ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN WONAGO WOREDA,SNNPR, ETHIOPIA

BY: FISSEHA MESFIN

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN BOTANICLA STUDIES

ADVISORS
PROF. SEBSEBE DEMISSEW
DR. TILAHUN TEKLEHAYMANOT

ADDIS ABABA UNIVERSITY

JULY, 2007

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my advisors Prof. Sebsebe Demissew and Dr. Tilahun Teklehaymanot for their consistent invaluable advice, comments and follow up from problem identification up to the compilation of this work. The technical staffs of the National Herbarium, AAU have cooperated by allowing all the available resources during the identification of voucher specimens.

I received much support from the office of the Woreda Administration and Agricultural Department, chairpersons and development agents of each kebele selected as study sites, informants and especially two persons namely Ato Woubshet Teshome and Senay Bulbula who had served as field guides throughout the field study in the study area. I would like to thank them all.

Last but not least, I would also like to extend my appreciation to my family for the moral support. My wife W/o Yamrot Bekele deserves the highest appreciation for understanding my feelings to pursue my studies and allowing me to do so.

Table of contents

List of Tables

List of Figures

List of appendices

ABSTRACT

An ethnobotanical study of traditional medicinal plants used by indigenous people in Wonago Woreda, SNNPR was carried out from November 1, 2006 to December 3, 2006. A total of 80 informants (60 males and 20 females) between the ages of 20 and 85 were randomly selected from the study sites or kebeles. Out of these, 30 key informants (22 males and 8 females) were systematically selected based on recommendation from elders and local authorities. Ethnobotanical data were collected using semi-structured interviews, field observations, and group discussions. Informant consensus, preference ranking, direct matrix ranking, paired comparison and informant consensus factor (IFC) were calculated. A total of 198 plant species: 133 species from wild vegetation, 43 species from home gardens and 22 species from both, belonging to 174 genera and 76 families were collected in the study area. Of these, 58 medicinal plant species belonging to 39 families and 55 genera were useful for treatment of human health problems. Twenty-seven species (46.5%) of the medicinal plants were shrubs, followed by 19 (32.7%) herbs, and 12 (20.6%) trees. The most frequently used plant parts were the roots (17, 29.3%), followed by leaves (14, 24.1%). Different preparation methods were reported. However, the most widely used method of preparation was in the form of powder (32, 36.4%), and 29 (32.9%) of the preparations were made by crushing and pounding and mixed with different plant parts or different part of the same plant. The common route of application recorded was internal, particularly oral (37, 63.7%). Paired comparison and preference ranking showed that people have preferences for some species over others in treating the same ailment. The medicinal plants that are preseumed to be effective in treating certain diseases such as, 'malaria and headache' (82.3%) had higher ICF value. Agricultural expansion, firewood collection, grazing and drought are major threats to medicinal plants. It was found that, there is little practice of bringing medicinal plants under cultivation. Indigenous practicies, various cultural and seasonal restrictions of collecting medicinal plants have contributed to the management and conservation of medicinal plants in the area. It is therefore, recommended that people need to be encouraged to cultivate medicinal plants in their home garden. The participation of the local people and awareness creation through training or education on sustainable utilization and management of plant resources should be encouraged.

1. INTRODUCTION

Since time immemorial, plants have been indispensable sources in both preventive and curative traditional medicine preparations for human beings and livestock (Dery *et al.,* 1999). According to the World Health Organization (WHO), medicinal plants form the bases of traditional or indigenous healthcare systems used by the majority of the population of most developing nations. Indeed, it is reported that more than 3.5 billion people rely on plants for the treatment of both human and livestock diseases. In south Asian countries alone 500 million people are reported to seek health security from the leaves, roots and barks of trees. This global utilization of medicinal plants has considerably increased in the last two decades (Medhin Zewdu *et al*., 2001).

The inaccessibility of modern medical system, economic and cultural factors still push majority of the population in developing countries to depend on traditional medicinal plants (Cunningham, 1993). 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 preparations in Ethiopia is of plant origin. The majority of population living in rural areas and an increased number of the poor in urban centers rely mainly on traditional medicine and its practitioners to meet their primary health care needs (Berhane Mewa, 2001).

Despite the use of traditional medicine over many centuries, only relatively small numbers of plant species have been studied for possible medical applications and the spread of this knowledge is mostly limited to indigenous societies (Cunningham, 1993). The loss of valuable medicinal plants due to population pressure, agricultural expansion, and deforestation is widely reported by different researchers in Ethiopia for example Abebe Demissie (2001); Getachew Berhan and Shiferaw Dessie (2002). Consequntly, the need to perform ethnobotanical researches and to document the medicinal plants and the associated indigenous knowledge must be an urgent task (Pankhurst, 2001; Hamilton, 2003). In addition, the conservation of ethnobotanical knowledge as part of living cultural knowledge and practice between communities and the environment is essential for biodiversity conservation (Martin, 1995).

Though limited numbers of professionals have made an attempt to document the medicinal plants and traditional knowledge in some parts of Ethiopia, there is a need to do more in parts

where such studies have not been conducted due to the multiethnic cultural diversity and the diverse flora of Ethiopia.

Thus, this study is initiated to document the indigenous knowledge on the use of traditional medicinal plants by the local people in Wonago Woreda.

2. OBJECTIVES OF THE STUDY

2.1. General Objective

To document plants species of medicinal value to the community in wonago woreda and the associated knowledge on use, management, preparation and other aspective of the indigenous knowledge of the people in wonago woreda.

2.2. Specific Objectives

- To document indigenous knowledge of the people on use of medicinal plants in study area;
- To identify plant species that are used as medicines for the treatment of human health problems;
- To identify the plant parts used for medicinal purposes and
- To find out the local methods used by indigenous people to conserve medicinal plants.

3. LITERATURE REVIEW

3.1. Indigenous Knowledge

Indigenous knowledge is knowledge that is unique to a given culture or society. It is contrasted to the knowledge gained at formal institutions. The development of indigenous knowledge systems, covering all aspects of life, including management of natural environment, has been a matter of survival to people who generated them. They may be an on-going experiment or may even have become established as a local tradition (SLUM, 2006).

Indigenous knowledge is a result of many generations', long years' experiences, careful observations and trial and error experiments (Martin, 1995). Thus over centuries, indigenous people of different localities have developed their own specific knowledge on plant resource use, management and conservation (Cotton, 1996).

According to Alcorn (1984), indigenous knowledge develops and changes with time and space. Hence such knowledge includes time-tested practice that developed in the process of interaction of humans with their environment. One of the widely used indigenous knowledge systems in many countries is the knowledge and application of traditional medicinal plants. Such knowledge known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials preparation of the indigenous knowledge on plant remedies in many countries including Ethiopia, pass from one generation to the other generation verbally with great secrecy. Such secret and verbal transfer makes the indigenous knowledge or ethnomedicinal knowledge vulnerable to distortion and in most cases some of the lore is lost at each point of transfer (Amare Getahun, 1976), hence the need for systematic documentation of such a useful knowledge now-a-days through ethnobotanical research.

3.2. Development of Ethnobotany

The term ethnobotany was for the first time used by Harshberger in 1895. Harshberger defined ethnobotany as 'the use of plants by aboriginal peoples' yet during the century which has intervened, considerable attention has focused not only on how plants are used, but also on how they are perceived and managed, and on the reciprocal relationships between human societies and the plants on which they depend (Shrestha *et al.*,1997). There has been an ever

increasing interest of anthropologists, botanists and explorers of the world to document the potential uses or economic potential of plants used by indigenous societies (Cotton, 1996). As the number of expeditions and scholarly communication became wider, there has been an intensified and continuous search by researchers in different fields to disclose traditional use of plants in different parts of the world by indigenous societies (Balick, 1996; Cotton, 1996).

According to Martin (1995), ethnobotanical studies are mainly useful in documenting, analyzing, and disseminating of knowledge on the interaction between biodiversity and human society, and how biodiversity is valued in different societies as well as how it is influenced by human activities. This in turn shows that ethnobotany is interactive and dynamic field of study.

Ethnobotanical data collection requires a systematic approach and information can be collected through actual field observation and semi structured interviews depending on the particular objective of the research (Martin, 1995). Alcorn (1984) also stated that ethnobotanists collect information on the indigenous knowledge not only to preserve them but also to perceive their relevance to development and conservation.

In general, ethnobotany is the scientific investigation of plants as used in indigenous cultures in food, medicine, magic, rituals, building, household utensils and implements, musical instruments, fire wood collection, pesticide, clothing, shelter and other purposes. Ethnobotany is also useful to define local community plant resource needs, utilization and management. Therefore, the conservation of ethnobotanical knowledge as part of living cultural knowledge and practices between communities and the environment is essential for biodiversity conservation (Martin, 1995; Cotton, 1996; Balick and Cox, 1996).

3.3. Medicinal Plants in Ethiopia

According to Pankhurst (2001), Ethiopia, is a country characterized by a wide range of climate and ecological conditions, possesses enormous diversity of fauna and flora. The country possesses a particularly wide range of potentially useful medicinal plants, more extensive indeed than available in many other parts of the world. Dawit Abebe (1986) estimated that 95% of traditional medical preparations in Ethiopia are of plant origin.

In Ethiopia, the long history of using traditional medicinal plants for combating various ailments can be confirmed by referring to the recent collection of medico-religious man-scripts of the Axumite kingdom (Fassil Kibebew, 2001). Pankhurst (1990) indicated that the antiquity of the traditional use of medicinal plants in Ethiopia could not be simply over looked. It has been noted that testimony to this is found in medical text books that have been written in Ge'ez, or even Arabic which were written between the mid of 17th and beginning of the 18th century (Tewolde Brehan Gebre Egziaber *et al.,* 1979; Dawit Abebe and Ahadu Ayehu, 1993 and Asfaw Debela *et al.,* 1999).

According to Jansen (1981), in Ethiopia, even though the traditional medical practitioners are the best sources of information about the knowledge of the medicinal plants, it was found very difficult to obtain their traditional medicinal information as they considered their indigenous knowledge as a professional secret, only to be passed orally to their older son, at their oldest age.

In Ethiopia, the local indigenous knowledge on medicinal plants is being lost at a faster rate with the increase of modern education, which has made the younger generation to underestimate its traditional values. In addition the increase in population growth rate would result in the intesfication of agriculture in marginal areas which would lead to deforestation with decrease in number or loss of medicinal plants in the wild (Phankhurst, 2001).

3.4. Medicinal Plants in Human Healthcare System

In Ethiopia, plants have been used as a source of traditional medicine from time immemorial to combat different ailments and human sufferings (Asfaw Debela *et al*, 1999). Due to its long period of practice and existence traditional medicine has become an integral part of the culture of Ethiopian people (Pankhurst, 1965, Mirgissa Kaba, 1996). It is common for people living in rural and urban centers to treat some common ailments using plants available around them. (For example, the flowers of *Hagenia abyssinica* used to expel tapeworm, *Ruta chalepensis* leaves used to treat various health problems (Abbink, 1995). The continued dependence on herbal medicine alongside modern medicine is largely conditioned by economic and cultural factors (Abbiw, 1996).

Modern healthcare has never been and probably never will provide for the forseable future adequate and equitable health service any where in Africa, due to the financial limitations

related to rapid population growth, political instability and poor economic performance (Anokbonggo, 1992). Due to incomplete coverage of modern medical system, shortage of pharmaceuticals and unaffordable prices of modern drugs, the majority of Ethiopian still depends on traditional medicine. The problem of ensuring the equitable distribution of modern healthcare has become more serious, as the gap between supply and demand has continued to widen. Hence, in present-day Africa including Ethiopia, the majority of people lack access to healthcare, and where available, the quality is largely below acceptable level (Abbiw, 1996).

It is also noted that since medicinal plants are often with an easy reach compared to modern drugs that are dispensed in remotely located health institutions most people in Ethiopia rely on the medicinal plants for their healthcare. Thus, medicinal plants continue to be in high demand in the healthcare system as components to the modern medicine (Cunningham, 1996). This indicates the need for in-depth investigation and documentation of plants of traditional value to rationally use and conserve the plant resources and indigenous knowledge (Dawit Abebe and Ahadu Ayehu, 1993).

3.5. Conservation and Management of Medicinal Plants

In various parts of the world, medicinal plants are mostly harvested from the wild sources either for local use or trade purposes (Large, 1997 cited in Matu, 1998). Availability of medicinal plants has been affected by a dramatic decrease in the area of native vegetation due to agricultural expansion, deforestation, fire, overgrazing, and drought, trading charcoal and firewood and urban associated developments (Cunningham, 1996; Kebu Balemie *et al.*, 2004). However, there were checks and balances in the past that made the use of such plants sustainable. For example, such practices including taboos on felling certain plants, seasonal and social restrictions on gathering and the nature of the gathering equipment (Odera, 1997 cited in Matu, 1998). It is reported that, every year the sum total of humans knowledge about the types, distribution, ecology, methods of management and methods of extraction the useful properties of medicinal plants is decreasing rapidly which is a continuation of a process of loss of cultural diversity including traditional knowledge system that has been under way for hundreds of years (Hamilton, 2003).

Getachew Berhan and Shiferaw Dessie (2002) explained that the knowledge on medicinal plants is commonly passed from generation to generation. In this process valuable information

can be lost when ever a medicinal plant is lost or when a traditional medical practitioner dies without passing his/her indigenous knowledge to others.

As stated by Zemede Asfaw (2001), in Ethiopia, traditional medicine as elsewhere in other developing countries is faced with a problem of sustainability and continuity mainly due to loss of taxa of medicinal plants, loss of habitats of medicinal and other category of plants and cultures. The diversity of plants in Ethiopia is on the process of erosion due to anthropogenic pressures (Abebe Demisse, 2001). The same document states that habitat destruction and deforestation by commercial timber interests and encroachment by agriculture and other land uses have resulted in the loss of some thousand hectares of forest which harbor useful medicinal plants, annually over the past several decades.

TRAFFIC international (1998) has explained that the only adequately recorded medicinal plant export from Ethiopia is that of *Catha edulis* which is traded primarily as stimulant (narcotic). However, there are certain medicinal plants such as *Embelia schimperi, Hagenia abyssinica* and *Glinus lotoides* that plants have been over exploited for local markets. The loss of habitats as a result of deforestation is the main cause for the reduction in the quantity of medicinal plants; a good example is *Hagenia abyssinica* growing in the wild (Kloos, 1976).

The growing recognition of the importance of medicinal plants in meeting local and global healthcare needs provides an important opportunity for conservationists, traditional medicine proponents, local communities and others to work together to develop mutually supporting solutions to problems associated with forest loss and biodiversity erosion. Nowadays, sustained and coordinated efforts are needed to transform currently unsustainable practices of medicinal plant mining from wild sources to more ecologically sustainable, socially acceptable, and economically equitable production and utilization systems (Parrotta, 2002). In fact such valuable activity requires appropriate action, and changes by the full range of societies and stakeholders involved in the conservation, production, management, marketing, processing and use of medicinal plants and their derivatives. Since an action on conservation and sustainable use of medicinal plants need involvement of various sectors and greater public support, it needs a continuous task of creating public awareness (Shanker, 1993).

Generally, there are some conservation measures that have been undertaken around the world aimed at protecting threatened medicinal plant species from further destruction (Cunningham, 1993). These include *in-situ* conservation (on their natural habitat like nature reserves and

parks) and *ex-situ* (field gene banks, seed banks and botanical gardens) conservation. Cunningham (1996) explains that countries like Sirlanka have implemented a strong policy of *in-situ* conservation to save valuable medicinal plants.

There are some cases that there is a tradition of cultivating plants from the wild in home gardens for their medicinal use in Ethiopia (Zemede Asfaw, 1997). This report indicated that from the species purposely maintained in home gardens, about 6% are primarily cultivated for their medicinal value and that in Ethiopia home gardens can play a role in easing the pressure on those plants that are scarce in native vegetation.

In order to conserve useful plants (including medicinal plants), which are threatened due to natural or man-made factors in Ethiopia, *in-situ* and *ex-situ* conservation strategies should be complementarily implemented (Abebe Demisse, 2001).

3.5. Medicinal Plants in Research

In 1978, the World Health Organization (WHO) officially launched an international program to promote and develop basic and applied research in traditional medicine (WHO, 1978; Tsige Gebremariam and Kaleab Asres, 2001). Medicinal plants then got a focus of attention and regional offices were established to coordinate basic and applied research activities on such plants. This was associated with the establishment of data based on medicinal plants to improve accessibility and dissemination of information on medicinal plants (Farnsworth and Soejarto, 1991).

According to Sebsebe Demissew and Ermias Dagne (2001), there is a considerable global interest in tapping the accumulated knowledge of traditional medicine, and therefore, researches are being carried out in many countries with the aim of increasing the use of traditional medicine to the welfare of the human population. The same document also explains that basic and applied researches on medicinal plants are interconnected and the basic research is primarily important in realizing new knowledge and serving as bases for applied research.

Tsige Gebremariam and Kaleab Asres (2001) explained that research programs in traditional medicine must be realistic and be based on the primary healthcare needs of the country, with an objective of developing safe, effective and quality phytotherapeutic preparation, which can

supplement and /or replace modern chemotherapy. Although, it has significant contribution to the society, it has received little attention in modern research and development until recently in Ethiopia. Basic researches with special emphasis on systematic study and documentation of medicinal plants have been made in this country by few professionals like Amare Getahun (1976), Jansen (1981), Mesfin Taddese (1986), Dawit Abebe and Estifanos Hagos (1991), Mesfin Taddese and Sebsebe Demissew (1992), Dawit Abebe and Ahadu Ayehu (1993), Abbink (1995), Mirutse Giday (1999), Bayafers Tamene (2000), Debela Hunde (2001), Abiyot Birhanu (2002), Kebu Balemie *et al.* (2004), Ermias Lulekal (2005), Tizazu Gebre (2005), Etana Tolasa (2007), Tilahun Teklehaymanot and Mirutse Giday (2007), Tilahun Teklehaymanot *et al. (*2007) and Mirutse Giday *et al.* (2007).

These research studies were carried out in different parts of the countries to document the medicinal plants and associated indigenous knowledge in the areas studied. Thus there is a need to carry out similar studies in areas not previously covered in order to get a full picture of the country's medicinal plants potential in the future.

4. Description of the Study Area

4.1. Geographical Location

Wonago Woreda (6^{o} 20'E between 6^{0}32'E and 38^{o} 14'N between 38^{0}24'N) is located 380 km from Addis Ababa in Gedeo zone; Southern Nations, Nationalities and Peoples Region (SNNPR). It is approximately 248 km^2 (24,790 ha) and comprises 19 kebeles (Figs. 1 and 2).

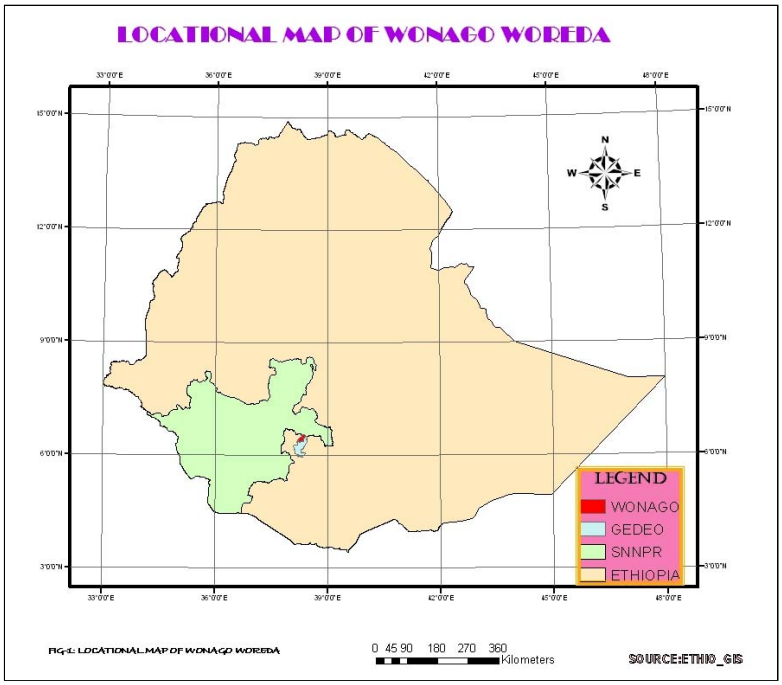


Figure 1 Location of Wonago Woreda in Gedeo zone; Southern Nations, Nationalities and Peoples Region, Southern Ethiopia

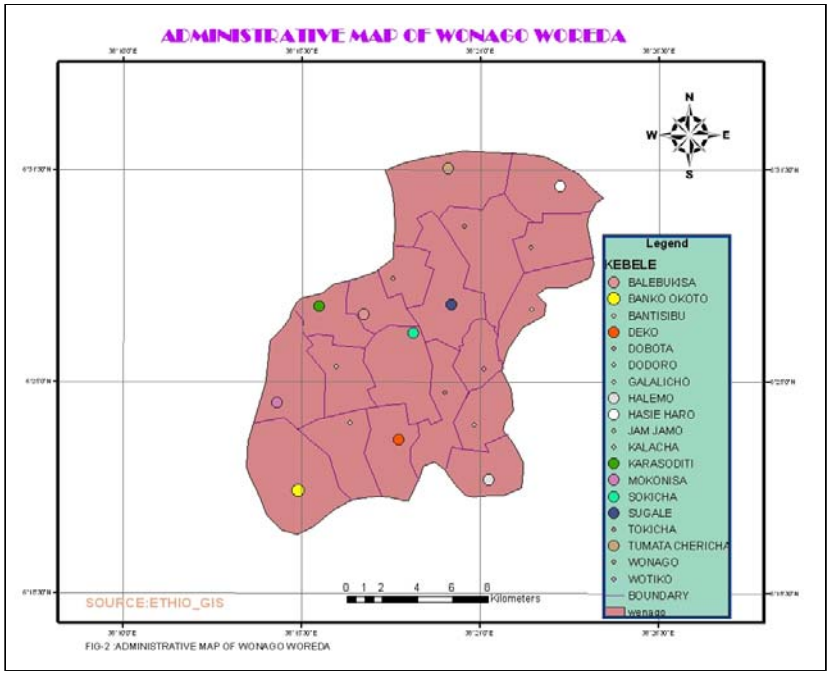


Figure 2 Administrative Map of Wonago Woreda

4.2. Landscape and Soil

The study area has undulated type of landscape with altitudinal ranging from 1350 to 2875 masl. The major mountain peaks of the Woreda include “Booncho” and “Alala”. There are permanent rivers, many streams and springs; and diversified natural resources. The soils are volcanic in origin and well-drained. According to Sustainable Land Use Management (2006), there are three major soil types in the area; chromic luvisols is the dominant soil type. It is good in its agricultural potential, and cover large area of the region. The second soil types are caloric and eutric flovisols and the third soil types are dystric nitisols, which are found on almost flat to sloping terrain due to high rainfall of the area. Generally, all the three soil types are suitable for agricultural activities including coffee growing. The depth of the soil reaches up to 1.5 meters and the pH value of the soil ranges from 4.5 to 5.5 (SLUM, 2006).

4. 3. Climate

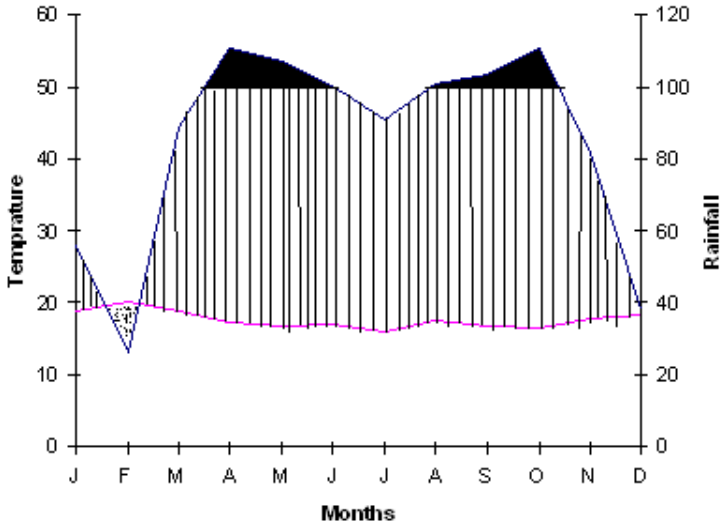
Wonago Woreda has three main agroclimatic zones (Table 1) with topography ranging from wide flat valley bottoms to steep mountain slopes (WWAO, 2005).

Table 1: Agroclimatic zone of the study area

Agroclimatic zone	Hectare	Percentage	Climatic condition
Dega (2100-2875m)	5,280.7	21.3	Cool
Weynadega (1500-2100m)	17,600.90	71	Warm
Kola (1350-1500m)	1,908.83	7.7	Hot
Total	24,790.43	100	

Source: WWAO, (2005)

The rain-fall distribution of the study area is bimodal. The first main rainy season is a combination of summer and autumn are traditionally called ‘Kiremt’ and ‘Mahar’ that lasts from August to November. The second one is the short rainy season what is traditionally known as ‘Belg’, which lasts from March to May. According to Wonago Woreda Agricultural Office, the annual rainfall ranges from 873-1449 mm and shows considerable variation from year to year and even from season to season. In general the mean annual average temperature of the Woreda is 20.65^{O}C (Fig. 3).



Source: National Meteorological Service Agency

Figure 3: Climadiagram of the study area from 1996 to 2005 at Kotty Weather Station.

4. 4. Landuse pattern

As the agricultural sector is the dominant means of livelihood for the majority of Wonago Woreda population, out of the total of 24,790 hectares of land in the Woreda, 22,871 hectares is known to have potential for agriculture. In the study area, annual crop covers 5.03 %; perennial crop 84.77%, uncultivable land 0.65 % and others are 3.52 % (Table 2).

Table 2: Land use Category in the Study Area

Item	Cultivated Land		Grazing land	Forest land	Cultivable land	Fallow land	Others	Total area
	Annual	Perennial						
Area in hectare	1248	21014	507	377	609	161	874	24,790
%	5.03	84.77	2.05	1.52	2.46	0.65	3.52	100

Source; WWAO, 2005

4.6. Population

The 2005 population census (WWAO, 2005) indicates that Wonago woreda has a total population of 162,663. Of these 78,649 (48.3%) are males and 84,014 (51.6%) are females. The population density of the Woreda was 702 persons per km^2 at national growth rate of 1.07 % (WWAO, 2005) (Table 3).

Table 3: The Population Data of the Study Area

Population	Male	Percent	Female	Percent	Total	%
Urban	10,789	13.71	11,094	13.20	21,883	13.45
Rural	67,860	86.29	72,920	86.80	140,780	86.54
Total	78,649	100	84,014	100	162,663	100

Source: WWAO, 2005

The population of the study area is not evenly distributed within the woreda. The majority of the population of the study area lives in rural areas (86.54%) and the rest 13.45% of the population lives in urban centers (WWAO, 2005).

5. MATERIALS AND METHODS

5.1. Selection of study sites

The study was conducted in ten kebeles in Wonago Woreda, SNNPR from November 1, 2006 to December 3, 2006. The study sites were selected based on availability of traditional healers identified with the assistance of local authorities. The study sites were 'Bankookoto', 'Balebukisa', 'Deko', 'Halemo', 'Haseharo', 'Karasodity', 'Mokonisa', 'Sokicha', 'Sugale', and 'Tumata cherecha' kebeles (Fig. 2).

5.2. Sampling of informants

A total of 80 individuals (60 males and 20 females) between the ages of 20-85 were randomly selected from ten kebeles (Appendix 1). Out of these, 30 key informants (22 males and 8 females) were systematically selected based on recommendation from elders and local authorities (Development Agents and Kebele administration leaders).

5.3. Ethnobotanical data collection

Ethnobotanical techniques were employed to collect data on knowledge and management of medicinal plants used by people in Wonago woreda as described in Martin (1995), Alexiades (1996) and Cotton (1996). The techniques were group discussion, semi-structured interviews, field observations, informant consensus, preference ranking, direct matrix ranking, paired comparison and informant consensus factor (IFC).

Semi-structured interviews

A brief group discussion was made with informants at each kebele prior to ethnobotanical data collection. During the discussions, an attempt was made to let them understand that their knowledge and the continued practice of their art of traditional medicine will be not interferred.

Semi-structured interviews were conducted with 80 informants in "Gedeoffa" language with the help of an interpreter following Martin (1995) and Cotton (1996) to collect ethnobotanical data. The data collected include informants' name and address, common human ailments/ diseases in the area, part of the medicinal plants used for treating different aliments, status of

the medicinal plants in the study area, method of preparation and application, dosage, route of administration, other uses of the medicinal plants and threat and conservation status of the plants (Appendix 2).

Field observations

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

Informant consensus

During the course of the study, each informant was visited 2-3 times in order to confirm the reliability of the ethnobotanical information. Consequently, the responses of an informant that were not in harmony with each other were rejected since such responses were considered as unreliable.

Preference ranking

Preference ranking was made following Martin (1995) for five medicinal plants in treating malaria. Eight randomly selected informants were made to participate in this exercise. The informants were given the plants and asked to arrange the five medicinal plants based on their personal preference of efficacy. The medicinal plant believed to be most effective got the highest value (5), and the one with the least effectiveness got the lowest value (1). Based on the total score of each species the rank was determined, and this helped to indicate the most effective medicinal plants used by the community to treat malaria.

Direct matrix ranking

Direct matrix ranking were conducted for five multipurpose medicinal plants commonly reported by key informants following Cotton (1996). Based on the relative benefits obtained from each plant, the informants were asked to assign value to each attribute. The list of attributes included were medicinal, cash income, washing, fire wood and charcoal. By adding the scores, given it was possible to compare use values of medicinal plants and also to identify the main cause for over harvesting of the plants.

Paired comparison

After identification of the five most important plants based on their high use values as perceived by the informants, paired comparisons were employed as described by Martin (1996). Paired comparisons on the five most effective plants in treating diarrhea were conducted using random number table and flipping coins. Eight informants were randomly selected from the key informants and allowed to show their responses independently for pairs of traditional medicinal plants noted for treating diarrhea.

5.4. Plant specimen collections and identifications

Medicinal plants were reported twice in the two different visits of informants were collected from wild and cultivated sources. The local names, habits and associated plants were recorded for each of the species. Voucher specimens were collected, pressed and taken to the National Herbarium (ETH.) of Addis Ababa University (AAU). For identification of the plants that were not readily identified in the field are takent to the National Herbarium of (AAU). Identification at the National Herbarium of (AAU) were done using taxonomic keys and Ethiopian and Eritrea floras (Hedberg and Edwards, 1989 and 1995; Edwards *et al.,* 1995; Edwards *et al.,* 1997; Edwards *et al*., 2000; Hedberg *et al.,* 2004; Hedberg *et al.,* 2006) and by comparison with already identified specimens that are deposited at ETH.

5.5. Data analysis

Preference ranking and paired comparison were computed to assess the degree of effectiveness of certain medicinal plants against Malaria and Diarrhea respectively.

The Informant Consensus Factor (ICF) was calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments. The ICF was calculated as follows: number of use citations in each category (n_{ur}) minus the number of species used (n_t), divided by the numbers of use citations in each category minus one (Heinerich *et al.,* 1998).

$$ICF = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

6. RESULTS

6.1. Local Categories of Vegetation and the Plant Species

The local communities categorized the vegetation of the study area into five types using the gedeo language based on plant density and associated landform.

I. **'Raqqa'** refers to densely forested land. Now-a-days this type of vegetation has declined in the study area because of degradation by human activities, over grazing, and climate changes.

II. **'Hakka cadanaba'** refers to vegetation growing in marshy or water logged areas often characterized by salty earth. Plant species such as *Phoenix reclinata* and *Cyperus spp*. are more frequent.

III. **'Mancchha'** refers to land that is bare or with poor vegetation land having some types of herbs and grasses appearing only during the rainy season.

IV. **'Bullukko'** refers to the heterogeneous mixture of shrubs and grass communities not suited for agriculture.

V. **'Wodae gido'** refers to wooded and under-growing herbaceous vegetation growing along riversides. Plant species like *Spathodea campanulata* subssp. *nilotica, Erythrina brucei, Ficus spp*. and *Arundo donax* are common.

In this study which was conducted in the five local categories of vegetation, a total of 155 plant species were collected from the wild vegetation. Of which, 48 were medicinal plant species. The collected plant species were distributed among 63 families and 136 genera. The leading family was Asteraceae with 17 species, followed by Fabaceae with 11 species, Euphorbiaceae with 9 species, Poaceae and Solanaceae with 7 species each, Rosaceae with 6 species and Myrtaceae with 5 species (Appindix 3).

Regarding life forms, out of the 155 plant species: 56 (36.1%) were herbs, 53 (34.1%) were shrubs, 41 (26.4%) were tree, 4 (2.55%) were climbers and 1(0.6%) were epiphyte (Appindix 3).

6.2. Plant Diversity of the Home Garden (‘Gattae Oduma’)

The people of the study area cultivate diverse plant species in their home gardens (‘Gattae Oduma’). Plants were grown for their known uses. The number of plants recorded was 65 species in 33 families and 57 genera (Appindix 4). In terms of species composition, Solanaceae had 6 species followed by Poaceae with 5 species, Asteraceae, Fabaceae, Lamiaceae and Rosaceae with 4 species and Brassicaceae, Euphorbiaceae and Rutaceae with 3 species each (Appindix 4).

Regarding life form, out of the 65 “Gattae Oduma” plant species, 31(47.6%) were herbs; 23(35.3%) were shrubs, 7 (10.7%) were trees and 4 (6.1%) were climbers (Fig. 4).

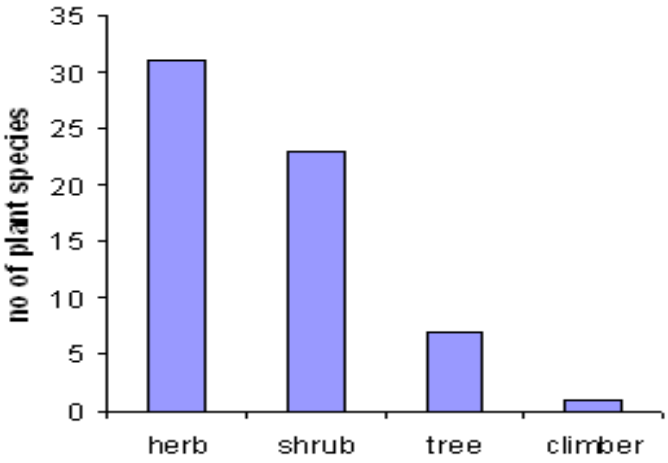


Figure 4: Life form diversity of plant species in home gardens (‘Gattae Oduma’)

The findings also showed that the home garden flora included 24 (36.9%) food, 10 (15.3%) medicinal and 31(48.7%) other useful plant species (Table 4). In addition, the analysis of the same data shows that the majority of the home gardens (38.4%) provide at least two of the uses listed in Table 4 (‘Gattae oduma’).

Table 4: Service categories of home garden plants (‘Gattae Oduma’)

Service categories	No. of plant species	% of the total species

Food	24	36.9
Medicine	10	15.3
Food & medicine	8	12.3
Medicine & cash income	1	1.5
Food & cash income	4	6.1
Life fence & ornamental	1	1.5
Medicine & ornament	3	4.6
Spice & medicine	1	1.5
Medicine and fence	2	3.0
Medicine, cash income & stimulant	3	4.6
Spice	1	1.5
Ornament	3	4.6
Fence	1	1.5
Stimulant	1	1.5
Food & ornament	2	3.0
TOTAL	65	

6.3. Medicinal Plants

6.3.1. Medicinal plants used to treat human ailments

A total of 58 species of medicinal plants, grouped into 39 families and 55 genera were documented as useful for the treatment of human ailments. The family Asteraceae were represented by 7 species (12%) followed by Euphorbiaceae (5, 8.6%), Asclepidaceae (2, 3.4%), Celastraceae (2, 3.4%), Cucurbitaceae (2, 3.4%), Fabaceae (2, 3.4%), Malvaceae (2, 3.4%), Rosaceae (2, 3.4%), Rubiaceae (2, 3.4%), Rutaceae (2, 3.4%), and Tiliaceae (2, 3.4%) (Appendix 5). These plants are reported as treatment for 36 types of human diseases in the study area. This study also showed that 7 species were used as remedy for malaria, 6 species to treat diarrhea, and 5 species for ascariasis (Appendix 6). The main feature of medicinal plant species and medicinal use in the study area are detailed in Appendix 7.

The highest number of traditional medicinal knowledge was acquired (79%) from parents or relatives (9.3%) followed by self trial and error, (7.6%) from healers, and the rest (4.1%) from other sources. The traditional healers of the study area showed a strong tendency to keep their knowledge secret. Only 1.5% of the healers were inclined to transfer the knowledge to the outsider without any incentives, except to close family member.

6.3.2. Sources of medicinal plants

The present study revealed that there were various sources for medicinal plants harvesting (Fig.5). 48(69.1%) were collected from wild vegetation followed by 10 (15.4%) from home gardens.

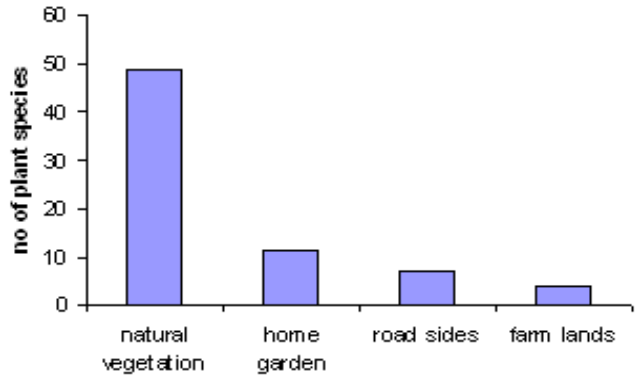


Figure 5: Sources of Medicinal plants in the study area

6.3.3. Habit of Medicinal Plants and Parts Used

The shrubs were the most harvested for medicinal purpose. They were represented with 27(46.5%) plant species followed by 19 (32.7%) herbs and 12 (20.6%) tree (Fig.6).

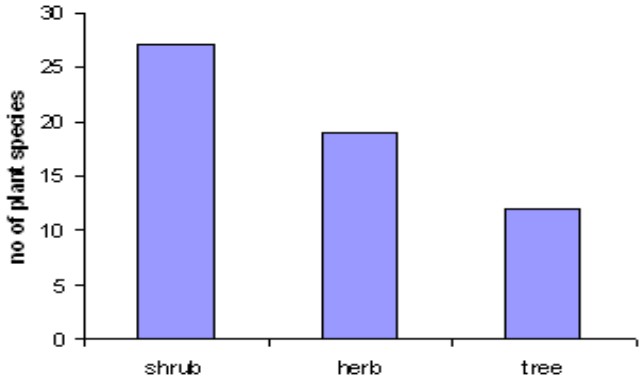


Figure 6: Growth forms (habit) of Medicinal plants for treatment of human health problems

Based on the information from all informants in the study area, the most commonly used plant parts for remedy preparations were 29.3% roots, followed by 24.1% leaves, fruit 15.5% (Table 5).

Table 5: Plant Parts used in preparation of remedies

Used part	No of plant species	%
Root only	17	29.3
Root bark	7	12
Stem only	7	12
Leaf only	14	24.1
Fruit only	9	15.5
Flower	1	1.7
Latex	1	1.7
Seed	1	1.7
Whole plant	1	1.7
Total	58	

6.3.4. Mode of Preparation, Dosage and Routes of Application

In this study, 32 (36.4%) preparations were made in the form of powder, 29 (32.9%) followed by crushed and pounded, and 12 (11.3%) in the form of chewing of plant parts used for treatment of human health problems (Table 6).

Table 6: Preparation Methods of Traditional Medicine

Preparation methods	Preparations	%
Powder	32	36.4
Crushing and pounding	29	32.9
Chewing	10	11.3
Concoction	6	6.8
Decoction	1	1.1
Others	10	11.3
Total	88	

People of the study area used various units of measurement such as; finger length (e.g. for root, root bark, and stem), pinch (e.g. for powdered) and numbers (e.g. for leaves, seeds, fruits and flowers) were used to estimate and fix the amount of medicine.

In this study, the most popular way of administration of herbal medicines were internal particularly oral which accounted for 37 (63.7%) followed by 13 (22.4%) dermal and 8 (13.6%) nasal (Table 7).

Table 7: Route of Administration of Traditional Medicines

Route of administration	Total applications	%
Internal		
Oral	37	63.7
Nasal	8	13.6
External		
Dermal	13	22.4

6.3.5. Informant Consensus / Medicinal Plants Use Report

The informants' consensus obtained during this study showed that some plants were cited by 41% and above informants (Table 8). *Vernonia amygdalina* cited by 73 (91.2%) followed by *Croton macrostachyus* 71 (88.7%), *Lagenaria siceraria* with 64 (80%) and *Lepidium sativum* with 58 (72.5%).

Table 8: Informant Consensus

Botanical name	Number of informants who cited the plant	%
Vernonia amygdalina	73	91.2
Croton macrostachyus	71	88.7
Lagenaria siceraria	64	80.0
Lepidium sativum	58	72.5
Senna occidentalis	47	58.7
Phytolacca dodecandra	46	57.5

6.3.6. Preference Ranking on Malaria

Preference ranking of five medicinal plants that were reported as effective for treating malaria (Table 9), which was the most common disease for which large number of patients visited the traditional medicinal practitioners.

Table 9: Preference ranking of medicinal plants used for treating malaria

List of medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	Total	rank

Allium sativum	3	2	5	3	3	2	3	3	24	3
Lepidium sativum	2	1	2	2	1	3	2	2	15	4
Croton macrostachyus	4	5	3	4	4	5	5	4	34	2
Phytolacca dodecandra	1	4	1	1	2	1	1	1	12	5
Vernonia amygdalina	5	3	4	5	5	4	4	5	35	1

6.3.7. Paired Comparison on Diarrhea

For medicinal plants that were identified by the informants to be used in treating diarrhea, a paired comparison was made among five of them (Table10).

Table 10: Paired comparison of medicinal plant species used to treat diarrhea

List of medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	Total	rank
Ensete ventricosum	1	2	1	2	2	1	2	2	13	4
Vernonia amygdalina	2	3	2	3	2	3	2	1	18	2
Colocasia esculenta	1	1	1	2	2	1	1	2	11	5
Croton macrostachyus	4	3	3	2	3	2	1	3	21	1
Hagenia abyssinica	2	1	3	1	1	3	3	2	16	3

6.3.8. Informant consensus factor

In this study, the result showed that the medicinal plants that are effective in treating certain disease have higher informant consensus factor values (Table11).

Table 11: Informant consensus factor by categories of diseases

Category	Species	% of species	No of informants cited	%	ICF %
Malaria and headache	10	11.60	52	27.3	82.30
Ascariasis and diarrhea	11	12.70	47	24.7	78.20
Intestinal parasite and stomachache	5	5.80	19	10	77.70
Gonorrhea & sexual impotence in men	5	5.80	16	8.4	73.30
Abdominal pain and amoebas	6	6.90	19	10	72.20
Ring worm and wounds	7	8.10	16	8.4	60.00
Bronchitis and cough	6	5.80	12	6.3	54.50
Fiber illness and lymphatic swelling	5	5.80	9	4.7	50.00

6.3.9. Direct matrix ranking for multiple use medicinal plants

In the study sites the majority of the community relies on wild plants for various purposes such as medicinal, firewood, washing, cash income and charcoal. To assess the relative importance and to check the major impact on such plants direct matrix ranking was preformed (Table 12).

Table 12: Direct matrix ranking of medicinal plants with different uses other than medicinal value (total score of ten informants)

Uses	*Croton macrostachyus*	*Phytolacca dodecandra*	*Coffea arabica*	*Cordia africana*	*Millettia ferruginea*
Medicinal	31	28	26	24	29
Cash income	29	12	27	13	19
Washing	21	26	0	19	23
Firewood	13	9	23	22	19
Charcoal	18	7	19	11	15
Total	112	82	95	89	105
Rank	1	5	3	4	2

6.4. Threats to and Conservation of Medicinal Plants in the Study Area

In the study area, various human induced and natural factors threaten the survival of many medicinal plant species. The order of importance of the threat factors in the study area is summarized in Table 13.

Table 13: Priority ranking factors perceived as threats to medicinal plants based on their level of destructive effects (values 1-6 were given: 1 is the least destructive threat and 6 is the most destructive threat)

Factors	Respondents (R1-R6)						Total	Percent	Rank
	R1	R2	R3	R4	R5	R6			
Drought	3	4	2	3	6	3	21	16.5	4th
Grazing	5	1	3	5	4	5	23	18.1	3th

Urbanization	1	5	4	1	3	1	15	11.8	5th
Agricultural expansion	6	2	6	6	5	6	31	24.4	1th
Fire wood	4	6	5	4	1	4	24	18.8	2th
Construction	2	3	1	2	2	3	13	10.2	6th

A group discussion, field observation and semi-structured interview administered clearly showed cultural and traditional activities and associated knowledge on conservation of medicinal plants by local people. Some traditional practitioners have started to conserve medicinal plants by cultivating at home gardens, though the effort is very low. Traditional beliefs in the area have their own role in conservation and sustainable utilization of medicinal plants. The local people and traditional healers believe that ‘Magano’ or God gives the knowledge of curing patients, by using medicinal plants, only to selected individuals. They believe that any act of cutting medicinal plants by non-healers will result in an attack by evil spirit or ‘Gadabicho’.

7. Discussion

7.1. Home Garden plant Diversity

Home gardens in the study sites provide a number of services to the local people. The primary function of these home gardens is to food stuffs as justified by the prevalence of high number and dominance of food plants. The occurrence of such high number of plant species in Wonago home gardens resulted from the farmer's attempt to have as much as possible high crop plant diversity in their gardens. This also agrees with findings of Taddese Kanshae (2002) who discussed the diversity of plants and number of cultivated food plants that are grown in fields than those in home gardens ('Gattae oduma'). In some home gardens of the study area, garden crops for example, *Colocasia esculenta, Brassica carinata, Phaseolus lunatus,* and *Capsicum annuum* are planted along with crops like *Zea mays* to maximize the use of the available land.

Home garden plants were also used as medicines to treat human ailments or diseases and a good number of medicinal plants used by people in the study sites are grown in and around home gardens. In addition, the results of this study indicated that the largest group is made up of wild vegetation, strictly followed by the medicinal species grown close to the house, with an overall representation of about 15.4% by cultivated species and the natural species accounted for about 69.1%. The finding obtained is similar to Belachew Wassihun *et al.* (2003) that reported 133 plant species grown in the 'Gamo' home gardens of which 18 were medicinal plants.

7.2. Medicinal Plants

7.2.1. Medicinal Plants Used To Treat Human Ailments

The highest medicinal plant knowledge acquisation by the people in the study sites were obtained from (79%) parents or close relatives followed by (9.3%) self trial and error method. This finding is in agreement with Etana Tolasa, (2007) who reported 91% and 9% traditional medicinal knowledge acquisition from parents or relatives and self trial and error, respectively. Keeping the traditional knowledge secrete was highly prevailed in the study area. Among the interviewed healers, less than 2% were ready to transfer the knowledge without incentives. Most of the healers' claim that traditional medicine is effective if done

within a family or with a close relative such as a trend which was also reported else where (Abbink, 1995; Etana Tolasa, 2007).

Fifty-eight medicinal plant species have been documented in the present study. Some medicinal plants recorded in Wonago are also used as remedies in other parts of Ethiopia. 22 plant species are mentioned in Mesfin Taddese (1986), 11 species in Mesfin Taddese and Sebsebe Demissew (1992), 23 plant species in Bayafers Tamene (2000), 11 plant species in Kebu Balemie *(*2002), 21 plant species in Debela Hunde *et al*. (2004), 39 plant species in Ermias Lulekal (2005), 21 plant species in Tilahun Teklehaymanot and Mirutse Giday (2007) and 17 plant species in Tilahun Teklehaymanot *et al*. (2007). Twenty-nine of the medicinal plants have also been used in Africa: 13 by Anokbongo (1992) and 16 by Iwu (1993).

From both paired comparison and preference ranking it could be understood that the most favoured species are usually the most efficacious, at least in the context of the people who use them. Furthermore, this also shows the credibility and contuinity of the ethnomedicinal informantion obtained from indigenous people.

The medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values. Table11 shows some of the categories of diseases that are common: malaria and headache (82.3%), ascariasis and diarrhea (78.2%), and intestinal parasite and stomachache (77.7%). This may indicate high incidence of these types of diseases in the study area, possibly due to the poor socio-economic and sanitary conditions of the people. The type of disease with lower ICF values such as: bronchitis and cough (54.5%) and febrile illness and lymphatic swelling (50%) are those whose occurrence is rare.

The direct matrix for randomly selected five medicinal plants with different uses other than medicinal value on five use criteria showed that medicinal plants are widely harvested for different purposes. This is particularly true for *Croton macrostachyus* and *Millettia ferruginea*. Thus, indigenous people use those species for firewood and charcoal. On the other hand, *Phytolacca dodecandra* is extensively used for medicinal purposes other than for firewood and charcoal collection.

7.2.2. Sources of Medicinal Plants

Medicinal plants utilized by indigenous people of Wonago Woreda are collected from the vegetation in the wild (69.1%), only a few being found under cultivation (15.4%). These indicated that the local people harvest more medicinal plant species from the wild than from home gardens.

Tesfaye Awas and Zemede Asfaw (1999) reported that 71% of the medicinal plants of the 'Berta' people in western Ethiopia are obtained from the wild vegetation. Zemede Asfaw (1997) reported that only 6% of the plants maintained in home gardens in Ethiopia are primarily cultivated for their medicinal value even though many other plants grown for non-medicinal purposes turn out to be important medicines when some health problems are encountered. These reasons are also true in the study area.

7.2.3. Habit of Medicinal Plants and Parts Used

The most widely used plant remedies by people of Wonago Woreda are obtained from shrubs (46.5%) followed by herbs (32.7%). The analysis of the data showed that the majority of medicinal plants in the wild are shrubs. This result indicated that people rely more on shrubs and herbs because they are relatively common in the area compared to tree species. This finding agrees with the findings of (Bayafers Tamene, 2000; Debela Hunde, 2004; Mirutse Giday and Gobena Amani, 2003; and Ermias Lulekal, 2005). However, the findings of Abiyot Birhanu (2002), Hussien Adal Mohammed (2004), Tizazu Gebre (2005), and Tilahun Teklehaymanot and Mirtsue Giday (2007) showed that herbs are the most frequently used.

The most widely sought plant parts in the preparation of remedies are (29.3%) the roots. The popularity of these parts has grave consequences from both ecological point of view and from the survival of the medicinal species (Dawit Abebe and Ahadu Ayehu, 1993). Constentinos Berhe *et al*. (1995) reported that some plant species such as *Dracaena steudneri*, *Hagenia abyssinica* and *Securidaca longepedunculata* that are harvested for their roots, barks or whole plants in many parts of Ethiopia have become scarce and so difficult to find. On the other hand, collecting leaves alone could not pose a lasting danger to the continuity of an individual plant compared with the collection of roots, bark, stem or whole plant. These reasons are true in the study area.

7.2.4. Mode of Preparation, Dosage and Route of Application

The most popular mode of preparation was in the form of powder which accounts to 36.4% followed by 32.9% of crushed and pounding. The potency of using a concoction rather than a single plant to cure a particular disease is evident when they prescribe two or more medicinal plants. For instance, the curing potential of *Croton macrostachyus* in the treatment of malaria and diarrhea is increased by mixing it with fruit or bulb of *Allium sativum* in the preparation. Furthermore; *Bersama abyssinica* when used in the treatment of febrile illness is potentiated by mixing it with leaf of *Ruta chalepensis* and fruit of *Zingiber officinale*. The effect of one plant on the other in prescription of multiple sources is well recognized in Ethiopian traditional medicinal parctice (Dawit Abebe and Ahadu Ayehu, 1993).

In the route of application, the popular one is internal particularly oral that accounted for 63.7%, followed by 22.4% dermal and 13.6% nasal. This is concurrent with the finding of Dawit Abebe and Ahadu Ayehu (1993) who reported that the leading route of application used in northern Ethiopia is oral, which accounted for 42%. This is also in agreement with the result of various ethnobotanical researchers elsewhere in Ethiopia (Mirtuse Giday, 1999; Debela Hunde, 2001; Getachew Addis *et al.,* 2001; Kebu Balemie *et al.,* 2004; and Ermias Lulekal, 2005) and indicates oral as the predominant route of application.

The informants' responses indicated that there were variations in the unit of measurement, duration and time at which remedies are taken and prescribed by healers for the same kind of health problems. Amare Getahun (1976), Sofowora (1982), and Dawit Abebe (1986) have also discussed lack of precision and standardization as one drawback for the recognition of the traditional health care system.

7.3. Threats and Conservation of Medicinal Plants

The main threat for medicinal plants were agricultural expansion (24.4%), which was most hazardous to medicinal plants and their habitats. Most informants' perceived that urbanization and construction are the least destructive factor (nearly 11.8% and 10.2% of the total score, respectively). The rise in the price of *Coffea arabica* and *Catha edulis* on the market are some of the contributing factors for the expansion of agriculture. Moreover, during the field study, it was observed that large number of big trees of *Macaranga capensis, Olea europaea* ssp. *cuspidata, Pouteria adolfi-friederici*, and *Syzygium guineense* were removed by the local

people to prepare the forestlands for agricultural expansion. These factors combined with the natural vulnerability of the area may lead to further reduction in number of medicinal plants. Pressure from agricultural expansion, wide spread cutting for fuelwood combined with seasonal drought is reported in Zerihun Woldu and Mesfin Taddese (1990), Ensermu Kelbesa *et al.* (1992) and Kebu Balemie *et al.* (2004) as main factors for environmental degradation in areas similar to the study site.

Athough the practitioners know the importance of conserving medicinal plants, limited conservation effort was observed in the area. Culture and spiritual beliefs some how helped in the conservation of medicinal plants. For instance, the claim of the traditional healers that medicinal plants are effective only if cut or collected and administered by the knowledgeable persons and healers helps in conservation of medicinal plants.

8. CONCLUSION AND RECOMMENDATION

The ethnobotanical investigation of medicinal plants indicates that the study area is rich in its medicinal plant composition and the associated indigenous knowledge. Medicinal plants are widely used in the study area. The wide uses of these plants indicate that there is good consensus on the effectiveness of their medicinal properties. The traditional medicinal plants are central to the rural cultures and material needs. People are knowledgeable about the plants, their distribution, use, and conservation. Indigenous practices some how contributed to the sustained use, management and conservation of medicinal and multiple-use indigenous trees. This is further buffered by cultural and spiritual practices.

Traditional medicinal plants are harvested mostly from wild stands followed by home gardens. They are also obtained from road sides and farm lands. Shrubs were found the dominant growth forms used for preparation of traditional remedies followed by herbs and trees. Roots were also found to be the most frequently used plant parts followed by leaves for preparation of human remedies. Moreover, they employ medicinal plants for different purposes besides their medicinal value such as washing, cash income, charcoal and firewood and alcohol preparation.

Therefore, these important medicinal plants are under threat and the indigenous knowledge is also eroding. The major threats to medicinal plants and the associated knowledge in this particular study area are: agricultural expansion, firewood collection, grazing and drought in that order. These have greatly affected the availability of medicinal plants and the indigenous knowledge of the people. To overcome these problems traditional healers have turned towards home gardens. Previously, home gardens were employed for growing vegetables. Now-a-days, traditional healers cultivate scarce and more valuable medicinal plants around their homes instead of going long distances to fetch medicinal plants. In spite of this fact, traditional healers still depend to a greater extent on naturally growing species, as they believe those species in the wild vegetation are more powerful in the prevention and treatment of different ailment and health problems. Hence, they usually cultivate medicinal plants in their natural places. This has become the day-to-day habit and culture of most traditional healers.

The results of this study would have significant contribution in efforts directed towards conservation and preservation of the remaining resources of which there is still a considerable proportion left, provided that the necessary mechanisms are put in place before it is too late.

Based on the research results, the following recommendations are forwarded:

Encouraging people to grow medicinal plants in their home gardens, live fences and farmlands. In addition to this, local peoples' management and conservation of indigenous resources should be maintained. This will ensure the continuation of the indigenous practices and the natural vegetation, which carry these medicinal plants.

Promoting the organizational structure at Zone and Woreda Agricultural Offices to identify and encourage the local herbal medicinal practitioners to enhance the use of traditional medicine and licensing the work of the practitioners.

The participation of the local people and awareness creation through training or education on sustainable utilization and management of plant resources should be encouraged: Indigenous peoples' who are not involved in traditional healing activities are not aware of the contributing traditional medicinal plants. Thus, the subject should concentrate on the protection and maintenance of the natural inhabitats, the forests in general and medicinal plants in particular.

9. 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.

Abbiw, O.K. (1996). Misuses and Abuses in self-medication with Medicinal plants. The case of *Erythrophelum* in Ghana**. In**: *Biodiversity of African plants*, pp. 700-720. (Masen, G., Burger, X. M. and Rooy, J. M., eds.). Kluwer Academic Publisher, Netherlands.

Abebe Demisse (2001). Biodiversity conservation of medicinal plants: Problem and prospects. **In**: C*onservation and sustainable use of medicinal plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia,* 28 April-01 May 1998, pp.198-203.(Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Abiyot Birhanu (2002). Use and Conservation of Human Traditional Medicinal Plants in Jabitehaan Wereda, West Gojam. M.sc. Thesis (unpublished).

Alcorn, B. J (1984). Holastee Mayan Ethnobotany. University of Texas Press. Austin, USA. PP. 982.

Alexiades, M. (1996). Collecting ethnobotanical data. **In**: *Selected Guideline for Ethnobotanical Research: A* field manual. Pp. 40-102 (Alexiades, M. N and Sheldon, J. W. eds), The New York Botanical garden, Bronex, New York, USA.

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

Ankobonggo, W. (1992). The Role of African Traditional Medicine in Healthcare Delivery alongside Modern Medicine. **In:** Plants used in African traditional medicine as practiced in Ethiopia and Uganda. Botany 2000. East and Central Africa. *NAPRECA Monograph Series*. **2:** 25-35. (Edwards, S. and Zemede Asfaw eds.). Published by NAPRECA, Addis Ababa University, Addis Ababa.

Asfaw Debela, Dawit Abebe and Kelbessa Urga (1999). An over view of traditional medicine in Ethiopia: perspective and developmental efforts. **In**: *Ethiopian Pharmaceutical Association.* Silver Jubilee Anniversary, Pp. 25-61. (Tamrat Ejigu, ed.). Addis Ababa, Ethiopia

Balick, M.J. (1996). Transforming ethnobotany for the new Millennium. *Ann. Missouri Bot. Garden.* **83:** 58-66.

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

Bayafers Tamene (2000). A Floristic Analysis and Ethnobotanical Study of the Semi- Wet land of Cheffa Area, South Wello, Ethiopia. M. Sc. Thesis, Addis Ababa University, Addis Ababa.

Belachew Wassihun, Zemede Asfaw and Sebsebe Demissew (2003). Ethnobotanical study of useful plants in DANIIO GADE (home garden) in Southern Ethiopia. *Ethiopi. J. Bio. Sci.* **2:** 119-141.

Berhane Mewa (2001). Promotion of Medicinal Plants through involvement of the private sector **In**: *Conservation and Sustainable Use of Medicinal Plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia,* 28 April-01 May 1998, pp.168-175.(Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Constentinos Berhe Tesfu, Beletu Mengistu and Ggebeyew W/Aregay (1995). Women Lead in Protecting Food Germplasm and Herbs for Health in Ethiopia. Report Submitted To Earth Care Africa, Nairobi, Kenya (unpublished).

Cotton, C.M. (1996). *Ethnobotany*: *Principles and applications*. John Wiley and Sons Ltd. Chichester, England. Pp 347.

Cunningham, A.B. (1993). African Medicinal Plants: Setting priorities at the interface healthcare between conservation and primary health care. (Sample, A. ed.). *People and plants working paper*, pp. 1-50. Paris, UNESCO.

Cunningham, A.B. (1996). People, park and plant use recommendation for multiple uses zones and development alternatives around Bwindi. Impenetrable National Park Uganda. **In**: *People and plant working paper*, **4:**18-23. UNESCO, Paris.

Dawit Abebe (1986). Traditional medicine in Ethiopia. The attempt being made to promote it for effective and better utilization. *SINET: Ethiop. J. Sci.*, **9:** 61-69. Addis Ababa, Ethiopia.

Dawit Abebe (2001). The Role of Medicinal Plants in Healthcare Coverage of Ethiopia, the possible integration. **In**: *Conservation and Sustainable Use of Medicinal Plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia,* 28 April-01 May 1998, pp.6-21.(Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Dawit Abebe and Ahadu Ayehu (1993). Medicinal plants and enigmatic health practice of north Ethiopia. Berhanina Selam Printing Enterprise, Addis Ababa, Ethiopia.

Dawit Abebe and Estifanos Hagos (1991). Plants as primary source of drugs in the traditional health care practices of Ethiopia. **In**: *Plant Genetic Resources of Ethiopia*, Pp.101-113

(Engles, J. M., Hawakes, J. G. and Malaku Worede, eds.), Cambridge University Press, Cambridge.

Debela Hunde (2001). Use and Management of Traditional Medicinal Plants by Indigenous People of Boosat Woreda, Wolenchiti Area: An Ethnobotanical Approach. M.Sc. Thesis, Addis Ababa University.

Debela Hunde, Zemede Asfaw and Ensermu Kelbessa (2004). Use and Management of Ethnoveterinary Medicinal Plants of Indigenous people in 'Boosat', Wolenchiti Area. *Ethiop. J. Biol. Sci*. **3(2):** 113-132.

Dery, B. B., Ofsynia, R. and Ngatigwa, C. (1999). Indigenous Knowledge of Medicinal trees and setting priorities for their domestication in Shinyanga rejoin, Tanzania. International Center for Research in Agroforestry, Nariobi, Kenya. 87pp.

Edwards, S., Mesfin Tadesse and Hedberg, I. (eds.). (1995). Flora of Ethiopia and Eritrea Vol.2 Part 2, *Canellaceae to Euphorbiaceae.* The National Herbarium Addis Ababa, Ethiopia and Upsala, Sweden, 456 pp.

Edwards, S., Sebsebe Demissew and Hedberg, I. (eds.). (1997). *Alliaceae*. **In**: *Flora of Ethiopia and Eritrea, Volume 6.* The National Herbarium, Addis Ababa and Uppsala. Pp586.

Edwards, S., Mesfin Tadesse, Sebsebe Demissew and Hedberg, I. (eds.). (2000). Flora of Ethiopia and Eritrea Vol. 2 Part 1. *Magnoliaceae to Flacourtiaceae*. The National Herbarium Addis Ababa, Ethiopia and Upsala, Sweden, 532 pp.

Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Edwards, S. (1992).Some threatened Endemic Plants of Ethiopia. **In:** *The Status of Some Plants in Parts of Tropical Africa*, pp.35-55. (Edwards, S. and Zemede Asfaw, eds.). Botany 2000: NAPREC, Monograph Series **No.2**. Addis Ababa University, Ethiopia.

Ermias Lulekal (2005). Ethnobotanical Study of Medicinal Plants and Floristic Composition of Mana Angatu Moist Montane Forest, Bale, Ethiopia. M.Sc. Thesis. Addis Ababa University.

Etana Tolasa (2007). Use, Treat and Cnservation of Taditional Mdicinal Pants by Idigenous Pople in Gmbi Wreda Wastern Wellega, West Ethiopia. M.Sc. Thesis. Addis Ababa University.

Farnsworth, N. R. and Soejarto, D. D.(1991). Global importance of medicinal plants. **In:** *Conservation of Medicinal Plants*. (Akerel, O., Heywood, N., and Synge, H. eds.). Cambridge University Press. Cambridge, UK.

Fassil Kebebew (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 Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia*, 28 April-01 May 1998, pp.168-175.(Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Getachew Addis, Dawit Abebe and Kelbesa Urga (2001). A Survey of Traditional Medicinal Plants in Shirka District, Arsi Zone, Ethiopia. *Ethiop. Pharmaceutical journal* **19:** 30-47.

Getachew Berhan and Shiferaw Dessie (2002). Medicinal Plants in Bonga Forest and Their Uses. *In Biodiversity Newsletter* **1:** 9-10, IBCR, Addis Ababa.

Hamilton, A. C. (2003). Medicinal Plants and Conservation: issues and approaches. International plant conservation unit, WWF-UK, Pandahouse, Catteshall Lane, UK. 51pp.

Hedberg, I. and Edwards, S. (eds.) (1989). Flora of Ethiopia and Eritrea Volume 3, *pittosoraceae to araliaceae.*The National Herbarium Addis Ababa University, Addis Ababa and Uppsala. 659pp.

Hedberg, I. and Edwards, S. (eds.) (1995). Flora of Ethiopia and Eritrea Volume 7, pp. 420. *Poaceae (Graminaceae).*The National Herbarium Addis Ababa University, Ethiopia and Uppsala.

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

Hedberg, I. Ensermu kelbessa, Edwards, S., Sebsebe Demissew and Persson, E. (eds.). (2006). *Plantaginaceae*. **In**: Flora of Ethiopia and Eritrea, Volume 5 Pp.690. The National Herbarium, Addis Ababa and Uppsala.

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.

Hussien Adal Mohammed (2004). Traditional Use, Management and Conservation of Useful Plants in Dry Land Parts of North Shoa Zone of the Ahmara National Region: An Ethnobotanical Approach. M. Sc.Thesis, Addis Ababa University.

Iwu, M.M (1993). *Handbook of African Traditional Medicinal plants. B*oca Raton Ann Arbor. London. 43 pp. CRC Press, Inc.

Jansen, P.C.M. (1981). *Spices, Condiments and Medicinal plants in Ethiopia: Their Taxonomic and agricultural significance.* Centre for agricultural publishing and documentation. Wageningen, the Netherlands.

Kebu Balemie (2002). Indigenous Medicinal Plant Utilization and Management System by Keryu Pastoralists in Fentale, Eastern Shewa. M. Sc. Thesis, Addis Ababa University.

Kebu Balemie, Ensermu Kelbessa and Zemede Asfaw (2004). Indigenous Medicinal Utilization, Managemetn and Threats in Fentale Area, Eastern Shewa, Ethiopia. *Ethiop. J. Biol. Sci.* **3(1):** 1-7.

Kloos, H. (1976). Preliminary studies of medicinal plants and plant products in markets of Central Ethiopia. *Ethnomed.* **4:** 63-102.

Martin, G.J. (1995). *Ethnobotany*: A Method Manual. Chapman and Hall, London, 267 pp. 347.

Matu, E.N. (1998). Some Kenyan Medicinal Plants Used in Treating Joint Diseases. M.Sc. Thesis. (Unpublished). Addis Ababa University.

Medhin Zewdu, Tsige Gebre Mariam and Kaleb Asres (2001). Global Perspectives of Medicinal Plants. **In**: *Conservation and Sustainable Use of Medicinal Plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia,* 28 April-01 May 1998, pp.198-203.(Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Mesfin Taddesse (1986). Some Medicinal Plants of Central Shewa and Southwestern Ethiopia. *SINET. Ethiop.J. Sci.* **9**: 143-167.

Mesfin Taddesse and Sebsebe Demissew (1992). Medicinal Ethiopian plants. Inventory, Identification and Classification. **In**: Plants used on African traditional medicine as practiced in Ethiopia and Uganda, East Africa. (Edwards, S. and Zemede Asfaw eds.). *Botany 2000: NAPRECA, Monograph Series.* **No. 5**: 1-19. Addis Ababa University, Ethiopia.

Mirgisa Kaba (1996). Utilization of Plant Medicine for the Treatment of Health Problems. The Case of the Oromo of Chore District, Illubabor Zone. *The Ethiopian Journal of Health Development.* **10(3):** 101-166.

Mirutse Giday (1999). An Ethnobotanical study of Medicinal Plants Used by the People in Ethiopia. M. Sc. Thesis, Uppsala, Sweden.

Mirutse Giday and Gobana Amini (2003). An Ethnobotanical Survey on Plants of Veterinary Importance in Two Woredas of Southern Tigray, Northern Ethiopia. *SINET: Ethiop. J. Sci.* **26 (2):** 123-136.

Mirutse Giday, Tilhaun Tekelehaymanot, Abebe Animut and Yalemtsehay Mekonnen (2007). Medicinal Plants of Shinasha, Agew-Awi and Amhara Peoples in Nortwest Ethiopia. *Journal of Ethnopharmacology*, **110:** 516-525.

Pankhurst, R. (1965). A Historical Reflections on The Traditional Ethiopian pharmacopeias. *Journal of Ethiopian Pharmaceutical Association.* **2**: 29-33.

Pankhurst, R. (1990). *An Introduction to Medicinal History of Ethiopia.* Pp. 250-261. The Red Sea Press, Inc. New Jersey.

Pankhurst, R. (2001). The status and availability of oral and written knowledge on traditional health care. **In**: Conservation and Sustainable Use of Medicinal Plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia, 28 April-01 May 1998, pp.92-106 (Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Parrota, J. A. (2002). Restoration and Management of Degraded Tropical Forest Landscapes. **In:** Modern Trends in Applied Terrestrial Ecology. (R.S., Ambashet and N.K., Ambashet eds.) pp. 135-148.

Sebsebe Demissew and Ermias Dagne (2001). Basic and Applied Research in Medicinal Plants. **In**: *Conservation and Sustainable Use of Medicinal Plants in Ethiopia Proceeding of The National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia*, 28 April-01 May 1998, pp.29-33. (Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

Shanker, D. (1993). Medicinal Plants and Biodiversities. *Journal of Ethiopharmacology.* **33**: 100-119.

Shrestha, K.K., Jha, P.K., Shengi, P., Rastogi, A., Rajbandary, S., Joshi, M. (1997). Ethnobotany for Conservation and Community Development. Ethnobotanical Society of Nepal. Pp 102.

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

SLUM (2006). Indigenous Agroforestry Practices and their Implications on Sustainable Land Use and Natural Resources Management. A Case of Wonago Woreda. Research Report No: 1 pp.93.

Taddesse Kanshae (2002). Five thousand years of sustainability? A case study on Gedeo land use (Southern Ethiopia). Wageningen Agricultural University. PhD Dissertation. Wageningen. 295pp.

Tesfaye Awas and Zemede Asfaw (1999). An Ethnobotanical Study of the Bertha People of the Benshangul Gumuz Region in Western Ethiopia. Program and Abstyracts of the National Workshop. “Have We Valued Our Biodiversity?”

Tewolde Berhan Gebre Egziabher, Mesfin Tadesse, Gelahun Abate, Birhanu Abegaz and Tesfaye Biftu (1979). The Potentials of Traditional Healers and Indigenous Drugs in Healthcare in Africa. **In**: *13th Annual Meeting of the Association of Medical Schools in Africa.* April 23-27, pp. 1-8. Addis Ababa University, Addis Ababa.

Tilhaun Teklehaymanot and Mirutse Gidey (2007). Ethnobotanical Study of Medicinal Plants used by People in Zegie Peninsula, Northwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicine*. **3:**12.

Tilhaun Teklehaymanot, Mirutse Giday, Girmay Medhin and Yalemtsehay Mekonnen (2007). Knowledge and Use of Medicinal plants by People around Debre Libanos Monastery in Ethiopia. *Journal of Ethnopharmacology*. **111**: 271-283.

Tizazu Gebre (2005). Ethnobotanical Study of Medicinal Plants in the Konso special Woreda (SNNPR), Ethiopia. M.Sc. Thesis. (Unpublished). Addis Ababa University

TRAFFIC International (1998). Searching for a Cure: Conservation of Medicinal Wildlife Resources in East and Southern Africa, pp. 111. Cambridge, UK.

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 Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia,* 28 April-01 May 1998, pp.108-113.(Medhin Zewdu and Abebe Demissie eds.). IBCR, AA.

WHO (1978). The Promotion and Development of Traditional Medicine. *Technical Report Series,* 622 pp, WHO, Geneva.

WWAO (2005). Wonago Woreda Agricultural office Annual Report. 47 pp.

Zemede Asfaw (1997). Survey of indigenous food plants, their preparations and home gardens in Ethiopia. Indigenous African food crops and useful plants (Bede, N. and Okigbo, B.N. eds.), ICIPE Science Press, Nairobi, pp.65.

Zemede Asfaw (2001). The role of home gardens in production and conservation of medicinal plants. **In**: *Proceedings of the National Workshop on Biodiversity Conservation and Sustainable Use of Medicinal Plants in Ethiopia,* pp. 76-91 (Medhin Zewdu and Abebe Demissie eds.). IBCR, Addis Ababa, Ethiopia.

Zerhiun Woldu and Mesfin Taddesse (1990). The Status of the Vegetation in the Lake Region of the Rift Valley of Ethiopia and Possibilities of its Recovery. *SINET: Ethiop. J. Sci*. **392**: 97-120.

Appendix 1: List of Informants Who Participated In This Study

No.	Name	Sex	Age	Marital status	Education status	Locality
1	Asefa Selli	M	42	M	No	Bale bukisa
2	Desta Welde	F	46	M	No	Bale bukisa
3	Endasha Wedago	F	29	M	10	Bale bukisa
4	Hiywot Wergecha	F	51	M	No	Bale bukisa
5	Kasaye Gemede	M	39	M	5	Bale bukisa
6	Tadelech Bekele	F	49	M	No	Bale bukisa
7	Tadesse Robe	M	36	M	No	Bale bukisa
8	Tadesse Rodeso	M	32	M	4	Bale bukisa
9	Zenebe Deyaso	M	32	M	No	Bale bukisa
10	Bekelech Gemede	F	37	M	3	Banko okoto
11	Gemede Alemu	M	67	M	No	Banko okoto
12	Lolae Gelgelo	M	49	M	4	Banko okoto
13	Merima Hagi Hussewn	F	39	M	No	Banko okoto
14	Tefera Wegiso	M	28	M	No	Banko okoto
15	Werqnesh Miju	F	38	M	TTI	Banko okoto
16	Migu Sirtu	M	27	M	8	Banko okoto
17	Chebeso Edema	M	50	M	No	Deko
18	Elefinsh Bekulae	F	47	M	No	Deko
19	Hagi Beyene Wase	M	37	M	3	Deko
20	Hirut Chebeso	F	41	M	No	Deko
21	Shoxxe Jigeso	F	35	M	No	Deko
22	Simegh Bekele	F	40	M	6	Deko
23	Trunesh Wedeso	F	52	M	No	Deko
24	Werku Lalunxe	M	41	M	3	Deko
25	Ararso Gura	M	39	M	No	Halemo
26	Ayele Wordefa	M	30	M	3	Halemo
27	Bereanu Dori	M	61	M	No	Halemo
28	Demesse Kallo	M	31	M	5	Halemo
29	Godana Xeko	M	74	M	No	Halemo
30	Madesha Gelchu	M	43	M	5	Halemo
31	Meserte Hailu	F	30	M	4	Halemo
32	Xiba Gemedae	M	37	M	2	Halemo
33	Daneal Jebo	M	32	M	5	Hase haro
34	Deko Boleka	M	40	M	No	Hase haro
35	Fekadu Murti	M	53	M	No	Hase haro
36	Geledeyo Alemu	M	59	M	12	Hase haro
37	Kuxxuya Ayele	M	37	M	No	Hase haro
38	Ture Wakeyo	M	25	S	No	Hase haro
39	Jello Sholka	M	41	M	10	Hase haro
40	Alemu Wakeyo	M	53	M	No	Kara sodity

No.	Name	Sex	Age	Marital status	Education status	Locality
41	Aselefech Migu	F	85	M	No	Kara sodity
42	Gemede Edema	M	25	M	2	Kara sodity
43	Girma Jebo	M	62	M	No	Kara sodity
44	Lema Gemede	M	74	M	No	Kara sodity
45	Meseret Hailu	F	42	M	No	Kara sodity
46	Seta Lorato	M	30	M	9	Kara sodity
47	W/o Lemetae Hasen	F	60	M	No	Kara sodity
48	Alemu Wedo	M	42	M	6	Mokonisa
49	Bali Boku	M	37	M	7	Mokonisa
50	Bedele Dullo	M	71	M	No	Mokonisa
51	Benxxore Dube	M	67	M	No	Mokonisa
52	Demesse Aleyae	M	47	M	No	Mokonisa
53	Hudesae Gebrae	M	31	M	No	Mokonisa
54	Kasahun Tilahun	M	36	M	6	Mokonisa
55	Kebede Werera	M	32	M	8	Mokonisa
56	Lole Berako	M	30	M	5	Mokonisa
57	Abebech Hordofa	F	41	M	3	Sokicha
58	Abera Daka	M	24	M	7	Sokicha
59	Alemu Guyae	M	41	M	No	Sokicha
60	Dawit Xebeto	M	56	M	No	Sokicha
61	Gelegela Guyae	M	39	M	No	Sokicha
62	Niguse Dori	M	72	M	No	Sokicha
63	Samuel Feysa	M	64	M	No	Sokicha
64	Tamerat Xero	M	51	M	No	Sokicha
65	Abera Werasa	M	29	M	7	Sugale
66	Alemnsh Chebeso	F	39	M	No	Sugale
67	Beyene Wuka	M	39	M	3	Sugale
68	Chebeso Gelgelo	M	20	S	8	Sugale
69	Robae Wadiso	M	61	M	No	Sugale
70	Sheferaw Gemede	M	21	M	6	Sugale
71	Sitina Gemede	F	42	M	4	Sugale
72	Werku Gedecha	M	36	M	5	Sugale
73	Asefa Sheferaw	M	51	M	No	Tumata chericha
74	Chenku Mekonen	M	49	M	No	Tumata chericha
75	Mekuria Gocha	M	56	M	No	Tumata chericha
76	Sheferaw Gedada	M	37	M	6	Tumata chericha
77	Tadesse Fundaga	M	72	M	No	Tumata chericha
78	Tegaye Alekae	M	63	M	No	Tumata chericha
79	Wediso Adiyo	M	62	M	No	Tumata chericha
80	Zenebech Leggae	F	27	M	10	Tumata chericha

Appendix 2: Checklist of Questions or Items used as a Basis for Discussion and Interview

1. Information on respondents:
    - Name_____
    - Age_____
    - Sex _____
    - Marital status_____
    - Educational status_____
    - Locality _____
2. What are the main human health problems?
3. What do you diagnose each disease/ health problems?
4. Symptoms of each disease?
5. How do you control diseases?
6. How do you treat human diseases?
7. Which plant/s do you use for treating those particular health problems/diseases?
8. Local name of the plant ('Gedeoffa')
9. Botanical name
10. Family name
11. Other uses of the plant
12. Use of other plants out of medicinal plant
13. Habit of the plant: tree, shrub, herb, parasite, semiparasite, liana, climbers, epitaties (underlined).
14. Brief description of the plant (by investigator), incuding: height, flower colour, mature fruit colour, mature seed colour, and other unique features
15. Part/parts of the medicinal plant collected for medicinal use.
16. Preparation of remedy: detailed account
    - Used alone, mixed with water or other materials, concoction, and decoction.
    - Condition to used: fresh, dried, and fresh or dried.
    - Preparation forms; crushed, pounded, powder, latex, miliky
17. Amount used (dose) and factors that affect dosage
18. Does the dose differ among males, females, children, and elders? Is/are there antidotes for adverse effects?
19. Any noticeable side effect (Adverse effect) caused by the medicine (if any)
20. Are there conditions that forbid taking the medicine such as pregnancy and others?
21. Are there taboos in the utilization of some medicinal plants in the locality?
22. How is the medicinal plant (s) preserved (if any)?

23. Are there members of the community who frequently use the medicinal plant
24. Are there economic groups who mostly or occasionally use these medicinal plants?
25. Are there regimens in the use of medicinal plants?
26. How is the knowledge passed from elders to younger people in the study area?
27. How does modernization interfere with traditional medicinal system?
28. Are there threats to the medicinal plants? List out the main threats
29. Are there traditional medicinal plants conservation methods in the area? Include the management practices by indeginous people
30. Is the plant currently cultivated in the study area?
31. Information on edibility and other uses of the plant besides its medicinal uses/value.
32. What are reciprocal impacts of plant-human interactions?

Date_____ time_____

Appendix 3: List of plant species in wild vegetation (Habit: T-tree, Sh-shrub, H-herb, Cl-climber, and Ep-epiphytes, Vou. No.-voucher number)

Plant Species	Family	Local name(language)	Habit	Vou. no
Acacia abyssinica Hochst. ex Benth.	Fabaceae	wochhoo	T	FM100
Acanthus eminens C.B.Clarke	Acanthaceae	Comexxo	S	FM201
Acanthus pubescens Del.	Acanthaceae	Dedexxo	S	FM 97
Achyranthes aspera Lam.	Amaranthaceae	Derrgu	H	FM115
Alchemilla cryptantha A. Rich.	Rosaceae	Imbricho	H	FM124
Allophylus abyssinicus (Hochst.) Radlk.	Sapindaceae	Embesae	T	FM132
Amaranthus spinosus L.	Amaranthaceae	Alemae	H	FM180
Arisaema enneaphyllum Hochst. ex A.Rich	Araceae	Badenxxo	T	FM99
Argemone mexicana L.	Papaveraceae	Kossalae	H	FM81
Arundinaria alpina K.Schum.	Poaceae	Kerrkeha	H	FM152
Arundo donax L.	Poaceae	Serrdo	H	FM214
Asparagus africanus Lam.	Asparagaceae	Uffae	Sh	FM206
Bersama abyssinica Fresen.	Melianthaceae	Jejjeba	S	FM163
Boswellia neglecta S. Moore	Burseraceae	Galgalchae	T	FM175
Brucea antidysenterica J.F. Mill.	Simaroubaceae	Kapparro	S	FM200
Buddleja polystachya Fresen.	Loganiaceae	Affarao	S	FM7
Caesalpinia decapetala (Roth) Alston	Fabaceae	Konnxxera	C	FM186
Callistemon citrinus (Curtis) Skeels	Myrtaceae	Paricho	Sh	FM155
Calpurnia aurea (Alt.) Benth.	Fabaceae	Chekketa	S	FM98
Carduus leptacanthus Fresen.	Asteraceae	Guccino	H	FM143
Casuarina cunninghamiana Miq.	Casuarinaceae	Shewshewae	T	FM76
Catha edulis (Vahl) Forssk ex Endl.	Celastraceae	Chatae	Sh	FM19
Caylusea abyssinica (Fresen.) Fisch. & Mey.	Resedaceae	Sheggitae	H	FM131
Centella asiatica (L.) Urban	Apiaceae	Xxerexxo	H	FM125
Cirsium englerianum O.Hoffm.	Asteraceae	Galigloo	H	FM64

Plant Species	Family	Local name(language)	Habit	Vou. no
Cissus qudriangularis L.	Vitaceae	Chobihada	Cl	FM27
Citrus lemon (L.) Burm.f.	Rutaceae	Lomae	Sh	FM123
Citrus medica L.	Rutaceae	Burtukanae	Sh	FM189
Coffea arabica L.	Rubiaceae	Bunno	S	FM1
Commelina diffusa Burm. f.	Commelinaceae	W/hankurae	H	FM129
Cordia africana Lam.	Boraginaceae	Waddissa	T	FM167
Crepis rueppellii Sch. Bip.	Asteraceae		H	FM178
Crotalaria pallida Ait.	Fabaceae		H	FM95
Croton macrostachyus Del.	Euphorbiaceae	Bissano	T	FM162
Cyathula cylindrica Moq.	Amaranthaceae	Gixxaa	H	FM80
Cyathula uncinulata (Schrad.) Schinz	Amaranthaceae	Gixxaa	H	FM4
Cynodon dactylon (L.) Pers.	Poaceae	Serrdo	H	FM110
Cynoglossum coeruleum Hochst ex A. Rich	Boraginaceae	Korchibae	H	FM135
Cynoglossum lanceolatum Forssk.	Boraginaceae	Korchibae	H	FM114
Cyperus dichroostachyus A. Rich.	Cyperaceae	Embuteteya	H	FM147
Cyperus mundfii (Nees) Kunth	Cyperaceae	Rogrogal	H	FM82
Dactyliandra stefaninii (Chiov.) C. Jeffrey	Cucurbitaceae		Cl	FM192
Datura stramonium L.	Solanaceae	Ashefareceae	H	FM47
Delonix regia (Boj. ex Hook.) Ref.	Fabaceae	Yed/zafae	T	FM130
Dicrocephala integrifolia (L.f..) O. Kuntze	Asteraceae	Gishtu	H	FM151
Discopodium penninervum Hochst.	Solanaceae	Serbae	T	FM199
Dissotis senegambiensis (Guill. & Perr.) Triana	Melastomataceae	Arkaae	H	FM156
Dodonaea angustifolia L.	Sapindaceae	Ittechhae	Sh	FM83
Dracaena afromontana Mildbr.	Dracaenaceae	Woreko	T	FM174
Dracaena steudneri Engler	Dracaenaceae	Afrafartu	T	FM37

Plant Species	Family	Local name(language)	Habit	Vou. no
Droguetia iners (Forssk.) Schweinf.	Urticaceae	Haroxxae	H	FM191
Drymaria cordata (L.) Schultes	Caryophyllaceae		H	FM166
Echinops amplexicaulis Oliv.	Asteraceae	Messichae	H	FM173
Ekebergia capensis Sparrm.	Meliaceae	Sessa	T	FM185
Embelia schimperi Vatke	Myrsinaceae	Sharrengo	Sh	FM122
Englerina woodfordioides (Schweinf.) M.Gilbert	Loranthaceae	Eritobekkesis a	EP	FM141
Erythrina brucei Schweinf.	Fabaceae	Korchae	T	FM79
Eucalyptus globulus Labill	Myrtaceae	D/barzafae	T	FM150
Eucalyptus saligna Smith	Myrtaceae	K/barzafae	T	FM157
Euphorbia candelabrum Kostshy	Euphorbiaceae	Addama	Sh	FM48
Euphorbia pulcherrina (R. Grah.) Willd	Euphorbiaceae	Abababo	Sh	FM40
Euphorbia tirucalli L.	Euphorbiaceae	Kinchbae	S	FM40
Ficus ovata Vahl	Moraceae	Shollae	T	FM153
Ficus sur Forssk.	Moraceae	Sholae	T	FM161
Foeniculum vulgare Mill.	Apiaceae	Mello	H	FM193
Girardinia diversifolia (Link.) Friis	Urticaceae	Mutate	H	FM199
Gnaphalium rubriforum Hilliard	Asteraceae	Nophixxo	H	FM12
Gomphocarpus purpurascens A. Rich.	Asclepiadaceae	Mexxino	Sh	FM142
Grevillea robusta R. Br.	Proteaceae		T	FM182
Grewia ferruginea Hochst.ex A.Rich.	Tiliaceae	Ogomdii	S	FM121
Guizotia abyssinica (L.f.) Cass.	Asteraceae	Mechae	H	FM154
Guizotia scabra (Vis.) Chiov.	Asteraceae		H	FM207
Hagenia abyssinica (Bruce.) J.F.Gmel	Rosaceae	Kossae	T	FM119
Hibiscus flavifolius Ulbr.	Malvaceae	Bayirro	H	FM109
Hyparrhenia filipendula (Hochst.)	Poaceae	Gedecho	H	FM137

Plant Species	Family	Local name(language)	Habit	Vou. no
Stat				
Hypericum peplidifolium A. Rich.	Clustiaceae	Dammae	Sh	FM195
Hypericum revolutum Vahl	Clustiaceae		Sh	FM93
Indigofera emarginella A. Rich	Fabaceae	Boffeae	H	FM172
Jacaranda mimosifolia D. Don	Bignonaceae	Y/zafae	T	FM145
Jasminum abyssinicum Hochst. ex A. Rich.	Oleaceae	Tembele	Cl	FM177
Juniperus procera Hochst ex Engl.	Cupresaceae	Xxdiae	T	FM159
Justicia schimperiana (Hochst. ex A. Nees) T. Anders	Acanthaceae	Dummiuggae	S	FM30
Kanahla laniflora (Forssk.) R. Br.	Asclepidaceae	Wundiffo	Sh	FM136
Lagenaria siceraria (Molina) Standl.	Cucurbitaceae	Botto	H	FM205
*Laggera alata (*D.Don) Sch. Bip. ex Oliv.	Asteraceae	Luggae	S	FM112
Laggera crispata (Vahl) Hepper	Asteraceae	Hopphicho	S	FM116
Lantana camara L.	Verbenaceae	Yewoffekolo	Sh	FM146
Leucaena leucocephala L.	Fabaceae		Sh	FM169
Lippia adoensis Hochst. ex Walp.	Verbenaceae	Kessae	Sh	FM197
Macaranga capensis (Baill.) Sim	Euphorbiaceae	Yunddae	T	FM31
Maesa lanceolata Forssk.	Myrsinaceae	Kaggano	T	FM210
Malus sylvestris Miller	Rosaceae	Apiliae	T	FM53
Malva verticillata L.	Malvaceae	Xxummo	H	FM160
Manihot esculenta Granz	Euphorbiaceae	Yammenoi	H	FM119
Maytenus arbutifolia (A. Rich.) Wilczek	Celastraceae	Kombollechae	Sh	FM138
Maytenus senegalensis (L.) Excell	Celastraceae	Shekko	Sh	FM54
Melia azedarach L.	Meliaceae	Nemae	T	FM115
Millettia ferruginea (Hochst.) Bak.	Fabaceae	Berberae	T	FM190
Momordica foetida Schumach &	Cucurbitaceae	Yubarrae	Sh	FM108

Plant Species	Family	Local name(language)	Habit	Vou. no
Thonn.				
Moringa stenopetala L.	Moringaceae	Shefferaw	T	FM62
Nicotiana tabacum L.	Solanaceae	Tambo	Sh	FM56
Oenanthe palustris (Chiov.) Norman	Apiaceae		H	FM91
Olea europaea L. ssp. *cuspidata (*Wall. ex G.Don*)*	Oleaceae	Wayrro	T	FM187
Osyris quadripartita Decn.	Santalaceae	Watto	Sh	FM105
Otostegia tomentosa A. Rich.	Lamiaceae	Mukalonii	S	FM63
Oxalis radicosa A. Rich.	Oxalidaceae		H	FM127
Panicum maximum Jacq.	Poaceae		H	FM140
Parthenium hysterophorus L.	Asteraceae	Partinumae	H	FM2
Passiflora edulis Sims	Passifloraceae	Woyane	Cl	FM134
Pentas schimperiana (A. Rich.) Vatke	Rubiaceae	Dibexxo	Sh	FM78
Persea americana Mill.	Lauraceae	Kokae	T	FM75
Phoenix reclinata Jacq.	Arecaceae	Xenebo	T	FM106
Phytolacca dodecandra L'Herit.	Phytolaccaceae	Indodae	S	FM176
Pinus radiata L.	Pinaceae		T	FM92
Pisum sativum L.	Fabaceae	Attaro	H	FM128
Plantago lanceolata L.	Plantaginaceae	Diggixxae	H	FM107
Podocarpus falcatus (Thunb.) Mirb.	Podocarpaceae	Zigebo	T	FM11
Polyscias fulva (Hiern) Harms	Araliaceae	Teleha	T	FM179
Pouteria adolfi-friederici (Engl.) Baehni	Sapotaceae	Quarero	T	FM200
Prunus africana (Hook. f.) Kalkam	Rosaceae	T/kaka	T	FM209
Psidium guajava L.	Myrtaceae	Gettamae	S	FM89
Pycnostachys eminii Gurke	Lamiaceae	Shegino	Sh	FM102
Rhamnus prinoides L'Herit.	Rhamnaceae	Gesho	S	FM49
Rhus vulgaris Meikle	Anacardiaceae	Xxugutae	S	FM57
Ricinus communis L.	Euphorbiaceae	Gulloo	S	FM71

Plant Species	Family	Local name(language)	Habit	Vou. no
Rubus apetalus Poir.	Rosaceae	Engorae	S	FM149
Rubus steudneri Shweinf.	Rosaceae	Engoraae	S	FM74
Rumex nepalensis Spreng	Polygonaceae	Dangago	H	FM10
Saliva nilotica Juss. ex Jacq.	Lamiaceae		H	FM85
Sapium ellipticum (Krauss) Pax	Euphorbiaceae	Waggiso	T	FM211
Satureja paradoxa (Vatke) Engler	Lamiaceae	Naddae	H	FM204
Schinus molle L.	Anacardiaceae		T	FM69
Senna occidentalis (L.) Link	Fabaceae	Assenmeka	H	FM103
Sesbania sesban (L.) Merr.	Fabaceae		Sh	FM113
Sida schimperiana Hochst. ex A.Rich.	Malvaceae	Gebresede	Sh	FM170
Snowdenia polystachya (Fresen.) Pilg.	Poaceae		H	FM183
Solanum americanum Miller	Solanaceae		Sh	FM73
Solanum anguiniri Lam.	Solanaceae	Embayo	Sh	FM203
Solanum incanum L.	Solanaceae	K/embayo	Sh	FM86
Solanum indicum L.	Solanaceae	D/embayo	Sh	FM104
Spathodea campanulata subspp. *nilotica* P. Beauv.	Bignonaceae		T	FM121
Sphaeranthus suaveolens (Forssk.) DC	Asteraceae		H	FM77
Stellaria sennii Chiov.	Caryophyllaceae		H	FM190
Stephania abyssinica (Dilloy and A. Rich.) Walp.	Menispermaceae	Shesheno	H	FM101
Syzygium guineense (Willd.) DC.	Myrtaceae	Debobessa	T	FM117
Tagetes minuta L.	Asteraceae	Chebbo	H	FM148
Thelypteris confluens (Thunb.) Morton.	Thelypteridaceae		H	FM7
Tragia cinerea (Pax) Gilbert & Radcl. Smith.	Euphorbiaceae	Aleblabitae	H	FM87

Plant Species	Family	Local name(language)	Habit	Vou. no
Trichilia dregeana Sond.	Meliaceae	Yumbarro	T	FM126
Triumfetta tomentosa Boj.	Tiliaceae	Kombocho	Sh	FM171
Vepris dainellii (Pichi-Serm.) Kokwaro	Rutaceae		Sh	FM133
Vernonia amygdalina Del.	Asteraceae	Ebicha	S	FM31
Vernonia auriculifera Hiern.	Asteraceae	Dangireto	S	FM144
Xanthium spinosum L.	Asteraceae		H	FM88
Xanthium strumarium L.	Asteraceae	Dehanekayae	H	FM9

Appendix 4: Home garden plant species (Habit: T-tree, Sh-shrub, H-herb, and Cl-climber. Uses: Sp-spice, F-food, M-medicinal, Ci- cash income, Fn-fence, Or-ornamental, and St-stimulant)

Plant species	Family	Local name	Ht	Use	Vou. no
Aframomum corrorima (Braun) Jansen.	Zingebraceae	Okkoshae	H	Sp	FM39
Allium cepa L.	Alliaceae	Kagelcha Sunkurtae	H	F	FM14
Allium sativum L.	Alliaceae	Dimoxxa sunkurtae	H	F , M	FM15
Ananas comosus L.	Bromelianceae	Annanassae	H	F	FM45
Annona squamosa L.	Annonaceae	Gishta	S	F	FM18
Artemisia abyssinica Sch.Bip. ex A.Rich.	Asteraceae	Sugetieae	H	M	FM17
Artemisia afra Jack. ex Willd.	Asteraceae	Chugughee	H	M	FM38
Beta vulgaris L.	Chenopodaceae	Dammooxxa	H	F	FM24
Brassica carinata A. Br.	Brassicaceae	Shaanna	H	F	FM23
Brassica oleracea L.	Brassicaceae	Faragae shaanna	H	F	FM70
Cajanus cajan L.	Fabaceae	Atarra	H	F	FM44
Capsicum annum L.	Solanaceae	Miximixo	H	F, M	FM25
Capsicum frutescens L.	Solanaceae	Bereberae	H	F	FM26
Carica papaya L.	Caricaceae	Papaya	T	F, M	FM46
Catha edulis (Vahl) Forssk. ex Endl.	Celastraceae	Chatae	S	M, CI	FM19
Citrus lemon (L.) Burm.f.	Rutaceae	Lomae	S	F,M	FM64
Citrus medica L.	Rutaceae	Trungo	S	F	FM27
Coffea arabica L.	Rubiaceae	Buno	S	M, CI	FM1
Colocasia esculenta (L.) Schott	Araceae	Godarre	H	F, M	FM43
Cucurbita pepo L.	Cucurbitaceae	Buqe	Cl	F	FM16

Datura stramonium L.	Solanaceae	Atsefareceae	H	M	FM47
Daucus carota L.	Apiaceae	Karoti	H	F	FM36
Dioscorea praehensilis Benth.	Dioscoreaceae	Qoco	Cl	F	FM28
Dovyalis abyssinica (A. Rich.) Warb	Flacourtiaceae	Akuku	S	Fn, O	FM13
Dracaena steudneri Engl.	Dracaenaceae	Afarfartu	T	M, O	FM37
Ensete ventricosum (Welw.) Cheesman	Musaceae	Warqo	Sh	M , O	FM5
Eragrostis tef (Zucc.) Trotter	Poaceae	Xxaffae	H	M	FM22
Euphorbia candelabrum Kostshy	Euphorbiaceae	Addama	Sh	M, fn	FM48
Euphorbia pulcherrima (R. Grah.) Willd.	Euphorbiaceae	Ababa	S	Or	FM40
*Glycine max (*L.) Merr.	Fabaceae	Atara	S	F	FM55
Gossypium herbaceum L.	Malvaceae	Jirbi	S	M,CI	FM29
Helianthus annuus L.	Asteraceae	Suufii	H	F, M	FM65
Hordeum vulgare L.	Poaceae	Dinnaae	H	F	FM21
Ipomoea batatas L.	Convolvulaceae	Boynnaae	C	F,	FM41
Justicia schimperiana (Hochst. ex Nees) T. Anders	Acanthaceae	Dhumuga	S	M,Fn	FM30
Lepidium sativum L.	Brassicaceae	Faxxoo	H	M	FM20
Lycopersicon esculentum Mill	Solanaceae	Timatimi	H	F	FM42
Malus sylvestris Mill	Rosaceae		T	F	FM53
Mangifera indica L.	Anacardiaceae	Mango	T	F, CI	FM61
Maytenus senegalensis (Lam.) Excell	Celastraceae	Shekko	Sh	M	FM54
Moringa stenopetala L.	Moringaceae	Shifferaw	T	M, Or	FM62
Musa paradisiaca L.	Musaceae	Musi	H	F, Or	FM33

Nicotiana tabacum L.	Solanaceae	Tambo	H	CI, M	FM56
Ocimum basilicum L.	Lamiaceae	Basobila	H	F	FM67
Ocimum lamiifolium Benth.	Lamiaceae	Damakase	H	M	FM52
Otostegia tomentosa A. Rich.	Lamiaceae	Tunjuti	S	Fn	FM63
Persea americana Mill.	Lauraceae	Abokado	T	F, CI	FM75
Phaseolus lunatus L.	Fabaceae	Coma	Cl	F	FM34
Phoenix reclinata Jacq.	Arecaceae	Maxxaae	T	Or	FM66
Plectranthus edulis Vatke	Lamiaceae	Dinich-Oromo	H	F	FM60
Prunus persica L.	Rosaceae	Kokae	S	F	FM32
Punica granatum L.	Punicaceae	Romanoo	S	F	FM68
Rhamnus prinoides L'Herit.	Rhamnaceae	Geshae	S	St	FM47
Rhus vulgaris Meikle	Anacardiaceae	Suggutae	Sh	M	FM57
Ricinus communis L.	Euphorbiaceae	Qobo	S	M, Sp	FM71
Rosa abyssinica Lindley	Rosaceae	Xigeradao	Sh	Or	FM6
Rubus steudneri Shweinf.	Rosaceae	Engorrei	Sh	F, Or	FM74
Ruta chalepensis L.	Rutaceae	Ciladami	H	M	FM50
Saccharum officinarum L.	Poaceae	Shunkora	H	F, CI	FM72
Solanum americanum Miller	Solanaceae		Sh	F	FM73
Sorghum vulgare Pers.	Poaceae	Agadae	H	F	FM35
Vernonia amygdalina Del.	Asteraceae	Ebicha	S	M	FM31
Vicia faba L.	Fabaceae	Baqqalleo	H	F, M	FM59
Zea mays L.	Poaceae	Beedeella	H	F,CI	FM58
Zingiber officinale Roscoe	Zingiberaceae	Jaanjiibeello	H	F, M	FM51

Appendix 5: number of Medicinal plants species recorded in each family

Family	Total No	%
Acanthaceae	1	1.7
Alliaceae	1	1.7
Apiaceae	1	1.7
Araceae	1	1.7
Asclepidaceae	2	3.4
Asparagaceae	1	1.7
Asteraceae	7	12
Boraginaceae	1	1.7
Brassicaceae	1	1.7
Caricaceae	1	1.7
Caryophyllaceae	1	1.7
Celastraceae	2	3.4
Curcurbitaceae	2	3.4
Dracaenaceae	1	1.7
Euphorbiaceae	5	8.6
Fabaceae	2	3.4
Lamiaceae	1	1.7
Loganiaceae	1	1.7
Malvaceae	2	3.4
Meliaceae	1	1.7
Melianthaceae	1	1.7
Moraceae	1	1.7
Moringaceae	1	1.7
Myrsinaceae	1	1.7
Myrtaceae	1	1.7
Musaceae	1	1.7
Phytolaccaceae	1	1.7
Podocarpaceae	1	1.7
Polygonaceae	1	1.7
Resedaceae	1	1.7
Rosaceae	2	3.4
Rubiaceae	2	3.4
Rutaceae	2	3.4
Sapindaceae	1	1.7
Simaroubaceae	1	1.7
Solanaceae	1	1.7
Tiliaceae	2	3.4
Verbenaceae	1	1.7
Zingibraceae	1	1.7

Appendix 6: Number of informants and percentage of total plant species used to treat frequently appearing human diseases in the study area ('Dingetegna'-Unidentified gastrointestinal disorder, 'Kintarot'-Wart,)

Health problem	No. plant species	% of total medicinal plants	No. of informants that cited the species	% of total informants
Abdominal pain	3	3.4	11	4.1
Amoebiasis	3	3.4	8	3.1
Ascariasis	5	5.8	16	6.0
Bleeding nose	1	1.1	5	1.8
Bronchitis	3	3.4	7	2.6
Cough	3	3.4	5	1.8
Diarrhea	6	6.9	31	11.6
'Dingetegia'	3	3.4	7	2.6
Epilepsy	4	4.6	9	3.3
Evil eye	2	2.3	3	1.1
Excessive menstral bleeding	1	1.1	4	1.5
Febrile illness	3	3.4	5	1.8
Fire burn	1	1.1	5	1.8
Fungal infection	1	1.1	3	1.1
Gonorrhea	3	3.4	9	3.3
Headache	3	3.4	13	4.9
Hemorrhoids	1	1.1	3	1.1
Hepatitis	2	2.3	4	1.5
Infected eye	1	1.1	2	0.7
Intestinal parasite	3	3.4	11	4.1
'Kintarot'/wart	2	2.3	1	0.3
Leprosy	1	1.1	2	0.7

Lymphatic swelling	2	2.3	4	1.5
Malaria	7	8.1	39	14.7
Mental problem	2	2.3	3	1.1
'Mich'	2	2.3	4	1.5
Food Poison	2	2.3	4	1.5
Ring worm	3	3.4	7	2.6
Sexual impotency in men	2	2.3	7	2.6
Snake poison	1	1.1	3	1.1
Stomachache	2	2.3	8	3.0
Tonsillitis	1	1.1	3	1.1
Toothache	1	1.1	5	1.8
Trachoma	1	1.1	3	1.1
Urine retention	1	1.1	2	0.7
Wounds	4	4.6	9	3.3
Total	86		265	

N.B: The total number of plant species used for human treatment documented was 58. The total numbers of plant species given in this table are 86. This is because of the fact that for one type of disease different plant species are used.

Appendix 7: Lists of medicinal plants for treating human ailments, scientific name, family, local name, Habit(H-herb, Sh-shrub, T-tree, Cl-climber), part used (R-root, Rb-root bark, L-leaf, St-stem, Fr- fruit, Sd-seed, Fl-flower, Lx-latex, WP-whole plant), Preparation, Disease treated used for human, Route of application(O-oral, Na-nasal, Ex-external), and condition to preparation (F-fresh, D-dried, F/D-fresh or dried).

Scientific name	Families	Local name (language)	Hb	PU	Preparation and application	Diseases treated	RA	P C
Allium sativum L.	Alliaceae	Dimoxxa sunkurtae	H	Fr	Chewing and swallowed early morning for four days before breakfast	Malaria	Or	
Artemisia abyssinica Sch.Bip. ex A. Rich	Asteraceae	Sugetieae	H	St	Crushed, pounded and mixed with butter and creamed on affected part	Eye infection	Ex	F
Artemisia afra Jack. ex Wild	Asteraceae	Chugughee	H	L	Crushed, Pounded and mixed with some water and boil then drink the warm solution. Chewing and swallowed The powder mix with butter and drink with coffee for three days before breakfast	Abdominal pain Headache Malaria	Or	F/D
Asparagus africanus L.	Asparagaceae	Uffae	Sh	R	Fine powder of plant part mixed with butter and applied to wound	Wound	Ex	D

Brucea antidysenterica J.F.Mill	Simaroubaceae	Kapparro	Sh	Rb	The powder mixed with water and applied on affected part	Wound	Ex	F/D
Bersama abyssinica Fresen	Melianthaceae	Jejjebba	Sh	R	Crushed, pounded and mixed with cold water and drink at the morning	Bronchitis	Or	F
					Crushed, pounded mix with leaf of *Ruta chalepensis* and mix with water and drink.	Fibrile illness		
Buddleja polystachya Fresen	Logniaceae	Affarao	Sh	L	Crushed, pounded and mixed with water and the infusion is taken.	'Dingetegia'	Na	D
Capsicum annum L.	Solanaceae	Miximixo	H	Fr	Chewing and swallowed	Ascariasis	Or	F/D
Carduus leptacanthus Fresen.	Asteraceae	Guccino	H	St	Fine powder of plant part mixed with butter and drink with coffee or tea.	Ascariasis	Or	D
					Crushed, pounded and mix with leaf of *Vernonia amygdalina* and drink the solution.	Hemorrhoids		

Carica papaya L.	Caricaceae	Papaya	T	Fr	Roasted with barley seeds and eat. Chewed and swallow the liquid.	Amoebiasis Intestinal parasite	Or	F
Catha edulis (Vahl) Forssk. ex Endl.	Celastraceae	Chatae	Sh	St	Crushed, pounded and mix with leaves of *Vernonia amygdalina* are boiled together and one glass of the filtrate is served as a drink	Urine retation	Or	F
Caylusea abyssinica (Fresen.) Fish. & Mey.	Resedaceae	Sheggitae	H	R	Crushed, pounded and mixed with water; then drink	Ascariasis	Or	F / D
Citrus lemon (L.) Burm.f.	Rutaceae	Lomae	Sh	Fr	Chewing and swallowed the solution	Cough	Or	F
Coffea arabica L.	Rubiaceae	Buno	Sh	L	Smoke inhalation of dried leaves is applied; infusion of leaves is given to be drink	Vomiting	N	D
Colocasia esculenta (L.) Schott.	Araceae	Godarre	H	R	Crushed, pounded and mix with fruit of *Zingiber officinale* with coffee and drink. Fine powder of plant part mixed	Diarrhea Trachoma	Or	F/D

					with water and the mixture drink or thick paste applied on affected part			
Cordia africana Lam.	Boragnaceae	Waddissa	T	Rb	Smoke the wood ash	Evil eye	N	D
Croton macrostachyus Del.	Euphorbiaceae	Bissano	T	L	Very old leaves are collected from seven branches at early morning and crushed, pounded and mix with water and boiled, then mix with *Allium sativum* (bulb) roasted with butter. The preparation left over night outside home. Then at the morning drink.	Malaria	Or	F/D
					Concoction	Diarrhea		
					Concoction	Epilepsy		
					Exudates of old leaf is rubbed on affected part	Ringworm		
Dodonaea angustifolia L.F.	Sapindaceae	Ittechhae	Sh	Fr	Crushed, pounded and mixed with water and the mixture is drink.	Ecoparasite	Or	D
					The powder is mixed with water and drink.	Lymphatic swelling		

Dracaena steudneri Engl.	Dracaenaceae	Afrafartu	T	R	Fine powder of plant parts mixed with milky latex of *Euphorbia candelabrum* and paste applied to wound.	Wound	Ex	D
Embelia schimperi Vatke	Myrsinaceae	Sharrengo	Sh	R	Concoction	Leprosy	Or	F
Ensete ventricosum (Welw.) Cheesman	Musaceae	Warqo	Sh	R	Crushed, pounded and mix with water and drink the mixture. Crushed, pounded and mix with water and drink the mixture. Crushed, pounded and mix with water and drink the mixture.	Abdominal pain Amoebiasis Diarrhea	Or	F
Eucalyptus globulus Labill	Myrtaceae	Deredawa barzafae	T	St	Boil freash stem with water and inhale repeatedly the vapour while boiling. Crushed, pounded and mix with water and wash all the body for three days.	'Mich' Malaria	Ex	F
Euphorbia candelabrum Kostshy	Euphorbiaceae	Addama	Sh	Lx	Milky latex of the plant applied on the infected part.	Ringworm	Ex	F

Euphorbia tirucalli L.	Euphorbiaceae	Kinchibae	Sh	R	Crushed, pounded and mixed with leaf of *Coffea arabica* and rubbed on affected part.	'Kintarot'	Ex	F/D
Ficus ovata Vahl	Moraceae	Shollae	T	Fr	The fine powder is mixed with butter and this is applied after scratching	Ringworm	Ex	D
Foeniculum vulgare Mill	Apiaceae	Melloo	H	R	Crushed, pounded and mixed with coffee or tea then drink.	Abdominal pain	Or	F/D
Gomphocarpus purpurascens A. Rich.	Asclepidaceae	Mexxino	Sh	Rb	Concoction	Fibrile illness	Or	F/D
Gossypium herbaceum L.	Malvaceae	Jirbiae	Sh	Rb	The powder is mixed with water and boiled, then the infusion is drink	Lymphatic swelling	N	D
Grewia ferruginea Hochst. ex A. Rich.	Tiliaceae	Ogomdii	Sh	Rb	Crushed, pounded with roots of *Ensete ventricosum* and mixed with water and kept over night, one glass of the mixture is served as a drink before breakfast.	Cough	Or	F/D
					Crushed, pounded and mixed with butter and drink for three days.	Evil eye		

Hagenia abyssinica (Bruce.) J. F. Gmel.	Rosaceae	Kossae	T	Fl	Mix the powder with honey and a little bit of water and then boil and drink before breakfast for five days. Mix the powder with local 'tella' and leave for overnight and drink before breakfast for three days	Ascariasis Diarrhea	Or	F/D
Helianthus annuus L.	Asteraceae	Suffae	H	Fr	Mix the powder with water and drink	Food poison	Or	D
Justicia schimperiana (Hochst. ex A. Nees) T. Anders	Acanthaceae	Dummiugga e	Sh	L	Crushed, pounded and mixed with leaf of *Croton macrostachyus* and boiled, then one glass is given as a drink for three days.	Intestinal parasites	Or	F/D
Kanahala laniflora (Forssk.) R. Br.	Asclepiadaceae	Wundiffo	Sh	R	Crushed, pounded root is concocted with leaf of *Croton macrostachyus* and *Senna occidentalis* are given as a drink on non-fasting days. The concoction is mixed with butter and drink for three days before breakfast.	Amoebiasis Bronchitis	Or	F/D

					Fine powder mix with honey and drink for three days before breakfast.	Hepatitis		
Lagenaria siceraria (Molina) Standl.	Cucurbitaceae	Botto	H	Fr	Ripe fruit including seeds are immersed in water for overnight; one glass is drink in the morning before breakfast.	Gonorrhea	Or	F
					Ripe fruit is bored, rinsed with cold water; one glass is served as a drink	'Dingetgha'		
Lantana camara L.	Verbenaceae	Yewofe kollo	Sh	St	Fine powder of plant part mixed with water and the mixture boiled. Then drink for three days.	Diarrhea	Or	D
Lepidium sativum L.	Brassicaceae	Feaxxo	H	Sd	The powder mixed with coffee and drink	Intestinal parasites	Or	F/D
					Crushed, pounded seeds are mixed with leaf of *Allium sativum* and honey, one cup or three spoons are served each day for five days before eating any kind of foods. After each dose, one	Malaria		

					glass of melted butter is recommended for immediate recovery.			
					The Powder with leaf of Ocimum *lamiifolium* is mixed with coffee and drink at the morning.	'Mich'		
					The Powder with leaf of *Ocimum lamiifolium* mixed with coffee and drinkfor three days at the morning.	Headache		
Maytenus senegalensis (Lam.) Excell	Celastraceae	Shekko	Sh	R	The powder mixed with water or butter and drink with coffee or tea for five days.	Epilepsy	Or	F/D
					The powder mixed with leaf of ocimum lamiifolium and drink with coffee.	Headache		
Millettia ferruginea (Hochst.) Bark	Fabaceae	Berberae	T	Fr	The fine powder is mixed with butter and applied on infected part.	Fungal infection	Ex	F/D
Momordica foetida Schumach.	Cucurbitaceae	Yubarrae	Sh	R	Crushed, pounded and mixed with bulb of *Allium sativum* and drink	Bronchitis	N	F/D

					before breakfast for three days.			
					The powder is mixed with water and the infusion drink	Food poison		
Moringa stenopetala L.	Moringaceae	Sihferaw	T	L	Chewing and swallowed the solution	Vomiting	Or	F
Ocimum lamiifolium Hochst. Ex Benth.	Lamiaceae	Damakase	H	L	Crushed, pounded and mix with butter or coffee and drink the morning for three days.	Cough	N	F
Pentas schimperiana (A. Rich.) Vatke	Rubiaceae	Dibexxo	Sh	Rb	The fine powder is mixed with water and drink	Epilepsy	Or	F/D
Phytolacca dodecandra L'Herit	Phytolaccaceae	Indoodae	Sh	L	Crushed, pounded and mixed with water is drink for three days before breakfast.	Malaria	Or	F/D
Podocarpus falcatus (Thunb.) Mirb.	Podocarpaceae	Zigbo	T	R	The powder is mixed with water and drink for three days before breakfast.	Fibrile illness	Or	F/D
Prunus africana (Hook.F.) Kalkam	Rosaceae	T/kaka	T	Rb	Crushed, pounded and mixed with water and drink	Ascariasis	Or	D
					The powder mixed with leaf of *Parthenium hysterophorus* then	Gonorrhea		

					drink for three days.			
Ricinus communis L.	Euphorbiaceae	Gulloo	Sh	L	Crushed, pounded with coffee, tea or milk; drunk two cups per day before sexual intercourse	Sexual impotency in men	Or	F
Rumex nepalensis Spreng.	Polygonaceae	Dangago	H	St	The fine powder is mixed with butter and the pasts is applied on affected part	Wound	Ex	F/D
Ruta chalepensis L.	Rutaceae	Xenadamae	H	L	Crushed, pounded and mixed with cold water or coffee, one cup is served as a drunk.	'Dingetega'	Or	F
					Chewing and swallowed the solution before taking any kind of food.	Stomachache		
					Chewing and swallowed the solution and stay for six hours without taking any kind of food.	Toothache		
Senna occidentalis (L.) Link	Fabaceae	Assenmeka	H	R	The powder is mixed with water and drink for three days	Bleeding nose	Or	F
					The powders are mixed with butter and drink three cups per day for three days before	Excessive menstrational bleeding		

					breakfast.			
					The powder is mixed with honey and drink before sexual intercourse.	Gonorrhea		
					Chewing and swallowed the solution	Tonsillitis		
Sida schimperiana Hochst. ex A.Rich.	Malvaceae	Gebresede	Sh	L	Crushed, pounded and Boiled with water and cool for two hours, two glasses are served as a drink.	Epilepsy	Or	F/D
					The powder is mixed with water and drink the mixture for three days before breakfast.	Mental problem		
Stellaria sennii Chiov.	Caryophyllaceae		H	R	Decoction	Hepatitis	N	F
Tragia cinerea (Pax) Gilbert & Radcl. Smith	Euphorbiaceae	Alebelabitae	H	St	Fine powder of plant part mixed with butter and drink before sexual intercourse with his partner.	‘Kintarot’	Ex	D
					Fine powder of plant part mixed with honey and drink before sexual intercourse	Sexual impotency in men		

Trichilia dregeana Sond.	Meliaceae	Yumbarro	T	WP	Concoction	Mental problems	N	F
Triumfetta tomentosa Boj.	Tiliaceae	Kombocho	Sh	L	The powder mixed with a little bit of local 'araqi' and then apply the paste to wound	Fire burn	Ex	D
Vernonia amygdalina Del.	Asteraceae	Ebicha	Sh	L	Crushed, pounded and mixed with little water then drink for five days.	Diarrhea	Or	F/D
					Wash the patient body with the plant part and drink for three days.	Malaria		
Vernonia auriculifera Hiern	Asteraceae	Dangireto	Sh	R	Crushed, pounded and mix with cold water, one cup of the filtrate is given for adult, one-half of the cup for children for three days	Snake poison	Or	F
Xantium strumarium L.	Asteraceae	Dehanekaye	H	L	The plant part squeezing it through clean locally made cloth for five days on affected part or wash the affected part for both diseases.	Skin infection "Kintarot"	Ex	F
Zingiber officinale Rosc.	Zingeberaceae	Jaanjiibeello	H	R	Chewed and swallowed	Stomachache	Or	F/D