5. DISCUSSIONS

5.1 Medicinal Plants Used to Treat Human and Livestock Ailments in the Study Area

One hundred twenty six medicinal plants have been documented in this study. The number of reported medicinal plants and their uses by the local people of the Wereda indicates the depth of the local indigenous knowledge on medicinal plants and their applications. Out of the collected medicinal plants, 78 species were reported as used to treat human diseases, whereas, 23 species were used to treat livestock ailments and 25 species were used to treat both human and livestock ailments. The use of medicinal plants to treat human diseases than livestock ailments by local people indicated that local people of the study area seek traditional medicine for his ailments first and then try to search for his livestock ailments. As a result, they could acquire low knowledge of medicinal plants to treat livestock ailments than knowledge of medicinal treating human ailments similar finding was reported by Seyoum Getaneh (2009). There are 7 endemic species of Ethiopia found in these traditional medicinal plants. They are *Albizia malacophylla*, *Coccinia abyssinica*, *Impatiens tinctoria* subsp. *abyssinica*, *Lippia adoensis*, *Pycnostachys abyssinica* and *Saturega paradoxa.*

Among the families, Fabaceae was represented by 15 species (12%) followed by Solanaceae 8 The finding of the family Fabaceae as the contributor of higher number of plant species used for medicinal purposes than other families is inline with similar studies elsewhere in Ethiopia (Mirutse Giday and Gobena Ameni, 2003; Kebu Balemie *et al.,* 2004; Endalew Amenu, 2007; Haile Yineger and Dilnessaw Yewhalaw, 2007 and Tesfaye Hailemariam *et al.,* 2009). Whereas, other researchers reported that Asteraceae is the leading family in which highest number of medicinal plants belong (Fisseha Mesfin, 2009; Haile Yineger *et al.,* 2008 and Seyoum Getaneh, 2009).

The most widely used plant remedies by people of Wayu Tuka Wereda were obtained from herbs which constitutes the highest category 55 species (43.6%). This finding is inline with the results of Mirutse Giday (200), Tizazu Gebre (2005), Endalew Amenu (2007), Tilahun Teklehaymanot and Mirutse Giday (2007) and Seyoum Getaneh (2009). However, the findings of Mirutse Giday and Gobena Ameni (2003), Debela Hunde *et al.* (2004), Kebu Balemie *et al.* (2004) Fisseha Mesfin (2009), Haile Yineger and Dilnesaw Yehuwalaw (2007) and Ermias Lulekal *et al.* (2008) indicated that shrubs are the most frequently used. It is true that herbs can grow everywhere (roadside,

homegarden, farmland and wild) and common in the study area compared with other species such as tree, shrub and climber. In addition, herbs are not exposed to various threats as compared with trees and shrubs as a result; they can be harvested and cultivated easily by local people. Another reason for the difference observed among researchers were may be due to the difficulty of categorizing plant species to their appropriate habit and vegetation difference of the study sites cane be another reason for differences observed among researchers..

People of the study area, prepare remedy for human or livestock ailments, either from single plant or plant parts or by mixing one another. Most of medicinal plants encountered in the study area prepared from a single plant or plant part. Dawit Abebe (1986), Kebu Balemie, *et al.,* (2004) and Reddy, *et al.,* (2009) also reported the use of multiple plants or plant parts for a single health problem was rare. This result disagree with the result of Endalew Amenu (2007) he reported that 78% of preparations of traditional medicine by People of Chelya wereda drawn from mixtures of different plants or plant parts. Haile Yineger and Dilnessaw Yehuwalaw (2007) also reported that local healers of Sokoru mostly used more than one plant species to prepare remedy for ailment. In this study what was observed was mostly healers use multiple plants or plant parts in order to increase strength and efficacy of the drug. For example, rabies was treated by mixing bark of *Clausena anisata* leaves of *Sida rhombifolia,* root of *Cucumis ficifolius,* and root bark of *Brucea antidysentrica* together. They use different additives like soil, ash, honey, salt, sugar, local beer, milk and butter in order to increase flavor and acceptability of certain oral remedies that means since traditional medicine could have sour taste they reduce sourness.

Large numbers of medicinal plants were collected from wild. It accounts for 86(68%) whereas, 33(26%) medicinal plants from homegarden and 7(5.6%) from both homegarden and wild.
Various studies conducted in Ethiopia as well as other countries in the world reported as majority of medicinal plants harvested from wild (Etana Tolessa, 2007; Ermias Lulekal, *et al.,* 2008; Ugulu, *et al.,* 2009). This indicated that local peoples did not yet cultivate majority of medicinal plants and local people harvest more medicinal plant species from the wild than from homegardens.

Some medicinal plants recorded in Wayu Tuka Wereda, are also used as remedies in other parts of Ethiopia. Accordingly, medicinal plants of the study area were most similar with Gimbi Wereda in which conducted by Etana Tolessa (2007) and least similar with Bale Mountain National Park. This may be due to the diverse climatic condition of the study area. However, JCS value was not enough to conclude the study site has similarity with other study sites rather the obtained value shows, as there are vegetation and cultural difference among the sampled areas.

Regarding plant parts, people of the study area prepare their remedy from leaves, roots, stem, carks, fruit and others. This study documented that leaves are the most widely harvested plant parts for preparation of remedy. The finding of this study agrees with the findings of (Endalew Amenu, 2007; Haile Yineger *et al.,* 2008; Mirutse Giday *et al.,* 2009 Seyoum Getaneh, 2009 and Tesfaye Hailemariam, *et al*., 2009). However, the findings of Fisseha Mesfin (2007), Tilahun Teklehaymanot, and Mirutse Giday (2007) indicated that people of Wonago Wereda, and people in Zegie Peninsula prepare their remedy mostly from roots. Kebu Balemie *et al.* (2004) obtained similar result that Kereyu people mostly prepare livestock remedy from roots. It was reported that collection of root, bark and whole plants might kill plants in harvest (Dawit Abebe and Ahadu Ayehu, 1993). The same document reported that in Ethiopia, the most extensively use plant part is root which accounts for 58.3%. In this study, leaves were reported to be the most utilized plant part for preparation of remedy therefore, preparation of remedy from this plant part do not have detrimental effects to the plants compared with utilization of roots.

5.2 Indigenous Knowledge of Local People in the Study Area

Local people of the study area, specially elders and knowledgeable community members have deep knowledge about their surrounding. They have knowledge of how to classify vegetation, soil and landscapes. Local people of the study area classify vegetation into four big categories based on density of plant species and type of plant species present. Namely, **'Caffee'**, Luugoo-lagaa': 'Bosona' and 'Daggala' similar ways of classifications were obtained by the study of Endalew Amenu (2007) and Etana Tolessa (2007). This knowledge of local people confirms, as people of the study area not only know the use of medicinal plants but has deep knowledge of their

surroundings. In addition local people of the study area classify seasons into four (Birraa, Bona, Arfaasaa and Ganna) based on the amount of rainfall.

During this study, knowledge difference was observed among educated and none educated, females and males, age groups and locality.

Concerning educational status, 40(63.5%) were illiterate and 9(14%) had attended educational standard 1-6 and 8(12.7%) completed high school education and 6(9.5%) had attended college level courses. Non-educated informants handled much knowledge of traditional medicine; where as educated informants had low knowledge of traditional medicine, which is an indication of impact of modern education on traditional medicine. This finding agrees with the findings of Debela Hunde *et al* (2004).

In that of knowledge difference between sexes, females tend to mention little number of medicinal plants compared with males. Here, it is obvious that females were not allowed to go out of home they look after babies and work at home. It was observed that their medicinal plant knowledge is limited to plants, which are found in homegarden like *Ruta chalepensis, Ocimum urticifolium* and *Allium sativum*. Seyoum Getaneh (2009), reported similar result. Other reason is knowledge of traditional medicine transfer to the first-born son or other relative that could keep secret. What surprised me during this work was even if the first-born is daughter, the knowledge will be told to the next son not to the female one.

Regarding age group, a rich knowledge of traditional medicine is mainly found among the elderly members 40-59. Young people do not have much knowledge compared with elders that is an indication of decline of the knowledge of traditional medicine in addition to secrecy. This might be related to the disinterest of young generation on traditional medicine. Various studies in different parts of Ethiopia have reported that transfer of medicinal plants knowledge have been affected by modernization like access to modern education and health services (Debela Hunde *et al.,* 2004 ; Kebu Balemie *et al.,* 2004; Tizazu Gebre, 2005, Fisseha Mesfin, 2009 and Tesfaye Hailemariam *et al.,*2009).

People who dwell in different parts of the Wereda did not report equal numbers of medicinal plants. For instance, informants from Kichi mentioned large number of medicinal plants and people of Gute Magala reported less number of medicinal plants. This study revealed that people

who live in town have less medicinal plant knowledge compared with people of the rural area. This may happened because of health facilities in towns and people can get modern drug easily than people dwell in rural areas.

One local healer called Deressa Birdida, age 102 who is a well known local healer of various cattle ailments told me that " Yeroon mucaa ture abbaan koo waa'ee qorichaa beeka ture, anis baruuf baay'een dhama'aa ture. Garuu inni natti hin himu ykn na hin barsiisu. Dulluma keessa natti hime. Amma wanti jiru faallaa kanaati ijoolleen koo nagaafachuu dhiisiiti yeroon itti himu baruu hin fedhan akka duubatti hafummaatti ilaalu." This means that when he was young he wanted to know more about medicinal plants from his father who was a well-known healer of cattle ailments, but his father was not interested to teach him until he became old enough. Now it is reversed he tried to teach his sons but they showed mistrust and perceived using traditional medicine as being backwardness.

Fig 8 Informant talking on the disinterest of young generation
(Photo taken by Moa, 2010)

5.3 Description of Mostly Cited Medicinal Plants

Acmella caulirhiza **Gutichaa (Afaan Oromoo)**

Perennial, stoloniferous herb. Lower parts of stem creeping, upper parts ascending and reaching up to 40 cm, pubescent. Leaves simple, opposite, ovate, spaesely pubescent on both surfaces, apex sub acute. Margins serrate, petiole; petiole up to 18cm long. Rey florets yellow or yellowish-orange. Corolla 4-5 lobed. Anthers black. Occur between 550-2600m (Mesfin Tadesse, 2004). Found in Tigray, Shewa, Kefa, Arsi, Welo, Gojjam, Welega, Ilubabor, Bale, Sidama and Harar. Local people of the study area use the flower to treat tonsillitis. Endalew Amenu (2007) documented the same result.

Allium sativum **Qullubbii adii (Afaan Oromoo)**

Cultivated herb grows within altitudinal ranges 1800-2800m. Bulb 2-7 cm in diameter, ovoid covered in a white coat enclosing bulblets, leaves five in two ranks, glabrous and blue green. Blade with a longitudinal canal in the middle, keeled below. Inflorescence stalk coiled towards the apex. Flowers green. Cultivated in homegardens. It is used both medicinally for a range of skin and stomach problems and also in preparing food, particularly some kinds of stew and in making dried food for storage (Tewolde Berhan Gebre Egziabhera and Edwards, 1997). In the study area, the bulb is eaten with 'Injera' and *Capsicum annuum* for five days before having breakfast to treat malaria. Other findings also revealed that it is useful for treatment of common cold and intestinal parasites (Seyoum Getaneh, 2009). In Europe, it is widely extracted and used in lowering blood cholesterol (Medhin Zewdu, *et al.,* 2001).

Brucea antidysentrica **Qomanyoo (Afaan Oromoo)**

Small tree, bark smooth, grey in color. Leaves oblong to ovate. Flowers in distant glomerules. Sepal pubescent. The plant is growing in forest and homegarden. The plant named by British traveler called James Bruce, who stayed in Ethiopia from 1769 to 1771, reported the wide use of a plant locally known as 'wagnos' or *Brucea antidysenterica* (Simaroubaceae), as a remedy against dysentery (Belachew Wassihun, 2008). According to oral literature while James Bruce was in Ethiopia, he felt sick and a person gave him a traditional medicine that prepared from this plant as soon as he took the drug he cured from his illness.

In the study area, leaves of 'Qomanyoo' used to treat Ascaris and Diarrhea in humans. Local people of the study area also use the plant to treat livestock ailments. Seyoum Getaneh (2009) also reported that People of Debere Libanos Wereda use the plant to treat wound, skin disorder and leprosy. From this plant, the potent anti-leukemic compound bruceantin was isolated (Sebsebe Demissew and Ermias Dagne, 2001).

Croton macrostachyus   **Bakkanniisa (Afaan Oromoo)**

Tree, base ovate, apex acuminate, margin sub entire with small marginal glands. Found in forest margin, secondary forest along edges of rock, in and around compound (Gilbert, 1995). Bark grey, leaves are long and heart shaped to 15x10cm. Crowded at the end of branchlets on long stalk to 10cm. flowers are yellow-white or creamy white. Fruit grayish woody capsule 3-lobed and 1cm in diameter with 3-flattend seed. The plant has medicinal importance and used as fire wood and for production of furniture. In the study area, the plant is found along roadsides and in homegardens. People of the study area, use juvenile leaves to treat ringworm locally known as 'Robi' and the bark is use to protect mosquito bite. Fisseha Mesfin, (2009) documented that people of Wonago Wereda use the plant for treatment of Diarrhea and Epilepsy.

Cucumis ficifolius **Faca'aa (Afaan Oromoo)**

Trailing perennial herb. Leaf blade ovate, margin dentate, palmetly five lobed, the lobes elliptic. Petals yellow. Fruit ellipsoid and has yellow color when ripe (Gilbert, 1995). It is found roadside. In Ethiopia, it is found in Tigray, Hararge, Gojjam, Shewa, Wellega and Gamogofa. This plant is also found in Uganda Rwanda, Kenya and Tanzania (Gilbert, 1995). In the study area, it is exploited due to its root and difficult to find the plant easily. The root of this plant is useful to treat Blackleg in Livestock and Gonorrhea in humans. It was also reported that, root extract is used in local honey-wine 'tej' to make beverage more intoxicating (Gilbert, 1995). Seyoum Getaneh (2009) documented that the plant is used to treat wounds and snakebite and People of Chelya Wereda use the plant to treat Fibril illness and Ear pain (Endalew Amenu, 2007).

Justicia schimperiana   **Dhummuugaa (Afaan Oromoo)**

Shrub with much branched stems 2m high, with slightly unpleasant smell. Stems pubescent with appressed and ascending non-glandular hairs. Leaves ovate, base cuneate, entire along the margins, apex acuminate, pubescent along veins on both surfaces, lateral veins 6 pairs, petiole pubescent. Corolla white and curved. In the study area it is used as lively fence and preparation of traditional medicine. The leaves of this plant bused to treat headache and root for treatment of liver disease. Endalew Amenu (2007) reported that the plant is used in treatment livestock ailment (blackleg) and internal parasite.

Lepidium sativum   **Shinfaa (Afaan Oromoo)**

Annual, aromatic erect herb up to 70cm tall, not much branched, glabrous. Stem leaves petiolated, up to 10cm long, pinnati-to bipinnatipartite with 2-4 pairs of side lobes; lobes up to 3cm long, linear to oblanceolate. Racemes lax, up to 25cm long. Petals, white to pink or violate, spathulate. Stamens 6. Seeds wingless. In the study area, this plant is cultivated with other crops like Eragrostis *tef, Linum ustitatissimum* and *Eleusine coracana.* It is found in Tigray, Shewa, Kefa, Arsi and Harar. It is native in NE Africa and Mediterianian area (Jonsell, 2000).

Local people of the study area, used seed of *Lepidium sativum* to treat malaria and blackleg. Fisseha Mesfin (2009) reported the seed is used to treat internal parasite. This plant is used for various human diseases in Turkey as reported by Ugulu *et al.* (2009) accordingly, Anemia, Cold, Cough, Flu, Urinary Disease, Hepatitis and Nephritis are the major diseases treated by leaves infusion.

Ocimum urticifolium   **Ancabbii (Afaan Oromoo)**

Shrub or sub shrub, 0.5-3m tall, with strong fragrance of curry; indumentum of simple hairs; stem pubescent. Leave petiolate; petiole short. Blade lanceolate, pubescent and gland dote above, grey in beneath; pubescent. Apex acute, base attenuate Margin serrate. Inflorescence dense. Corolla pale green. Evergreen bush vegetation. In the study area, the plant grows in homegardens. Local people of the study area use leave of the plant to treat fibril illness. Kebu Balemie *et al.* (2004),

documented that this plant is used in the ethnoveterinary medicine of the Kereyu pastoralists of Fentale District in East Shewa to treat Anthrax in livestock ailments.

Ruta chalepensis **Cilaattama (Afaan Oromoo)**

Herb leaves bipinnate, alternate. Inflorescence cymose, bracts ovate. Petals yellow. Fruit an apically dehiscent capsule, each with several small seeds. The plant found in homegarden. The plant is used to flavor milk cheese and coffee and it is originated from the Mediterranean or Middle East (Gilbert, 1989).

People of the study area use the plant to get relief from stomachache. Fisseha Mesfin (2009), documented people of Wonago Wereda use the plant for treatment of toothache

5.4 Belief

Traditional healers (Practitioners) keep secret about medicinal plants. There is strong belief that herbal medicines lose their healing capacity if non-healers know them. They also claim that in order to increase the efficacy of the drug; incentives should be given which is locally known ('Irreessa') if not; the drug loses its healing power. There is also a belief on medicinal plants collection time, storage and time of administration. For instance, people of the study area believe medicinal plants, which collected early in the morning before working anything, have high efficacy. The same is true with time of administration. E.g., drug for liver disease should be taken early and after having the drug, the patient should sleep alone and the shadow of other person should not lie on him. Informants also reported that medicinal plants should be collected during 'Cagginoo' meaning during Monday, Wednesday and Friday and in lip year locally known as 'Qaammee' or 'Xawalwal'. They believe that medicinal plants collected during those days have high efficacy, especially those collected in lip year.

5.5 Mode of preparation, Condition and Route of Application

According to informants, the most popular method of preparation of remedy in the study area was crushing. This finding is inline with the results of Haile Yineger and Dilnessaw Yehuwalaw (2007), Seyoum Getaneh (2009) and Gidey Yirga (2010). However, Fisseha Mesfin (2009), in a similar study on people of Wonago Wereda reported that Powdering was dominant methods of preparation of remedy and Endalew Amenu (2007) in his work documented as people of Chelya Wereda prepare their remedy by pounding mostly.

54

Concerning condition, about 74% of traditional medicines were prepared from fresh plant materials in the study area and 5% medicinal plants were reported to be used both in dry or fresh form. Different studies in different parts of Ethiopia reported similar result (Etana Tolessa, 2007; Tilahun Teklehaymanot and Mirutse Gidey, 2007; Haile Yineger *et al*., 2008; Fisseha Mesfin, 2009; Mirutse Giday *et al*., 2009; Mirutse Giday *et al*., 2009; Seyoum Getaneh, 2009; Teferi Flatie *et al.,* 2009 Tesfaye Hailemariam *et al.,* 2009; and Gidey Yirga, 2010).

Informants claimed that they use fresh plant parts mostly are because they believe that using fresh materials increases efficacy compared with the dry one. This is because of the fact that the content or ingredients may be lost or reduced when the plants became dry. However, it has contribution on threat of medicinal plants since local people have no habit of preserving dry form of traditional medicine.

Regarding route of application, the well-known one is internal particularly oral that accounted for 64% followed by dermal 27.3%. This result agrees with the findings of Endalew Amenu (2007) who reported that the leading route of application used by Chelya People is oral which accounted for 60.3% and Kebu Balemie *et al.* (2004) in their study on Fentalle area (Eastern Shewa) reported that about 54.7% of remedies are taken orally.

5.6 Effectiveness and Dosage of Traditional Medicine

Informants reported that there are medicinal plants, which are very effective in treating certain diseases. Even patients prefer to visit local healers (traditional medicine) than modern medicine or use traditional medicine after failure of modern drug. Haile Yineger and Dilnessaw Yehuwalaw (2007) also documented the same results that local people of Sokoru District have been seeking for traditional healers' treatment even in preference to modern medications. Local people of the study area prefer traditional medicines than modern drugs to get relief from rabies, liver and health problems associated with spider poison and bat urine.

Concerning dosage, it was reported that, lack of precise dosage is one drawback of traditional medicinal plants (Amare Getahun, 1976; Sofowora, 1982; and Dawit Abebe, 1986) the result of this study is inline with it since lack of consistency was observed among the informants. Gobena Ameni and Mirutse Giday (2003) reported similar results. In the study area, various ways of

measuring dosage were reported by local people. It can be seen by classifying into three. One is for those medicinal plants which are expected to be dangerous, the measurement was by little finger index. Very few amount given by a cup of coffee (Locally known as 'Sinii') e.g. traditional medicine prepared from *Phytolacca dodecandra, Cucumis ficifolius, Carissa spinarum* and *Securidaca longepedunculata*. Others are medicinal plants which can have effect but are not as danger as the above ones. The dosage is by hand palm and taken by bottle or locally made material from *Lagenaria siceraria* Known as 'Hullee'. E.g., traditional medicine prepared from *Vernonia amygdalina.* In the third case, medicinal plants that have not any observable side effect. Traditional medicine prepared from those plants can be taken according to personal preference of the patient. Traditional medicine prepared from *Allium sativum, Citrus limon, Citrus aurantium* and other medicinal plants applied dermally.

Regarding adverse effects, it was not frequently reported. It may happen rarely and to overcome the effect, milk and butter are recommended. Informants reported that, equal amount of medicine should not be given for adults and children or for fat or thin cattle. There are also conditions that restrict taking of traditional medicine. For instance, pregnant women and babies are not allowed to take drug, which are prepared from *Phytolacca dodecandra, Cucumis ficifolius, Carissa spinarum and Securidaca longepedunculata*. Because indigenous people believe that, pregnant women have not strength to take, the drug and the drug can harm the fetus.

According to informants, every economic group use traditional medicine. This result is in disagreement with the results of Haile Yineger and Dilnessaw Yehuwalaw (2007), who reported that poor local people of Sokoru District frequently use traditional medicines.

5.7 Ranking of Medicinal Plants

Preference ranking, paired comparison and direct matrix ranking were employed to assess the degree of importance of medicinal plants of the study area. Ranking of medicinal plants showed that there are medicinal plants that are preferred by local people than the other. This indicated that local people acquire the knowledge through experience and could differentiate medicinal plants that are effective for treatment of their or their livestock ailments. In the study area, *Cordia africana* stood first by having the highest multipurpose use. Although, it has low medicinal value, the plant is used mostly for construction (timber) production. This is the evidence for the depletion

of this plant. *Eucalyptus globulus* had the second rank; there is no fear for its depletion, since people of the study area grow this plant in their garden.

5.8 Threats to Medicinal Plants in the Study Area

Many of the threats to medicinal plant species are similar to those causing endangerment to plant diversity in general. The most serious proximate threats generally are habitat loss, habitat degradation and over-harvesting (Hamilton 1997; cited in Hamilton, 2004).

About 15,000 medicinal plant species may be threatened with extinction world widely due to Habitat loss and over harvesting and it is estimated that the earth is losing one potential major drug every two-year (Roberson, 2008). Medicinal plants are at increasing risk from destruction of their habitats (Agricultural, fire, construction, overgrazing, and urbanization) and over harvesting of known medicinal species. The result of Mirutse Giday (2001) indicated that intense deforestation became the major threat on medicinal plants in Zey people. Kebu Balemi *et al.,* (2004), reported overgrazing was principal threat to medicinal plants in Fentalle area.

Informants reported that deforestation (agricultural expansion, construction, woody fire collection) urbanization and over utilization were the major threats observed in the study area. The latter two have less impact on medicinal plants compared with other threats. It was already reported that much of medicinal plants in the study area were collected for their leaves and this practice helps to reduce the rate of threat on plant species compared with the utilization of roots. However, there are medicinal plants in the study area in which their roots are useful for treatment of ailments. Therefore, over collection posses a significant threat to medicinal plants that roots are used. This was observed on *Cucumis ficifolius*, *Rumex nepalensis* and *Securidaca longepedunculata.* Those medicinal plants are used to treat blackleg, evil eye and liver diseases and informants reported that it is difficult to collect them easily and they are getting lost due to over utilization.

Informants highly cited that deforestation became the most threatened factor on medicinal plants. In this respect, plant species with multipurpose uses are highly affected. For instance, local people of the area for various uses prefer *Cordia africana* for construction; timber production, charcoal and medicinal and the plant are getting to be eliminated.

Knowledge of traditional medicine is also getting lost due to the mistrust of the young generation and secrecy. Informants reported that the young generation refused to know or use traditional medicine and a lot of invaluable information could be lost whenever traditional medicinal practitioners die without sharing their knowledge to others. Modernization has its own role on the decline of traditional medicinal knowledge. (E.g. development of schools and clinics).

Religions have reported to have impact on the knowledge of medicinal plants in the study area. Thus, most of informants from Protestant reported that their religious leaders discourage using of traditional medicine by linking with evil work. Health officers also, discourage people not to use traditional medicine and local healers reported that health officers tell to people as local healers are cheating local people and has no any medicinal knowledge. Informants reported that there is no hesitation as more medicinal plants were found in the past decade than today and knowledge of traditional medicine is declining than ever before.

Fig 9 Discussion on threat of medicinal plants with informants
              (Photo taken by Moa, 2009)

5.9 Conservation of medicinal plants in the study area

Because so many plants are medicinal, medicinal plant conservation is in some ways, a microcosm of plant conservation as a whole (Hamilton, 2004). People of the study area, know the benefit of conserving medicinal plants however; the effort of conserving medicinal plants is less (minimal). Even, local healers do not conserve medicinal plants very well and they prefer to collect from wild when patients visit them to get relief from their ailments. Local healers do this in order to hide the medicinal plants from other community members. That means if they bring to homegarden, somebody might see them while they are preparing the medicine from the plant and prepare by himself as a result the income of local healers may decrease. However, there were medicinal plants that frequently observed in homegarden like, *Ocimum urticifolium* and *Ruta chalepensis.*

In the study area, belief contributed to conservation of medicinal plants. It was reported that medicinal plants collected during 'Chegino' that means Monday, Wednesday and Friday and limitation of days for collecting medicinal plants reduced the effect. This result is in line with the result of the study of Etana Tolessa (2007) in Gimbi Wereda. Keeping secret on medicinal plants on one hand have effect on knowledge of traditional medicine on other hand can have importance on conservation. Thus, if medicinal plants known by all people the impact could increase.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The results of the study revealed that there is high diversity of medicinal plants and traditional knowledge about the use, preparation, and application, which is still maintained among local people of Wayu Tuka Wereda. In the study area, Fabaceae was the leading Family by which local people of the Wereda derive their medicine for treatment of various ailments as it was represented by 15 plant species and herbs stood first by which local people of the study area derive their remedy. Utilization of more herbs than trees and shrubs for medicinal purpose may indicate, as pressure due to harvesting medicines is insignificant on plant diversity in the study area.

People of the study area mostly prepare the remedy from leaves and utilization of more leaves than other plant parts do not put medicinal plants under pressure compared with using of root or whole plants. Large numbers of medicinal plants are collected from wild areas. This shows, as there is lack of conserving medicinal plants in homegardens by local people of the study area even local healers run to the wild to collect medicinal plants when the need arise. Knowledge of medicinal plants in the study area vary among age and sex much of knowledge of medicinal plants are handled by elders who were between the age of 40-59 and males were able to mention more medicinal plants than females, especially for those which are found in wild areas. The study revealed that much of females' knowledge is limited to medicinal plants, which are cultivated in homegardens. In the study area, all medicinal plants have not equal importance as there were medicinal plants mostly preferred by local people of the study area for treatment of the same disease they acquire the knowledge through long experience and able to differentiate the most efficacies medicinal plants for treatment of their or their livestock ailments.

The results of the study also revealed that many wild species of medicinal plants are under pressures from various human induced factors. In addition, disinterest of young generation on traditional medicine; put the continuity of traditional medicinal knowledge under question. Since young generation show lack of interest to use or know medicinal plants from elders, the knowledge of traditional medicine might be eliminated in the near future unless proper documentation is made. Moreover, creation of awareness on young generation about medicinal plant uses and how elders used traditional medicine in the absence of modern drugs to maintain their or their livestock ailments is very important so that the young generation could appreciate and use TM.

6.2 Recommendations

Based on the results obtained, the following recommendations are forwarded.

- ➢ Government officers and NGOs should participate in conservation of medicinal plants found in the study area. More over, people of the study area should take part in conservation of medicinal plants.

- ➢ To alleviate knowledge of traditional medicine from ever loss, awareness of young generation on the usage of traditional medicine is recommended. This can be done by incorporating traditional medicine in the school curriculum and the media in general can play vital role by broadcasting the importance of medicinal plants, in the form of drama or teaching.

- ➢ Create awareness to local people of the study area to conserve medicinal plants in their garden.

- ➢ Planting of multipurpose plants is beneficial. E.g., *Cordia Africana,* the Wereda Agricultural Office need to distribute such medicinal plants to local people since the use of *Cordia africana* is vital to people of the study area.

- ➢ *Cucumis ficifolius*, *Rumex nepalensis* and *Securidaca longepedunculata* were reported to be utilized for their roots and are getting lost in the study are. Therefore, they should survive by the effort of local people by growing them in homegarden since; these plants had the highest consensus for treating blackleg and liver disease.

- ➢ Religious leaders especially from Protestants and health officers should change their attitude towards traditional medicine and practitioners. They have to develop courage rather than discouraging the use of traditional medicinal plants as local people have been used traditional medicine for a long time before the invention of modern drugs.

- ➢ In the study area, local healers are famous on certain diseases. They cure the diseases that could not be cured by modern drugs. Indigenous people of the study area, name them by the disease they heal. E.g. 'beekaa dhukkuba saree' means healer of rabies; 'beekaa sabbata waaqayyoo' means healer of liver diseases. Since those local healers got acceptance in the study area, they should be licensed so that they can do their work without any hesitation.

- ➢ Further clinical research should be carried out on the biochemical activity and efficacy of mostly cited medicinal plants. To do this finance can be a constraint. Therefore, the collaboration of NGOs, Companies and other responsible stakeholders is highly needed.

7. REFERENCES

Abbink, J. (1995). Medicinal and ritual plants of Ethiopia southwest: An account of recent research. *Indigenous knowledge and Development Monitor* **3 (2):** 6-8.

Abebe Demissie (2001). Biodiversity conservation of medicinal plants: problems and prospects. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp* 56-64.(Medhin Zewdu and Abebe Demissie eds.), IBCR, AA.

Abiot Birhanu, Zemede Asfaw and Enserrmu Kelbessa (2006). Ethnobotany of plants used as insecticides repellants and anti malarial agents in Jabitehnan District, West Gojjam. *SINET, Ethiop. J. Sci*. **29(1):**87-92.

Aklilu Lemma, Brody, G., Newell, G. W., Pankharust, R. M. and Skinner, W. A. (1984). Studies on molluscicidal properties of 'endod' *(Phytolaca dodecandra)*. Increased potency with butanol extraction. **In:** *Phytolaca dodecandra*), final report of the international scientific workshop. Lusaka, Zambia 263-270 pp. (Aklilu Lema, Heynman, D. and Silangwa, S.M. eds).

Amare Getahun (1976). Some Common Medicinal and Poisonous Plants Used in Ethiopia Folk Medicine. Addis Ababa University, pp 3-63.

Andy, C. (1999). ''Methods on the moove'' A review of veterinary uses of participatory approaches and methods focusing on experiences in dryland Africa. *IIED*, London, 97 Pp.

Arihan, O. and Mine, A. (2007). Traditional medicine and intellectual property rights. *J. Fac. Pharm.* **36 (2):** 135-151

Balick, M. J. and Cox, P. A. (1996). Plants People and Culture. The science of ethnobotany. Scientific American library, New York, USA.Pp288.

Belachew Wassihun, Zemede Asfaw and Sebsebe Demissew (2003). Ethnobotanical Study of Useful Plants in `Danioo Gade` (Home Garden) in Southern Ethiopia. *Ethiop. J. Bio. Sci*.**2 (2):** 119-141.

Belachew Wassihun (2008). National economic value of the unexploited traditional medicinal plants, Ethiopia, Biodiversity newsletter. Retrieved from, *http//www.ibc-et.org* 04-02-2010

Berhanemeskel Weldegerima (2009). Review on importance of documenting ethnopharmacological information on medicinal plants. *Afr. J. Pharm. Pharmacol* **3 (9):** 400-403.

BGCI (1998). `Plants as Medicine`. Botanic Gardens Conservation International/British air ways/ International Center for Conservation Education. Fact sheets 3 pp4.

Boadker, J. (2005). *Medicinal plant biodiversity and local healthcare*: *sustainable use and livelihood development*. 17th Common wealth forestry conference, Colombia, Sri Lanka, 15pp.

Connive, V. and Steven, K. (1996). *Introduction to Ethnobotany.*

www.accessexcallence-org/RC/ethnobotany/index.html

Cotton, C.M. (1996). *Ethnobotany: Principles and Applications*. John Willey and Sons LTD. Chichester, UK, pp424.

Cunningham, A.B. (1993). African medicinal plants: setting priorities at interface healthcare between conservation and primary health care. *People and plants working paper*. Paris, UNESCO. 50pp

Cunningham, A.B., Patricia, S. and Sarah, L. (2008). Health, habitats and medicinal plant use.

Davidson, H. I. (2000). Ecological ethnobotany: stumbling towards new practices and paradigms. *MASA Journal,* **16 (1):** 1-13.

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

Dawit Abebe (2001). The Role of Medicinal Plants in Health Care Coverage of Ethiopia, the Possible Integration. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia ,Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp 6-21*. (Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

Dawit Abebe and Ahadu Ayehu (1993). Medicinal plants and enigmatic health practices of northern Ethiopia. B.S.P.E., Addis Ababa.

Debela Hunde, Zemede Asfaw and Enzsermu Kelbessa (2004). Use and Management of Ethnovetarnary Medicinal Plants of Indigenous People in `Boosat`, welenchiti area, *Ethiop. J. Biol. Sci.* **3(2):**113-132.

Dery, B.B., Ofsynia R., Ngatigwa C. (1999). Indigenous knowledge of medicinal trees and setting priorities for their domestication. Shiryanga region, Tanzania, Nairobi, Kenya. International center for research in agroforestry.

Dessalegn Dessisa (2001). A preliminary economic valuation of medicinal plants in Ethiopia: Trade volume and price. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp 176-197*. (Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

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.

Endashaw Bekele (2007). *Study on actual situation of medicinal plants in Ethiopia*. Prepared for JAICAF (Japan Association for International Collaboration of Agriculture and Forestry). 73Pp.

Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Edwards (1992). Some Threatened Endemic Plants of Ethiopia. **In:** the status of some plants in parts of tropical Africa. (Edwards, S. and Zemede Asfaw, eds). *Botany 200: NAPRECA, Monograph Series.* **No. 2:**35-55. Addis Ababa University, Ethiopia.

Ermias Lulekal, Ensermu Kelbessa and Tamrat Bekele (2008). An Ethnobotanical Study of Medicinal Plants in Mana Angetu District, South Eastern Ethiopia. *Journal of Ethnobiology and Ethnomedicine*. **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.

Fabricant, D. S. and Farnsworth, N. R. (2001). The value of plants used in traditional medicine for drug discovery. *Environmental Health Perspectives*. **109:** 69-75.

Farnsworth, N.R. (1994). Ethnopharmacology and drug development in ethnobotany and the search for new drugs. Ciba foundation symposium 185 chic ester, UK John Wiley and Sons. 42-59.

Fassil Kibebew (2001). The Status and Availability of Oral and Written Knowledge on Traditional Health Care in Ethiopia. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp 168-175*. (Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

Fisseha Mesfin (2009). An Ethnobotanical Study of Medicinal Plants in Wonago Woreda,SNNPR *Journal of Ethnobiology and Ethnomedicine* **5:28**.

Friis (2009). *Floristic richness and endemism in the flora of Ethiopia and Eritrea* **In**: Hedberg, I., Friis, I. and Persson, E. (eds.). Flora of Ethiopia and Eritrea Vol. **8.** General part and index to Volumes 1-7.The National Herbarium, Addis Ababa and Uppsala, 33-38pp

Gidey Yirga (2010). Assessment of indigenous knowledge of medicinal plants in Central Zone of Tigray, Northern Ethiopia. *Afr. J. Plant Sci.* **4(1):** 6-11.

Gilbert (1989). ***Rutaceae.*** **In**: Hedberg, I. and Edwards, S. (eds.). Flora of Ethiopia and Eritrea Vol. **3**. *Pittosporaceae to Araliaceae*. The National Herbarium, Addis Ababa and Uppsala, 419-432pp.

Gilbert (1995). *Euphorbiaceae.* **In**: Edwards, S., Mesfin Tadesse and Hedberg, I. (eds.). Flora of Ethiopia and Eritrea Vol. **2:2.** *Centallaceae to Euphorbiaceae*. The National Herbarium, Addis Ababa and Uppsala, 265-380pp.

Haile Yineger and Delnesaw Yehuwalaw (2007). Traditional Medicinal Plant Knowledge and Use by Local Healers in Sekoru District, Jimma Zone, Southwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicine.* **3:24.**

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 (6):**132-153.

Hamilton, A.C. (2004). Medicinal plants, conservation and livelihood. International Plants Conservation Unit, WWF-UK, Panda House, Catteshall Lane, Godalming 35pp.

Hamilton, A.C., Shengji, P., Kessy, J., Khan, A.A., Lagoss-Witte, S. and Shinwari Z.K. (2003). The Purpose and Teaching of Applied Ethnobotany. *People and plants working paper* WWF, UK, 71PP.

Heinrich, M., Ankli, A., Frei, B., Weimann, C. and Sticher, O. (1998). Medicinal plants in Mexico: Healer's consensus and cultural, importance. *Social Science and Medicine* **47:** 1863-1875.

Huffman, M. A. and Wrangham, R. W. (1994). Diversity of medicinal plant use by chimpanzees in the wild. **In:** *Chimpanzee Cultures pp 129-149.* (Wrangham, R. W., McGrew, W. C., De Waal, B. M. and Poul, G. H. eds.). Harvard University Press.

Iwu, M.M. (1993). Handbook of African Traditional Medicinal Plants. Roca Raton Ann Arbor. CRC Press, London 43pp.

Jackak, S. M. and Saklani, A. (2007). Challenges and opportunities in drug discovery from plants. *CURRENT SCIENCE.* **92 (9):** 1251-1257.

Jansen, P.C.M. (1981). *Spices Condiments and Medicinal Plants in Ethiopia: Their Taxonomic and Agricultural Significance. Center for Agricultural Publishing and Documentation*. Wageningen, the Netherlands, pp 327.

Jonsell, B. (2000). *Brassicaceae* **In:** Edwards, S., Mesfin Tadesse, Sebsebe Demissew and Hedberg, I. (eds.). Flora of Ethiopia and Eritrea Vol. **2:1**. *Magnoliaceae to Flacourtiaceae* . The National Herbarium, Addis Ababa and Uppsala, 121-154 pp.

Lucy, H. and DaSilva, E.J. (1999). Medicinal plants: a re-emerging health aid. *Electric Journal of Biotechnology*. **2 (2):** 58-70.

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(1):** 37-58.

Kebu Balemie (2006). Indigenous Knowledge and Wild Plants Use by Dawero People in the Upper Omo Valley, South Ethiopia. **In:** *Dry lands ecosystem: Challenges and Opportunities for Sustainable Natural Resources Management Proceedings of the Regional Work Shop Held at Hotel Impala,* impala, pp72-78. *(Nikundlwe, A.M. and Kablgumulla, J.D.L eds.),* Arusha. Tanzania.

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* 04-02-2010

Kent, M. and Coker, P. (1992). *Vegetation description and analysis*: A practical approach. 363pp. Belhaven press, London.

Kokwaro, J.O. (1976). *Medicinal plants of east Africa.* General printers LTD. Nairobi, Kenya. 384pp

Mahesh, B. and Satish, S. (2008). Antimicrobial activity of some important medicinal plants against plant and pathogens. *World Journal of Agricultural Science* **4:** 839-843.

MacDonald, I. (2009). Current trends in ethnobotany. *Trop J Pharm Res*. **8(4):** 295-297.

Martin, G.J. (1995). *Ethnobotany*: *A method manual*. Chapman and Hall, London, 347pp.

Mathias, E. (1996). How can ethnoveterinary medicine be used in field project? *I. K. Monitor* **4:** 6-7.

McCorkel, C.M. and Mathias, E. (1996). Animal Health Biotechnology. **In:** Building on Farmers Knowledge, pp22-51. (Bunders, J., Haverkort, B and Heiemstra, W., eds.). Macmilan education limited London

Medhin Zewdu, Tsige Gebre-Mariam and Kaleab Asres (2001). Global perspectives of medicinal Plants. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998*, pp 198-203. (Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

Mesfin Tadesse (1986). Some medicinal plants of central Shewa and South Western Ethiopia. *SINET. Ethiopi. J. Sci.* **9:** 143-167.

Mesfin Tadesse (2004). *Asteraceae* **In:** Hegberg, I., Friis, I. and Edwards, S. (eds.). Flora of Ethiopia and Eritrea Vol. **4:2**. The National Herbarium, Addis Ababa and Uppsala, 408pp.

Mesfin Tadesse and Sebsebe Demissew (1992). Medicinal Ethiopian Plants Inventory, Identification and Classification **In:** Plants used on African traditional medicine as practiced in Ethiopia and

Uganda, east Africa. (Edwards, S. and Zemede Asfaweds). *Botany 200: NAPRECA, Monograph Series.* **No. 5:**1-19. Addis Ababa University, Ethiopia.

Mirutse Giday (2001). An Ethnobotanical Study of Medicinal Plants Used by the Zay People in Ethiopia. CBM: *Skriftserie* **3:**81-99.

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 (2):** 123-136.

Mirutse Giday, Zemede Asfaw, Zerihun Woldu and Tilahun Teklehaymanot (2009). Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an ethnobotanical investigation. *Journal of Ethnobiology and Ethnomedicine*. **5:** 5- 34.

Mirutse Giday, Zemede Asfaw and Zerihun Woldu (2009). Medicinal plants of the Meinit ethnic group of Ethiopia: an Ethnobotany study. *J Ethno pharmacol*. **124(3):**513-521.

Muthuswamy, R. and Solomon Mequanente. (2009). Ethynomedicinal survey of folk drugs used in Bahirdar Zuria district, Northwestern Ethiopia. *Indian Journal of Traditional Knowledge.* **2:** 281-284.

Ohigashi, H. (2008). Utilization and production of medicinal plants. **In**: Medicinal crops in Ethiopia Current status and future potential. (Makiu ed.). JAICAF (Japan Association for International Collaboration of Agriculture and Forestry). 4-6.

Okigbo, R.N. and Mmeka, E.C. (2006). An appraisal of phytomedicine in Africa. *Sci. Tech. J.* **6 (2):** 83-94.

Pande (2000). *An Introduction to Botany*. 4th edn. Rajsons Printers, New Delhi.

Pankhurst, R. (1995). A historical examination of traditional medicine and surgery. *Ethiopian Medical Journal.* **3(4):**160.

Reddy, C.S., Reddy, K.N., Murthy, E.N. and Raju V.S. (2009). Traditional medicinal plants in Seshachalam hills, Andra Pradesh, India. *J. Med. Plant. Res*.**3 (5):** 408-412.

Roberson, E. (2008). *Medicinal plants at risk*. A native plant conservation campaign report. 16pp.

Samy, R. P. and Gopalakrishnakone, P. (2007). Current status of herbal and their future perspectives. *Nature precedings* **1176:** 1-13.

Sebsebe Demissew and Ermias Dagne (2001). Basic and applied research on medicinal plants of Ethiopia. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp 29-33*. (Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

Seyoum Getaneh (2009). Ethnobotanical studies of medicinal plants in Debre Libanos Wreda, North Shewa Zone of Oromia Region, Ethiopia. M.Sc. Thesis, Addis Ababa.

Sofowora, A. (1982). *Medicinal Plants and Traditional Medicine in Africa*. 256pp, John Wiley and Sons, Ltd. New York.

Sofowora, A. (1996). Research on medicinal plants and traditional medicines in Africa. *The Journal of Alternative and Complementary Medicine*. **2 (3):** 365-372.

Tafesse Mesfin and Mekonnen Lemma (2001). The role of traditional veterinary herbal medicine and its constraints in animal health care system in Ethiopia. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp 168-175*.(Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

Teferi Flatie, Teferi Gedif, Kaleab Asres and Tsige Gebre-mariam (2009). Ethnomedicinal survey of Bertha ethnic group Asossa Zone, Benishangul-Gumuz regional state, mid-West Ethiopia. *Journal of Ethnobiology and Ethnomedicine.* **5:14**.

Tewolde Berhan Gebre Egziabher and Edwards, S. (1997). *Alliaceae.* **In:** Edwards, S., Sebsebe Demissew and Hedberg, I. (eds.). Flora of Ethiopia and Eritrea Vol. **6**. *Hydrocharitaceae to Arecaceae* . The National Herbarium, Addis Ababa and Uppsala, 148- 156pp.

Tesfaye Hailemariam, Sebsibe Demissew and Zemede Asfaw (2009). An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta special Wereda, Southern Nations, Nationalities and People Regional State, Ethiopia. *Journal of Ethnobiology and Ethnomedicine, 6:25*.

Tilahun Teklehaymanot and Mirutse Giday (2007). Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicine.* **3:**1-12.

Tsige Gebremariam and Kaleab Asres (2001). Applied research in medicinal plants. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable USE OF Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp 168-175*. (Medhin Zewdu and Abebe Demissei eds.), IBCR, AA.

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. Addis Ababa University.

Ugulu, I., Baslar, S., Yorek, N., and Dogan, Y. (2009). The investigation and quantitative ethnobotanical evaluation of medicinal plants used around Izmir province, Turkey. *J. Med. Plant. Res*. **3 (5):** 345-367.

Verma, S. and Singh, S.P. (2008). Current and future status of herbal medicines. *Veterinary World*. **1(11):** 347-350.

Vlietink, A. J. and Vanden, D. A, (1991). Can ethnopharmacology contribute to the development of antiviral drugs? *J Ethnopharmacol* **32:** 141-153.

Wirtu, Adugna, Samuel, Ensermu and Geleto (1999). Aspects of farmers' knowledge, attitudes and practices of animal health problems in central Ethiopia. **In**: *Ethnoveterinary medicine: alternatives for livestock development*. Proceedings of an international conference held in Pune, India, 4-6 November 1997.

Wright, C.W. (2005). Plant derived antimalarial agents: new leads and challenges. *Phytochemistry*. **4:** 55-61.

WTWAO (2007). Wayu Tuka Wereda Agricultural Office. Unpublished annual report on population size and agriculture.

WTWHO (2009). Wayu Tuqa Wereda Health Office. Unpublished report on diseases found in the Wereda.

WHO (1991). Traditional medicine and modern health care: progress report by the director general. World Health Organization, Geneva.

WHO (2001). Legal status of traditional medicine and complementary/alternative medicine: A world wide review. World Health Organization, Geneva. 189pp.

WHO (2008). Traditional medicine fact sheet World Health Organization. No34.

Zemede Asfaw (2001). The role of home gardens in production and conservation of medicinal plants. **In:** *Conservation and Sustainable Use of Medicinal Plants in Ethiopia, Proceeding of The National Work Shop on Biodiversity and Sustainable use of Medicinal Plants In Ethiopia, 28 April-01 May 1998, pp* 76-91. (Medhin Zewdu and Abebe Demissei eds.), IBCR, Addis Ababa.

Zemede Asfaw (2006). Towards a Dynamic Indigenous Knowledge Practice: Optimization of the Uses and Management of Plant Resources in the Dry lands of Ethiopia. **In:** *Dry lands ecosystem: Challenges and Opportunities for Sustainable Natural Resources Management Proceedings of the Regional Work Shop Held at Hotel Impala,* pp 64-71. *(Nikundlwe, A.M. and Kablgumulla, J.D.L eds.),* Arusha. Tanzania.

Zerihun Woldu (1999). Forests in the vegetation types of Ethiopia and their status in the geographical context. **In:** *Forest Genetic Resources Conservation: Principles, Strategies and Actions*, *pp 1-38* (Edewards, S., Abebe Demissie, Taye Bekele and Haase, G., eds). Workshop Proceedings. Institute of Biodiversity Conservation and Research GTZ, Addis Ababa.

Appendix 1 Checklist of questions to used as basis for discussion and interview

1) General information of counterpart or respondent.

Name…………….

Age ……………..

Occupation…………………………

Sex………………………

Educational status…………………………………..

Kebele……………………

Religion………………………..

2) How do you classify vegetation traditionally?

3) How do you classify soils traditionally?

4) How do you classify landscapes traditionally?

5) How do you classify seasons traditionally?

6) Are there plants, which you use to treat humans, livestock, or both when they have health problems?

7) Mention human and livestock ailments treated by each medicinal plant you indicate.

8) Local name of the plant.

9) Habit of the plant (etic categorization).

10) From where do you collect medicinal plants? Wild, home garden, etc.

11) Part of the plant collected for remedy in the study area. (Leaves, root, stem, fruit, flower, latex, whole plant.)

12) Method of preparation.

❖ Preparation forms: crushed, pounded, powder, chewed etc.

❖ Used alone, mixed with water or other etc.

❖ Condition: dried, fresh, both.

13) Route of administration. (Oral, nasal, dermal).

14) Amount used or dosage.

15) Does the dosage vary? For instance, age group, sex etc.

16) Is there any noticeable side effect of the medicine?

17) If yes, how can you over come the effect?

18) Are there conditions, which restrict taking of the medicine?

19) Are medicinal plants easily accessible?

20) How do you assess accessibility of medicinal plants when compared with the past decade?

21) Are there any beliefs linked with the utilization of medicinal plants in the study area? (Age, method, storage, time of collection, time of administration, condition like pregnancy, healthy status).

22) Is the medicinal plant marketable?

23) How does modernization interfere with traditional medicine?

24) How is the effectiveness of medicinal plant?

25) Are there economic groups who frequently use the medicinal plant?

26) How does the knowledge transfer take place from elders to younger?

27) What are the major threats to medicinal plants? As a group and individual species.

28) Is there any effort made to conserve the medicinal plants?

29) How do you conserve medicinal plants?

30) Information of edibility and other uses if any of the plant beside its medicinal value?

Appendix 2 Lists of informants

No.	Name	Age	Sex	Occupation	Kebele	Religion	Educ.status
1	Abera Geneti	59	M	Farmer	Gbadiya	Protestant	Illiterate
2	Adis Adno	90	M	Priest	Bonya	Orthodox	Illiterate
3	Adugna Jirata	20	M	Student	Mkuraa	Protestant	Elementary
4	Alemayehu Timeketa	37	M	Farmer	Bonya	Protestant	High school
5	Amante Ayana	47	M	Farmer	Gbadiya	Orthodox	Illiterate
6	Amelewerk Teklu	22	F	Merchant	Gute	Protestant	High school
7	Amsalu Abebe	50	M	Farmer	Kichii	Protestant	Illiterate
8	Asefa Jirata	65	M	Farmer	Ghudhaa	Orthodox	Illiterate
9	Asefa Tesema	70	M	Farmer	Ghudhaa	Orthodox	Illiterate
10	Ayantu Birhanu	30	F	Teacher	Ghudhaa	Protestant	Collage
11	Ayantu Jabesa	31	F	Teacher	Mkura	Orthodox	Institute
12	Barkesa Faaliqa	65	M	Farmer	Gute	Orthodox	Illiterate
13	Chawaka Alemu	44	M	Farmer	Gjimata	Protestant	Illiterate
14	Chala Abeya	45	M	Farmer	Kichii	Protestant	Illiterate
15	Chaltu Feyissa	35	F	House wife	Ghudhaa	Protestant	Illiterate
16	Danse Chewaka	80	F	Farmer	Mkuraa	Orthodox	Illiterate
17	Deresa Birdida	102	M	-	GJimata	Orthodox	Illiterate
18	Eba Galaaan	41	M	Farmer	Ghudhaa	Protestant	Illiterate
19	Eba Muleta	60	M	Student	Ghudhaa	Catholic	Illiterate
20	Ebisa Tesgera	25	M	Farmer	Gute	Orthodox	Elementary
21	Fikadu Abdisa	63	M	Farmer	Bonya	Orthodox	Illiterate
22	Fikadu Birhanu	30	M	Farmer	Bonya	Protestant	Elementary
23	Fikadu Kejela	76	M	Guard	Komto	Orthodox	Elementary
24	Gidi Fufa	50	M	Farmer	Komto	Orthodox	Illiterate
25	Habtamu Adugna	19	M	Student	Gute	Protestant	Student
26	Hanbissa Tesema	21	M	Student	Bmiinya	Protestant	High school
27	Hisene Oljira	30	F	Merchant	GJimata	Protestant	High school
28	Ijigayehu Mijena	40	F	House wife	Mkuraa	Protestant	Illiterate
29	Ilfinesh Aga	50	F	House wife	Bmiinya	Orthodox	Illiterate
30	Itana Mesadi	50	M	Purchaser	Gute	Orthodox	High school
31	Jamaye Tareka	31	F	House wife	Mkuraa	Protestant	Illiterate
32	Juar Lebesa	39	M	Farmer	Komto	Muslim	Elementary
33	Kamiso Doro	50	M	Farmer	Mkuraa	Orthodox	Illiterate
34	Kibitu Busha	53	F	House wife	Gbadiya	Protestant	Illiterate
35	Kidanu Diriba	30	M	Farmer	Mkuraa	Protestant	Elementary

36	Likitu Tufa	36	F	Teacher	Gute	Protestant	Collage
37	Meskerem Belete	38	F	Framer	Kichii	Orthodox	Illiterate
38	Mitike Kejela	45	F	House wife	Bmiinya	Catholic	Illiterate
39	Mulgeta Regasa	21	M	Student	Ghudhaa	Orthodox	Collage
40	Senbeto Lamesa	38	M	Farmer	Bmiinya	Catholic	Elementary
41	Shoro Hunduma	65	M	Farmer	Gute	Orthodox	Illiterate
42	Sirata Senbeto	60	M	Guard	Bonya	Protestant	Illiterate
43	Soreti Wakuma	22	F	Student	Gjimata	Protestant	High school
44	Tadesse Oli	60	M	Farmer	Komto	Protestant	Illiterate
45	Temesgen Chemeda	33	M	Farmer	Komto	Orthodox	Elementary
46	Temesgen Geleta	33	M	Farmer	Bonya	Orthodox	Illiterate
47	Temesgen Negeri	55	M	Farmer	Bmiinya	Catholic	Illiterate
48	Terfa Nemesa	65	M	Farmer	Komto	Orthodox	Illiterate
49	Tolashii Goshu	41	F	House wife	Kichii	Protestant	Elementary
50	Tsehay Jaleta	22	F	Xena Kela	Bmiinya	Catholic	Institute
51	Umeta Gudeya	70	M		Gbadiya	Orthodox	Illiterate
52	Werkinesh Abebe	35	F	Farmer	Bmiinya	Catholic	Illiterate
53	Werkinesh Bedasa	30	F	Farmer	Gjimata	Protestant	Illiterate
54	Xayitu Chemeda	25	M	Student	Bonya	Orthodox	Collage
55	Xirunesh Tegeny	49	F	House wife	Gbadiya	Protestant	Illiterate
56	Xiyar Chemeda	55	M	Farmer	Gbadiya	Orthodox	Illiterate
57	Yaadataa Guta	41	M	Framer	Kichii	Orthodox	Illiterate
58	Yaazaachoo Gammadaa	31	M	Farmer	Kichii	Protestant	Illiterate
59	Yadeta Gurmu	58	M	Merchant	GJimata	Orthodox	Elementary
60	Yosef Tolera	22	M	Student	Kichii	Protestant	High school
61	Yusuuf Alii	53	F	Farmer	Gjimata	Muslim	Illiterate
62	Zamzam Yaasin	42	F	Teacher	Komto	Muslim	Elementary
63	Zenebu Kitila	40	F	House wife	Gbadiya	Protestant	Illiterate

Appendix 3 List of plant species collected from the study area. Key: In bold are medicinal plants. Habit: T=Tree, Sh=Shrub, H=Herb, Li=Liana, Cl=Climber, Ep=Epiphyte.

Scientific Name	Family	Afaan Oromoo name	Habit	Coll. No.
Acacia abyssinica Hochst. ex Benth.	*Fabaceae*	*Laaftoo*	T	MM072
Acacia persiciflora Pax	Fabaceae	Garbii	T	MM064
Acacia brevispica Harms	Fabaceae	Harangamaa	Sh	MM201
Acacia mearnsii De Wild.	Fabaceae	Xidii faranjii	T	MM071
Acacia etabaica Schweinf subsp. *etabaica*	Fabaceae	Doddota	T	MM143
Acanthus polystachius Del.	Achanthaceae	Kosorruu	Sh	MM106
Achyrantes aspera L.	Amaranthaceae	Darguu	H	MM042
Acmella caulirhiza Del.	Asteraceae	Guutichaa	H	MM038
Adiantum poiretii Wikstr.	Adiantaceae		H	MM117
Albizia gummiffera (J. F. Gmel.) C.A. Sm.	Fabaceae	Muka arbaa	T	MM068
Albizia malacophylla (A. Rich.) Walp.	Fabaceae	Arganboobee	T	MM070
Albizia schimperiana Oliv.	Fabaceae	Muka arbaa	T	MM069
Asparagus africanus Lam.	Asparagaceae	Sariitii	Sh	MM092
Aspilia mossambicensis (Oliv.) Wild	Asteraceae	Hadaa	H	MM192
Berseama abyssinica Fresen.	Melianthaceae	Lolchiisaa	T	MM054
Bidens macroptera (Sch. Bip. ex Chiov.) Mesfin	Asteraceae	Keelloo	H	MM037
Bridelia micrantha (Hochst.) Baill.	Euphorbiaceae	Galaanoo	T	MM186
Brucea antidysentrica J.F. Mill.	Simaroubaceae	Qomonyoo	T	MM028
Buddleja polystachya Fresen.	Loganaceae	Hanfaarree	Sh	MM024
Caesalpina decapetala (Roth) Alston	Fabaceae	Qonxir	Sh	MM187
Calpurnia aurea (Ait.) Benth.	Fabaceae	Ceekaa	Sh	MM074
Canarina eminii Aschers ex Schweinf.	Campanulaceae	Maaracaa	Cl	MM154
Capparis tomentosa Lam.	Capparidaceae	H.gurraacha	Sh	MM101
Carissa spinarum L.	Apocynaceae	Agamsa	Sh	MM103
Caylusea abyssinica (Fresen.) Fisch. and Mey.	Residaceae	Illancoo	H	MM110
Celtis africana Burm.f.	Ulmaceae	Cayii	T	MM179
Centella asiatica (L.) Urban	Apiaceae	Baala buqqee	H	MM058
Chenopodium ambrosioides L.	Chenopodiaceae	Qoricha goondaa	H	MM197
Clausena anisata (Wild.) Benth.	Rutaceae	Ulmaayii	Sh	MM090
Clematis simensis Fresen.	Ranunculaceae	Hidda fiitii	Cl	MM198
Clutia abyssinica Jaub. & Spach.	Euphorbiaceae	Ulee foonii	Sh	MM098
Combretum collinum Fresen.	Combretaceae	Unuunuu	T	MM102
Combretum molle R. Br. ex. G. Don	Combretaceae	Dabaqqaa	T	MM149
Conium maculatum L.	Apiaceae	Aramaa	H	MM077

Scientific Name	Family	Afaan Oromoo name	Habit	Coll. No.
Cordia africana Lam.	Boraginaceae	Waddeessa	T	MM091
Croton macrostachyus Del.	Euphorbiaceae	Bakkanniisa	T	MM080
Crotalaria rosenii (Pax) Milne-Redh. ex Polhill	Fabaceae		Sh	MM135
Crotalaria spinosa Hochst. Ex. Benth.	Fabaceae	Shumburaa gugee	H	MM067
Cucumis ficifolius A. Rich.	Cucurbitaceae	Faca`aa	H	MM026
Cynodon dactylon (L.) Pers.	Poaceae	Coqorsa	H	MM174
Cynoglossum lanceolatum Forssk.	Boraginaceae	Maxxannee	H	MM124
Cyperus rotundus L.	Cyperaceae	Qeexamaa	H	MM190
Cyphostemma cyphopetalum (Fresen.) Desc. ex Wild & Drummond	Vitaceae	Hidda reeffaa	Li	MM155
Datura stramonium L*.*	Solanaceae	Asaangira	H	MM084
Dodonoea angustifolia L. f.	Sapindaceae	Ittacha	Sh	MM086
Dracaena afromontana Mildbr.	Dracaenaceae	Siiqqee qamalee	T	MM113
Echinops amplexicaulis Oliv.	Asteraceae	Qoree harree	H	MM126
Echinops hispidus Fresen.	Asteraceae	Keberchoo	H	MM034
Ehretia cymosa Thonn.	boraginaceae	Ulaagaa	T	MM009
Ekebergia capensis Sparrm.	Meliaceae	Somboo	T	MM170
Eleusine coracana (L.) Gaertn.	Poaceae	Dagujjaa	H	MM195
Embelia schimperi Vatke	Myrsinaceae	Hanquu	Li	MM047
Eucalyptus globulus Labill	Myrtaceae	Akaakltii adii	T	MM087
Euclea divinorum Hiern	Ebenaceae	Mi`eessaa	Sh	MM166
Euphorbia ampliphylla Pax	Euphorbiaceae	Adaamii	T	MM157
Erythrina brucei Schweinf.	Fabaceae	Waleensuu	T	MM073
Ficus ovata Vahl	Moraceae	Qilinxoo	T	MM183
Ficus sycomorus L.	Moraceae	Odaa	T	MM107
Ficus thonningii Blume.	Moraceae	Dambii	T	MM184
Ficus vasta Forssk.	Moraceae	Qilxuu	T	MM185
Flacourtia indica (Burm. F) Merr.	Flacourtaceae	Akuukkuu	Sh	MM142
Galinsoga quadriradiata Ruiz & Pavon	Asteraceae	Aramaa	H	MM194
Gardenia ternifolia Schumach. & Thonn.	Rubiaceae	Gambeela	T	MM019
Girardina diversifolia (Link) Friis	Urticaceae	Doobbii	Sh	MM178
Girardinia bullosa (Steud.) Wedd.	Urticaceae	Gurgubbee	Sh	MM046
Grewia bicolor Juss.	Tiliaceae	Harooressa	T	MM151
Grewia ferruginea Hochst. ex A. Rich.	Tiliaceae	Dhoqonuu	T	MM048
Guizotia scabra (Vios.) Chiov.	Asteraceae	Tuufoo	H	MM191
Hagenia abyssinica (Brace) J.F.Gmel.	Rosaceae	Heexoo	T	MM089
Helinus mystacinus (Ait.) E. Mey. ex Steud.	Rhamnaceae	Hidda hoomoo	H	MM097
Hygrophila schulli (Hamilt.) M.R. & S.M. Almeida	Acanthaceae	Arraba nadheenii	H	MM122

Scientific Name	Family	Afaan Oromoo name	Habit	Coll. No.
Hymenodictlon floribundum (Hochst. & Steud.) Robinson	Rubiaceae	Altadhahaa	T	MM156
Impatiens tinctoria A. Rich. subsp. *abyssinica* (Hook. f.) Grey Wilson	Balsaminaceae	Qicuu	H	MM153
Indigofera arrecta Hochst. ex A. Rich.	Fabaceae	Heennaa	Sh	MM078
Indigofera spicata Forssk.	Fabaceae	Reencii	H	MM077
Isodon schimperii (Vatke) J. K. Morton	Lamiaceae		Sh	MM119
Juniperus procera Hochst. ex Endl.	Cupressaceae	Gaattiraa	T	MM123
Justicia diclipteroides Lindau subsp. *aethopica* Hedren	Acanthaceae		H	MM199
Kalanchoe laciniata (L.) DC.	Crassulaceae	Bosoqqee	H	MM158
Lagenaria siceraria (Molina) Standl.	Cucurbitaceae	Buqqee seexanaa	H	MM099
Leucas martinicensis (Jacq) R.Br.	Lamiaceae	Fidoo	H	MM132
Lippia adoensis Hochst. ex walp	Verbenaceae	Kusaayee	H	MM109
Lotus corniculatus L.	Fabaceae	Abbaa qiddii	H	MM065
Maesa lanceolata Forssk.	Myrsinaceae	Abbayyii	Sh	MM079
Malva verticillata L.	Malvaceae	Karfichoo	H	MM150
Maytenus arbutifolia (A.Rich.) Wilczek	Celastraceae	Kombolcha	T	MM169
Maytenus undata Blakelock	Celastraceae	Illikkee	T	MM167
Maytenus obscura (A. Rich.) Cuf.	Celastraceae	Kombolcha	T	MM168
Melia azedarach L.	Meliaceae	Niimii	T	MM052
Millettia ferruginea (Hochst.) Bak.	Fabaceae	Sootalloo	T	MM075
Mirabilis jalapa L.	Nyctagnaceae	Ababa diimaa	H	MM111
Momordica foetida Schumach.	Cucurbitaceae	Humbaawoo	H	MM029
Nicandra physaloides (L.) Gaertn.	Solanaceae	Asaangira	H	MM189
Olea europea L. subsp. *cuspidata* (Wall. Ex G. Don) cif.	Oleaceae	Ejersa	T	MM041
Panicum hochstetteri Steud.	Poaceae	Marga gogorrii	H	MM127
Pavonia urens Cav.	Malvaceae	Hincinnii	Sh	MM062
Periploca linearifolia Quart. –Dill. & A. Rich.	Asclpiadaceae	Annanoo	Cl	MM095
Phragmanthera macrosolen (A. Rich.) M Gilbert	Loranthaceae	Dhertuu Laaftoo	Ep	MM180
Plantago lanceolata L.	Plantaginaceae	Qorxobbii	H	MM044
Podocarpus falcatus (Thunb.) R.B. ex. Mirb.	Podocarpaceae	Birbirsa	T	MM171
Pouteria adolfi-friederici (Engl) Baehni	Sapotaceae	Qararoo	T	MM043
Premna schimperi Engl.	Lamiaceae	Urgeessaa	T	MM134
Prunus africana (Hook. F.) Kalkm.	Rosaceae	Hoomii	T	MM016
Psychotria orophila Petit	Rubiaceae	Buruurii	T	MM172
Pycnostachys abyssinica Fresen.	Lamiaceae	Yeeroo	Sh	MM129
Pycnostachys meyerii Gurke	Lamiaceae	Mata bokkee	H	MM128

Scientific Name	Family	Afaan Oromoo name	Habit	Coll. No.
Rhus ruspolii Engl.	Anacardaceae	Xaaxessaa	T	MM051
Rumex abyssinicus Jacq.	Polygonaceae	Dhangaggoo	H	MM053
Rumex nepalensis Spreng.	Polygonaceae	Timijjii	H	MM055
Rytigynia neglecta (Hiern) Robyns	Rubiaceae	Mixoo	T	MM056
Sacchharum officinarum L.	Poaceae	Shankora	H	MM093
*Sapium ellipticum (*Krauss) Pax	Euphorbiaceae	Bosoqa	T	MM188
Saturega paradoxa (Vatke) Engl. ex Seybold	Lamiaceae	Kefo sa'aa	H	MM200
Schefflera abyssinica (Hochst. ex A. Rich.) Harms	Araliaceae	Gatamaa	T	MM175
Schinus molle L.	Anacardaceae	Qundoobarbaree	T	MM023
Securidaca longepedunculata Fresen.	Polygalaceae	Xamanaayii	T	MM112
Senna didymobotrya (Fresen.) Irwin & Barneby	Fabaceae	Raamsoo	Sh	MM147
Senna occidentalis (L.) Link	Fabaceae	Lubee	H	MM146
Senna petersiana (Bolle) Lock	Fabaceae	Raamsoo	Sh	MM148
Senna septemtrionalis (Viv.) Irwin& Barneby	Fabaceae	*Samamakii*	Sh	MM145
Setara megaphylla (Steud.) Th. Dur. & Schinz	Poaceae	Baballii	H	MM030
Sida rhombifolia L.	Malvaceae	Karaabaa	H	MM001
Sida schimperiana Hochst. ex A. Rich.	Malvaceae	Kotteeharree	H	MM060
Solanecio gigas (Vatke) C. Jeffrey	Asteraceae	Jirma jaldeessaa	Sh	MM039
Solanum anguivi Lam.	Solanaceae	Hidii seexanaa	Sh	MM120
Solanum dasphylum Schumach.	Solanaceae	Hiddii hongorca	Sh	MM121
Solanum incanum L.	Solanaceae	Hiddii loonii	Sh	MM118
Solanum gigantum Jacq.	Solanaceae	Hiddii saree	Sh	MM202
Spathodea campanulata P. Beauv. subsp. *nilotica* (Seem.) Bidgood	Bignoniaceae		T	MM116
Stephania abyssinica (Dillon & A. Rich.)Walp.	Mensipermaceae	Hidda kalaalaa	H	MM040
Stereospermum kunthianum Cham.	Bignoniaceae	Botoroo	T	MM176
Syzygium guineense subsp. *guineense* (Willd.) DC.	Myrtaceae	Goosuu	T	MM177
Sysygium guineense (Willd.) DC. subsp. *afromontana* F. Tieghem	Myrtaceae	Baddeessaa	T	MM181
Tapinanthus globiferus (A.Rich.) Tieghem	Loranthaceae	Dhertu bakkanisa	Ep.	MM196
Teclea nobilis Del.	Rutaceae	Hadheessa	Sh	MM025
Thalictrum rhynchocarpum Dill. & A. Rich.	Rananculaceae	Mararree	H	MM045
Verbascum sinaiticum Benth.	Scrophulariaceae	Gurra harree	H	MM125
Vernonia auriculifera Hiern	Asteraceae	Reejii	Sh	MM033
Vigna vexillata L. A.Rich.	Fabaceae	Gurra hantuutaa	H	MM066
Ximenia americana L.	Olacaceae	Hudhaa	T	MM152

Appendix 4 List of plant species in homegardens Key: in bold are medicinal plants
Habit T=Tree, Sh=Shrub, H=Herb, Li=Liana, Cl=Climber, Ep=Epiphyte.

Scientific Name	Afaan Oromoo name	Family	Coll.No.	Habit
Aframomum corrorima (Braun) Jansen	Koroorimaa	Zingebraceae	MM161	H
Allium sativum L.	Qullubbii adii	Alliaceae	MM013	H
Beta vulgaris L.	Hundee diimaa	Chenopodiaceae	MM163	H
Brassica carinata A. Br.	Goommana	Brassicaceae	MM002	H
Capsicum annuum L.	Darraa	Solanaceae	MM105	H
Capsicum frutescens L.	Mimmixa	Solanaceae	MM104	H
Carica papaya L.	Paappaayyaa	Caricaceae	MM085	T
Catha edulis (Vahl) Forssk ex Endl.	Caatii	Celastraceae	MM020	T
Cicer arietinum L.	Shumburaa	Fabaceae	MM164	H
Citrus aurantium L.	Qomxaaxxee	Rutaceae	MM021	T
Citrus limon (L.) Burn.f.	Loomii	Rutaceae	MM022	T
Citrus reticulata Blanco	Mandariinii	Rutaceae	MM057	T
Citrus sinensis (L.) Osb.	Burtukaana	Rutaceae	MM160	T
Coccinia abyssinica (Lam.) Cogn.	Ancootee	Cucurbitaceae	MM100	H
Coffea arabica L.	Buna	Rubiaceae	MM017	T
Colocasia esculenta (L.) Schott	Goodarree	Araceae	MM027	H
Coriandrum sativum L.	Dimbilaala	Apiaceae	MM049	H
Cucurbita pepo L.	Buqqee	Cucurbitaceae	MM018	H
Cymbopogon citratus (DC.) Stapf	Marga citaa	Poaceae	MM173	H
Dioscorea praehensilis Benth.	Qoccoo	Dioscoriaceae	MM137	Cl
Dovyalis caffra (Hook. f. & Harv.) Hook. f.	Koshommii	Flacourtaceae	MM141	Sh
Dracaena steudneri Engl.	Afarfattuu	Dracaenaceae	MM014	T
Dryanaria volkensii Hieron.	Baala balleessaa	Polypodiaceae	MM059	Ep
Englerina woodfordioides Gilbert	Dh. Bunaa	Loranthaceae	MM032	Ep
Ensete ventricossum (Welw.) Cheesman	Baala warqee	Musaceae	MM012	H
Eragrostis tef (Zucc.) Trotter	Xaafii	Poaceae	MM182	H
Euphorbia tirucalli L.	Cadaa	Euphorbiaceae	MM005	T
Foeniculum vulgare Miller	Inshilaala	Asteraceae	MM050	H
Gossypium barbadense L.	Jirbii	Malvaceae	MM061	Sh
Guizotia abyssinica (L.f.) Cass.	Nuugii	Asteraceae	MM036	H
Helianthus annuus L.	Suufii	Asteraceae	MM193	H
Hordeum vulgare L.	Garbuu	Poaceae	MM082	H
Ipomoea batatas (L.) Lam.	Booynaa	Convolvulaceae	MM139	H
Justicia schimperiana (Hochst. ex Nees) T. Anders.	Dhummuugaa	Acanthaceae	MM008	Sh
Linum ustitatissimum L.	Talbaa	Linaceae	MM096	H
Lepidium sativum L.	Shinfaa	Brassicaceae	MM015	H
Lycopersicon esculentum (L.) Mill.	Timaatima	Solanaceae	MM140	H

Scientific Name	Afaan Oromoo name	Family	Coll.No.	Habit
Mangifera indica L.	Maangoo	Anacardaceae	MM076	T
Morus alba L.	Goraa	Moraceae	MM138	T
Musa x paradisiaca L.	Muuzii	Musaceae	MM115	H
Nicotiana tabacum L.	Tamboo	Solanaceae	MM004	H
Ocimum americanum L.	Bssoobilaa	Lamiaceae	MM131	H
Ocimum basilicum L.	Kefoo	Lamiaceae	MM130	H
Ocimum lamiifolium Hochst. ex Benth.	Kasee	Lamiaceae	MM036	Sh
Ocimum urticifolium Roth	Ancabbii	Lamiaceae	MM133	Sh
Oliverella hildebrandtii (Engl.)Tieghem	Dh. dhummuugaa	Loranthaceae	MM 031	Ep
Phaseolus lunatus L.	Abbaa coomaa	Fabaceae	MM144	Cl
Phytolacca dodecandra L Herit.	Andoodee	Phytolaccaceae	MM088	Li
Pisum sativum L.	Atara	Fabaceae	MM165	H
Plectranthus edulis (Vatke) Agnew	Dinnicha oromoo	Lamiaceae	MM108	H
Prunus persica (L.) Batsch	Kookii	Rosaceae	MM007	T
Psidium guajava L.	Roqaa	Myrtaceae	MM159	T
Rhamnus prinoides L Herit.	Geeshoo	Rhamnaceae	MM081	Sh
Ricinus communis L.	Qobboo	Euphorbiaceae	MM006	H
Rosa x richardii Rehd.	Roozii	Rosaceae	MM114	Sh
Ruta chalepensis L.	Ciraaddama	Rutaceae	MM083	H
Solanum tuberosum L.	Dinnicha	Solanaceae	MM162	H
Sorghum bicolor (L.) Moench	Bisingaa caabbii	Poaceae	MM094	H
Vernonia amygdalina Del.	Eebicha	Asteraceae	MM010	Sh
Vicia faba L.	Baaqelaa	Fabaceae	MM003	H
Vigna unguiculata (L.) Walp.	Hiphoo	Fabaceae	MM063	Cl
Zingiber officinale Roscoe	Giginbila	Zingebraceae	MM011	H

Appendix 5 Lists of Human diseases encountered in the study area

No.	Afaan Oromoo name	Equivalent medical term	Number of plant species treat the diseases
1	Baarollee	Tinea corporis	2
2	Busaa	Malaria	4
3	Cittoo	Scabies	2
4	Cophxoo	Gonorrhea	2
5	Dabala dhiigaa	Hypertension	1
6	Dhiiga foon ilkaanii	Gum bleeding	1
7	Dhiitoo	Swelling	2
8	Dhukkuba gurraa	Ear disease	1
9	Dhukkuba ijaa	Eye disease	3
10	Dhukkuba ilkaanii	Toothache	7
11	Dhukkuba kalee	Kidney problem	2
12	Dhukkuba saree	Rabies	4
13	Dhukkuba sukaraa	Diabetes	1
14	Dhukkuba sombaa	TB	2
15	Dhukuba garaachaa	Stomach ulcer	2
16	Foroforii	Dandruff	3
17	Funuuna	Nasal bleeding	1
18	Garaa ciniinnaa	Stomach ache	8
19	Garaa kaasaa	Diarrhea	2
20	Guba ibiddaa	Fire burn	1
21	Huuba qoonqoo	Tonsillitis	5
22	Iddaa bofaa	Snake bite	7
23	Budaa	Evil eye	3
24	Koosoo	Tape worm	3
25	Kormommuu	Hemorrhoid	4
26	Kuukkii	Amoeba	1
27	Laguu dheerate	Lengthy Menstruation	1
28	Laphee gubaa	Gastritis	1
29	Maagaa	Ascaris	4
30	Madaa	Wound	4
31	Mataa bowwuu	Headache	2
32	Mimmi'oo	Athletis foot	1
33	Mura gogaa	Skin bleeding	3
34	Nyaata lagachuu	Loss of appetite	1
35	Nyaataa	Rheumatism	2
36	Of egano daumsaa	Contraceptive	1
37	Qufaa	Cough	4
38	Raammoo	Worms	1
39	Roobbii	Ring worm	1

No.	Afaan Oromoo name	Equivalent medical term	Number of plant species treat the diseases
40	Rukuttaa	Fibril illness	4
41	Sabbata waaqayyo	Liver disease	5
42	Sariitii	Spider poison	7
43	Sinbira	Leismaneseis	4
44	Utaalloo	Common cold	3

Appendix 6 Lists of Livestock ailments encountered in the study area

No.	Afaan Oromoo name	Equivalent veterinary term	No. of plant species treat the ailment
1	Abbaa gorbaa	Anthrax	1
2	Arraba hiddaa	Tongue infection	1
3	Bishooftuu	Blackleg	9
4	Cinii	External parasite	1
5	Ciniinaa waraabessaa	Hyena bite	1
6	Dhiitoo harmaa	Breast swelling	2
7	Dhiiga fincessa	Urine mixed with blood	4
8	Dhoqqee goge	Retained feces	2
9	Dhora	External parasite	6
10	Dhukkuba ijaa	Eye disease	2
11	Dhukkuba saree	Rabies	1
12	Dhullandulla	Leech	1
13	Diluu ture	Delayed placenta	4
14	Gandii	Trypanosomiasis	1
15	Garaa ciniinnaa	Stomach ache	2
16	Gororsaa	Pasturolisis	4
17	Garaa bokoksa	Blotting	1
18	Huuqqina	Thinness	1
19	Hudhaa	Tonsillitis	1
20	Iddaa bofaa	Snake bite	2
21	Kaafira		1
22	Kaashmeerii		5
23	Kurruufsiisaa	Actinomycosis	4
24	Madaa gatiittii	Wound	2
25	Madaa	Wound	1
26	Mandarraa	Foot and mouth disease	2
27	Mugsiisa Hindaaqqoo	Coccidiosis	1
28	Qufaa	Cough	4
29	Raammoo garaa	Intestinal parasite	1
30	Silmii	Tick	2

Appendix 7 List of medicinal plants used for Human ailments treatment in the study area Key: Hab= Habit (H-Herb, Sh-Shrub, T-Tree, Cl-Climber and Li-Liana), PU (R-Root, B-Bark, Fr-Fruit, La-Latex, L-Leaves, St-Steam, S-Seed, Fl-Flower, BU-Bulb, WP-Whole part), RA-Root of application (O-Oral, N-Nasal, Op-Optical, D-Dermal, Ear,) and CO-Condition (F-Fresh, D-Dried F/D-Fresh or Dried

Scientific name	Afaan Oromoo name	Family	Hab.	PU	Preparation and application	Disease Treated	RA	CO
Acacia abyssinica Hochst. ex Benth.	Laaftoo	Fabaceae	T	L	Juvenile leaves crushed and sniffed	Leismaneseis	N	F
Acmella caulirhiza Del.	Guutichaa	Asteraceae	H	Fl	Flower chewed and swallowed	Tonsillitis	O	F
Albizia gummiffera (J. F. Gmel.) C.A. Sm.	Muka arbaa	Fabaceae	T	L	Leaves crushed and mixed in water and by putting in cotton rubbed on affected teeth.	Toothache	O	F
				B	Bark chewed in order to get relief from Rheumatism	Rheumatism	O	F
Albizia schimperiana Oliv.	Ambaltaa	Fabaceae	T	B	Dried bark of *Albizia schimperiana* powdered and applied on affected part	Wound	D	D
Allium sativum L.	Qullubbi i adii	Alliaceae	H	BU	Eaten with 'injera' and *Capsicum annuum* L. for 5 days before eating breakfast	Malaria	O	F
Asparagus africanus Lam.	Sariitii	Asparagaceae	Sh	L	Leaves crushed and applied on the affected part	Spider poison	D	F
Bidens macroptera (Sch. Bip. ex Chiov.) Mesfin	Keelloo	Asteraceae	H	L	Leaves put on fire and rubbed on affected part	Athletis foot	D	F

82

Scientific name	Local name	Family	Habit	Part	Preparation	Use		
Brassica carinata A. Br.	Goommana	Brassicaceae	H	S	Powdered and mixed with water then dunk.	Common cold	O	D
Brucea antidysentrica J.F. Mill.	Qomanyo	Simaroubaceae	T	L	Crushed with Leaves of *Bersema abyssinica* and cooked With porridge and given for children	Ascaris	O	F
				R	Root powdered and mixed in water and drunk	Diarrhea	O	F
Croton macrostachyus Del.	Bakkanisa	Euphorbiaceae	T	LA	Exudates put on the cut skin to stop bleeding	Skin bleeding	D	F
				B	Bark of croton put on fire and the smoke used as to protect mosquito bite	Mosquito repellant	D	F
				L	Juvenile leaves smashed and rubbed on affected part	Ring worm	D	F
Catha edulis (Vahl) Forssk ex Endl.	Caatii	Celastraceae	T	L	Leaves of *Catha edulis* crushed and boiled in water with leaves of *Ruta chalepensis,* fresh leaves of *Periploca linearifolia* and fresh leaves of *Englerina woodfordioides* then sugar added while it is boiling, put off from the fire and make to cool finally a cup of tea drunk for four days.	Cough	O	F
Carissa spinarum L.	Agamsa	Apocynaceae	Sh	B	Chewed early before having breakfast	Stomach ache	O	F
					The bark Chewed or hold in teeth for 5-10min.	Toothache	O	F
Canarina eminii Aschers ex Schweinf.	Maaracaa	Campanulaceae	Cl	L, R	Crushed together, chewed and swallowed	Headache	O	F
				Wp	Whole plants crushed and rubbed on affected part	Scabies	D	F
Capparis tomentosa Lam.	H.gurraacha	Capparidaceae	Sh	R	Roots crushed and sniffed	Fibril illness	N	F

Scientific name	Local name	Family		Part	Preparation and application	Disease		
Calpurnia aurea (Ait.) Benth.	Ceekaa	Fabaceae	Sh	L	9 juvenile leaves of *Calpurnia aurea,* 9 leaves of *Senna occidentalis* and 9 juvenile leaves of *Clausena anisata* smashed and the extracts taken. One cup of tea is given for man and half cup for Children	Ascaris	O	F
Carica papaya L.	Paappaay yaa	Caricacea e	T	L	When the leaves become yellow, that means getting to dry, powdered and boiled in water and drunk one cup of tea for 5 days.	Malaria	O	F, D
				St	The steam crushed and tied on affected part	Wound	D	F
				S	Seed chewed and swallowed	Intestinal parasite	O	F
Caylusea abyssinica (Fresen.) Fisch. and Mey.	Illancoo	Residacea e	H	L	Leaves cooked and eaten with 'injera' as a cabbage	Amoeba	O	F
Centella asiatica (L.) Urban	Baala buqqee	Apiaceae	H	L	Leaves crushed and rubbed	Tinea corporis	D	F
Citrus limon (L.) Burn.f.	Loomii	Rutaceae	T	Fr	Crush the fruit and apply the content on bleeding gum	Gum bleeding	O	F
					Crush the fruit and apply its content on skin burn.	Skin burn	D	F
Citrus aurantium L.	Qomxaax xee	Rutaceae	T	Fr.	Suck the content of the fruit when suffered by hypertension	Hyperte nsion	O	F
Clausena anisata (Wild.) Benth	Ulmaayii	Rutaceae	Sh	L	Leaves powdered and mixed with water and given immediately for patient	Snake bite	O	D
				B	Bark of *Clausena anisata,* leaves of *Sida rhombifolia,* root of *Cucumis ficifolius,* bark of root of *Brucea antidysentrica* powdered together and mixed in milk then drunk 1 cup of tea for three days in order to get cured from Rabies disease	Rabies	O	F/ D
Clematis simensis	Hidda	Ranuncul	Cl	R	Fresh root chewed and swallowed	Stomach	O	F

84

Fresen.	fiitii	aceae				ache		
Clutia abyssinica Joub. & Spach.	Ulee foonii	Euphorbia ceae	Sh	L	Fresh leaves hold in teeth for 20-30 minutes	Toothac he	O	F
Coffea arabica L.	Buna	Rubiaceae	Sh	Fr	The dried coffee bean roasted and powdered then given to the patient by mixing with honey.	Diarrhea	O	D
Coccinia abyssinica (Lam.) Cogn.	Ancootee	Cucurbita ceae	H	R	Root of *Coccinia abyssinica* (Cooked with leaves of *Croton macrostachyus* and eaten with 'injera' for *four* days.	Tuber closes	O	F
Cordia africana Lam.	Waddeess a	Boraginac eae	T	L	Leaves of *Cordia africana,* leaves *of Acanthus polystachius* crushed together with Feces of goat then put on fire the ash mixed with butter and creamed on affected part.	Spider poison	D	D/ F
Crotalaria spinosa Hochst. ex. Benth..	Shumbura a gugee	Fabaceae	H	R	Root crushed, mixed with water and drunk	Rabies	O	F
Cucurbita pepo L.	Buqqee	Cucurbita ceae	H	S	The dried seed roasted and eaten	Tape worm	O	D
Cucumis ficifolius A. Rich.	Faca`aa	Cucurbita ceae	H	R	Very few root chewed with salt and swallowed	Gonorrh ea	O	F
Cymbopogon citratus (DC.) Stapf	Marga citaa	Poaceae	H	R	Root chewed with salt to get relief from stomach ache	Stomach ache	O	F
Cynoglossum lanceolatum Forssk.	Maxxann ee	Boragina ceae	H		Leaves smashed and the exudates dropped in ear	Ear disease	E	F
					Leaves crushed and sniffed	Headach e	N	F
					Leaves smashed and the extracts dropped in eye	Eye disease	O	F
				L	Leaves powdered with leaves of *Croton macrostachyus* and creamed on the affected part by mixing with butter	Hemorr hoid	A	F

				L	Fresh leaves smashed and smelled	Nasal bleeding	N	F
Datura strumanium L.	Asaangira	Solanaceae	Sh	S	Seed put on fire and the smoke inhaled	Tooth ache	O	D
Dryanaria volkensii Heiron.	Baala balleessaa	Polypodiaceae	Ep	R	Fresh root put on fire and until get hot and then bite by affected teeth for an hour	Tooth ache	O	F
Echinops hispidus Fresen.	Keberchoo	Asteraceae	H	B	Dried bark put on fire and the smoke inhaled	Evil eye	D	D
Ehretia cymosa Thonn.	Ulaagaa	Boraginaceae	T	L	Chewed	Toothache	O	F
Embelia schimperi Vatke	Hanquu	Myrsinaceae	Li	Fr	Fruit eaten early in the morning	Tape worm	O	F
Ensete ventricossum Cheesman	Baala warqee	Musaceae	H	L	The latex half cup of tea taken to get relief from stomach ache	Stomach ache	O	F
Eucalyptus globulus Labill	Akaakltii adii	Myrtaceae	T	L	Fresh leaves boiled in water and then the patient laid down in it in order to inhale the smoke	Common cold	D	F
Euphorbia tirucalli L.	Cadaa	Euphorbiaceae	Sh	La	The milky latex dropped on affected part	Hemorrhoid	D	F
Ficus sycomorus L.	Odaa	Moraceae	T	LA	The milky latex dropped in the nose	Leismaneseis	N	F
Gardenia ternifolia Schumach.	Gambeela	Rubiaceae	T	S	Seed put in fire ad when it gets hot put on affected part	Hemorrhoid	D	F
Grewia ferruginea Hochst. ex A. Rich.	Dhoqonuu	Tiliaceae	T	L	The hair washed by leaves of *Grewia ferruginea* and used as a soap	Dandruff	D	F

Guizotia abyssinica (L.f.) Cass.	Nuugii	Asteraceae	H	S	Seed roasted powdered and the decoction drunk	Swelling	O	D
Hagenia abyssinica (Brace) J.F.Gmel.	Heexoo	Rosaceae	T	Fl	The dried or fresh floral part powdered soaked in water and left for four days and taken with coffee before having break fast	Tape worm	O	F/ D
Helinus mystacinus (Ait.) E. Mey. ex Steud.	Hidda hoomoo	Euphorbiaceae	Cl	L	Leaves crushed and smashed and rubbed for external parasite	Worm	D	F
Hordeum vulgare L.	Garbuu	Poaceae	H	S	Seed of *Hordeum vulgare* powdered with seed of *Brassica carinata* and drunk	Swelling	O	D
Indigofera arrecta Hochst. ex A.Rich	Heennaa	Fabaceae	Sh	L	Fresh leaves powdered and mixed with butter and applied on the affected part for five days	Spider poison	D	D
Indigofera spicata Forssk.	Reencii	Fabaceae	H	L	Leaves powdered and mixed in water and taken when need arise.	Diabetes	O	D
Justicia schimperiana (Hochst. ex Nees) T. Anders.	Dhummu ugaa	Acanthaceae	Sh	L	Leaves put on fire with leaves of *Brucea antidysentrica* and rubbed on head	Headache	D	F
Lagenaria siceraria (Molina) Standl.	Buqqee seexanaa	Cucurbitaceae	H	Fr	Put on fire and burn the affected part	Dandruff	D	F
Leucas martinicensis (Jacq) R.Br.	Fidoo	Lamiaceae	H	St	Steam put on fire and let the patient laid in it for smoke	Eye disease	O	F
Lippia adoensis Hochst. ex Walp	Kusaayee	Verbenaceae	H	L	Fresh leaves chewed	Gastritis	O	F
Lepidium sativum L.	Shinfaa	Brassicaceae	H	S	Seed powdered and eaten with injera to get cure from malaria or rubbed the body for protection from mosquito bite	Malaria	O	D

Linum ustitatissimum L.	Talbaa	Linaceae	H	S	The hair washed by seeds of *Linum ustitatissimum* and used as a soap	Dandruf f	D	D
Lotus corniculatus L.	Abbaa qiddii	Fabaceae	H	R	The root powdered and drunk with tea	Snake bite	O	D
Malva verticillata L.	Karfichoo	Malvacea e	H	L	Leaves cooked and the smoke inhaled to get relief from 'Mich'	Fibril illness	N	F
Mirabilis jalapa L.	Ababa diimaa	Nyctagna ceae	Sh	Fr	The fruit has creamy powder then rubbed on affected part.	Hemorr hoid	D	F
Momordica foetida Schumach.	Humbaaw oo	Cucurbita ceae	H	R	Root washed, crushed and mixed with water and the exudates taken for five days one liter per a day.	Kidney problem	O	F
Nicotiana tabacum L.	Tamboo	Solanacea e	H	L	Leaves crushed and mixed with water and drunk	Snake bite	O	F
Ocimum lamiifolium Hochst. ex Benth.	Kasee	Lamiacea e	Sh	L	Leaves crushed and smashed then the extracts rubbed on affected part	Fibril illness	D	F
Ocimum urticifolium Roth	Ancabbii	Lamiacea e	Sh	L	Leaves crushed and smashed then the extracts rubbed on affected part	Fibril illness	D	F
Olea europaea L. subsp. *cuspidata* (Wall. ex G. Don) Cif.	Ejersa	Oleaceae	T	R	Fresh root chewed and swallowed	Stomach ache	O	F
Panicum hochstetteri Steud.	Marga gogorrii	Poaceae	H	L	Leaves chewed and swallowed	Kidney problem	O	F
Pavonia urens Cav.	Hincinnii	Malvacea e	H	L	Leaves powdered and tied on affected part	Wound	D	D
Phytolacca dodecandra L Herit.	Andoodee	Phytolacc aceae	Li.	R	Few root powdered and mixed with water and drunk for two days	Gonorrh ea	O	F
					Root of *Phytolacca dodecandra,* juvenile leaves of *Momordica foetida* leaves of *Justicia schimperiana*	Liver disease	O	D/ F

					and juvenile leaves *of Croton macrostachyus powdered together and very few given with tea before having breakfast for three days. One cup of tea is given for man whereas half cup of tea for children*			
Plantago lanceolata L.	Qorxobbii	Plantagin aceae	H	L	Leaves crushed and tied on the cut skin	Skin bleeding	D	F
Plectranthus edulis (Vatke) Agnew	Dinnicha oromoo	Solanacea e	Sh	R	Root boiled and eaten	Loss of appetite	O	F
Prunus africana (Hook. f.) Kalkm..	Hoomii	Rosaceae	T	B	Powdered and tied for five days	Wound	D	D
Prunus persica (L.) Batsch	Kookii	Rosaceae	T	L	Juvenile leaves dried and powdered then mixed with butter and creamed on affected part in Wednesday and Friday	Tinea corporis	D	D
Pycnostachys abyssinica Fresen.	Yeeroo	Lamiacea e	H	L	Leaves crushed, smashed and the extracts dropped in the eye	Eye disease	O	F
Rhamnus prinoides L Herit.	Geeshoo	Rhamnac eae	Sh	L	Fresh leaves chewed and swallowed	Tonsilliti s	O	F
				Fr	Fresh fruit rubbed on affected part.	Tinea corporis	D	F
Rhus ruspolii Engl.	Xaaxessaa	Anacardac eae	T	L	Leaves crushed and rubbed on affected part	Worm	D	F
Ricinus communis L.	Qobboo	Euphorbia ceae	H	R	Crushed and mixed with water and taken one cup of tea for 3 consecutive days.	Rabies	O	F
					Root crushed and mixed with root of *Justicia schimperiana* and put in cup of tea and mixed with water and drunk	Liver disease	O	F
Rumex abyssinicus Jacq.	Dhangagg oo	Polygonac eae	H	L	Leaves crushed and smashed then applied on affected part	Scabies	D	F
Rumex nepalensis Spreng.	Timijjii	Polygonac eae	H	R	Few root chewed and swallowed	Stomach ulcer	O	F
				L	Leaves crushed and mixed with Leaves of *Acanthus polystachius* By mixing with butter creamed on affected part	Spider poison	D	F
Ruta chalepensis L.	Ciraaddam a	Rutaceae	H	L, R	The two parts chewed together and swallowed	S.ache	O	F

Rytigynia neglecta (Hiern) Robyns	Mixoo	Rubiaceae	T	L	Leaves powdered and sniffed	Hemorr hoid	N	D
Saccharum officinarum L.	Shankora	Poaceae	Sh	St	Steam put in fire and eaten when get hot in order to get relief from common cold	common cold	O	F
Schinus molle L.	Qundoob arbaree	Anacarda ceae	T	S	Chewed and swallowed	Tonsilliti s	O	F
Saturega paradoxa (Vatke) Engl. ex Seybold	Kefo sa'aa	Lamiacea e	H	L	Leaves crushed and sniffed	Hemorr hoid	N	F
Securidaca longepedunculata Fresen.	Xamanaa yii	Polygalac eae	T	R	Roots crushed and put on fire then the smoke sniffed	Evil eye	N	D
				B	Bark powdered and taken with local alcohol for 5 days	Liver disease	O	D
Senna septemtrionalis (Viv) Irwin & Barneby	*Samamak ii*	Fabaceae	Sh	L	Fresh leaves smashed and mixed with water then one cup of tea taken.	Snake bite	O	F
Sida rhombifolia L.	Karaabaa	Malvacea e	H	L	Fresh leaves crushed and smashed then the extracts dropped on the cut skin	Skin bleeding	D	F
Solanum dasphylum Schumach.	Hiddii hongorca	Solanacea e	Sh	Fr	Break the fruit, put the content on cotton, and rubbed On tonsil for children.	Tonsilliti s	O	F
Solanum incanum L.	Hidi lonii	Solanace ae	Sh	Fr	Break the fruit and drop its content on wound to stop bleeding	Wound	D	F
Solanum gigantum Jacq.	Hiddii saree	Solanacea e	Sh	R	Root crushed and taken with coffee	Rabies	O	F
Stephania abyssinica (Dillon & A. Rich.)Walp..	Hidda kalaalaa	Mensiper maceae	H	W P	The whole part of *Stephania abyssinica* crushed and boiled in water then the smoke will be inhaled until the patient getting sweat	Common cold	O	F
Stereospermum kunthianum Cham.	Botoroo	Bignoniac eae	T	B	Dried bark put on fire and the smoke inhaled	Evil eye	N	D
					Powdered and mixed with water and one cup of tea taken for three days	S.ache	O	D

Tapinanthus globiferus (A.Rich.) Tieghem	Dhertu bakkanisa	Loranthaceae	Ep	L	Leaves crushed and rubbed	Spider poison	D	F
Vernonia amygdalina Del.	Eebicha	Asteraceae	Sh	L	Leaves crushed and soak in water and the exudates drunk for five days	Malaria	O	F
Vernonia auriculifera Hiern	Reejii	Asteraceae	Sh	L	Leaves smashed and the extracts dropped on the cut skin	Skin bleeding	D	F
Vicia faba L.	Baaqelaa	Fabaceae	H	S	Seed chewed to get relief from gastric	Stomach ulcer	O	D
Vigna unguiculata (L.) Walp.	Hiphoo	Fabaceae	Cl	L	Fresh leaves smashed and rubbed on affected part	Tinea corporis	D	F
Vigna vexillata L. A.Rich.	Gurra hantuutaa	Fabaceae	Cl	L	Leaves crushed with leaves of *Cucumis ficifolius* A. Rich. and rubbed on affected part	Spider poison	D	F
Oliverella hildebrandtii (Engl.)Tieghem	Dheertuu dhumuga a	Loranthaceae	Ep	L	Leaves crushed and rubbed on hair	Dandruff	D	F
Ximenia americana L.	Hudhaa	Olacaceae	Sh	B	Crushed and mixed with water and one cup of tea taken for 1-5 days until the blood stop	Lengthy menstruation	O	F
				L	Exudates drunk for five days 2 cup per a day.	Contraceptive	O	F
Zingiber officinale Roscoe	Jinjibila	Zingebraceae	H	R	Chewed and swallowed	Tonsillitis	O	F

91

Appendix 8 List of medicinal plants used for Live stock ailments treatment in the study area Key: Hab= Habit (H-Herb, Sh-Shrub, T-Tree, Cl-Climber and Li-Liana), PU (R-Root, B-Bark, Fr-Fruit, La-Latex, L-Leaves, St-Steam, S-Seed, Fl-Flower, BU-Bulb, WP-Whole part), RA-Root of application (O-Oral, N-Nasal, Op-Optical, D-Dermal) and CO-Condition (F-Fresh, D-Dried, F/D-Fresh or Dried

Scientific name	Afaan Oromoo name	Family	Hab.	PU	Preparation and application	Disease Treated	RA	CO
Acacia persiciflora Pax	Garbii	Fabaceae	T	B	Bark of *Acacia persiciflora* powdered and mixed in water then given for the cattle forcefully	Stomach ache	O	D
Acanthus polystiachius Delile	Kosorruu	Achantaceae	Sh	L	Leaves crushed and rubbed on affected part	'Madaa gatiittii'	D	F
Albizia malcophylla (A. Rich.) Walp.	*Arganboobee*	*Fabaceae*	T	B	Bark powdered and given for Blackleg	Blackleg	O	D
Albizia gummiffera (J. F. Gmel.) C.A. Sm.	Muka arbaa	Fabaceae	T	B	Bark powdered and mixed water then given for cattle	Retained feces	O	D
Buddleja polystachya Fresen.	Hanfaarree	Loganaceae	Sh	L	Leaves smashed and the extracts dropped in the eyes of affected cattle	Eye disease	Op	F
Brucea antidysenterica J.F. Mill.	Qomonyoo	Simaroubaceae	T	L	Leaves crushed and rubbed on leap of donkey	'Kaafira'	D	F
Calpurnia aurea (Ait.) Benth.	Ceekaa	Fabaceae	Sh	L	Leaves soaked in water and wash the body of calf	Tick	D	F
					Leaves crushed and mixed in water given by bottle forcefully	Snake bite	O	F
Capparis tomentosa Lam.	H.gurraacha	Capparidaceae	Sh	R	Root powdered and mixed with seed of *Capsicum annuum* L by dropping a few water in it, rubbed on affected part.	Foot and mouth	D	D

92

						disease		
Colocasia esculenta (L.) Schott	Goodarree	Araceae	H	Tu	Tuber crushed and mixed with water then given to the cow which the placenta is retained	Delayed placenta	O	F
Combretum collinum Fresen..	Unuunuu	Combreta ceae	T	B	Bark crushed and mixed in water and given for cattle by one bottle forcefully	Breast swelling	O	F
Croton macrostachyus Del.	Bakkannii sa	Euphorbi aceae	T	R	Dried root of *Croton macrostachyus* Del. powdered and given to dog with 'injera' which suffered by Rabies	Rabies	O	D
Clematis simensis Fresen.	Hidda fiitii	Ranuncul aceae	Cl	R	Root crushed and given for cattle by mixing in water to get relief from Internal parasite	Intestina l parasite	O	F
Cucurbita pepo L.	Buqqee	Cuccurbit aceae	H	Fr	Fruit cooked and rubbed on affected part	Tick	O	F
Cucumis ficifolius A. Rich.	Faca`aa	Cucurbita ceae	H	R	Very few root powdered and mixed with one litter of water then given to the cattle forcefully	Blackleg	O	F
Combretum molle R. Br. ex. G. Don	Dabaqqaa	Combreta ceae	T	St	Steam put on the fire and rubbed finally cut the affected part by blade to let the tongue bleed	Tongue infection	O	F
Cyphostemma cyphopetalum (Fresen.) Desc. ex Wild & Drummond	Hidda reeffaa	Vitaceae	Li	L	Leaves crushed and the exudates given to cure Blackleg	Blackleg	O	F
Dracaena steudneri Engl.	Afarfattu u	Dracaena ceae	T	L	Leaves powdered and mixed in water and given forcefully	'Worm'	O	F

				L	Fresh leaves crushed and mixed with soil the few water dropped finally given for the cattle	Stomach ache	O	F
Dodonaea angustifolia L. f.	Ittacha	Sapindaceae	Sh		Dried leaves powdered and put on wound	wound	D	D
Eleusine coracana (L.) Gaertn.	Dagujjaa	Poaceae	H	S	Seed powdered and baked then given for the cattle by mixing in the remnants of local beer	Thinness	O	D
Ficus sycomorus L.	Odaa	Moraceae	T	B	Fresh bark crushed and mixed with water and One loiter is given for big cattle and half Litter for calf	Worm	O	F
Grewia bicolor Juss.	Harooressa	Tiliaceae	T	B	Bark of *Grewia bicolor* grinded and mixed in water and salt added finally given for the cattle which placenta is delayed during delivery	Delayed placenta	O	F
Guizotia scabra (Vios.).Chiov.	Tuufoo	Asteraceae	H	L	Leaves of *Guizotia scabra* and Leaves of *Calpurnia aurea* crushed and rubbed	tick	D	F
Guizotia abyssinica (L.f.) Cass.	Nuugii	Asteraceae	H	S	Seed powdered and rubbed on madaa gatiitii of oxen	Madaa gatiittii	D	D
Girardinia bullosa (Steud.) Wedd.	Gurgubbee	Urticaceae	Sh	R	Root powdered and mixed in water and applied orally	Blackleg	O	D
Hordeum vulgare L.	Garbuu	Poaceae	H	S	Seed covered and left to let germinate then grinded and mixed with remnants of local beer or 'tella' and given orally	Blotting	O	D
Hymenodictyon floribundum (Hochst. & Steud.) Robinson	Altadhahaa	Rubiaceae	T	L	Leaves smashed and the exudates dropped in the eyes of affected cattle	Eye disease	O	F

94

Impatiens tinctoria A.Rich. subsp. *abyssinica* (Hook. f.) Grey Wilson	Qicuu	Balsaminaceae	H	R	Root powdered and given for	Blackleg	O	F
Justicia schimperiana (Hochst. ex Nees) T. Anders.	Dhummugaa	Acanthaceae	Sh	L	Fresh leaves crushed and given for hen or cock Blackleg	Coccidiosis	O	F
Kalanchoe laciniata (L.) DC.	Bosoqqee	Crassulaceae	H	R	Root of *Kalanchoe laciniata,* seed of *Capsicum frutescens, Allium sativum* and leaves of *Croton macrostachyus* Powdered together and given for affected cattle	Blackleg	O	F/D
				B	Bark crushed and mixed in water and given forcefully	Worm	O	F
Lepidium sativum L.	Shinfaa	Brassicaceae	H	S	Seed powdered in water and given by the bottle forcefully	Blackleg	O	D
Linum ustitatissimum L.	Talbaa	Linaceae	H	S	Seed powdered and given by mixing in water	Breast swelling	O	D
Maesa lanceolata Forssk.	Abbayyii	Myrsinaceae	Sh	L	Leaves crushed and rubbed on the body	Worm	D	F
Nicotiana tabacum L.	Tamboo	Solanaceae	H	L	Leaves crushed and tied on affected part	Snake poison	O	F
					Leaves crushed and put in the mouth then the cow will not drink water or feed for certain minutes until the leech come out	Leeching	O	F
Phytolacca dodecandra L Herit.	Andoodee	Phytolaccaceae	Li	L	Leaves crushed and mixed with *Capsicum annuum* then rubbed on affected part	Foot and mouth disease	O	F
Rhus ruspolii Engl.	Xaaxessaa	Anacardaceae	T	R	Root of *Rhus ruspolii* Engl. powdered and mixed with water and drunk	Hyena bite	O	F

Rumex nepalensis Spreng.	Timijjii	Polygonaceae	H	R	Root powdered and mixed in water then mixed in water and given for the cattle forcefully(waga'uu)	Blackleg	O	F
Sorghum bicolor (L.) Moench	Bisingaa caabbii	Poaceae	H	S	Seed mixed in remnants of local beer and given	Delayed placenta	O	F
Solanum anguivi Lam.	Hidii seexanaa	Solanaceae	Sh	Fr	Fruit boiled in water and dropped in the eyes of affected cattle	Eye disease	O p	F
				R	Root grinded and mixed with water and given One bottle for three days	Trypano somiasis	O	F
Sida rhombifolia L.	Karaabaa	Malvaceae	H	L	Leaves crushed and rubbed externally	Worm	D	F
Stereospermum kunthianum Cham.	Botoroo	Bignoniaceae	T	B	Bark of *Stereospermum kunthianum*, bark of *Croton macrostachyus,* Root of *Cucumis* ficifolius, bulb of *Allium sativum* and seed of *Capsicum frutescens* powdered together and half of a bottle given for three days	'Kaashmeer'	N / O	F/ D
Teclea nobilis Del.	Hadheessa	Rutaceae	Sh	L	Leaves crushed and mixed with water and given for the thin cattle	Thinness	O	F
				St	Steam powdered and mixed with water and given forcefully by beer bottle	Anthrax	O	D
Thalictrum rhynchocarpum Dill. & A.Rich.	Mararree	Rananculaceae	H	W p	The whole part crushed and given	Blackleg	O	F

				L	Leaves of T*apinathus globiferus, fresh bark of Bersema abyssinica,* leaves of *Datura stramonium* and root of *Indigofera arrecta* powdered together and used for various diseases	Urine mixed with blood, Cough, Blotting and Actinom ysis	O	F/ D
Tapinathus globiferus (A.Rich.) Tieghem	Dhertu bakkanisa	Loranthac eae	Ep					
Verbascum sinaiticum Benth.	Gurra harree	Scrophula riaceae	H	L	Leaves powdered and mixed in water then given orally for external parasite	Worm	O	F
Vernonia amygdalina Del.	Eebicha	Asteracea e	Sh	L	Leaves crushed and mixed with remnants of local beer('Farsoo')and given for the cow	Delayed placenta	O	F
Ximenia americana L.	Hudhaa	Olacaceae	Sh	L	Juvenile leaves smashed and the exudates dropped in the mouth	Tonsilliti s	O	F

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other Universities and that all sources of materials used for the thesis have been correctly acknowledged

Name:

 Signature _____

This thesis has been submitted for examination with my approval as a University advisor:

 Prof. Ensermu Kelbessa _____

 Dr. Zemede Asfaw   **_____**