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USE AND MANAGEMENT OF MEDICINAL PLANTS BY INDIGENOUS PEOPLE OF EJAJI AREA (CHELYA WOREDA) WEST SHOA, ETHIOPIA: AN ETHNOBOTANICAL APPROACH

BY

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ABSTRACT

The purpose of the study was to organize and document information on use, management and conservation of medicinal plants by Chelya Woreda people (Ejaji area), West Shoa, Western Ethiopia. The area lies between latitudes 9° 02' and 9º1' North and longitudes 37° 25' and 37º 16' East. The study involved traditional healers, knowledgeable elders and local communities. Various ethnobotanical techniques were used to collect and analyze the data: semi- structured interview, guided field walk and observation, group discussion, preference raking and paired comparison, use diversity matrix and fidelity level index, combined with descriptive statistical analysis. Seventy-two informants from 9 kebeles and 36 quadrats were included in the study. A total of 188 plant species (145 from wild, 31 from home garden and 12 plant species from crop field and agricultural field) distributed in 70 families and 151 genera, were collected from the study area and identified. Out of these, a total of 89 medicinal plants distributed in 75 genera and 46 families were recorded, of which 48 species (53.9%) are used for treatment of 47 human and 27 species (30.3%) for 34 livestock aliments, while 14 species (15.7%) are used to treat both livestock and human ailments. Herbaceous species constitute the largest number with 28 species (31.5%) followed by shrubs 27 species (30.3%) and trees make up the third growth form with 24 species (26.9%) harvested for medicinal value. In addition to their medicinal value plants in the area are utilized for forage, fencing, fire wood, construction and spiritual and cultural needs. The highest informant consensus was documented for the plants Ocimum urticfoluim (Hancabbii adii) cited by 64 (88.8%) informants for its medicinal value treating fibril illness. Allium sativum, Lepidium sativum and Nicotiana tabacum are cited by 62 (86%), 52 (72.2%) and 48 (66.7%) informants ranking 2nd, 3rd and 4th respectively for their medicinal value. Oral administration is the dominant route (60.3%), followed by dermal route (20.1%) in which pounding, powdering, crushing, squeezing, smashing, chewing, burning, steam bath, dry bath and rubbing are recorded methods of preparation techniques. Preference ranking, use reports, paired comparison and fidelity level index showed the efficacy, popularity and preference people have for some species over the other for different uses and in treating ailments. Modernization and acculturation have contributed in making the younger generation unwilling to practice and retain traditional knowledge. Environmental degradation, charcoal making, collection of fuel wood, construction materials and the need for agricultural land resulted in major threat to medicinal plants and indigenous knowledge. Indigenous practices, cultural, spiritual and prime restrictions for collection have contributed to the management and conservation of medicinal plants. On the contrary, this cultural and spiritual believes were discovered to deteriorate (threaten) the local knowledge associated with medicinal plants.

Key words: **- Ethnobotany, indigenous knowledge, ailments, plant use-categories, informant consensus, treatment, harvest**

1. Introduction

1.1 Background

Ethnobotany is a broad term referring to the study of direct interrelations between humans and plants (Martin, 1995; Balick and Cox, 1996). The indispensable dependency of human up on plants for their livelihood was primarily started by domestication and dates back10,000 years (Martin, 1995). From plants, humans can obtain food, pesticides, medicines, fuel, fodder, construction materials, tools, and derives aesthetic and spiritual fulfillments. Thus indigenous knowledge on plants appeared when humans started and learned how to use plants (Posey, 1999). Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation (Cotton, 1996). The complex knowledge, beliefs and practices generally known as indigenous knowledge (IK) or traditional knowledge develops and changes with time and space, with change of resources and culture.

Each indigenous population through time has developed its own way of conserving nature, as the life of each community has evolved with the biota existing in their ecological setup. Thus, indigenous knowledge has developed because of human interaction with their ecosystem. To view this ethnobotanical studies are useful in documenting, analyzing and disseminating of knowledge and interaction between biodiversity and human society, how diversity in nature is used and influenced by human activities (Martin, 1995).

Local communities have experienced indigenously in emic categorizations, where they use their perceptions and experiences to categorize plants. From their experience, a number of categorization and classification criteria were developed which is important in plant diversity conservation and management. The common criteria here include plant use, habitat, life form, color, abundance, morphological characteristics and combinations (Martin, 1995; Cotton, 1996; Alexiades, 1996). It is this fact that enabled traditional people to develop several statements (proverbs and poems) that apply to plants up on which they are so immediately and intimately dependent (Kokwaro,1976; Cotton,1996). Moreover, the use of plants in medicinal sector by local people over the past period take a huge concern as they have long years lineage of utilization and management. This has been achieved through many

generations of age old, time-tested practices, and as a consequent accumulation of knowledge through a series of observations, interactions and innovation (Abbink, 1995; Cunningham, 1996).

In Ethiopia, little emphasis has been given to ethnobotanical (ethnomedicinal) studies over the past decades (Dawit Abebe, 2001; Mirutse Giday, 1999), even if there has been some attempt in investigating medicinal plants and indigenous knowledge on sustainable use and management of plant resources. The Institute of Biodiversity Conservation has pledged to do this in its long range strategic research plan (IBCR, 2000). However, there exists an accelerated devastation of plant resources with loss of indigenous knowledge.

The lack of conservation actions and activities is observed in Chelya Woreda, which is similar to other areas in Ethiopia. Even though it is known that, the woreda has relatively better plant resources and hence, the associated traditional knowledge resource is expected to be siginificant. The current plant use trend shows that the environment is facing problems of resource depletion and loss of indigenous knowledge like other areas of the country. Thus, concerted ethnobotanical research plays a vital role to draw information on plants and related indigenous knowledge for conservation and sustainable utilization. However, to have full picture of ethnomedicinal knowledge of societies in Ethiopia, an over geographical, cultural and botanical diversity studies need be included. Recently, some studies were done on some localities of Ethiopia. Nevertheless, no study was done to include medicinal plants and indigenous knowledge of the local communities of Chelya Woreda in the medicinal records of Ethiopia.

Therefore, the study focuses on gathering and documenting use and management of traditional medicinal plants and the associated ethnomedicinal knowledge of Chelya Woreda (Ejaji area). This is belived to add up to the countrys database of medicinal plants and in documenting indigenous knowledge of the people.

1.2 Objectives

1.2.1 General objective

To conduct ethnobotanical study of medicinal plants in Chelya woreda (Ejaji area) and to compile and document indigenous knowledge of the people.

1.2.2 Specific objectives

1. To gather, record, and document indigenous knowledge of the people on medicinal plants in the study area;
2. To collect and identify traditional medicinal plant specimens used in the study area for treatment of human and livestock health problems;
3. To document the management and conservation measures practiced in the study area;
4. To provide recommendations that would contribute to the development of strategies for conservation and sustainable management of medicinal plants in the study area; and
5. To contribute to the on-going efforts towards building the ethnobotanical database of Ethiopia in order to facilitate further actions in the management and utilization of medicinal plants.

2. Literature review

2.1 Origin and development of ethnobotany

Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility including tremendous botanical expertise (Martin, 1995). This implies that humans are dependent on other organisms for their life. Although various animal and mineral products contribute to human welfare, the plant kingdom is most essential to human well being especially in supplying his basic needs. This close interaction and dependency of humans on plants is studied under the field of ethnobotany.

It is difficult to tell exactly when the term ethnobotany became part of modern science. However, it can be traced back to the time when humans started making conscious interaction with plants and animals. Ethnobotanical work seems to have started with Christopher Columbus in 1492, at a time when he brought tobacco, maize, spices and other useful plants to Europe from Cuba (Cotton, 1996) and when other immigrants from the new world documented food, medicine and other useful plants of the Aztec, Maya and Inca peoples (Martin, 1995).

John Hershberger proposed the term ethnobotany for the first time in 1895 (Balick, 1996). However, this term has been given different interpretations and definitions depending on the interest of workers involved in the study (Cotton, 1996). Hershberger (1896; cited in Cotton, 1996), defined ethnobotany as the study of the use of plants by aboriginal peoples. Martin (1995) defined ethnobotany as a study of people's classification, management and use of plants. In 1941, Shultes redefined ethnobotany as the study of the relationship, which exits between humans and their ambient vegetation (Castetter, 1944; cited in Cotton, 1996). Bye (1985) stated ethnobotany as a science investigates the biological (including the ecological) basis of interaction and relation ship between plants and people over evolutionary time and geological space.

Ethnobotanical investigation documents the knowledge on cultural interaction of people with plants. It also tries to find out how local people have traditionally used plants for various

purposes, and how they incorporated plants in to their cultural tradition and religions (Balick and Cox, 1996). Therefore, traditional local communities worldwide have a great deal of knowledge about native plants on which they intimately depend (Langeheim and Thimann, 1982).

As stated by Martin (1995) to achieve more detailed and reliable information of plants and plant use, ethnobotanical study needs involvement of specialists from various disciplines, such as plant taxonomists, plant ecologists, anthropologists, linguists, economic botanists, pharmacologists and others. With such interdisciplinary and multidisciplinary approaches, ethnobotany is aimed at gathering and documenting indigenous botanical knowledge, cultural practice, use and management of botanical resources and discovers benefits from plants.

2.2 Indigenous knowledge

Indigenous knowledge refers to the accumulation of knowledge, rule, standards, skills, and mental sets, which are possessed by local people in a particular area (Quanash, 1998). The immediate and intimate dependency of local people on natural resources resulted in the accumulation of indigenous knowledge that helped people to adapt to and survive in the environments in which they live. It is local knowledge that is unique to a given culture or society and the base for agriculture, health care, food preparation, education, environmental conservation and a host of other activities (Thomas, 1995).

The complex knowledge, beliefs and practices generally known as 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 (Alcorn, 1984). Therefore, it is the result of many generations long year's experiences, careful observations and trial and error experiments (Martin, 1995).

Indigenous knowledge is a body of knowledge built up by a group of people through generations of living in close contact with nature and it is cumulative and dynamic. It builds upon the historic experiences of people and adapts to social, economic, environmental, spiritual and political change. The quantity and quality of traditional knowledge differs among community members according to their gender, age, social standing, profession and intellectual capabilities. For instance, socities concerned with biological diversity will be

most interested in knowledge about the environment; this information must be understood in a manner, which encompasses knowledge about the cultural, economic, political and spiritual relationships with the land. It provides a distinctive worldview of which outsiders are rarely aware and at best can only incompletely grasp (Balick and Cox, 1996). Indigenous people of different localities have developed their own specific knowledge on plant resources, use, management and conservation (Cotton, 1996). Thus, systematic application of indigenous knowledge is important for sustainable use of resources and sustainable development (Thomas, 1995).

One of the widely used indigenous knowledge system in many countries is the knowledge and application of traditional medicine. Such knowledge, known as ethnomedicinal knowledge involves traditional diagnosis, collection of raw materials, preparation of remedies and its prescription to the patients (Farnsworth, 1994). Indigenous knowledge on remedies in many countries including Ethiopia, pass from one generation to the other generation verbally with great secrecy (Jansen, 1981). Such secrete and crude transfer makes 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 there is a need for systematic documentation of such useful knowledge through ethnobotanical research

2.3 Traditional medicinal plants

The world health organization (WHO) (2001) defined traditional medicine as the total combination of knowledge and practices that can be formally explained or used in prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing (Yilma Desta et al., 1996; cited in Fassil Kibebew, 2001).

According to Fassil Kibebew (2001), about 75-90 % of the rural population in the world (excluding western countries) relies on traditional medicines as their only health care system. This is not only because of poverty where people can not afford to buy expensive modern drugs, but traditional systems are also more culturally acceptable and meet the psychological needs in a way modern medicine does not.

According to WHO (2001), consultation of medicinal practitioners is very helpful for the development and incorporation of useful approaches in planning and budgeting system for health care provision of most developing nations and indigenous communities. In Africa, traditional medicine plays a central role in health care needs of rural people and urban poor. Here, it is said that, this situation would remain so long as modern medicine continues to be unable to meet the health care of the people of the continent effectively (Jansen, 1981). Their value and role of this health care system will not diminish in the future, because they are both culturally viable and expected to remain affordable, while the modern health care service is both limited and expensive (WHO, 1998).

Indigenous traditional medicinal practices were carried out essentially based on private practice, i.e. private agreement between consenting parties, and the knowledge of traditional practice in most cases has descended through oral folk lore (Asfaw Debela *et al*., 1999). The secrete of information retained by traditional healers is relatively less susceptible to distortion but less accessible to the public (Dawit Abebe, 1986). However, the knowledge is dynamic as the practitioners make every effort to widen their scope by reciprocal exchange of limited information with each other (Dawit Abebe, 1986; Abbink, 1993).

2.4 Medicinal plants and ethnomedicine in Ethiopia

2.4.1 Traditional medicinal plants in public health care system

Plants have been used as a source of traditional medicine in Ethiopia from the 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 Keba, 1998). According to Dawit Abebe (2001), there is a large magnitude of use and interest in medicinal plants in Ethiopia due to acceptability, accessibility and biomedical benefits. In this country, the long history of use of medicinal plants is reflected in various medico- religious manuscripts produced on parchments and believed to have originated several centuries ago (Fassile Kibebew, 2001). Medical textbooks written in Geez or even Arabic in Ethiopia between the mid of 17^{th} and 18^{th} century imply that plants have been used as a source of traditional medicine in Ethiopian health care system. Even today, it is common for people living in rural and urban areas to treat some common ailments using plants available around them (example,

Hagenia abyssinica to expel tapeworm, *Ruta chalepensis* for various health problems) (Abbink, 1995).

The continued dependency on herbal medicine along with the side of modern medicine is largely conditioned by economic and cultural factors (Aketch, 1992). In addition to these factors, the fact that modern medical services are inaccessibile to the vast majority of the populations due to their costs made herbal medicines more acceptable.

The problem of ensuring equitable distribution of modern health care 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 health care and where available the quality is largely below standard (Abbiw, 1996). This is why Archer (1990) and Nijar (1996) stated that for most indigenous peoples and the local communities' reliance on plant resources accounts for anything up to 95% of their survival requirements. Therefor, herbal remedies are the world's therapeutic means to act against diseases for a large proportion of people both rural and urban centers in developing countries like Ethiopia (Abbiw, 1996).

2.4.2 Plants in ethnoveterinary medicine

In most developing countries, particularly in Sub-Saharan Africa, disease remains one of the principal causes of poor livestock performance leading to an ever-increasing gap between supply and demand for livestock and products. The ever-declining provision of animal health services has resulted in the reappearance of a number of epizootic diseases reducing the economic efficiency of livestock production in Africa (Tafese Mesfin and Mekonen Lemma, 2001).

Ethnoveterinary medicine which refers to traditional animal heath care knowledge and practices comprising of traditional surgical and manipulative techniques, traditional immunization, magi co-religious practices and beliefs, management practices and the use of herbal remedies to prevent and treat a range of disease problems encountered by livestock holders (Tafesse Mesfin and Mekonnen Lemma, 2001). Ethoveterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments. Livestock holders can prepare and use home made remedies with minimum

expense. Sofar, many livestock holders in rural areas where there are relatively few veterinarians and shortages of other facilities, traditional medicinal plants are the only choice to treat many ailments (McCorkle, 1995).

In Ethiopia, as in other developing countries, livestock production plays an important role in the lively hood and economy of majority of the population. Crop production is almost entirely dependent on traction power provided by animals. Livestock offers in many harsh environments the only way of survival and constitutes a driving force for food security and sustainable development in developing countries like Ethiopia. Although, the gain from livestock production is directly related with safeguarding animal health convention, veterinary medical system is among the smallest in Ethiopia. Techniques such as those to treat the more wide spread ailments are common knowledge among livestock holders (ITDG and IIRR, 1996). On the contrary, others are known only to a few indigenous professional healers who have over the year learned the practice.

Stock raisers, both farmers and herders have developed their own ways of keeping their animal health and productivity (McCorkle and Mathias, 1996). They treat and prevent livestock diseases using some times age old home made remedies, surgical and manipulative techniques. Taken together, these indigenous local animal health care beliefs and health care practices constitute an ethnoveterinary medicine. Like other kind of local technical knowledge, ethnoveterinary medicinal practice and skills are built up on over time empirical observation, mainly through trial and error and some times through deliberate, or even desperate experimentation and innovation (McCorkle and Mathias, 1996).

Ethnoveterinary medicine can be useful when ever and where ever stock raisers have no other animal health care options, whether in rural or peri-urban areas. In spite of its paramount importance as livestock health care system, the various traditional veterinary practices remained undocumented in Africa and Ethiopia (Dawit Abebe and Ahadu Ayehu, 1993). Thus, creation of awareness on ethnoveterinary medicine emphasizing on useful plants used for treatement of livestock has paramount importance to livestock management. In addition, proper documentation and understanding of farmers' knowledge, attitude and practices about the occurrence, cause, treatment, prevention and control of various ailments

is important in designing and implementing successful livestock production (Tafese Mesfine and Mekonen Lemma, 2001).

2.5 Threats to and conservation of traditional medicinal plants (TMPs) in Ethiopia

2.5.1 Threats to medicinal plants

People use many wild species of plants for food, medicine, clothing, shelter, fuel, fiber, income generation and the fulfilling of cultural and spiritual needs through out the world (Zemede Asfaw, 2001).

Ethiopia's traditional medicine as else where in Africa is faced with problems of continuity and sustainability (Ensermu Kelbessa *et al*., 1992). The primary causes of this problem are loss of taxa of medicinal plants, loss of habitats of medicinal plants and loss of indigenous knowledge. Some studies have shown that most of the medicinal plants utilized by Ethiopian people are harvested from wild habitats (Mirutse Giday, 1999; Tesfaye Awas and Zemede Asfaw, 1999) and hence this aggravates the rate of loss of taxa with related indigenous knowledge and loss of widely occurring medicinal plant species.

There are two sources of threats to medicinal plants, i.e.man made and natural causes. Rapid increase in population, the need for fuel, urbanization, timber production, over harvesting, destructive harvesting, invasive species, commercialization, honey cut, degradation, agricultural expansion and habitat destruction are human caused threats to medicinal plants. Likewise, natural causes include recurrent drought, bush fire, disease and pest out breaks (Ensermu Kelbessa *et al*., 1992). As else where in Ethiopia, the problem is manifested in Chelya Woreda due to the above-mentioned factors.

2.5.2 Conservation of traditional medicinal plants

Conservation is defined as the sustainable use of biological resources. The concept of sustainability is now seen as the guiding principle for economic and social development, particularly with reference to biological resources. According to Zemede Asfaw (2001), medicinal plants are considered to be at conservation risk due to over use and destructive harvesting (roots and barks collection).

Dawit Abebe and Ahadu Ayehu (1993) found that many medicinal preparations use roots, stem and bark by effectively killing the plant in harvest. Plant parts used to prepare remedies are different; however, root is the most widely used part. Such wide utilization of root part for human and live stock aliments with no replacement has severe effect on the future availability of the plant. Recent work of Haile Yineger (2005) confirms the fact that of the total plant parts to prepare remedies root is widely used with 64 species (35.5%) followed by leaf 47 species (25.97%) which hence affects sustainable utilization.

In a broad sense, conservation is achieved through in-situ and ex-situ means. In-situ conservation is conservation of species in their natural habitat. Some traditional medicinal plants have to be conserved in-situ due to difficulty for domestication and management (Zemede Asfaw, 2001). Moreover, some plants fail to produce the desired amount and quantity of the active principles under cultivation out of their natural habitats. Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally (Zemede Asfaw, 2001), this can be possible in places of worship (churches, mosques, grave yards, etc), scared grooves, farm margins, river banks, road sides, live fences of gardens and fields.

According to (Zemede Asfaw (2001), medicinal plants can be conserved using appropriate conservational methods in gene banks and botanical gardens. This type of conservation of medicinal plants can also be possible in home gardens, as the home garden is strategic and ideal farming system for the conservation, production and enhancement of medicinal plants.

3. Description of the study area

3.1 Geographical location

The study was carried out in Oromya Region, Western Ethiopia, West Shoa Zone in Chelya woreda. The study area lies between latitudes 9° 02' and 9º1' north and longitudes 37° 25' and 37º 16' east with total area of about 67472.5 hectares and an elevation range of 1300-3060 masl.. The western part of the woreda ‘Ejaji’ (the study area) is found with an elevation range of 1300-2400 masl. The northwestern part of the woreda is covered with hilly slopes and mountainous escarpments rising to an elevation of about 3060 masl, in case of mount Tullu Jarso.

Ambo woreda in east, Enchini in southeast, Jima Zone, Dano woreda and Nono woreda in south, Bako Tibe woreda in west and Wollega Zone (Jimma Rare woreda in north west) and Mida Kengn woreda in north borders Chelya woreda.

The administrative town of Chelya woreda is Gedo, which is located 194 km west of Addis Ababa and about 65 km from Ambo. Ejaji is 16 km from Gedo on the Ambo - Nekempt road (Fig.1 Map of study area).

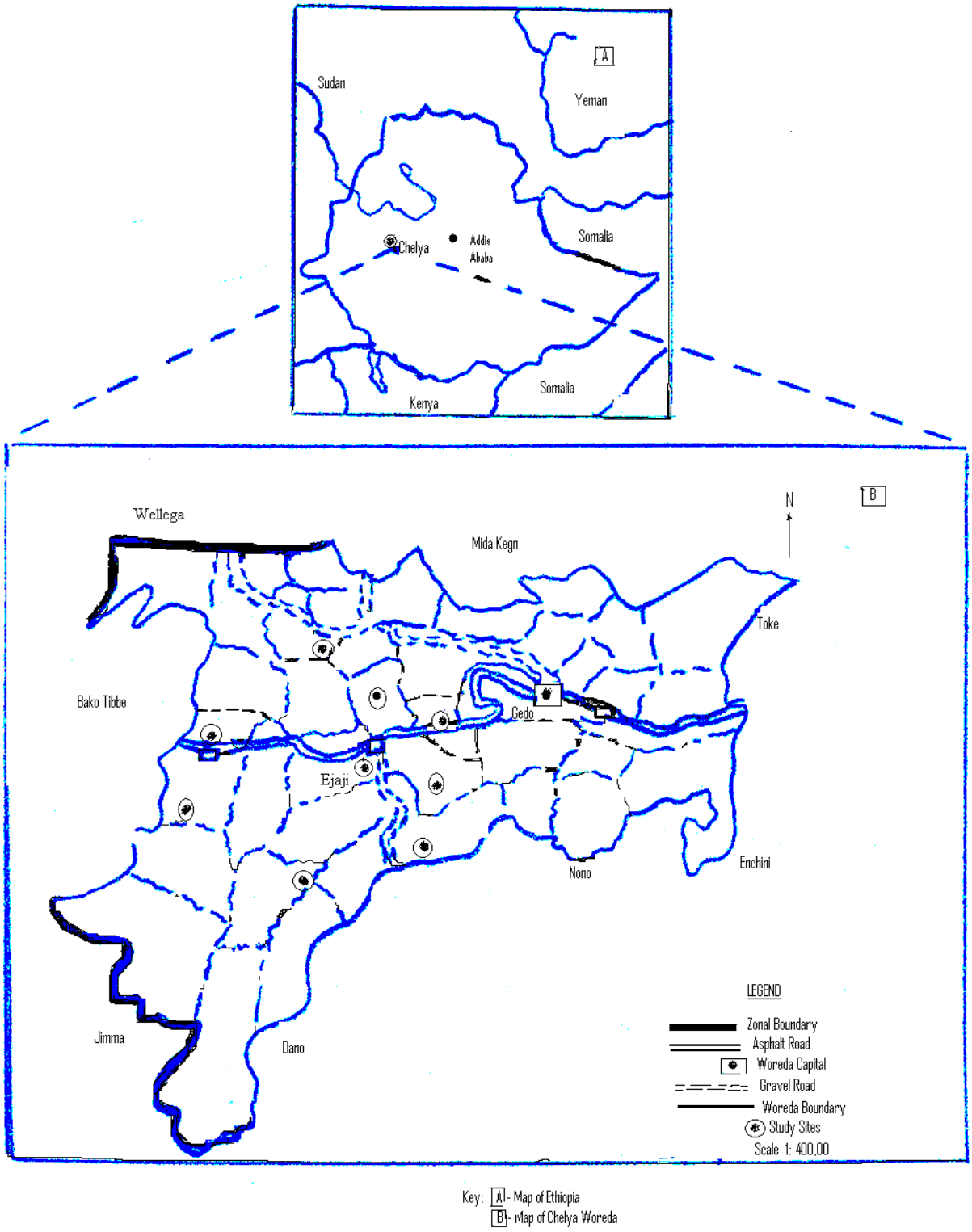

Figure 1 Map of the study site modified with permission of Chelya Woreda Agricultural Office (2004)

3.2 Climate

Chelya faces humid air current coming from Atlantic Ocean and receives heavy rainfall during the main rainy season. The woreda has two stations for climatic description. However, for this study data obtained from Ejaji station was used to describe the climate of the area because the station is within Ejaji locality.

Metrological data taken from Addis Ababa National Metrology Service Agency indicates that Ejaji area obtain high rain fall between May to September and low rain fall in October and, dry season extends from November to April. The highest mean annual rainfall of the study area within ten years was 240 mm recorded in July, whereas the lowest mean total was 11.8 mm recorded in December. The lowest mean temperature over ten years was 18.5ºc recorded in October, where as the highest was 24ºc recorded in February (Figure 2).

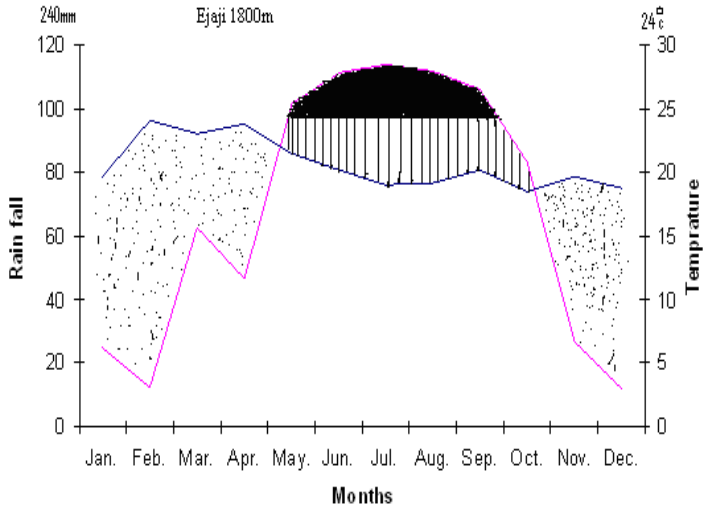

Figure 2 Climadiagram following the method of Walter (1985) showing rainfall distribution and temperature variation from 1996-2005 at Ejaji Station

Source: Data obtained from National Metrological Service Agency (2006)

3.3 Population and medical services

People belonging to the Oromo Nationality make majority of those living in Chelya woreda. The total population of the woreda is about 169502 of which 84152 are males and 85350 are females. The woreda has three urban centers i.e. Gedo (woreda center), Ejaji 01 and Babich 01 all on the road Addis Ababa to Nekemt. Rural peoples of the woreda completely lead their life on cropping and livestock rearing. Thus, crop production and livestock rearing are the main activities of the population in the woreda.

Chelya Woreda Health Office (2004) reported the first ten major diseases as malaria, lung disease, diarrhea, internal parasites, tonsillitis, rheumatism, gastritis, skin diseases, gonorrhea and fever of unknown source. These diseases mostly affect people living in the rural areas where the health services are at most in shortage and do not cater their needs, as well they are unable to afford the high cost of modern drugs. In the woreda, there is one health center, two health stations and nine health posts. The report from the office shows that 102887 people are assisted by this service, which covers only 60% of the population. The service does not cover the need of 40% of the total population in the study area. In addition there are private health services even though, their standard is under question. Private health facilities of the area as recorded: there are two medium clinics, five lower clinics, one drug store and four rural drug vendors.

Of the total 42 kebeles in the woreda, malaria affects 28 kebeles. These conditions force people to be served by traditional health practitioners and traditional means of treatment. The prevalence of mentioned diseases is higher in the low land areas or around Ejaji town; this is because of climatic factors that provide suitable conditions for parasitological multiplication for host attack.

3.4 Livestock

Livestock population of the area is significant. According to Chelya Woreda Agricultural Office (2004) the woreda possesses 226155 livestock population consisting of 124713 cattle; 22220, goats; 11578, mule; 8294, horses; 1331, donkey; 4993, sheep and poultry, 53026. There are problems like shortage of grazing and browsing land, adequate health services and facilities. The woreda has one central veterinary clinic and three health posts. As the woreda, size and health facilities do not match and unable to support this vast population of livestock, people try to treat their livestock by ethnoveterinary medicine.

The main outbreak diseases in the study area are actinomycosis, anthrax, black leg, and pasteurellosis, FMDs (Foot and Mouth Diseases), trypanosomiasis, actinobacilliosis and drematophilosis that affect large ruminants including equines. Bacteria cause synerosis celebralis and ovine pasturollsis and produces skin rash, with others like mechanical trauma hump, flagmon, cocsidiosis, internal parasites, mites, malignant catterech and mastitis are the

non-out break diseases in the area. Bureau of agriculture in the woreda has also reported that epizootic lymphangities and ulcertic lymphangities are common equine diseases and avian cholera, new castle (fingille) and gambaro disease affects poultry.

Veterinary health service coverage is less than 50%. The underlined reason reported by Chelya Woreda Agricultural Office is that there is shortage of material, skilled human resource, medicine and logistic supports. Therefor, about 226155 livestock population of the woreda are supported by one central veterinary clinic and three health posts, and five health workers i.e. one veterinary medical doctor and four veterinary technicians.

3.5 Land use

Land inheritance and transfer of ownership from generation to generation is culturally based and only males inherit family's land. This enables males to have power to inherit, conserve and preserve resources on family land. Peoples in the study area use and classify their land through functional categorization i.e. grazing land, browsing land, agricultural land and forestland.

Chelya Woreda Agricultural Office (2004) annual report showed 45849.5 hectares of land are used for farming purpose. Different crop types are cultivated in the woreda, as the woreda people lead their life based on crop production and livestock rearing. Individual farmer production is for household consumption and local markets. Agricultural production is based on rain fed cultivation and few irrigation activities are found around Ejaji. Major food crops grown by farmers are largely field crops (Table 1).

Table1 Major food crops grown in the study area

Crop category	Scientific name	English name	Local name
Cereals	*Sorghum bicolor*.L.	Sorghum	Boobee
	Zea mays L.	Maize	Boqqolloo
	Eragrostis tef (Zucc.)Troteer	Tef	Xaafii
	Eleusine coracana (L.)Gaertn	Finger millet	Daagujjaa
	Hurdeum vulgare L.	Barley	Garbuu
	Triticum aestivum L.	Wheat	Qamadii
Fruits	*Citrus sinensis* (L.)Osb	Citrus	Burtukana
	Citrus limon (L.)Burm.f.	Lemon	Loomii
	Musa paradisiaca L.	Banana	Muuzii
	Mangifera indica L.	Mango	Maangoo
	Carica papaya L.	Papaya	Paapayya
Pulses	*Pisum satium* L.	Field peas	Atara
	Phaseolus vulgaris L.	Haricot beans	Adenguare
	Vicia faba L.	Horse beans	Baaqelaa
Cash crops	*Coffee arabica* L.	Coffee	Buna
	Nicotiana tabacum L.	Tobacco	Tamboo
	Saccharuum officinarum L.	Sugar cane	Shonkoraa
	Catha edulis(Vahl)Forssk.ex Endle	Khat	Caatii
Oil crops	*Linum usitatissimum* L	Lin seed	Talbaa
	*Guizoia abyssinica(*L.f.)	Niger seed	Nuugii
	Brassica napus L.	Kale seed	Sanyii raafuu
Vegetables	*Capsicum frutescens* L.	Pepper	Barbaree
	Allium cepa L.	Shallot	Qullubbii
	Lycopersicon esculentum Mill.	Tomato	Timatimii
	Cucurbita pepo L.	Pumpkin	Buqqee nyaataa
	Allium sativum L.	Garlic	Qullubbii adii
	Brassica oleracea L	Cabbage	Raafuu
Root crop	*Ipomoea batatas* (L) Lam.	Sweet potato	Sukaaree

Source: Chelya Woreda Agricultural Office (2004)

3.6 Vegetation

Demel Teketay (1999) stated the vegetation of the study area is montane forest type as Chelya is located in west Ethiopia. Vegetation of Chelya woreda is with one regionally protected forest named ‘Gurra’ forest 2km from Gedo to the west and forested areas like ‘Siree’ forest and ‘Beeneso’ forest 5km from Ejaji to the southeast along the main asphalt road and patches of bushy and shrubby vegetations.

The common vegetations in the study area as visualized include mostly remnants of trees in agricultural fields, bushes, shrubs and secondary forests. The common plant species of the

study area include *Olea europaea* L.subsp. *cuspidata* , *Albizia schimperiana, Albizia lebix, Acacia spp., Carissa edulis, Cordia africana, Syzygium guineense, Olinia rochetiana, Croton macrostachyus, Ptrerolobium spp. Vernonia spp., Ficus species, Phoenix reclinata, Bersama abyssinica, Teclea nobilis, Eucalyptus globulus* plantations, *Buddleja polystachya, Calpurnia aurea* and different shrubs, and herb species.

Mountainous parts of the district such as Keraru, Gura, and Sire silase and tullu Mara are more covered with larger trees and diverse plants with variety of shrub and herbaceous species than other areas. However, human interference is intense as there is settlement and agricultural activities in and around the forests. Recently, foothills of mountainous areas are under severe treat than the past decades due to population pressure and the need for agricultural and grazing land. The case of mount Keraru and Beneso can be mentioned.

Some of the near by informants to the areas have reported that in recent year's wild animals are emmigrating from these areas due to deforestation, increased daily need of wood, agricultural activities and the daily need for charcoal, pushed them to escape from the area. There were claims by the informants as the area was the home for a number of pigs, bushbucks, monkeys, cheatas, different snake species, warthogs, porcupine and bird species. Today, fewer wild animal populations are observed in these areas as the informants pointed their observation.

4. Materials and Methods

4.1 Reconnaissance survey

A reconnaissance survey of the study area was conducted from August 10 to 30, 2006 and determined to include nine study sites. The study area is found within the range of 1300-2400masl. This variation in altitude resulted in variability in climate, vegetation types, life systems and life constraints. One of the variations seen was disease prevalence, as reported by informants in Warji and Kiltu Elala areas the case of malaria killied many individuals in past years. This condition is not seen in Shano Agalo and Sire Silase high landers. Thus, the study was carried out in three altitudinally varying nine sites. Areas with higher altitude (1900-2400masl)(Sire Sillase, Shano Agalo and Obora Beneso) are located in the south east of Ejaji, lower altitudinal areas(1300-1800masl)(Ejaji, Kiltu Elala and Warji) around west of Ejaji town and medium altitudinal areas(1700-1900masl)(Racho, Rafiso Kamino and Obora Keraru) which are located in the northeastern Ejaji.

4.2 Informant selection

In this study, 72 informants 7 to 9 individuals from each study site (60 men and 12 women) from the age of 20 and above were included. From the nine study sites 28 key informants were selected; 3-4 persons from each study site (Appendix 7; in * are key informants). Information regarding the knowledge of traditional practitioners was first gathered from the local people in the sites and the selection of key informants take place with local administrators, elders (Jarsa biyyaa) and Development Agents (DAs). When recording knowledge held by traditional healers or by certain social groups such as women and elders, the choice of key informants is dictated (Martin, 1995). Accordingly, the selection of key informants was made through preferential methods to drain necessary informations and to include at least three to four traditional medicinal practitioners in each study site.

4.3 Data collection

Ethnobotanical data was collected between September 2006 to December 2006 on four field trips made to the site based on methods given by Hedberg (1993), Martin (1995) and Cotton (1996). Accordingly, semi-structured interviewees, observation, group discussion, and guided field walks with informants were employed to obtain indigenous knowledge of the local community on health, vegetation, landform and soil of the locality.

Interviews and discussions were based on, around a checklist of topics or questions prepared before hand in English, and translated to Afaan Oromoo (Appendix 6). Most of the interviews and discussions were held in Afaan Oromoo directly by the investigator and information was gathered technically by speaking to the villagers and accessible informants on an informal base to maximize the source of information. Information regarding local names of medicinal plants, part(s) used methods and conditions of gathering and preparation, diseases treated, dosage used, route of application, adverse effect, uses other than medicinal uses, management methods was recorded at the spot.

Local names of plants were studied by repeated inquiries at different times with the same informants to check the accuracy of information obtained and information was recorded. Discussions were conducted with 10 to 15 informants and residents in seeking to understand the traditional medicinal system of the people and its management, and to know how knowledge is maintained and transferred in family or community.

4.4 Specimen collection

In order to classify and describe plant communities by dominant and co-dominant plant species and assess the distribution of medicinal plants in the study area, specimen collection was carried out between 10th December and 20th Feburary, 2007, establishing total of 36 quadrats. At each study site, two plots with homogenous vegetation resulting in 18 quadrats and 2 quadrats for home gardens resulting in 18 quadrats; from these plots, specimens were collected.

A modified Whittaker Nested-Quadrat sampling method by Stohlgren *et al.*, (1994) was adopted for natural vegetation. Trees were sampled in 20m x 20m plots, Shrub 5m x 5m and herbs 2m x 2m plot nested on the bigger plot, and 5m x 5m quadrats for home gardens in a separate plot.

Based on ethnobotanical information provided by informants specimens were collected, numbered, pressed, and dried for identification.

4.5 Specimen identification

Based on ethnobotanical information provided by informants specimens were collected, numbered, pressed, and dried for identification. Preliminary identification was done in the field. In addition, identification of unidentified specimens was done in March and April 2007, by comparison with authentic specimens, illustrations and taxonomic keys, and with the assistance of experts at Addis Ababa University, National Herbarium. The identification was based on the works of Sebsebe Demissew (2003), Friis (1995), Tewolde B. Gebregiziabeher and Edwards (1997), Friis and White (2003) and Gilbert (1995).

Voucher specimens with scientific name, vernacular name, families and collection numbers for all medicinal plants (Appendix 1) and plants recorded from the study area (Appendix 4), home gardens (Appendix 5) from the plots were stored at the National Herbarium, Science Faculty, after conformation by Dr. Sileshi Nemomissa, one of my two co-advisors.

4.6 Vegetation description

Two approaches were used in describing the vegetation of the study area. On one hand, information was gathered from informants following the emic categorization technique i.e. categorization by indigenous people based on their own indigenous knowledge. On the other hand, it was described and classified through repeated curious visual observation following the etic classification technique of ethnobotany as described by Martin (1995). In the latter case, morphological characteristics or general appearance of vegetation such as growth and life forms of the dominant or co-dominant plants were focused upon.

4.7 Description of most frequently used medicinal plants

After identification of medicinal plants by informants, those with informant consensus greater than 25% used for human only, livestock only, and both for livestock and human were described with respect to habit, habitat, distribution and medicinal uses in the study area

4.8 Major plant use categories

Use- reports (UR) of plant species were recorded and assigned use categories of plant uses (Table 2). Analysis of homogeneity of the ethnobotanical information following the factor of informant consensus (FIC) was quantified and quantitative variation in use reportes were analysed.

4.9 Data analysis

4.9.1 Descriptive statistics

A descriptive statistical method such as percentage and frequency were employed to analyze and summarize the data on medicinal plants, associated knowledge, management methods, use and conservation. The most useful information gathered on medicinal plants reported by local people: medicinal value, application, methods of preparation, route of application, disease treated, dosage, part and habit used were analyzed through descriptive statistical analysis. In addition**,** nine categories of plant use-reportes and relative frequency of tree species was tabulated and analyzed statistically.

4.9.2 Informant consensus

In order to evaluate the reliability of information recorded during the interview, informants were contacted at least two times for the same ideas and the validity of the information was proved and recorded. Consequently, if the idea of the informant deviates from the original information, it was rejected since it was considered irrelevant information. Only the relevant ones were taken into account and statistically analyzed (Table 9). This method was adopted from Alexiades (1996). Similarly, factor of informant consensus was quantatively analyzed for nine groups of plant uses reported by informants (Table 2).

4.9.3 Preference ranking

Preference ranking was conducted following Martin (1995) for seven most important medicinal plants used in treating gonorrhea (Table 10), as traditional healers treat it usually. Fifteen informants were selected to identify the best-preferred medicinal plant species for treatment of gonorrhea. Each informant was provided with seven medicinal plants reported to cure this disease with each leaf of medicinal plant used being paper tagged name, and asked to assign the highest value (7) for plant species most preferred, against this illness and the lowest value (1) for the least preferred plant and in accordance of their order for the remaining ones. These values were summed up and ranks given to each plant species.

By clustering the responses of 15 individuals, further analysis was made based on methods given by Hoft *et al.,* (1999) using SPSS computer programme. The linkage distance between respondents was obtained and dendrogram was drawn (Figure 11) to show similarities and

differences of 15 respondents in preference ranking of seven medicinal plants used for the treatment of Gonorrhea.

4.9.4 Paired comparison

Paired comparison can be used for evaluating the degree of preferences or levels of importance of certain selected plants/ parts of plants (Nemarundwe and Richards, 2002). A list of the pairs of selected items with all possible combinations is made and sequence of the pairs and the order within each pair is randomized before every pair is presented to selected informants and their responses recorded and total value was summarized.

In this study, ten informants to indicate the efficacy and popularity of six medicinal plants species used to treat evil eye and rank was made based on the report of the informants (Table 11). As traditional healers treat evil eye and no treatment is provided by modern clinics, the local informants are endowed with the knowledge of evil eye treatment.

4.9.5 Direct matrix ranking

Direct matrix ranking exercise was done following Martin (1995) in order to compare multipurpose use of a given species and to relate this to the extent of its utilization versus its dominance. Based on information gathered from informants, eight multipurpose tree species were selected out of the total medicinal plants and eight use diversities of these plants were listed for 15 selected key informants to assign use values to each species (Table 12). The eight use-values include medicinal, fodder, food, firewood, construction, charcoal, fencing, and furniture making.

Fifteen key informants were chosen to conduct this activity and each key informants was asked to assign use values (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used). Accordingly, each key informants use values for the eight multipurpose medicinal plant species, average value of each use-diversity for a species was taken and the values of each species were summed up and ranked.

4.9.6 Fidelity level index

Fidelity level index quantify the importance of a given species for a particular purpose in a given cultural group (Friedman *et al*., 1986; cited in Cotton, 1996). Confirmation or consensus could not be taken as a single measure of the potential efficacy of any medicinal plant. Thus, efficacy is not the only factor that influences the informant choice but prevalence of a given plant and disease in the area can affect informants' choices.

In this study, two sites varying in altitude and malaria prevalence were chosen to indicate the fidelity level of *Allium sativum* for treatment of malaria, as malaria is one of the frequently reported diseases in low land (kola) areas (Ejaji, Kiltu Elala and Warji) and less frequent in high land (dega) areas (Sire Silase and Shano Agalo). The total overall use and particular use reports of *Allium sativum* by informants for malaria treatment are recorded and its fidelity level index for the two areas was calculated and summarized.

5. Results and Discussion

5.1 Indigenous knowledge on health

People of the study area confer value for their health, as their health is their life cog and security. The local people call health “fayya" which is taken as a special wealth provided by God "Waaqayyo". They belive or understand as ailments are the cause for health upset caused either with organisms “ilbiisa” or can be sent from God as punishment “Dheekkamsa Waaqayyoo” for wrong doings. They can also classify health problems, as those that can be treated and that cannot. For instance, the informants pointed that AIDs “dhibee baraa” and spiritual diseases “dhibee ayyanaa” are non-curable either traditionally or by modern treatment.

In the interaction and from discussion made with elders, the community in the past and even today expresses the value of their health by using poems, proverbs and songs. Among few of the proverbs are:

- "**Fayyaa xaba seete qayyaan laga ceete**" meaning it is important to give special attention and care to health.
- **“Fayyaan muka nyaata**” to show that healthy man does every thing, can even devour any available food.
- **“Dhibbi abbaan hin beekne fayyaadha**” to show that a great wealth and gift is health, though usually goes un-noticed by the self.

These proverbs indicate that, health is considered as a great asset, which is assumed as a life engine for any aspects of life in the area.

5.2 Botanical and ecological indigenous knowledge

5.2.1 Soil classification by indigenous people

Indigenous people classify (name) soil based on color, texture and suitability for cropping. Thus, the local people identify the following soil types:

- **Biyyoo diimillee –** meaning clay soil, they call it biyyoo diimillee because of its red color and poor fertility. On this soil, people cultivate crops like *Ipomoea batatas, Capsicum frutescens* and *Cucurbita pepo.*
- **Biyyoo kootichaa -** meaning black soil due to its color and with better fertility than other soil types. Crops like *Pisum satium, Vicia faba, Allium cepa, Zea mays,*

*Eragrostis tef, Phaseolus vulgari*s and *Linum usitatisimum, Guizoia abyssinica and Brassica napus* are cultivated on such soil.

- **Biyyoo cirrachaa –** meaning sand soil sandy soils and silt soils resulting from deposition by erosion. This soil type is easily distinguished by its content of fine sand soil with silt, and is suitable to grow specific crop types.
- **Biyyoo walinii –** meaning mixed soil type characterized by containing all the above three soil types.
- **Biyyoo Kosii-** soil type containing high amount of organic materials drawn from household left wastes and animal excreta. It is suitable for vegetable and home garden cultivation.Vegetables like *Capsicum frutescens, Allium cepa, Lycopersicon esculentum, Cucurbita pepo, Allium sativum; Brassica oleracea and Nicotiana tabacum* are usually cultivated on it.

5.2.2 Land form classification

5.2.2.1 Use based land classification by indigenous people

Landforms, rivers, gorges and mountains have spiritual and cultural importance for people living around Ejaji. Ejaji is a name derived in past time by revenue collectors from merchants coming to the central Shoa from Jima and Wollega. The revenue collectors have established a gate at Ejaji town and order merchants to stop (Ejaji! Or.), and pay the revenue. From then on wards the name was given to the place.

Peoples living there have long year experience of interaction with each other and the natural resources existing there. Land inheritance is cultural based and it is only males who have the power to inherit the familily's land and females have no chance and choice for land ownership from time passed to the recent existence. This is based on the belief and practice that a male plays the best and the greatest role in conserving and preserving natural resources on family land. Thus, culture places much faith on the power of men for maintaining this valuable property for the family.

In the present study, it was found that indigenous people classify their land based on use as grazing land, agricultural land, forestland, "goodaa", reverie bank, residential area "qe'ee" and marshland.

- **Lafa dheeddicha** -meaning grazing land saved for cattle, calf, donkey, mule and horse for grazing. It is left in between agricultural land as a fallow.
- **Lafa qonna**- meaning agricultural landform that serves for cropping. It is cultivable or cultivated land for growing different crops.
- **Lafa bosonaa** - meaning forestland secondary forestlands, where different plant species are found, which is the source of different wood and wood products e.g. Beeneso and Siree forest.
- **Gooda** - meaning refers to an extensive area that is not suitable for agriculture in most cases. It is left aside by the community for common grazing and browsing. It is an open grazing land containing shrubs, herbs and bushes as observed in the study area.
- **Lafa caffe** - meaning marshland suitable for irrigation and grazing.
- **Lafa manaa** - meaning residential land where the community has settled. They make fences around and restricted cropping for vegetables cultivation, as home garden. This is important in land capability identification, land use management, and land classification, and hence it has to be blended with modern systems of land use, as we are at a time of land constraint and shortage in the study area and other parts of Ethiopia due to population growth.
- **Luugoo lagaa**- meaning riverine banks where deep gorges or simple gorges are found and better vegetation exists along its course.

5.2.2.2 Topographic land classification

Indigenous people of the area classify their land also based on topographic landescape. Even though, the knowledge is based on mainly topography of the land, the combined fact is that the types also differ in their resource content and land use.

The local people classify their land topographically as:

- **Tullu**- mountain area characterized with higher altitude and covered with vegetations e.g. tullu Beenesoo and Siree Sillasee.
- **Tabba**-land forms with smaller elevation (hills) compared to **Tullu**, on which agriculture, grazing and other practices can be performed.
- **Goodaa-**refers to an extensive field characterized with lower elevation area, left aside by the community for grazing and browsing. It is a plain around reverine areas.
- **Lafa ciisaa**- plain on which settlement and agricultural activities are usually practiced.

5.2.3 Indigenous vegetation classification

According to some informants from Beeneso and Siree, vegetation of the study area is classified based on dominating tree species and density of plants that cover the land. In the present study the informants has identified the following vegetation types:

- **Bosona-** this type of vegetation is with densely populated plant species and composed of a range of larger trees, where many wild animals dwell. In the study area, it is not as such common to find **'Bosona'** except few areas, among which Beenesoo on the road from Gedo to Ejaji and, Siree10 km. southeast of Ejaji are recorded.
- **Luugoo lagaa**-refers to reverine forest. The range of plant species composition here varies based on the accessibility of plants existing there to both humans and livestock. In areas where the riverine is shallow deep, it is more densely populated with different species, while in areas where human and livestock interference exists the composition is less.
- **Ciccita (Hurufa)** - open woody and shrub land with patches of trees, bushes, shrubs and herbaceous species. It is common near agricultural margins, along main asphalt road and mountain escarpments.
- **Caffee-** marshy vegetation in marshy fields suitable for grazing**.**

5.3 Visual vegetation classification

Plant community can be defined as the collection of plant species or vegetation growing together in a particular location that shows a definite association or affinity with each other (Kent and cooker, 1992). Communities can be understood as a combination of plants that are dependent on their environment, influence one another, and modify their own environment (Mueller-Dombois and Ellenberg, 1974). In this study vegetation classification into community types was done visually to allocate and characterize the distribution of medicinal plants in the area. Hence, it is common to use the dominant species in naming plant communities. Thus, after regrous visual observation vegetation of the area was classified into the following dominating plants.

1. ***Millettia ferruginea* - *Ficus ingens*** dominating -this is characterized by trees with larger canopy, under side covered with thick bushes and shrubs. The major species observed, collected and documented include *Millettia ferruginea, Ficus ingens***,** *Vernonia adoensis, Vernonia hochetetteri, Carissa edulis, Vernonia glabra, Leontis ocymifoli, Capparis*

tomentosa, Rumex nervosus, Carissa spinarum and Buddleja polystachya. This community type is found in Shano Agelo, Sire Sillase and Racho study sites.

2. ***Eucalyptus*** Plantation -this type is dominates mainly around and near Ejaji town, and along the main asphalt road to Gedo and Bako. The major species observed with this type of vegetation are herbs and small shrubs.
3. ***Bridelia micrantha-Maesa lanceolata*** dominating - it is recorded in Sirre Sillase and Kiltu Elala study sites.The associated species are *Calpurnia subdecandera, Calpurnia aurea, Combertum paniculatum, Pterrollobium stellatum, Vernonia leopoldi, Brucea antidysenterica, Bersama abyssinica, Achyranthes aspera, Crateva adansonii, Rosa abyssinica, Embelia schimperi, Clausena anisata and Diospyros abyssinica.*
4. ***Maytenus arbutifolia- Teclea nobilis*** dominating - this is recorded in four of the study sites namely: Warjii, Obora, Sire Sillase and Kiltu Elala. This community is on the processes of being converted in to shrubby and bushy vegetation because of grazing and browsing by livestock and human impact. The associated species to this community type are *Ocimum lamifolium, Echinops amplexicauli, Calpurnia subdecandra, Premna resinos*a, *Crateva adansonii and Dovyalis abyssinica*.
5. **Reverine** – which was recorded along the river courses of river Alanga, Fato and Shanno. The major species obtained from this vegetation type are *Salix subserrata, Osyris quadripartita, Gomphocarpus fruticosus, Clausena anisata, Croton macrostachyus, Echinops hoehnelii Cynoglossum coerulem* and *Ficus palmata.*
6. ***Croton macrostachyus- Albizia schimperiana*** dominating – the associated species are *Dovyalis abyssinica, Crateva adansonii, Celtis africana, Gnidia glauca, Leonotis ocymifolia* and *Mimusops kummel*. These are found almost in all the study sites.
7. ***Podocarpus falcatus- Ficus sur*** dominating -this is found at Obora Keraru and Obora Beneso study sites as remnants of forests in agricultural land or at margins of agricultural field. The associated species *Calpurnia subdecandra, Bersama abyssinica, Croton macrostachyus, Calpurnia aurea* and *Premna resinos*a

5.4 Plant resources of the study area

A total of 188 plants were collected and identified. Of these, 145 species are obtained from forest (Appendix 4), 31 species are from home garden (Appendix 5), 8 species are from agricultural field or margin and 4 species are from crop field.

These plants are distributed under 70 families and 151 genera. Family Asteraceae was represented by 20 species, followed by Fabaceae 14 species; Poaceae 10 species; Euphrobiaceae 9 species; Solanaceae 8 species; Rubiaceae and Lamiaceae 7 species each; Moraceae 6 species; Rutaceae 5 species; Anacardiaceae, Myrtaceae, Malvaceae, and Cucurbitaceae 4 species each; Verbenaceae, Ranunculaceae, Polygonaceae, Rocaceae and Apocyanaceae 3 species each. The remaining16 families had 2 species each and 36 had 1 species each. This finding is agood indicator for the presence of aconsiderable diversity of plant species in the area. Regarding habit diversity, shrubs were the most common and stood first (63 species), followed by herbs (58 species), trees (55 species), climbers (6 species), lianas (3 species) and epiphytes (3 species).

Eighty-nine (47.3%) species were found to be used as traditional medicine. The existence and utilization of such alarge number of medicinal plants by people in the study area indicates that majority of the people used and continue to use indigenous medicinal practices to catter medication problems. Of the 89 medicinal plants recorded, 70 (78.7%) are obtained from wild vegetation, 10 (11%) species from home gardens, 4 (5%) crop field and 5 (6%) in agricultural margin or field. Thus, the majority of medicinal plants are from wild vegetation and there was a relaxed practice to cultivation in the area. Mirutse Giday (1999) presented similar findings in his work on medicinal plants of the Zay people. However, home gardening is a promising activity of the future in the study area owing to the increasing scarcity of farmland, due to population growth and the need for conserving medicinal plants.

5.4.1 Major plant use categories by people of the study area

A total of 2825 use- reports (UR) from 418 frequency of occurrence among 188 species of plants were recorded. These species were assigned to nine categories of plant uses (Table 2). Analysis of homogeneity of the ethnobotanical information following the factor of informant consensus (FIC) revealed that there is high consistency of plant use among informants, all values tending to 1. Quantitative variation in use reports reflected relative frequency and /or preference of uses. Both frequency and preference of use depends on personal choice, availability and abundance of the relevant plant and popularity among informants.

The consistency of use in descending order was charcoal (0.93), furniture (0.92), fencing (0.9), commercial (0.89) and edible (0.88). Other use categories were below average indicating heterogeneity of uses among informants (Figure 3). Use reports below average were recorded for fodder, miscellaneous, firewood and medicinal (0.83) use categories.

Table 2 Quantitative ethnobotanical analysis of nine groups of plant uses by informants

Use Category	Species	% of species	Use-reports	% of use reportes	Factor of Informant Consensus
Medicinal	89	21.3	482	17.1	0.83
Edible	45	10.8	320	11.3	0.88
Fire wood	72	17.2	410	14.5	0.84
Furniture	36	8.6	370	13.1	0.92
Fodder	48	11.5	309	10.9	0.87
Commercial	31	7.4	210	7.4	0.89
Charcoal	26	6.2	262	9.3	0.93
Fencing	29	6.9	212	7.5	0.90
Miscellaneous	42	10.1	250	8.8	0.86

Average FIC= $\frac{nur - nt}{nur - 9}$

$= 0.88$

The low FIC for medicinal use category (Fig.3) may be due to a complex preparation of plants requirement to treat ailments, which results in high number of species and high number of uses recorded for these 89 medicinal plants. Majority of plants (47.3%) species have medicinal values and a number of uses, which result in greater heterogeneity of use reports.

The highest informant consensus was documented for the following species: *Ocimum urticfoluim* (Hancabbii Adii) was cited by 64 (88.8%) for its medicinal value for treating fibril illness, *Allium sativum*, *Lepidium sativum* and *Nicotiana tabacum* 62 (86%), 52 (72.2%) and 48 (66.7%), respectively. The latter three species were ranked 2nd, 3rd and 4^{th,} respectively by informants.

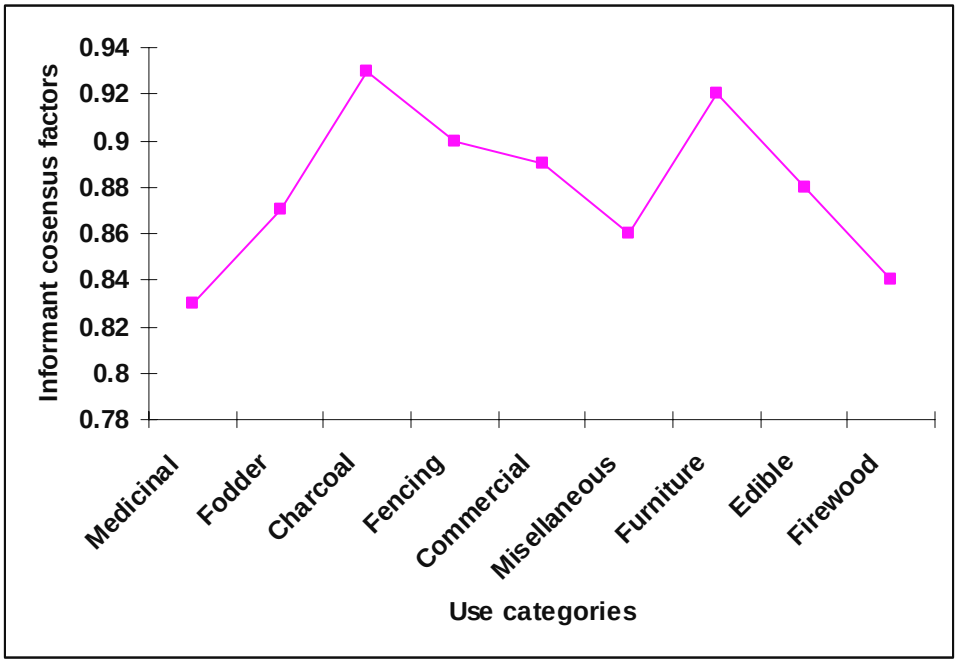

Figure 3 Graph showing factor of informant consensus (FIC) for nine use- categories of plant resources

5.4.2 Frequency of tree species in the study area

In Ejaji area, the most frequent trees with a frequency value greater than 25 percent were recorded (Table 3). It was found that *Croton macrostachyus* is the most frequent species (83.3%) occurring in 15 quadrats sampled and followed by *Maesa lanceolata (*72.2%) recorded in 13 quadrats and the third is *Albizia schimperiana,* and the least frequent species is *Ficus sur (*27.8%).

Table 3 Percentage frequency (percentage>25) of trees in the study sites

Scintific name	No of quadrats	Total quadrats	Frequency (%)	Relative frequency (%)
Croton macrostachyus	15	18	83.3	13.0
Albizia schimperiana	12	18	66.6	10.5
Millettia ferruginea	11	18	61.1	9.6
Olinia rochetiana	10	18	55.5	8.7
Ficus sur	5	18	27.8	4.4
Maesa lanceolata	13	18	72.2	11.3
Teclea nobilis	7	18	38.2	6.0
Ehretia cymosa	6	18	33.3	5.3
Syzygium guineense	7	18	38.2	6.0
Schrebera alata	10	18	55.5	8.7
Mimusops kummel	8	18	44.4	6.9
Vangueria apiculata	9	18	50	7.8

Compared to frequent tree species existing in the study area, it was recorded that *Croton macrostachyus is* more frequent than the other species. It is also to be noted this species is favoured by anthropogenic disturbance of natural vegetation. Furthermore, it is not harvested as the others for firewood, building, not browsed and grazed compared to others in the area. Infact, the plant is popular among the informants for its medicinal value.

5.5 Ethnomedicinal plant species used by people of the study area

A total of 89 species of medicinal plants (Appendix 1) were gathered and documented from the study area, out of which 48 species (53.9%) were noted to treat only human ailments while 27 species (30.3%) are used to treat livestock ailments. Fourteen species (15.7%) are used to treat both livestock and human ailments. Informant consensus on these medicinal plants confirms their efficacy against some human and /or livestock ailments.

These plants are distributed in 75 genera and 46 families. Family Fabaceae with 10 species has the highest species. The second highest family in terms of species number is Asteraceae, 9 species. Solanaceae is the third, 6 species; Rutaceae, Poaceae, Lamiaceae, Moraceae are the fourth with 4 species each; Euphorbiaceae and Cucurbitaceae fifth with three species each; Ranunuclaceae, Capparidaceae, Boraginaceae, Myrtaceae and Verbenaceae ranked sixth with two species each. The remaining of the families are represented by one species.

Out of 89 medicinal plant species in this study, 13 species were in common with Mirutse Giday (1999), 24 with Debela Hunde (2001), 22 with Ermias Lulekal (2005) and 18 species with Haile Yinger (2005). Six species that are common with Kokwaro (1976) are known to be used in the medicinal lora of other countries. These observations acknowledge the local people over awide area in Ethiopia show the tendency to use same medicinal plants, which indicates the genuine therapeutic value of these medicinal plants as well as indigenous knowledge on them.

5.5.1 Distribution of medicinal plants in to dominant plant species

The result of the study revealed that these medicinal plants are evenly distributed in recorded dominant plant species type (Table 4). Most of medicinal plants were harvested from *Croton macrostachyus-Albizia schimperiana* and the least from *Eucalyptus* plantation. *Croton macrostachyus- Albizia schimperiana* species contains trees and shrubs that are not frequently harvested by the local communities for different use values compared to the other community types. These enabled for high regeneration and contributed to the abundance of medicinal plants in this species. In contrast, *Eucalyptus* plantation that is frequently harvested for firewood and in some cases weeds, is removed purposely by human activity or harvest of the plantations and hence less number of medicinal plants was recorded. Reverine vegetation type contains better distribution of medicinal plants, although plants in it are inaccessibile for collection due to gorges.

Table 4 Distribution of medicinal plants in to dominating species

Dominating species	**No (%) of medicinal plants**
Millettia ferruginea - Ficus ingens	36 (40.4%)
Eucalyptus plantation	14 (15.7%)
Bridelia micrantha-Maesa lanceolata	48 (53.9%)
Maytenus arbutifolia- Teclea nobilis	54 (60.6%)
Croton macrostachyus- Albizia schimperiana	64 (71.9%)
Podocarpus falcatus- Ficus sur	22 (24.7%)
Reverine community type	40 (45%)

5.5.2 Habit, preparation and administration methods

Analysis of growth forms of these medicinal plants (Fig.4) reveals that herbs constitute the largest category (28 species, 31.5%) followed by shrubs (27 species, 30.3%). Trees amounted to (24 species, 26.9%). The others included climbers (6 species, 6.7%), lianas (2 species, 2.3%) and epiphytes (2 species, 2.3%). The current findings show that the most widely used medicinal plants habit in the study area are herbs followed by shrubs. This may be due to these speices exhibit high level of abundancy and easy to obtain them. Relatively high number of herbs and shrubs for medicinal purpose were also previously reported in Ethiopia (Bayafers Tamene, 2000; Debela Hundie, 2001; and Ermias Luelkal, 2005). Njau (2001) in Tanzania also found similar finding.

Furthermore, this study also revealed that similar proportions of growth form of medicinal plants are used in medicinal a practice that possibly contributes for slowing threat rate of medicinal plants coming from limited habit collection.

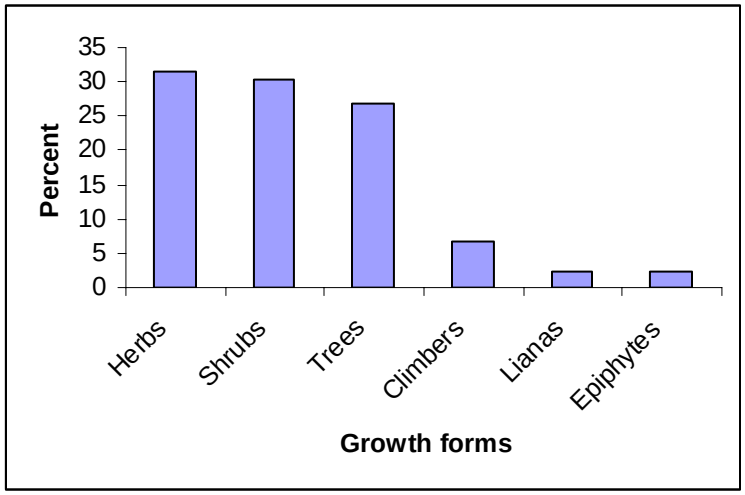

Figure 4 Percentage distribution of growth forms of medicinal plants used for both livestock and human

Plant parts used for medicinal purposes indicated that, the local communities mostly use leaves (31.5%) and followed by roots (28.3%). Other plant parts are also used to prepare traditional medicine, i.e, fruit (8.2%), seed (6.5%), bark (4.9%), stem (3.4%), sap (3.3%), latex (1.6%), flower (0.5%) and others (13.1%) (Fig.5). Analysis of the data showed that leaf is the most part used in preparation of remedies. Previous reports in Ethiopia have shown that leaves were the most commonly used and followed by roots to treat various health problems

(Dawit Abebe, 1991; Bayafers Tamene, 2000; Mirutse Giday (1999); and Gobana Amani, 2003).

Given the highest frequency of leaves used for medicinal purposes in the study area, threat to the distruction of medicinal plants was found to be minimal, as high threat to the mother plant comes with root, bark and stem harvest. According to Dawit Abebe and Ahadu Ayehu (1993) medicinal plant harvest that involves roots, rhizomes, bulbs, barks and stems have serious effect on the survival of mother plants.

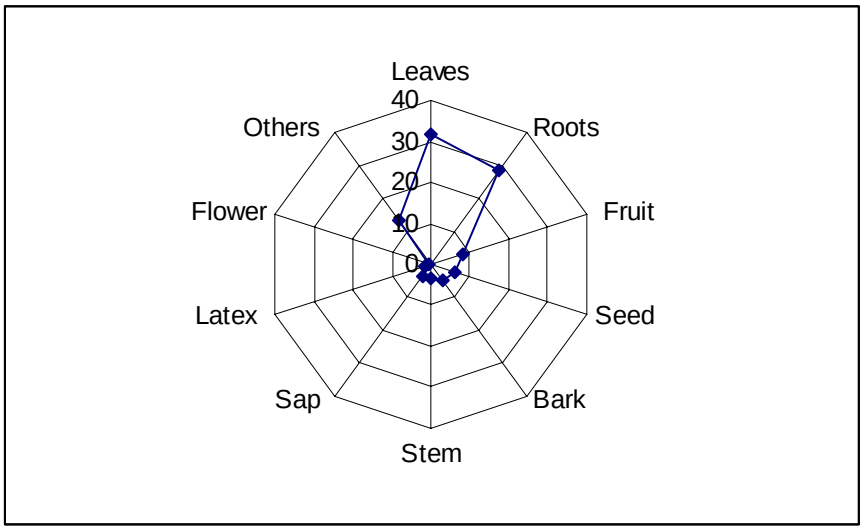

Figure 5 Percent distribution of plant part(s) used for medicinal purposes for both livestock and human ailments

The local people employ several methods of preparation of traditional medicines from plants. Pounding and powdering are the most frequently used methods of traditional medicine preparation in the study area. According to the informants, both pounding and powdering as a strategy permit to preserve the plant materials that are not available both in dry and rainy seasons. It was also found that, these are effective for the complete extraction of the potential content of the plant and increase the curative power of the medicine or its efficency, as as both increases the healing power of the remedy through faster physiological reaction, as respondants reported (Table 5). After preparation, the remedies are either used soon or preserved for latter use. Traditional practitioners often use any dry clean containers (16%) to preserve traditional medicines. Almost greater proportions of informants (45%) do not have the habit of keeping traditional medicines prepared for a long time. About 20% of them hang

dried medicines on roofs and walls, 10% use plastic bags, while about 5% use sheet of clothes and 4% seal in bottles.

The majority (78%) of these preparations are drawn from mixtures of different plant species with different additive substances like honey, sugar, teff powder, butter, soda ash, salt, ground honey, soil and charcoal ash for the treatement of single ailment. These additive substances have double function i.e to improve flavor and reduce adverse effects such as vomiting and diahrrhoea, and enhance the efficacy and healing conditions. Similar result was also reported ealse where (Mirutse Giday, 1999) and (Bayafers Tamene, 2000). Dawit Abebe (1986) has also identified the additive substances in herbal remedy preparations with their possible benefits.

The current finding and other recordes else where, which revealed the interrelation ships of the use of medicinal plants in combination and high level of cure efficacy is not concordant to the findings of Dawit Abebe (1986), Debela Hundie (2001) and Etana Tolessa (2007). These authors have reported that the use of medicinal plants in a unit has high traditional medicinal efficacy.

It was also reported that some medicinal herbs are mixed with food and drinks in such amanner that, they give special flavor and taste to it. For instance, *Allium sativum* and *Ruta chalepensis* are added to Coffee and cheese to improve the flavor and taste, and to avoid abdominal discomfort. Mixing and using some medicinal plants with common foods and drinks might be an easy way for effective treatement (Abdu and Hamed, 1982; cited in Etana Tolessa, 2007).

Table 5 Methods of traditional medicinal plant preparation in the area

Method of preparation	Total Prep.	Percent
Pounding	72	39.1
Powdering	41	22.3
Smashing	13	7.1
Chewing	11	5.9
Rubbing	6	3.3
Squeezing	12	6.5
Cream	4	2.2
Crushing	9	4.9
Steam bath	5	2.7
Dry bath(Smoke)	7	3.8
Burning	2	1.1
Rinsing	2	1.1
Total	184	100

There are various routes of administration of traditional medicinal plants prepared products by the local community. The major routes of administration in the study area are oral, dermal, nasal, anal, auricular and optical. Oral administration is the dominant route (60.3%), followed by dermal route (20.1%) (Fig. 6). Both oral and dermal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power. Previous reports such as Dawit Abebe (1986), Bayafers Tamene (2000) and Kebu Balemie *et al*., (2004) agree with this current finding. In addition, informants reported that there are related restrictions to enhance rapid physiological reaction and to increase its curative power of remedies. Forexample, a patient who take remedy against tapeworm should not take any food six hour's before and after adiminstration of the medicine.

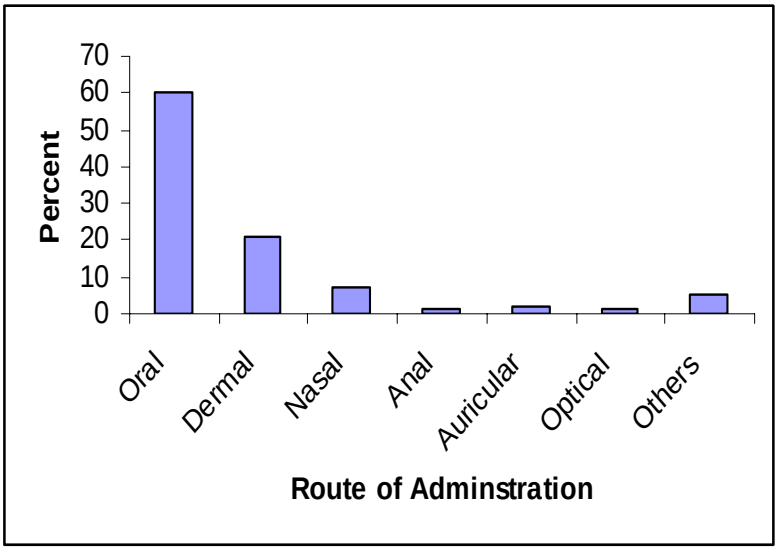

Figure 6 Percentage distributions of routes of adminstration of plant remedies used for both livestock and human

Local people depend on both dry and fresh remedies. In this case, 98 preparations (53.3%) are in fresh form, 54 (29.3%) are dried and 32(17.4%) are dried or fresh. The dependency of local people on fresh materials put the plants under serious threat than the dried form, as fresh materials are harvested directly and used soon with its extra deterioration with no chance of preservation i.e not stored for latter use.. However, local people argue that fresh materials are effective in treatment as the contents are not lost before use compared to the dried forms. The livelihood of most traditional healers relies on fresh materials that have aggravated the decline of rare medicinal plants from the study area according to the informants. Traditional practitioners are collecting medicinal plants with less attention than would be preferred from viewpoint of conservation of plant resource. Debela Hunde (2001) and Kebu Balemie *et al.,* (2004) have reported that the use of fresh medicinal plants are more threatened than dry forms.

5.5.3 Medicinal plant species used to treat human diseases

As described earlier, the local people utilize 48 medicinal plant species (53.9%) to treat 47 human ailments. These plants comprise 40 genera and 30 families. Family Asteraceae ranked first (6 species) and followed by Fabaceae, Lamiaceae and Moraceae with 4 species each, and thirdly Rutaceae, Boraginaceae, Polygonaceae and Solanceae with 2 species each. The remaining species all with 1 species each.

The current study revealed that medicinal plants to treat human ailments constitute herbs (15 species, 31.3%), shrubs (14species, 29.2%), trees (13 species, 27.1%), climbers (3species, 6.2%), lianas (2 species, 4.2%) and epiphytes (1species, 2.1%) (Fig.7). Most of these plants (43 species, 89.6%) are collected from wild habitats indicating the existence of pressure on wild plants. According to the informants, they are facing the scarcity of land and there is practice of home gardening of medicinal plants (10 species, 11%) in the area. This practice has botanical, ecological and economical meanings for reduction of pressure on wild plants. Mirutse Giday (1999) and Bayafers Tamene (2000) have also reported the dominance of wild collection in their work on medicinal plant study.

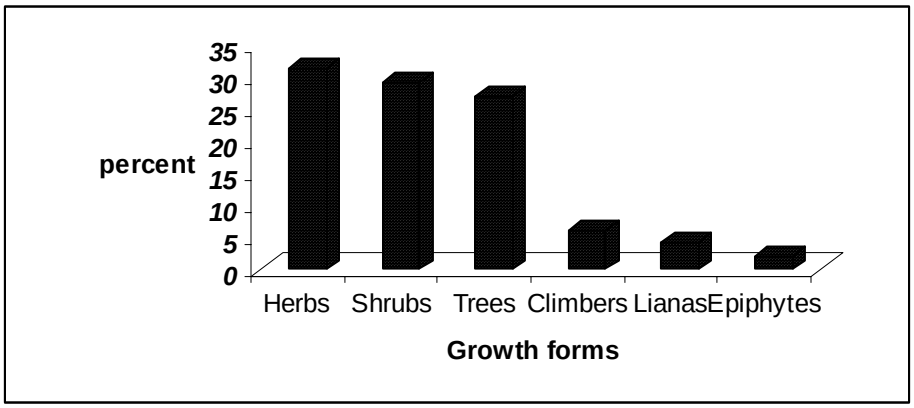

Figure 7 Graph showing growth forms of medicinal plants used for human ailment Treatment

With regard to the plant parts used for medicinal purposes, the practitioners mostly harvest leaves (29 species, 38.3%) and roots (16 species, 21.1%) of the total recorded. The other parts include fruits (10 species, 12.2%), bark (specie 6.6%), stem (3species, 3.9%), seed (2 species, 2.6%) and others (14.5%) (Fig.8). The investigation showed that leaves are most harvested resulting in little threat to rare plants in the area. However, the second most collected plant part root, which negatively affects the growth and physiology of the plant results in the death of mother plant at the end (Odera, 1997).

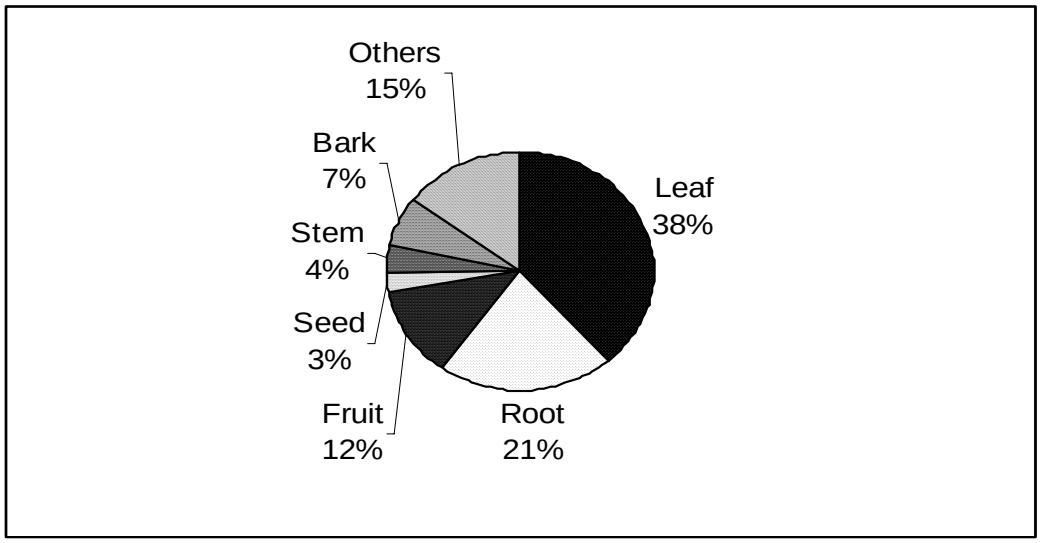

Figure 8 Percentage distribution of medicinal plant parts used for human ailment treatement

The prepared traditional medicines are applied in a number of methods, among which drinking (35.6%), swallowing (17.9%), sniffed (13%), eating (9.8%), chewing (8%), dry bath (smoke) (7%), creamed (6.4%), steam bath (5.2%), washing (4.8%), tied (3.8%), tooth brushing (3.2%) and put on (3%) were mentioned. In this study, drinking and swallowing account for the largest percentage (Fig. 9).

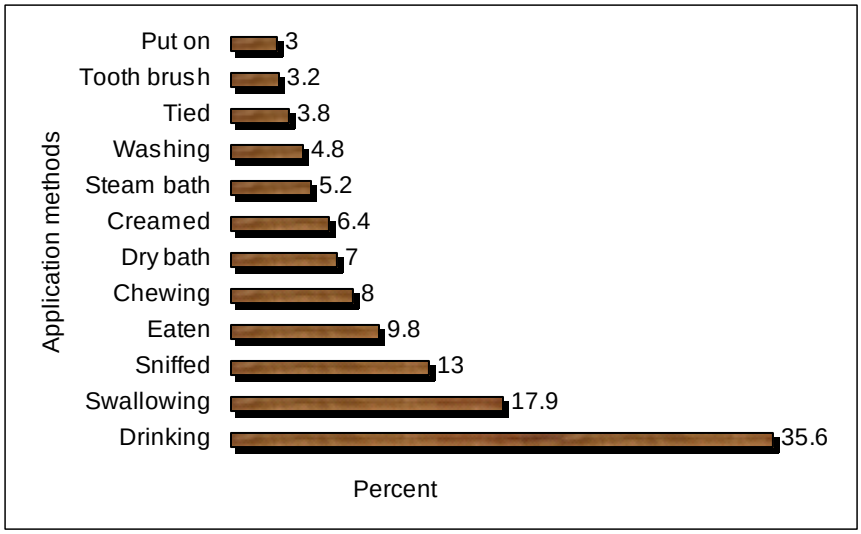

Figure 9 Graph showing ways of application of plant remedies in human ailment treatement

5.5.3.1 Major human diseases and plant species used by indigenous people

In the area a total of 47 diseases of humans **(**Appendix 2), recorded are treated with a total of 48 plant species and 135 preparations, where one species can treat a single disease or a number of diseases. Similarly, one ailment can be treated with combination of plant species or single plant (Table 6). Forexample, Headache is treated with 9 species of plants, Stomach problem 8 species, Gonorrhea with 7 species, Evil eye (Budaa), Fibril illness and Malaria with 6 species each. The fact that the above ranked diseases being treated by a number of species is coupled with the frequent occurrence of the diseases and ease of accessibility of plant species for treatment. In turn, these factors widen the popularity of these species among the informants and indigenous knowledge for treating these diseases.

Table 6 Major human diseases and number of plant species used by indigenous people of Ejaji Area.

Diseas treated	Total species	% total
Amoeba case	3	2.2
Anemia	1	0.7
Ascaries	2	1.5
Back pain	2	1.5
Breast ulcerate	1	0.7
Cough	1	0.7
Dandruff	1	0.7
Diarrhoea	3	2.2
Ear pain	1	0.7
Epilepsy	1	0.7
Erythroblasts	1	0.7
Evil eye	6	4.4
Evil sprit	2	1.5
Eye infection	1	0.7
Fibril illness	6	4.4
Fire burn	1	0.7
Goiter	1	0.7
Gonorrhea	7	5.2
Head ache	9	6.7
Hepatitis	2	1.5
Homeoroide	3	2.2
Influenza	3	2.2
Internal parasites	4	2.9
Kidney problem	1	0.7
Liver problem	3	2.2
Malaria	6	4..4
Nasal bleeding	2	1.5
Rabies	4	2.9
Rheumatism	1	0.7
Ring worm	5	3.7
Scabies	2	1.5
Skin rash	2	1.5
Snake poison	4	2.9

Snake replant	5	3.7
Spider poison	2	1.5
Stomach problem	8	5.9
Sudden sickness	4	2.9
Swelling	1	0.7
Swelling	1	0.7
Taenia pedies	2	1.5
Tania pedies	2	1.5
Tania versicolaries	2	1.5
Tape worm	1	0.7
Teeth infection	4	2.9
Tetanus	4	2.9
Tonsillitis	4	2.9
Wound	3	2..2

5.5.3.2 Description of the most frequently reported medicinal plants used to treat human ailments only

Brief notes on some morphological parts, ecology and medicinal uses of each species are given below. In cases, phytochemical notes are briefly presented.

***Datura stramonium* L., Solanaceae; Manjii (Or.)**

Habit, habitat and distribution: Annual herb to 1.50m high, growing in wooded grassland cropland, and road sides and gardens. Grows at altitudes between 900-2350. In Ethiopia, it is found distributed in Gojam, Shewa, Sidamo, Kefa, Gamo Gofa, and Bale.

Medicinal uses: In the study area this species is used to treat diarrhea, malaria, head ache scabies and dandruff. Powdered seed of *Datura stramonium* 2-3 spoon of the powder is mixed with butter and creamed to the skin as treatment of scabies. Seed of *Datura stramonium* is dried and powdered, mixed with water and used to wash head skin to avoid dandruff. Similarly, powdered seed of *Datura stramonium* is mixed with honey and three to four spoons are eaten as a malaria treatment. Furthermore, this species is pounded with leaves of *Ocimum gratissimum* and sniffed nasally to treat head ache. Elsewhere in Ethiopia, crushed leavs are used to cure open sores of pack animals (Amare Getahun, 1976) and various wounds in livestock (Debela Hunde, 2001).Where as pounded leaves are used to treat tenia versicolour and pounded roots treat infected wounds (Bayafers Tamene, 2000). In Kenya, this species is used to treat tonsillitis (Njorge *et al*., 2004).

Modern biomedical investigations and medical profiles of *Datura stramonium* depict that the root part of this species bears chemicals called Atropine ($C_{17}H_{23}NO_3$) and Scopolamine

(C17H21NO4), which are found effective in pre-operative medication and are commonly used in anesthesia to sedate, reduce secretions, vasodilatation and excitement as well as to prevent delirium/fever (Glasby, 1991; Harborne and Baxter, 1993). This agrees with the use of the species by traditional healers in the study site for malarial treatment and as fever sedative.

***Croton macrostachyus Del.*, Euphorbiaceae; Bakkannisa (Or.)**

Habit, habitat and distribution: Shrub or tree 2-25m long. Found in forest margins and secondary woodlands, extending in to disturbed areas and along edges of roads, mostly in soils of volcanic origin. The altitudinal range so far recorded for the plant is 500-2350m. In Ethiopia this plant is found in Tigray, Gonder, Gojam, Wello, Shewa, Arsi, Wellega, Illuababora, Kefa, Sidamo, Bale and Harerge. In Africa, it is ditribute West to Guinea, South to Angola, Zambia, Malawi and Mozambique (Gilbertt, 1995).

Medicinal uses: In the study area, this plant is used to treat five human diseases and one livestock disease. Leaf of *Croton macrostachyus* is crushed and smashed, liquid extract is creamed on affected area to treat ringworm (roobbi (Or.)). Bark of *Croton macrostachyus* and *Vernonia hymenolepis* are powdered together and 3-4 spoons of the powder are taken mixed with a cup of "Beso" (roasted barley flour worked with water) to treat gonorrhea. Leaves of *Croton macrostachyus* with leaf of *Brucea antidysenterica* are crushed together and used as skin wash to remove scabies of calf. Root of *Croton macrostachyus* and *Carissa spinarum* are chopped together and fumigated for evil eye treatment. Leaf of *Croton macrostchyus* and *Ocimum urticifolium* are fumigated for fibril case of humans. In addition, leaf of *Croton macrostachyus* and *Ocimum urticifolium* are smashed and sniffed nasally to treat headache. The informants pointed out that the plant is also used for ritual ceremonies of cattle as a good hope for cattle health and productivity. Elsewhere in Ethiopia, fruit and root decoctions are used for the treatment of venereal diseases; stem bark with *Hagenia abyssinica* is used as purgative and vermifuge; young shoots and leaves for jaundice (Amare Getahun, 1976).

***Carissa spinarum* L., Apocynaceae; Hagamsa (Or.)**

Habit, habitat and distribution: *Carissa spinarum* is a richly branched, some times creeping, shrub or climber. It is found in open Acacia woodland, often on termite mounds and riverine fringing vegetation with in altitudinal ranges of 550-2500masl. In Ethiopia, this

plant is found in Afar, Tigray, Gonder, Gojam, Wello, Shewa, Arsi, Wellega, Kefa, Gamogofa, Sidamo, Bale and Harerge (Jeffrey, 1995). *Carissa spinarum* is widely distributed in Africa from Senegal to Somalia, from Sudan to Transvaal Namibia, and in Madagascar. From Yemen to Indian and Thailand, and on Islands of Indian Ocean.

Medicinal uses: In this study, people of the study area use it to treat gonorrhea, stomachache, headache and evil eye (Appendix 1).

The ripe fruits of this plant are widely eaten by children in Ethiopia. Goats browse bushes vigorously. The spiny stems are used for fencing fields of growing crops. It also makes a good live fence (Leeuwenberg, 2003).

***Lagenaria siceraria* (Molina) Standl, Cucurbitaceae; Buqqee hadhaa (Or.)**

Habit, habitat and distribution: Vigorous prostrate or climbing annual herb to 4.5m. The species grows in bush land and grassland in cultivated places at altitudes 300-2300m. The species is found in Gonder, Gojam, Tigray, Shewa, Arsi, Ilubabor, Kefa, Gamo Gofa, Bale and Harerge (Jeffrey, 1995). In the study area, it is found in cultivated lands, hedges, trailing on live fences, under ritual trees (muka jaarii) and farm margins.

Medicinal uses: Malaria, Tinea versicolour and Scabies.

In the study area, for malaria ripe fruit is bored, rinsed with cold water, one glass is used as a drink early in the morning before breakfast; leaves are steam inhaled. Fresh fruit is creamed to the affected body to treat scabies and tinea versicolour. Mature fruits are widely used as containers, particularly for milk container "Qabee" and used for celebration of 'Ateete' among the Oromo Women often beautifully decorated.

***Vernonia amygdalina* Del., Asteraceae; Eebicha (Or.)**

Habit, habitat and distribution: Shrub or small tree 0.5 to 10m tall much branched, spreading branches up to 40cm in diameter (Fichtl and Admasu Adi, 1994). The species is found in wide range of bush, woodland and forest habitat between 500 and 2800m. It occurs in almost all Sub-Saharan African countries, also in Yemen (Fichtl and Admasu Adi, 1994).

Medicinal uses: Tooth infection, Stomachache, Fibril illness, Evil sprit.

To clean evil eye and evil work from home, crushed leaves are sprayed on utensils, on bed and gate. To treat malaria, leaves of *Vernonia amygdalina* are concocted with leaves of *Ruta chalepensis* and one cup is served as a drink for three to five days with ground honey in the morning. For tooth infection, leaves are chewed with bulb of *Allium sativum.* Stomach

problem is treated by crushing and pounding the leaves, mixed with honey, and used as a drink.

In the study area, it is common to find *Vernonia amygdalina* mixed with *Justica schimperiana* as life fence. Elsewhere in Ethiopia, the leaves and bark are bitter and used in local medicine. They are used against menstruation pain, as purgative and vermifuge, in wound dressing and against urinary inflammation (Abbink, 1993).

***Allium sativum* L., Alliaceae; Qullubbii adii (Or.)**

Habit, habitat, distribution: Herb usually cultivated in home gardens, in small-irrigated fields, and grows in Ethiopia within altitudinal ranges of 1800-2800m. Currently it is being grown in all parts of the world and is employed for its variety of uses; like its medicinal value for a range of skin and stomach problems and in preparation of a variety of food types, more particularly in making spices (Tewolde Berhan Gebre Egiziabeher and Sue Edwards, 1997).

Medicinal uses: Used to treat malaria, stomachsache, common cold and intestinal parasites.

To treat malaria and stomachache bulb of *Allium sativum* is pounded with seed of *Lepidium sativum* and eaten with "injera". For common cold and abdominal problems, its bulb is pounded and mixed with meat soup and used as a drink. Intestinal parasites can be killed by using pounded *Allium sativum* with rhizome of *Ginger officinale* and eaten with honey.

Bulb of this plant is used elsewhere in Ethiopia to treat jaundice and cutaneous leshimaniasis (Getachew Addis *et al*., 2001). The curative ability of the plant against the majority of the diseases listed in this study area and elsewhere is associated with different properties of the steroid compounds allin and allicin in the plant. Allin and allicin are steroid compounds known to occur in this plant (Glasby, 1991)

5.5.4 Medicinal plant species used to treat livestock health problems

Medicinal plants recorded in this study area for their veterinary use by the medicinal practitioners to treat livestock are 27 species (30.3%) (Appendix1). They comprise 26 genera and 22 families. Family Fabaceae is represents four species and followed by family Asteraceaea three species and the rest of the families have one species each. In the current study area, traditional healers follow up the patterns of cattle grazing and identify those plants ignored (due to their taste or smell) by cattle and try out these plants to treat different

ailments. The majority of these plants are wild (23 species, 85.2%) and few are found in crop fields (4 species, 14.8%). Figure 10 depicts plants part(s) for veterinary uses i.e, trees (10 species, 37%), herbs (8 species, 29.6%), shrubs (7 species, 25.9%) and climbers (2 species, 7.4%) (Fig.10). This finding disagrees with the study of Etana Tolessa (2007) where people of Gimby woreda rank shrubs, herbs and trees in their order of frequency. However, trees are most commonly used, followed by herbs and shrubs. Note, in this study herbs, shrubs and trees ranked first, second and third for human ailments treatement, which agrees with Etana's (2007). This may be related to the healing power and dosage requirement differences of human and livestock, in which livestock requires higher dosage and powerful remedy.

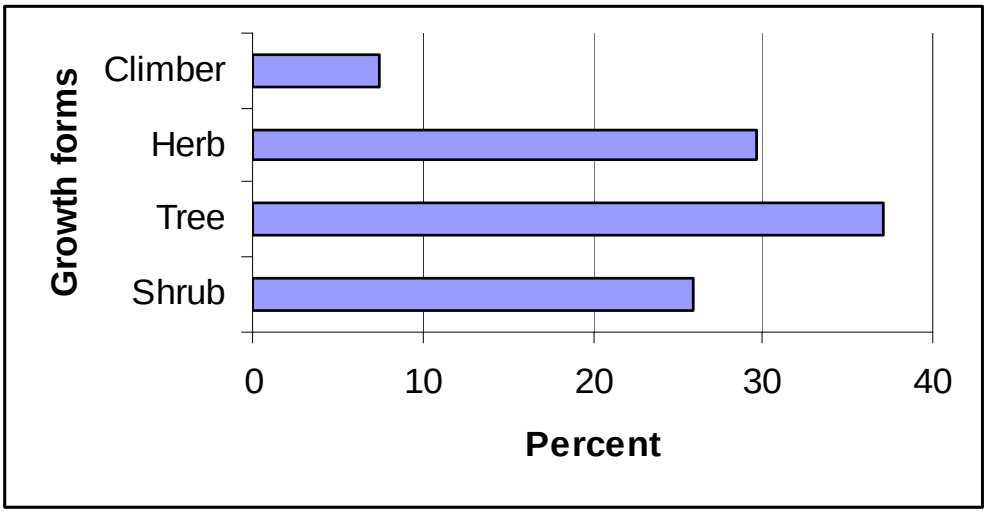

Figure 10 Percentage distribution of the growth forms of medicinal plants used for livestock ailment treatement

Roots are widely used parts for a range of preparations than the other parts. Roots account for greatest preparations (34.9%), followed by leaf (16.5%), bark (3, 6.9%), fruit (4, 6.8%), seed (4.7%), sap (2, 4.7%), stem (1, 2.3%) and others (20.9% preparations) (Table 7). Debela Hunde (2001) and Kebu Balemie *et al*., (2004) reported similar proportion of root and leaf requirement for remedy preparation to treat of livestock diseases.

Table 7 Plant parts and habit of medicinal plants preparation for livestock by Ejaji people

Habit					Total	%
Plant parts used	Herb	Climber	Shrub	Tree		
Leaf	1	-	3	4	7	16.5
Root	7	1	3	4	15	34.9
Bark	-	-	-	3	3	6.9
Fruit	-	-	4	-	4	9.3
Seed	2	-	-	-	2	4.7
Latex	-	-	1	1	2	4.7
Sap	-	-	-	2	2	4.7
Stem	1	-	-	-	1	2.3
R+L	-	1	1	-	2	4.7
L+B	-	1	-	1	2	4.7
B+R	-	-	-	2	2	4.7
L+St	-	-	-	1	1	2.3
Total	11	3	12	18	43	100

Concerning plant part preparations for human ailment, 38% of the preparations are from leaf and 21% are from roots. On the other hand, roots constitute 35% while leaf 17% to treat livestock diseases. Leaf remedial preparation technique requires easier and quicker method than root. However, root is used for a range of preparations for livestock treatments. People of the study area acquainted with more knowledge of human ailment treatments than livestock because people of the area exercise sedentary agriculture and livestock population is limited cattle heads per household. Livestock usually graze above ground plant parts, preparation of these parts as a remedy has less importance and hence root has a potential value as it is rarely grazed and browsed by livestock.

Similarly the most frequently applied modes of preparation of ethnoveterinary medicine include pounding (20, 46.5%) followed by powdering (12, 27.9%). Chewing (3, 6.9%), rubbing (2, 4.7%), steam and dry bathes (4, 9.3%) and others (4.7%) have low frequency of occurance.

Routes of traditional medicinal administration for livestock include oral, dermal, nasal, auricular and optical. Oral 26 (60.5%) and dermal 10(23.3%) adiminstration are the most

frequent routes of adiminstration. These remedies are suited for drinking 18 (41.8%), swallowing 11(25.6%), wash and cream 9 (20.9%) and the others 5 (11.6%).These results are akin with human medicinal treatements in this study and work of Mirutse Giday (1999), and Bayafers Tamene (2000).

5.5.4.1 Major livestock diseases and number of plant species used by indigenous people of the study area

Compared to human diseases, livestock diseases are treated with a few number of plant species.As obtained from informants, fewer numbers of medicinal plants are used to treat livestock diseases than humans. However, most of the informants revealed hat in most cases they treat their livestock by indigenous medicine and rarely look for modern medication.

Thirty-four livestock diseases were found to be treated with 27 plant species and 65 preparations. Internal parasites and eye problem ranked first since they are treated with five species of plants. Wound and diarrhoea ranked 2nd (four species) and the 3rd rank constitutes sudden sickness, external parasites and retained placenta (three species) (Table 8). Thus, indigenous knowledge of the local people reveals that the people are more endowed with the knowledge of human diseases and treatments than livestock disease. This may be due to (1) high occurrence range of human diseases than livestock and (2) the relative high priority attached to human health. In addition, it can be argued that the people (the respondents) have limited knowledge about the treatement of livestock diseases compared to human ailments since they lead sedentary way of life and not pastoralists.

Table 8 Major livestock diseases and number of ethnoveterinary plant species used to treat livestock by indigenous people of Ejaji area

Disease treated	Total species	% total
Actinomycosis	1	1.5
Anthrax	2	3
Anti- inflammatory	1	1.5
Avian cholera	1	1.5
Blackleg	2	3
Blotting	2	3
Breast ulcer	1	1.5

Coccidiosis	1	1.5
Cough	2	3
Diarrhoea	4	6.2
Epilepsy	1	1.5
Epizootic lymphagities	1	1.5
Erythroblasts	1	1.5
External parasites	3	4.6
Eye problem	5	7.8
FMD (Foot and Mouth Diseases)	1	1.5
Hyena bite	1	1.5
Infection	1	1.5
Internal parasites	5	7.8
Leeches	1	1.5
Lumpy skin	1	1.5
Mechanical trump	1	1.5
Newcastle disease	1	1.5
Pasturolosis	1	1.5
Rabies	1	1.5
Retained faces	1	1.5
Retained placenta	3	4.6
Scabies	1	1.5
Snake poison	2	3
Sudden sickness	3	4.6
Synerosis celebralis	1	1.5
Trypanosomiasis	2	3
Ulcer tic lymphagities	1	1.5
Wound	4	6.2

5.5.4.2 Description of the most frequently reported medicinal plant species used to treat livestock ailments

***Ricinus communis* L., Euphobiaceae; Qoobboo (Or.)**

Habit, habitat, distribution: Varying from ephemeral less than 1m high to tree- like herb 5-10m high with trunk 15 cm thick, stems hallow and young shoots often purplish. A wide spread plant of home garden in both rural and urban areas, also common along seasonally dry rivers; 400- 2500m. The plant is widely distributed in the flora of Ethiopia and Eritrea

(Eastern Wellega, Gonder, Kefa, Gamo Gofa, Sidamo and Bale)(Tewolde BGebregiziabeher and Edwards, 1997)

The oil from the seeds of the plant has recorded medicinal and industrial uses and produced commercially. The plant contains a very dangerous toxin, a few molecules of which are capable of killing any cell into which they are introduced (Gilbert, 1995).

Medicinal uses: Anthrax, Sudden sickness, Blotting, Actinomycosis, Uleceritic lymphagities and Epizootic lymphagities. The local people use this plant to treat six livestock diseases. Fruit of the plant is used to treat anthrax, uleceritic lymphagities (Biichee harree) and epizootic lymphagities (Biichee fardaa).To treat anthrax, dried fruit of *Ricinus communis* is powdered and mixed with water, and one cup of tea is given to cattle. For epizootic lymphagities and uleceritic lymphagities, dried fruit of *Ricinus communis* is powdered and mixed with bark powder of *Prunus africana* and creamed to the ulcerated skin of horse, mule and donkey.

Root of this plant is used to treat "dingetegna", blotting and actinomycosis of livestock. For treatment of dingetegna, root of *Ricinus communis* and root of *Justica schimperiana* pounded, mixed with cold water, 1-2 cup of tea given to cattle. Similarly, blotting can treated by root of *Ricinus communis* after pounded with table salt, mixed with cold water and half a cup given to cattle. For actinomycosis root of *Ricinus communis is* pounded with table salt and soil, one glass of the concoction given to cattle, half a glass given to goat and sheep.

***Cussonia ositinii* Chiov. Araliaceae; Harfattu (Or.)**

Habit, habitat, distribution: Tree up to 7m high; bark corky, leaves palmately lobed, peltate, up to 35x35; lobs7, glabrous margin creenulate to serrate, apex caudate- acuminate.

Distribution upland Savanna; 1500-2100m. Found in Ethiopia in Gonder, Gojam, Wellega and Kefa (Friis et al., 2003).

Medicinal uses: Cough, Ulceric lymphangites and Hepatitis

The local people treat cough in cattle by powdering the leaf of *Cussonia ostinii* and *Asplenium monathes* together and giving 3-4 drops of the exudates. To treat Ulceric lymphangites bark of *Cussonia ostinii*, leaf of *Asplenium monathes* and *leaf of Calpurnia subdecandra* are pounded together and 2 cups are given to an infected donkey. For the

treatment of hepatitis, bark (root) of *Cussonia ostinii*, leaf of *Asplenium monathes* and leaf of *Calpurnia subdecandra* are pounded together and 2 cups are given to infected cattle

5.5.5 Medicinal plant species used to treat both livestock and human ailments

Fourteen (15.7%) medicinal plant species of human and veterinary importance were gathered and documented in this study. These plants are classified under 14 genera and 12 families. Family Fabaceae and Euphorbiaceae accounted for two species each and the rest of the families had only one species each. The majority of these plants are collected from wild; eight species (57.2%), 4 species cultivated and 2 species (14.3%) are either cultivated or wild.

5.5.5.1 Habit, preparation and methods of application.

Concerning habits of medicinal plants harvested, shrubs (7 species, 50%) and trees (4 species, 28.6%) are the most dominant growth forms. Herbs and climbers make up 2 species (14.3%) and 1 species (7.2%) respectively.

As that of medicinal plants for human use, the largest proportion of plant parts utilized for medicinal preparations are accounted by leaves (27 preparations, 42.2%) followed by roots (19 preparations, 29.7%). The other parts include fruit (3 preparations, 4.7%), seed (six preparations, 9.4%), bark (two preparations, 3.4%) and others (7 preparations, 10.9%). These plant parts are commonly prepared and used in fresh form (38 preparations, 59.4%), dried form (20 preparations, 31.3%) and dried or fresh form (6 species, 9.4%). These preparations are major as pounding (34.4%) and powdering (28.1%) and minor crushing (9.4%), chewing (4.7%), dry bath (6.3%), steam bath (3.1%), squeezing (3.1%), burning (3.1%) and smashing (7.8%).

These prepared medicines are taken through different routes. However, oral route is the major route (45 preparations, 70.3%) and coincides with livestock medicinal plant route of application in this study, and with the works of Mirutse Giday (1999) and Bayafers Tamene (2000). Nasal (9.6%), dermal (9.4%), optical (1.6%), auricular (1.6%) and others (7.8%) are the other minor recorded routes of application. Drinking, swallowing and eating are major recorded application methods in the area, which are in corollary with the findings of Kebu Balemie *et al*., (2004).

5.5.5.2 Description of the most frequently reported medicinal plants used to treat livestock and human ailments

***Thalictrum rhynochocarpum* Dill. & A. Rich., Ranunuclacea*e;* Siraabuzuu (Or.)**

Habit, habitat, distribution: An erect herb 0.4-3m tall. Usually grows in shade, by roadsides and stream banks, in moist fallow fields and west shady montane forest in the range of 1600-3050m. Found in Kenya, Tanzania, Uganda, Rwanda, Burundi, Malawi and Nigeria (Demel Teketay, 2000).

Medicinal uses: In the study area, this plant is used to treat Sudden sickness, Blackleg (Bishoftuu), Diarrhoea and Cattle infection (Arraba idda) of livestock, and Sudden sickness and Tetanus (Hadhaa) of humans diseases.

***Lepidium sativum* L., Brassicaceae; Feecoo (Or.)**

Habit, habitat, distribution: An erect glabrous annual herb to 80cm high. Grows scattered in and with other crops, mostly with *Eragrostis teff* and *Linum usitatissimum* at altitudes between 750-2900masl (Fichtl and Admasu Adi, 1994). In the study area, it is found with *Eragrostis teff, Linum usitatissimum and Brassica napus.*

Medicinal uses: For fibril illness, Diarrhoea and Malaria in humans and Blotting in cattle. Mode of preparation and application; for diarrhoea pounded seeds are concocted with *Allium sativum* bulbs and honey, one cup of tea or three spoons are eaten for three days after breakfast. To treat malaria seeds are pounded mixed with sugar, one-two cup of the concoction mixed with water are used as a drink for two days. For fibril, illness seeds are dry fumigated or dry bath is applied. For cattle blotting, seed of *Lepidium sativum* and bulb of *Allium sativum are* pounded together and given to cattle.

In most parts of Ethiopia, it is cultivated for its seeds considering it as the standardized medicine used to treat variety of skin complaints as well as cold, stomach upsets and swollen glands (Jansen, 1981; in Debela Hunde, 2001). Seeds are chewed to cure throat diseases, asthma and headache (Kloos, 1976). Seed floor is mixed with honey and taken against amoebic dysentery (Jansen, 1981).

***Nicotiana tabacum* L., Solanaceae; Tamboo (Or.)**

Habit, habitat and distribution: An erect glandular pubescent annual or biennial herb growing to 2.5m high. It is a cultivated plant in home gardens in some parts of the country and some times escaped into waste ground and along streams at altitudes between 1700 and 2400m (Fichtl and Admasu Adi, 1994). In the study area, it is found in farmers' home garden or under the shade of life fence and ritual trees.

Medicinal uses: Blotting, Expel leeches, Internal parasites, Trypanosomiasis, Eye infection and Head ache. The local people use this plant to treat four livestock and one human disease.) For treatment of blotting in cattle, leaf and root of *Nicotiana tabacum* is dried, powdered, mixed with salt and made as bread and a slice given to cattle for three days. Crushed and backed leaf of *Nicotiana tabacum* is dried, powdered and mixed with water. One third of a litter given to cattle to expel leeches.

Leaf of *Nicotiana tabacum* is pounded with root of *Carissa spinarum*, mixed with water and cup of tella given to calf. To treatment of internal parasites, leaf of *Nicotiana tabacum* is pounded with root of *Carissa spinarum* and mixed with water, and a cup of tella is given to calf; crushed and backed leaf of *Nicotiana tabacum* is given to cattle to treat trypanosomiasis and dried and powdered leaf of *Nicotiana tabacum* sniffed ('Suurata') by human for relive to headache.

***Phytolacca dodecandra* L., Phytolaccaceae; Handoode (Or.)**

Habit, habitat and distribution: Semi- succulent, straggling or scrambling shrub to 10m or more. It grows in evergreen bush land, forest edges and disturbed places in altitudinal range of 1500- 3000m. In Ethiopia, this plant is found distributed in Tigray, Bale, Gamo Gofga, Gonder, Welo, Gojam, Wellega, Shewa, Illubbabor, Kefa, Arsi, Sidamo and Harerge regions. It is also found in other African countries in Eritrea, Madagascar and in tropical and South Africa (Polhil, 2000). *Phytolacca dodecandra* is widely used as soap specially for making cotton costume white, also as a vermifuge and molluscicide for the control of the snails that are vectors of Bilharziasis. The importance of this plant due to molluscidal properties has led to setting up of the Endod Foundation, with its head quarter in Addis Ababa. Endod varieties with high molluscidal content have been identified and are now being cultivated by peasant farmers (Polhil, 2000). The active substance known as Lemma toxin (C48 H78 O18), isolated from berries of this species is found effective for its molluscidal activity (Glasby, 1991; Harbone and Baxter, 1993).

Medicinal uses: Liver problem, Hyena bite, Gonorrhea and Rabies

To treat liver problem *Phytolacca dodecandra* root is crushed and pounded, mixed with water. One third of tella cup is given to human. For hyena bite *Phytolacca dodecandra* root is smashed with its leaf, and tied on neck of cattle by clean cloth.

Gonorrhea is treated by powdering *Phytolacca dodecandra* and *Croton macrostachyus* root, and 1-2 cup of coffee is given to human with coffee and rabies is treated with dried root of *Phytolacca dodecandra* powder and one-two cup of domestic alcohol (malakie) is taken by human 3-4 is used for livestock. This plant is popular in the study area as the fruits are pounded and used as soap widely by the local people. The local people identify also the non-medicinal value of male species, as it is highly toxic. Elsewhere in Bale, the root of this plant is mentioned for its use in treating nasal and eye infections in horse and for treating gonorrhea (Menassie Gashaw, 1991). In Cheffa Welo, the root powder is used for treatment of gonorrhea (Bayafers Tamene, 2000).

***Cucumis ficifolius* A. Rich., Cucurbitaceae; Hiddii Hooloo (Or.)**

Trailing perennial herb to 4m. It is found growing in grassland and woodland; Acacia woodland, rocky slopes found in secondary vegetation and cultivated places. It is found in altitudinal ranges of 1300-2400m.a.s.l.

In Ethiopia, *Cucumis ficifolius* is found in Tigray, Gojam, Shewa, Wellega, Gamo Gofa, Harerge. This plant is also found in Uganda, Rwanda, Kenya and Tanzania (Jeffery, 1995). The root extract of this plant is used in local honey wine (Tej) to make beverage more intoxicating (Jeffery, 1995)

Medicinal uses: Fibril Illness, Ear pain, Stomach problem, Cattle Infection, Tetanus and Anti- inflammatory.

To treat fibril illness root of *Cucumis ficifolius*, leaf of *Ocimum gratissimum and* leaf of *Calpurnia aurea* are pounded together and mixed with cold water and a cup of coffee given to human. Sap of fruit of *Cucumis ficifolius* added to ear canal to cure ear pain. A piece of root of *Cucumis ficifolius* chewed with salt and swallowed by human for stomach complication. Root of *Cucumi ficifolius* with leaf of *Teclea nobilis* are pounded together and mixed with cold water and two cups of tella are given to cattle. Leaf of *Cucumis ficifolius* is smashed and 2-4 drop of the sap added to the swelling to cure tetanus. Bark and leaf of

Cucumis ficifolius are dried and powdered together mixed with alcohol, and with a cup of tea taken by human in order to treat dingetegna and, root of this plant is pounded and mixed with cold water; one litter is given to cattle, to cure anti-inflammatory case in cattle. In the study area, the local people use the plant during cattle ritual ceremony by stretching the plant stem on cattle gate "Dalla Loonii". According to Ermias Lulekal (2005), this plant is used for treatment of rabies, jaundice and gonorrhea. The root concoction of this plant is used to cure gonorrhea (Mesfin Tadesse and Sebsebe Demissew, 1986). In Chefa, South Welo, this species is used for treatment of sores; diarrhea and stomach disorder (Bayafers Tamene, 2000).

5.6 Informant consensus

The results of the study showed that some medicinal plants are popular than the others, in view of that, *Ocimum urticfoluim* (Hancabbii adii) took the lead where it was cited by 64 (88.8%) informants for its medicinal value for treating fibril illness. *Allium sativum, Lepidium sativum* and *Nicotiana tabacum are* cited by 62 (86%), 52 (72.2%) and 48 (66.7%) informants ranking 2nd, 3rd and 4th respectively (Table 9). The latter three species are used for treating a series of different health problems. The action of plant extracts on different health problems may explain the broad- spectrum nature of plants, while their action on aparticular problem explains their narrow spectrum nature.

Popularity of these medicinal plants according to key informants is due to their wide range of diseases they treat or due to the abundance of the plant in the area for easy access. The case of *Ocimum urticfoluim and Nicotiana tabacum* can be cited for their abundant distribution in the area. With this, other medicinal plants mentioned by four or more, scoring percentage greater than 25 (Table 9) and those frequently used ones for treatement of more than two ailments are described in section 5.5.3.2, 5.5.4.2 and 5.5.5.2.

Table 9 List of medicinal plants and the corresponding informants (percentage>5) (for families and local names see Appendix 1)

Scientific name	Total informants	% total
Acmella caulirhiza	16	22.2
Allium sativum	62	86
Aloe pubescens	6	8.3
*Bidens biternat*a	10	13.8
Brucea antidysenterica	18	25

Calpurnea aurea	17	23.6
Capparis tomentosa	8	11.1
Carica papaya	18	25
Carissa spinarum	24	33.3
Citrus limon	17	23.6
Clematis simensi	5	6.9
Croton macrostachyus	23	31.9
Cucumis ficifolius	38	53
Cussonia ostinii	21	29
Cynodon dactylon	14	19.4
Datura stramonium	25	35
Echinops kerebicho	17	23.6
Ekebergia capensis	4	5.5
Embelia schimperi	16	22.2
Erythrina brucei	5	6.9
Euphorbia lathris	16	22.2
Eucalyptus globulus	10	13.8
Ficus vasta	10	13.8
Grewia ferruginea	4	5.5
Lagenaria siceraria	24	33.3
Lepidium sativum	52	72
Linum usitatissimum	18	25
Lippia adoensis.var.Adoensis	9	12.5
Nicotiana tabacum	48	66.7
Ocimum urticifolium	64	88.8
Phytolacca dodecandra	28	38.8
Plantago lanceolata	16	22.2
Ricinus communis	31	43
Ruta chalepensis	17	23.6
Schinus molle	8	11.1
Solanum incunum	8	11.1
Thalictrum rhynchocarpum	32	44.4
Vernonia amygdalina	26	36

5.7 Preference ranking and paired comparison

5.7.1 Preference ranking

When there are different species prescribed for the same health problem, people show preference of one over the other. They also show preference in searching for treatement either from clinics or from local healers. Some informants reported that searching treatment from clinics for gonorrhea and some other diseases are taken as taboo. Thus, the rural communities prefer traditional healers. However, the case is reversed among the informants from Ejaji town, as the dwellers are better experienced in using modern drugs for ailment treatement.

Preference ranking for seven medicinal plants used to treat gonorrhoea (Table 10) shown that *Carissa spinarum* ranked first and hence is the most effective medicinal plant to cure gonorrhea. The second, third, fourth and fifth most preferred medicinal plants against this disease are *Croton macrostachyus, Echinops kerebicho*, *Crateva adansonii* and *Justica schimperiana* while, the least preferred species compared to the other five species are *Phytolacca dodecandra and Vernonia hymenolepis* according to informants.

Table 10 Preferance ranking of seven selected medicnal plants based on their degree of treating gonorrhoea as perceived by informants

Species / Respondants	*Crateva adansonii*	*Croton macrostachyus*	*Phytolacca dodecandra*	*Echinops kerebicho*	*Justica schimperiana*	*Vernonia hymenolepis*	*Carissa spinarum*
R_1	3	6	2	7	4	1	5
R_2	4	5	1	6	3	2	7
R_3	4	5	3	7	2	1	6
R_4	3	4	6	1	7	2	5
R_5	6	4	1	3	2	5	7
R_6	5	6	3	4	1	2	7
R_7	5	4	2	7	3	1	6
R_8	2	1	5	6	7	4	3
R_9	6	4	1	5	2	3	7
R_{10}	5	3	2	7	4	1	6
R_{11}	4	6	5	3	1	2	7
R_{12}	4	7	2	6	3	1	5
R_{13}	6	7	1	3	2	5	4
R_{14}	5	7	2	3	4	1	6
R_{15}	5	6	2	4	1	3	7
Total	**67**	**75**	**38**	**72**	**46**	**34**	**88**
Rank	4^{th}	2^{nd}	6^{th}	3^{rd}	5^{th}	7^{th}	1^{st}

Information correspondence among 15 key informants was analyzed using SPSS programme, as indicated in the dendrogram (Fig.11). Since the knowledge on the use, application, preparation and administration differ from healer to healer, the output of the result depicts that there is variation among 15 informants for gonorrhea treatment.

The informants are grouped into three on their knowledge experience in treating gonorrhea. Informants 1,2,3,5,6,7,9,10,11,12,13,14, and 15 are grouped under one category and informants 4 and 8 are grouped under the other category. On the other hand, informants 5,6,9,11,14 and 15 are healers who are mainly involved in different social activities and give supportive intermittent ailment treatments. While the other classes of the first group 1, 2, 3,7,10, 12 and 13 are yet treated a number of individuals and they are known traditional healers of different ailments in addition to gonorrhea in the locality.

Informant number 4 and 8 are practitioners with the age of below 25 and hence less experienced compared to the other. However, they are gruoped in to two classes based on their differences. Hence, as analyzed, there is variation in treatment access by local people and variation in the knowledge of the healers found in relation to plant resources and additional social service they provide is shown by dendrogram using average linkage (within group) rescaled distance cluster combin.

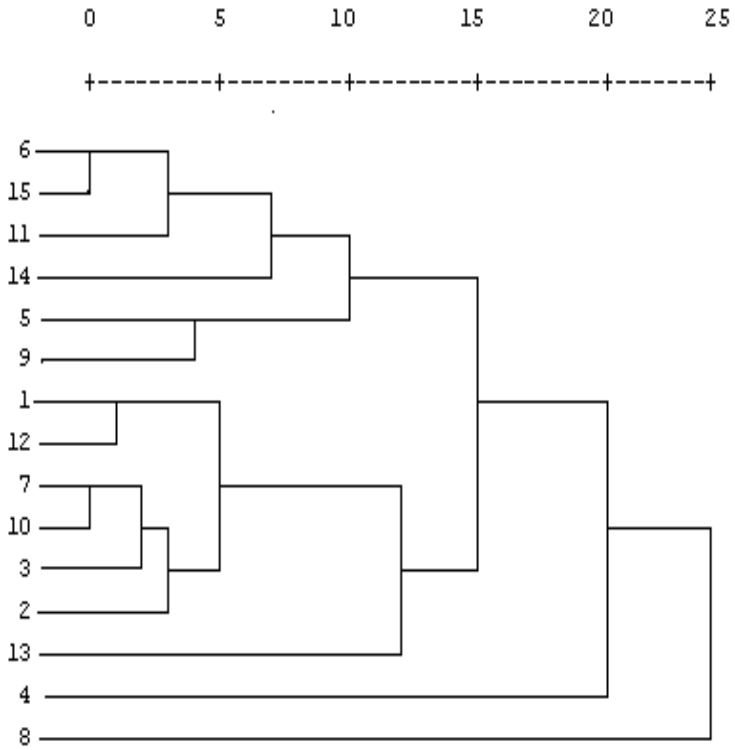

Figure 11 Dendrogram showing distance between respondents (Single Linkage Euclidian Distance)

5.7.2 Paired comparison

In this study, ten informants to indicate the efficacy and popularity of these species to treat evil eye did paired comparison of six medicinal plants (Table 11). *Pterolobium stellatum, Carissa spinarum, Capparis tomentosa and Croton macrostachyus* were ranked 1st, 2nd, 3rd and 4th respectively. *Albizia schimperiana and Crateva adansonii* are less preferred and less efficacious compared to the other four species.

Table 11 Paired comparisons of six medicinal plants used to treat evil eye

Plant species	Respondents										Total	Rank
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10		
Albizia schimperiana	3	4	1	0	3	2	2	2	1	2	20	5th
Capparis tomentosa	2	0	3	2	2	3	2	1	2	5	22	3rd
Carissa spinarum	3	2	3	5	2	5	4	3	4	4	35	2nd
Crateva adansonii	1	3	1	2	0	2	2	2	3	0	16	6th
Croton macrostachyus	4	2	2	3	3	1	1	2	2	1	21	4th
Pterolobium stellatum	2	4	5	3	5	2	4	5	3	3	36	1st

Some studies made in Ethiopia (Bayafers Tamene, 2000; Gebremedhin Hadera, 2000; Debela Hundei, 2001; Abiyot Berhanu, 2002) have used the method of pair wise ranking where informants made their choices on individual basis.

For example Abiyot Berhanu (2002), employed pair wise ranking to reveal the most preferred traditional medicinal plants used by the local people to treat malaria in Jabitehnan Woreda, West Gojjam; quantitatively showing that *Allium sativum* was the most preferred antimalarial plant.

5.8 Direct matrix ranking

In this study, a number of medicinal plants were found to be multipurpose species being utilized for a variety of uses. The common uses include medicinal, fodder, food, firewood, construction, charcoal, fencing and furniture making. Eight commonly reported multipurpose species and eight use-categories were involved in direct matrix ranking exercise in order to

evaluate their relative importance to the local people and the extent of the existing threats related to their use values (Table 12).

As shown in Table 12, *Syzygium guineense* and *Cordia Africana* were ranked 1st and 2nd and hence are the most preferred medicinal plants by local people for various uses and are the most threatened species as the informants reported, which is evidently shown by their distribution scarcity and time required for collection of these species. Eventhough *Eucalyptus globulus* is required for, various use values and ranking 3rd it is abundantly recorded in the area as human being plants it. *Carissa spinarum, Prunus africana and Olinia rochetiana* are the other multipurpose medicinal species ranking *4th, 5th* and 6th respectively. The least ranked species in multipurpose aspect are *Vernonia amygdalina and Croton macrostachyus.* Thus, the least ranked species are the less threatened and the dominantly distributed species in the area. However, it is not appreciated for other uses their use for food by human being in the area, *Croton macrostachyus* with the least rank is a highly regarded and abundant medicinal plant in the area

Similarly, the values for use reportes across the selected species were summed up and ranked. The results show that the local people harvest eight multipurpose species mainly for firewood, fencing, medicine, charcoal, construction and furniture with the rank of 1st, 2nd, 3rd, 4th, 5th and 6th respectively. Thus, the long-term survival of the top- ranked species are under question, as the daily demand of the local society is usual and continuous with lesser rate of re-plantation, except for *Eucalyptus globulus*. This is evidenced by the high rate of loss of *Cordia africana in the area.*

Table 12 Average score for direct matrix ranking of eight medicinal plant species based on their general use values(5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used)

Species	Use-categories								**Total**	Rank
	Fire wood	Forage	Construction	Furniture	Food	Charcoal	Fencing	Medicine		
Croton macrostachyus	3	0	2	4	0	1	3	5	**18**	8th
Cordia africana	4	0	5	5	2	5	4	4	**29**	2nd
Olinia rochetiana	4	2	4	2	0	4	4	2	**22**	6th
Syzygium guineense	4	2	5	5	4	4	4	3	**31**	1st
Vernonia amygdalina	4	5	1	0	0	1	3	5	**19**	7th
Prunus africana	2	4	4	4	0	3	3	3	**23**	5th
Carissa spinarum	5	5	0	0	3	4	4	4	**25**	4th
Eucalyptus globulus	5	0	5	5	0	5	5	3	**28**	3rd
Total	**31**	**18**	**26**	**25**	**9**	**27**	**30**	**29**	**195**	
Rank	1st	7th	5th	6th	8th	4th	2nd	3rd		

5.9 Fidelity level index

Confirmation or consensus could not be taken as a single measure of the potential efficacy of any medicinal plant in fidelity level index. Thus, efficacy is not the only factor that influences the informant choice but abundance of a given plant and prevalence of disease in the area can affect informants choices.

As malaria is one of the frequently reported diseases in low land areas (Ejaji, Kiltu Elala and Warji) and less, frequent in high land areas (Sire Silase and Shano Agalo). Different number of informants from the two areas for malaria case reported the use of *Allium sativum* as a remedy. The fidelity level index was calculated for *Allium sativum* for the two ecological areas.

Atotal of 13, 17 specific and general use for *Allium sativum* were reported by informants from Sire Silase and Shano Agalo. While 17, 18 specific and general uses for *Allium sativum* were reported by informants from Kiltu Elala and Warji.

Use reports of informants from Sire Silase and Shano Agalo were compared with informants from Kiltu Elala and Warji to asses the fidelity level of *Allium sativum (*FL=IP/IU*).* From the comparison, it was found that the fidelity level of *Allium sativum* for malaria treatment by Sire Silase and Shano Agalo informants was 76.4%, while for Kiltu Elala and Warji was 94.4%. Thus, the medicinal value of *Allium sativum* is high in Kola areas compared to Dega zones.

6. Management and conservation of medicinal plants

People of the study area manage the local vegetation to not only meet their fodder, fruits, construction, fuel wood, commercial values, cultural and spiritual needs but also for their medicinal attributes, as the knowledge is with them. An informant from Warji revealed that the knowledge on medicinal plants in the area passes from generation to generation as there is opportunity of knowledge exchange and transfer to the youngs. The informant pointed out that collection, preparation and marketing takes place with the assistance afamily or close relatives, which open for knowledge gain and transfer. Practitioners coming from Wellega, Jima, Shewa and Illubabore for the search of medicines and other marketing activities also exchange their knowledge with the practitioners from Ejaji. Even today, two of the vendors in Ejaji town revealed that, there is knowledge exchange between the practitioners from Bale, Arsi and Gambella with the practitioners of study area, as prepared remedies ingredients are brought from these areas or zones.

Informants also reported that the healers know time and processes of gathering, and storing medicinal plants. It is once a year that some medicinal plants are collected and preserved. *Lepidium sativum, Sorghum bicolor, Cucumis ficifolius, Datura stramonium, Embelia schimperi, Ricinus communis* and *Thalictrum rhynchocarpum* seed, leaf, fruit or root are harvested, dried and preserved in roof corners or out side house, and dried parts are powdered and stored in different containers like pots, bottles or tied with clothes and used when needed

Indigenous people of the area have strong and genuine belief on healing power of plants and they know their habitat, distribution, harvesting technique, time of harvest and the status of a plant in the area. For instance, medicinal plants like *Ocimum urticifolium, Ruta chalepensis* and *Nicotiana tabacum* are found in majority of family gardens and farm borders in the study area, as they need these plants in their daily life as a stimulant, medicine or for other values. Other medicinal plants are also maintained or protected near vicinity due to their fragrance, as live fences to avoid enemies, as spices and for food.

Plants are also left as remnants of forest in agricultural field due to their uses as timber source, for construction, fuel wood, spiritual and ritual values. Thus, plants are managed and conserved because of their spiritual, ritual and material values, which open the way for the possibilities in conservation of vegetation of the locality in general and medicinal plants in particular. Here, the intermixing of multi- purpose tree species by farmers on their farmland is evidence to management practices in the area. This type of management practice should not be disregarded as it benefits the indigenous people and encourages them to conserve plants of medicinal value with indigenous practices. In the area, about 11% of medicinal plants collected were reported as cultivated in home garden and 5% under cultivation in crop field.

The ritual and spiritual protected areas for celebration of "Gada" and "Jaarii", "Errecha" and "Qe'ee Ayyantuu" preferably contain more plant diversity because, cultural rule of harvest forbid harvest of plant resources from these areas, possibly preserving indigenous ethnobotanical information and cultural components. Culturally, trees with synonymous to an individual are not harvested by an individual, which has contribution to conservation activities in the area. A person named Ejersa cannot harvest *Olea europea (*locally named "Ejers*a*".

Collection and application of medicinal plants requires strict cleanses of spiritual body, such as special prey to God to attain full power of healing. The informants further revealed that, the healer or collector should not sleep with his or her partner and sexual activity is not allowed for 24 hours before collection (laguu). In connection, experienced healers follow the lunar calendar "lakkofsa ji'aa" or time of "cagginoo" to collect medicinal plants, as this time retards the rate of healing of plants from which medicinal part has been collected.

The healers also know the direction, site and angle from which the plant should be harvested. Shoots, main root, regenerating parts and insect or human and animal injured plants are not harvested. During root harvest, the healer buries the pit from which the harvest has taken place. This is either to increase the healing power of the medicine or to increase the regenerating capacity of the plant. Besides, collection of immature plant

resourses, shoot harvest, harvest from spring source “Burrqaa bishanii”, under ritual trees “muka irrecha, dhibayyu, jaarii” are believed as it results in attack of “magannga” and the healer faces misfortunes in his lifetime. Thus, as reported by informants’ taboos, social restrictions and seasons of collection all limit over exploitation of medicinal plants by healers in the area.

Traditional healers in general treat diseases like malaria, fibril, evil eye, gonorrhea and other STDs by traditional medicinal plants than they watch modern treatment. Thus, economy, severity and taboo related factors determine diseases either to be treated by traditional healers or to watch modern Clinics or Hospitals. Rabies, which is commonly treated by traditional healers by “Qoricha aadaa”, can be also referred to higher Hospitals at Addis. This enables the healers again to retain their knowledge.

Traditional beliefs have an indirect contribution to the conservation of plants of medicinal importance, since they limit excessive harvesting of these plants in one way or another. Thus, these beliefs could be considered as the major parts of traditional medicinal plant conservation activities of the local people. (Debela Hunde (2001) and Kebu Balemie *et al.*, (2004) from other parts of Ethiopia, based on their studies in Rift valley have reported parallel beliefs, attitudes and practices.

7. Threats to medicinal plants and indigenous knowledge in the area

Nowdays, the world is losing plants every minute due to deforestation, for agriculture, firewood, timber, construction materials, over browsing and over grazing (Seyani and Chikuni, 1997). These common anthropogenic factors beside some natural factors resulted in loss of plant genetic diversity and threatening the very survival of human kind with erosion of some life saving medicinal plants of wild genes (Odera, 1997). The loss of medicinal plants associates with the missing advantages gained from medicinal plants and indigenous knowledge associated with plants (Sofowara, 1982). This is observed in Chelya Woreda as collection and search for some medicinal plants like *Cordia Africana*, *Thalictrum rhynchocarpum* and *Ekebergia capensis* need longer time and distance from their residence.

The surge in global demand for herbal medicines has been followed by a belated growth in international awareness about the dwindling supply of the world's medicinal plants. In the area, medicinal plant harvesting for local use does not result in their threat. Instead, most endangered medicinal plants of the area area threatened due to other use modes. Over-harvesting for commercial purposes, destructive harvesting practices, habitat loss resulting from forest degradation and agricultural encroachment have all been recognized as contributing factors to the loss of plant taxa with indigenous knowledge. Thus, the need for agricultural land and population pressure severely threatened plant species in general and medicinal plants in particular. The effect of deforestation on medicinal plants was reported in Mirutse Giday (1999). Harvest of medicinal plants put them also under threat, even though it is not severe as the other factors.

In the study area, the tragedy is that the knowledge on medicinal plants depth and width become lesser and lesser due to its secrecy, unwillingness of young generation to gain the knowledge, influence of modern education, religious and awareness factors, which all resultes in gradual disappearance of indigenous knowledge on medicinal plants. This trend is also observed in other parts of Ethiopia. Ethnomedicinal knowledge diminishes with the death of elderly knowledgeable members of the society, since less and less young people are willing to acquire the knowledge. Thus, erosion of knowledge on

medicinal plants is more significant in species collected from forests for use in treating rare and unusual ailments (Caniago and Siebert, 1998).

Business obtained from charcoal making and timber production severely accelerated the high rate exploitation of *Acacia abyssinica* and *Cordia africana.* An insignificant number of *Acacia abyssinica* and *Cordia africana* mature plants were recorded in the area indicating over exploitation. Balick and Cox (1996) argue that quite simply, mature seed producing trees that are the backbone of the population will die and are not replaced and ultimately the resource base on which cultural values are built will disappear because of over harvesting. This case is justified for areas near Ejaji town and Warji where people need to travel longer distances to collect firewood and charcoal because of earlier unsustainable harvesting.

Significant number of animals graze and brows on vegetations in their locality. They put an actual effect on vegetations there during dry season, as the availability of browsable and grazable vegetation is limited. These in turn affect the survival of medicinal plants and associated knowledge.

Another threatening factor of vegetation of the study area is ceremony celebration periods. In the area, plants are harvested for celebration of ceremonies like “Ayana Gada, Jaarii loonii, Ateete and (“Gaa’ela”) or Matrimony ceremony” and spiritual ceremonies “Ayyaana giiftii” put plants under threat. These celebrations come with selected plant parts cut for the ceremony. Plants like *Maesa lanceolata*, *Premna resinos*a, *Phoenix reclinata* and *Clausena anista* are affected in the areae due to these activities.

Individual farmers in the area as observed during the study penetrate the forest with their axes daily. Here, the scenario is people need plants for their daily life activity i.e. as source of household tools, furniture, ornaments, utensil making and agricultural implements. Thus, those multi- purpose species are on the front line to be affected by these activities.

Threat to indigenous knowledge on medicinal plants in the area is manifested not only due to loss of taxa. However, secrecy during collection, oral based knowledge transfer, impact of modernization, refusal from the younger generation to inherit the knowledge and unavailability of the species all resulted in accelerated rate of indigenous knowledge loss in the area.

Supplementary difficulty is the system of verbal knowledge transfer dictating vernacular names of plant, mode of preparation, diseases treated and habit of the plant hardens the secrecy. Combined with these factors also age of the healers passing the knowledge i.e. old age healers provide the description with doubtful authenticity to the learners.

Religious concerns also disregard traditional medicinal plants in the area, as if it is wrong fortune the healers portray to gain business benefit. Thus, a number of combined conditions stated above resulted in oveall loss of taxa and indigenous knowledge in the area. Evidently, more medicinal plants were used in the past than today.

8. Conclusion

- Indigenous people of the study area have their own ways of managing resources as they are endowed with specific culture, tradition and ethical norms. The present study revealed people of the area have different depth and width of knowledge of natural resources in general and medicinal plants in particular in their locality. These resources are with wide and varied use values i.e. forage, fodder, charcoal, timber, tools, spiritual and cultural values. Thus, local peoples know when, where and how to use these plant resources around their locality.
- The locality is rich in plant diversity. One hundred eighty eight species of plants were recorded comprising of 89 (47.3%) medicinal plants, of which 48 species (53.9%) were noted to treat 47 human ailments while, 27 species (30.3%) are used to treat 34 livestock ailments and 14 species (15.7%) are used to treat both livestock and human ailments.
- Peoples of the study area partly depend on this resource for their day-to-day health care. Traditional medicinal plants provide 40% of human health service and more than 50% of livestock health service.
- The introduction of modern education, religious factors, environmental degradation, and intense deforestation, increased need for farmlands, fuel woods, and construction materials in the area are the main causes for reduction in quantity of medicinal plants and associated knowledge. In addition, browsing and grazing by livestock and celebration of ceremonies resulted to the threat of medicinal plants. However, threat due to utilization for medicinal purpose is low compared to the other factors.
- Generation thought religious, spiritual and cultural related practices has played a significant role in conservation of resources and medicinal plants in the area. However, they have also negative impact to the vegetation and indigenous knowledge of the area.

9. Recommendations

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

- Resources, especially plant resources are integral to the life of all biota, as they are the primary food producers. Life of world biota is directly or indirectly dependent on plant resources. Thus, indigenous people of the study area should be involved in conservation and management plans of plant resources or their indigenous knowledge in their locality.
- Traditional medicinal plants are central to the indigenous cultures and material needs. Therefore, formal and non- formal education systems should be designed to create positive attitude among the young by integrating in to the curricula about the traditional use of plants in general and medicinal plants in particular.
- As the local people harvest vegetations for business or for household use with little awareness of its threat or future sustenance, awareness should be created either, by development agents or agricultural workers through which sustainable harvesting be practiced.
- Creating awareness to the local society through adopting multi-purpose tree species giving especial emphasis to medicinal plants cultivation.
- Training the local people, on resource use value, management and conservation at kebele or woreda level by agricultural experts or development agents, as it facilitates an integration of resource conservation with sustainable use.
- An already started plantation of indigenous and forage trees in the woreda by Gedo Agricultural Department (GAD) at Gedo town should also add another site at Ejaji town and should include medicinal plants from wild, home gardens and cultivations, as it can be used as a site for training, conservation and demonstration.
- Recognitions and intellectual property rights should be given to traditional healers, either through certification or through organizing them at community or woreda level, which popularizes their indigenous knowledge and medicinal plants value.

- In-situ and ex-situ conservation activities should be practiced in the woreda through training model farmers to ensure the continuity of threatened medicinal plants. This can be achieved by:
    - Encouraging people to grow medicinal plants in home gardens, mixing with crops in farmlands and live fences.
    - Promoting the establishment of local botanical garden at least at woreda level
    - Encouraging people to protect and enclose ritual and spiritual areas with higher distribution of medicinal plants in the locality.
- Participatory development of environmental projects should originate at grass root level and not from top-down. It should integrate the needs and interests of the local people and their knowledge.

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11. Appendices

Appendix 1. List of medicinal plants used for both human and livestock, scientific name; family ; local name; habit; parts used; disease treated; methods of preparation with dosage used and route of application. For collection, voucher numbers see Appendix 4

Key : Habit(Ha.): Herb(H) ; Shrub(Sh) ; Tree(T) ;Liana(Li) ; Climber(Cl.); Epiphyte(Ep.). Parts used (Bark, B; Latex, La; Root, R; Leaf,L; Fruit, Fu.;Flower,Fw.; Seed, Se.;Stem,St.;Sap,Sa;Bulb, Bu.;Root and leaf, LR.;Above ground , Ag; Leaf and seed, LSe; Bark and leaf, BL.; Whole plant, Wp; Sap, Sa.and Leaf and fruit, LFu.

Scientific name	Family	Local name	Ha	Pu	use	Disease tr.	Mode of preparation	Route
Acacia abyssinica Hochst ex.Benth.	Fabaceae	Laaftoo	T	L	Hu	Goiter (Inniqqii)	Leaf of *Acacia abyssinica is* smashed and the sap is applied to the goiter for three days with needle.	Dermal
Acmella caulirhiza Del.	Asteraceae	Gutichaa	H	Fw.	Hu	Tonsilites (Harsasse)	Flower of *Acmella caulirhiza* is Chewed and spitted on tonsilites	Oral
Albizia schimperiana Oliv.	Fabaceae	Imalaa	T	R	Hu	Evil eye (buda)	Root of *Albizia schimperiana and Pterolobium stellatum* are dried and powdered. 3-4 spoon of the powder is fumigated on broken pot.	Nasal
				R	Ls	Blackleg (Bishoftuu)	Root of *Albizia schimperiana is* powdered and mixed with water a glass of the concoction is given to cattle.	Oral
				,,	Ls	Swelling (Dhiitoo)	Root of *Albizia schimperiana is* powdered and the powder is rolled in clean cloth and tied to the neck of equines.	Neck
Allium sativum L.	Alliaceae	Qullubbi adii	H	Bu.	Hu	Malaria (Busaa)	Bulb of *Allium sativum* and rhizome of *Ginger officinale* are pounded and eaten with honey.	Oral
				,,	Hu	Stomach problem	Bulb of *Allium sativum* and seed of seed of *Lepidium sativum* are pouinded together and eaten with injera.	Oral
Aloe pubescens Reynolds	Aloaceae	Hargisa	H	R	Ls	Anthrax	Root of *Aloe pubescens* is pounded and mixed with cold water. 2 cup of tella is given to cattle.	Oral
Amaranthus caudatus L.	Amaranthaceae	Iyaasuu	H	L	Ls	Diarrhoea	Leaf of *Amaranthus caudatus* is pounded and boiled with pounded *Allium sativum* and given to cattle.	Oral
Asplenium monathes L.	Aspleniaceae	Digaluu bakkannisaa	Ep.	L	Hu	Sudden sickness	Leaf of *Asplenium monathes is* pounded with leaf of *Cussonia ostinii* and 3-4 cup of tea is taken by human.	Oral
Bersama abyssinica Fresen.	Melianthaceae	Lolchiisaa	T	R	Ls	Pest control (parasitic)	Root of *Bersama abyssinica* is powdered and sprayed on cattle skin and fodder.	Dermal

Bidens biternata (Lour.) Merr.& Sherff.	Asteraceae	Maxxanne	H	L	Hu	Fibrill illness(Michii)	Leaf of *Bidens biternata* is smashed and sniffed	Nasal
Bidens pilosa L.	Asteraceae	Maxxanne	H	L	Hu	Taneia pedis	Leaf of *Bidens pilosa* is immersed in hot water and rubbed to the affected skin of human.	Dermal
				L	Hu	Nasal bleeding	Freshly squeezed leaves are inhaled through nasal opening.	Nasal
Buddleja polystachya Fresen.	Loganiaceae	Hanfaaree	T	L	Ls	Eye disease	Leaf of *Buddleja polystachya* is chewed and spitted on cattle eye.	Optical
Brucea antidysenterica Fresen.	Simaroubaceae	Qomonyo	Sh	L	Ls	External parasites (cinii)	Leaf of *Brucea antidysenterica is* pounded and mixed with water in dish. The mixture is used to wash skin of cattle, donkey, mule and horse for 3-5 days.	Dermal
Calpurnia aurea (Ait.)Benth.	Fabaceae	Ceekaa	Sh	L	Ls	Scabies (citto)	Leaf of *Calpurnia aurea, Croton macrostachyus* and *Justicia schimperiana* are pounded and used to wash scabies of cattle.	Dermal
				,,	Ls/	Snake bite	Leaf of *Calpurnia aurea* is smashed and 3-4 drop of the sap is given orally to cattle, and 2-3 drop to human.	Oral
				,,	Ls	Lumpy skin	Leaf *Calpurnia aurea* is smashed and directly rubbed on skin of cattle.	Dermal
Calpurnia subdecandra (L'Herit.) Schweick.	Fabaceae	Ceekaa Qamalee	Sh.	RL	Ls	Mechanical trump	Leaf of *Calpurnia subdecandra* is smashed and rubbed on affected area.	Dermal
Capparis tomentosa Lam.	Capparidaceae	Harangamaa	Sh	RL	Hu	Sudden sickness	Root of *Capparis tomentosa is* dried powdered and preserved. One spoon of the powder is mixed with alcohol and given to human.	Oral
				L	Hu	Evil eye	Leaf of *Capparis tomentosa* and *Ruta chalepensis* are poundedand mixed in water together and one domestic alcohol cup is used as a drink.	Oral
				L	Hu	Intestinal worm	Root of *Capparis tomentosa* is dried and powdered, mixed with water. Three spoon is given per aday for three days	Oral
				L	Hu	Tooth Infection	Leaf of *Capparis tomentosa*, *Croton macrostachyus Vernonia amygdalina* and *Carissa spinarum* are smashed together and rolled in leaf and heated on charcoal and put on infected teeth.	Tooth surface
Carica papaya L.	Caricaceae	Papaya	T	L	Hu	Malaria	Leaf of *Carica papaya* and *Allium sativum* bulb are pounded together and made in the form of soup, boiled and mixed with honey and one –two cup of coffee is used.	Oral

				Fu	Hu	Anaemia	Fruit of *Carica papaya* squeezed and mixed *with* sugar, and left over night. Two glasses are used as adrink early in the morning.	Oral
Carissa spinarum L.	Apocynaceae	Hagamsa	Sh.	R	Hu	Evil eye	Root of *Carissa spinarum* is pounded and dried. Dry smoke is used as treatment for evil eye.	Nasal
				L	Hu	Head ache	Leaf of *Carissa spinarum* is pounded and dried. Dry smoke is used as treatment for head ache.	Nasal
				L	Hu	Stomach ache	Pounded leaf of *Carissa spinarum* mixed with honey. Two-three spoon is taken early in the morning	Oral
				R	Hu	Gonorrhea	Fresh root of *Carissa spinarum* pounded mixed with cold water. One cup of tella is used as a drink for three days.	Oral
*Citrus limon (*L.) Burm.f.	Rutaceae	Loomii	Sh	Fu.	Hu	Stomach ache	Fruit of *Citrus limon* and bulb of *Allium sativum* are pounded together and mixed with honey and eaten with wheat bread.	Oral
				Fu	Hu	Nasal bleeding	Liqud sap of *Citrus limon* is added to nose or the sap is taken orally.	Nasal/ Oral
Clausena anisata (Willd.) Benth.	Rutaceae	Ulumaayii	Sh	L	Hu	Skin rash (shiffe)	Leaf of *Clausena anisata*, *Solanecio gigas* and *Justicia schimperiana* are pounded together, and creamed on skin.	Oral
Clematis simensis Fresen.	Ranunculaceae	Hidda feetii	Cl.	L	Hu	Tonsilites	Leaf of *Clematis simensis* is crushed and pressed, rolled in clean cloth and tied on neck.	Neck
				,,	Hu	Lymphatic Swelling (Dhulla)	Leaf of *Clematis simensis and Lagera aleta* are crushed, smashed and tied on swelling.	Neck
*Clerodendrum myricoides (*Hochst.) Vatke	Lamiaceae	Maraasisaa	Sh	R	Hu	Head ache	Latex root of *Clerodendrum myricoides* is dried ,powdered and mixed with butter and creamed on head	Dermal
Combretum paniculatum Vent.	Combretaceae	Baggi	Li.	La.	Hu	Ring worm (roobbi)	Latex of *Combretum paniculatum* is pounded and mixed with soda and creamed on affected skin.	Dermal
Cordia africana Lam.	Boraginaceae	Waddeesa	T	L	Hu	Spider poison	Leaf of *Cordia africana* is burned and the remaining ash is mixed with butter and creamed on affected part.	Dermal
Crateva adansonii Dc.	Capparidaceae	Qollaadii	Sh.	R	Ls	Anthrax	Root of Crateva adansonii and leaf of Croton *macrostchys* are pounded together and mixed with water, 2-3 glass is given to cattle.	Oral
				R	Hu	Gonorrhea (Cophxoo)	Dried root of *Crateva adansonii* powdered mixed with water and one-three cup of local alcohol cup is used as adrink.	Oral
				,,	Hu	Intestinal worms	Root of *Crateva adansonii* is pounded with root of *Ruta chalepensis*. Three spoons are used as a drink.	Oral

				,,	Hu	Evil eye	Root of *Crateva adansonii* is pounded with root of *Ruta chalepensis*. The solution is sniffed.	Nasal
				L	Hu	Tooth infection	Leaf of *Crateva adansonii*, *vernonia amygdalina*, *Carissa spinarum* and *Croton macrostchys* aresmashed together and rolled in leaf, and heated on charcoal and put on infected tooth.	Oral
Crotalaria incana L.	Fabaceae	Atarii kuruphee	Sh	L	Hu	Tetanus (hadhaa)	Leaf of *Crotalaria incana* is crushed and put on swelled area	Dermal
				Sap	Hu	Hepatitis (sibira)	Sap from the whole part of the plant is directly creamed on affected area.	Dermal
Croton macrostachyus Del.	Euphorbiaceae	Bakkannisa	T	L	Hu	Ring Worm (roobb)	Leaf of *Croton macrostachyus* is crushed and smashed the extract is creamed on affected area.	Dermal
				B	Hu	Gonohrhea	Bark of *Croton macrostachyus* and *Vernonia hymenolepis* are powdered together, and 3-4 spoons of the powder is taken with tella.	Oral
				L	Ls	Scabies	Leaf of *Croton macrostachyus* with leaf of *Brucea antidysenterica* are crushed together and used as skin wash for calf.	Dermal
				R	Hu	Evil eye	Root of *Croton macrostachyus* and *Carissa spinarum* are chopped together and fumigated.	Nasal
				L	Hu	Febrile illness	Leaf of *Croton macrostachyus* and *Ocimum urticifolium* are fumigated.	Oral & Nasal
				L	Hu	Head ache	Leaf of *Croton macrostachyus* and *Ocimum urticifolium* are smashed and sniffed.	Nasal
				B	Hu	Wound	Bark of *Croton macrostauchyus* is dried and powdered, added to wound	Dermal
				L	Ls	Infection (Arraba iddaa)	Leaf of *Croton macrostachyus* and bulb of *Allium sativum* are pounded together and given to cattle.	Oral
Cucumis ficifolius A.Rich.	Cucurbitaceae	Hiddi hooloo	Cl.	R	Hu	Febrile illness	Root of *Cucumis ficifolius* leaf of *Ocimum gratissimum and* leaf of *Calpurnia aurea* are pounded together and mixed with cold water and a cup of coffee is given to human.	Oral
				Fu	Hu	Ear pain	Sap of fruit of *Cucumis ficifolius* is added to ear canal.	Ear canal
				,,	Hu	Stomach ache	A piece of root of *Cucumis ficifolius* chewed with salt and swallowed by human.	Oral
				,,	Ls	Cattle Infection	Root of *Cucumi ficifolius s* with leaf of *Teclea nobilis* are pounded together and mixed with cold water. Two cups of tella are given to cattle.	Oral

				L	Hu	Tetanus	Leaf of *Cucumis ficifolius* is smashed and 2-4 drop of the sap is added to the swelling.	Dermal
				BL	Hu	Sudden sickness	Bark and leaf of *Cucumis ficifolius* is dried and powdered together mixed with alcohol, and a cup of tea is taken by human.	Oral
				R	Hu	Anti-infilammatoy (gubaa)	Root of *Cucumis ficifolius* is pounded and mixed with cold water. One litter is given to cattle.	Oral
Cussonia Ostinii Chiov.	Araliaceae	Harfattu	T	L	Ls	Cough	Leaf of *Cussonia ostiniichiov* and *Asplenium monathes*are pounded together and 3-4 drop of the exudate is given to cattle.	Oral
				RB	Ls	Ulceric lymphangites	Bark (root) of *Cussonia ostiniichiov*, leaf *Asplenium monathes* and *leaf of Calpurnia subdecandra* pounded together and 2 cups given to donkey.	Oral
				RB	Ls	Hepatitis	Bark (root) of *Cussonia ostiniichiov*, leaf *Asplenium monathes* and *leaf of Calpurnia subdecandra* pounded together and 2 cups given to cattle.	Oral
Cynodon dactylon (L.) Prers	Poaceae	Coqorsa	H	Ag.	Hu	Snake poison (Buutii)	Above ground parts of *Cynodon dactylon is* rubbed to the affected skin for seven days with butter.	Dermal
Cynodon nlemfuensis Vanderyst.	Poaceae	Warata	H	Wp	Hu	Snake poison	Leaf of *Cynodon nlemfuensis* and leaf of *Calpurnia aurea* are pounded together and taken by human; washed with the solution by mixing it with water.	Oral
Datura stramonium L.	Solanaceae	Manjii	H	Fu	Hu	Scabies (citto)	Powdered fruit of *Datura stramonium* 2-3 spoon of the powder is mixed with butter and creamed.	Dermal
				,,	Hu	Dandruff (Foroforii)	Fruit of *Datura stramonium* is dried and powdered, mixed with water and used to wash head skin.	Dermal
				,,	Hu	Malaria	Powdered fruit of *Datura stramonium* ismixed with honey and three to four spoons are eaten with pounded *Allium sativum.*	Oral
				R	Hu	Head ache	Roots of *Datura stramonium* is pounded with leaf of *Ocimum gratissimum* sniffed nasallly.	Nasal
Dodonaea angustifolia L.f	Sapindaceae	Ittacha	Sh	L	Ls	Wound	Dried leaves of *Dodonaea angustifolia* are powdered and sprayed on the wound of pack animals.	Dermal
Echinops amplexicaulis Oliv.	Asteraceae	Kosorru harre	H	R	Ls	Trypano-somiasis	*Echinops amplexicaulis* root is dried, powdered and mixed with water. A glass is given to cattle for three days.	Nasal & Ear canal
				,,	Ls	Hepatities	Root of *Echinops amplexicaulis is* dried, powderedand mixed with water. The concoction is given to cattle.	Oral

				R	Ls	Pasturolosis (Furrii)	Root of *Echinops amplexicaulis* is pounded and the decoction is given to cattle	Ear canal
Echinops kerebicho Mesfin	Asteraceae	Qarabicho	H	R	Hu	Snake repellent	Root of *Echinops kerebicho is* dried and smoked in house**.**	N nasal & oral
				,,	Hu	Internal parasite	Root of *Echinops kerebicho* is dried powdered and mixed with water. Half of tea cup is given to human.	Oral
				,,	Hu	Febrile Illness	Dried Root of *Echinops kerebicho* is fumigated.	Nasal
				,,	Hu	Gonorrhea	Root of *Echinops kerebicho* and bark of Croton *macrostachyus* are pounded together mixed with honey. One cup of tea is taken by human.	Oral
Echinops macrochaetus Fresen	Asteraceae	Kossorru	Sh.	St.	Ls	Footand mouth disease(FMDs) Amdarra hoolaa	Fresh stem of *Echinops macrochaetus* is chopped and fumigated to sheep.	Nasal
Ehretia cymosa Thonn.	Boraginaceae	Ulaaga	T	L	Hu	Pain (waransa)	*Ehretia cymosa* leaf is smashed and the sap is taken by human.	Oral
Ekebergia capensis Sparm.	Meliaceae	Somboo	T	B	Hu	Wound	Bark of *Ekebergia capensis* is powdered and half a spoon is added to wound.	Dermal
				Sa.	Hu	Hemorrhoid.	Sap exudate of *Ekebergia capensis* is directly applied to hemorrhoid	Anal
Embelia schimperi Vatke	Myrsinaceae	Haanquu	Sh	Se	Hu	Tape worm	Seed of *Embelia schimperi* is dried and powdered, mixed with water, two glasses is taken once.	Oral
				L	Hu	Internal Parasite	Leaf and seed of *Embelia schimperi* and leaf of *Croton macrostchys* are pounded together and one glass is taken by human.	Oral
Erythrina brucei Schweinf.	Fabaceae	Waleensuu	T	B	Ls	Swelling (dhitoo)	Bark of *Erythrina brucei* pounded with leaf of *Teclea nobilis* mixed with water and half a glass is given to mule and donkey.	Oral
				R	Ls	Eye disease	Root of *Erythrina brucei* and leaf of *Premna resinos*a are pounded together and 4-6 drop of the liquid extract is added to cattle eye.	Optical
Eucalyptus globulus sLabill.	Myrtaceae	Bargamoo adii	T	L	Ls	Avian cholera	Leaf of *Eucalyptus globulus* pounded, boiled and the solution is added to soup of wheat powder and given to hen.	Oral
				L	Hu	Influenza	Leaf of *Eucalyptus* globules is chopped and boiled. steam bath is taken by human.	Nasal
Euphorbia lathryis L.	Euphorbiaceae	Hadaamii	T	St.	Hu/	Breast Ulcer	Stem of *Euphorbia lathris is* chopped and fumigated to ulcerated breast.	Dermal

				St.	Hu	Ascaries (maagaa)	2-3 drop of *Euphorbia lathris* sap is backed with teff and given to human.	Oral
Ficus sur Forssk.	Moraceae	Harbuu	T	Sa.	Hu	Ring worm	Sap from *Ficus sur* is creamed on affected skin.	Dermal
Ficus ingens (Miq.)Miq.	Moraceae	Qilinxoo	T	St.	Ls	Wound	Sap of *Ficus ingens is directly creamed on cattle skin.*	Dermal
Ficus sycomorus L.	Moraceae	Odaa	T	St.	Hu	Hepatitis (sibira)	Sap of *Ficus sycomorus* is creamed directly on skin.	Dermal
				B	Hu	Rabies	Bark of *Ficus sycomorus* and root of *Prunus africana* are powdered together and backed with teff flour and eaten.	Oral
				B	Hu	Hemorrhoid.	Bark of *Ficus sycomoru* is dried powdered and mixed with butter and creamed directly.	Anal
Ficus vasta Forssk.	Moraceae	Qilxuu	T	Sa.	Hu	Hemorrhoid.	Sap from *Ficus vasta* and powdered root of *Pterolobium stellatum* are mixed together and creamed to the external hemorrhoid.	Anal
Gnidia glauca (Fresen) Gilg.	Thymelaceae	Qaqaroo	Li.	R	Hu	Kidney problem	Root of *Gnidia glauca is* pounded and mixed with teff powder, then backed and eaten by human.	Oral
Grewia ferruginea Hochst.ex. A. Rich	Tiliaceae	Dhoqonuu	Sh	La.	Ls	Retained placenta	Latex of Grewia ferruginea is pounded,mixed with water and on e glass of tella is given to cattle	Oral
Indigofera hochstetteri Bak.	Fabaceae	Qoricha hadha'a	H	R	Hu	Tetanus	Root of *Indigofera hochstetteri* is powdered and mixed with butter and put on affected area.	Dermal
Indiigofera tinctoria L.	Fabaceae	Qoricha dingetenya	H	R	Ls	Sudden sickness	Root of *Indiigofera tinctoria* chopped and mixed with salt, and rolled with leaf of *Vernonia amygdalina* and given to cattle.	Dermal
				R	Ls	Internal prasites	Root of *Indiigofera tinctoria* chopped and mixed with salt and given to cattle.	Oral
Justica schimperiana (Hochst.ex.Nees) T. Andres	Acanthaceae	Dhumuugaa	Sh.	RL	Hu	Rabies	Root and leaf of *Justica schimperiana* is pounded together and mixed with water and 2-3 cup of tella is used as adrink.	Oral
				RL	Ls	Blackleg	Leaf and root of *Justica schimperian* is pounded with dried fruit of *Ricinus communis.*One bottle of the solution is given to cattle.	Oral
				L	Ls	Internal parasites	Pounded leaf of Justica *Schimperiana* is added to barely malt powdere. Three – four glass of tella given to cattle, horse and donkey	oral
				R	Hu	Gonorhea	Root of Justica *schimperiana and leaf of Erythrina brucei are pounded and concocted together. One cup of coffee is used as adrink.*	Oral
Lagenaria siceraria	Cucurbitaceae	Buqqe hadhaa	Cl.	F	Hu	Tinea versicolor	Inner part of fresh fruit of *Lagenaria siceraria* is creamed on affected head skin.	Dermal

(Molina)Standl.				Fu	Hu	Malaria	Ripe fruit of *Lagenaria siceraria* is bored rinsed with cold water, one glass is used as a drink early in the morning.	Oral
				Fu	Hu	Scabies(C ittoo)	Inner part of fresh fruit of *Lagenaria siceraria* is creamed on affected head skin.	Dermal
Lepidium sativum L.	Brassicaceae	Feecoo	H	Se.	Ls	Blotting (bokoksa)	Seed of *Lepidium sativum* and bulb of *Allium sativum* are pounded together and given to cattle.	Oral
				,,	Hu	Malaria	Seed of *Lepidium sativum* and bulb of *Allium sativum* are pounded together and given to human with honey.	Oral
				Se.	Hu	Diarrhoea	Seed of *Lepidium sativum* and bulb of *Allium sativum* are pounded together and given to human with honey.	Oral
				Se	Ls	Diarrhoea	Seed of *Lepidium sativum* is powdered and mixed with bulb *Allium sativum* and given to cattle.	Oral
				Se	Hu	Tonsillities	Seed of *Lepidium sativum* and bulb of *Allium sativum* are pounded together and given to human with honey for three to four days..	Oral
				,,	Hu	Cough	Seed of *Lepidium sativum* and bulb of *Allium sativum* are pounded together and given to human with honey for five days..	Oral
Linum usitatissimum L	Lineaceae	Talbaa	H	Se.	Ls	Retained placenta	Seed of *Linum usitatissimum* is powdered and half a glass of the powder is dissolved in water and given to cattle.	Oral
Lippia adoensis Hochst.ex.Walp. Var. adoensis.	Verbenaceae	Kusaayee	Sh	L	Hu	Ring Worm (Roobbii)	Leaf of *Lippia adoensis* is directly rubbed on affected skin.	Dermal
Nicandra physaloides (L.) Gaertn.	Solanaceae	Hawwixii	H	LR	Hu	Liver problem	and root *Nicandra physaloide* are pounded together and mixed with cold water. 2-4 cup of tella is used as a drink.	Oral
Nicotiana tabacum L.	Solanaceae	Tamboo nyaata	Sh	LR	Ls	Blotting	Leaf and root of *Nicotiana tabacum* is dried, powdered, mixed with salt and made as bread. Slice is given to cattle for three days.	Oral
				L	Ls	Expel leeches	Crushed and backed leaf of *Nicotiana tabacum* is dried, powdered and mixed with water. One third of a litter is given to cattle.	Oral
				L	Ls	Internal parasites	Leaf of *Nicotiana tabacum* is pounded with root of *Carissa spinarum* and mixed with water. A cup of tella given to calf.	Oral
				L	Ls	Trypanos-omiasis (Gandii)	Crushed and backed leaf of *Nicotiana tabacum* is given to cattle.	Oral

				L	Ls	Eye infection	Leaf of *Nicotiana tabacum* is chewed and spitted on cattle eye.	Optical
				,,	Hu	Head ache	Dried and powdered leaf of *Nicotiana tabacum* sniffed (suurata).	Nasal
Ocimum gratissimum L.	Lamiaceae	Daamakasee	Sh/ H	L	Hu	Febrile illness	Leaf of *Ocimum gratissimum* is smashed and sniffed nasally.	Nasal
Ocimum lamifolium Hochst. Ex. Benth.	Lamiaceae	Hancabbii diimaa	H	L	Hu	Head ache	Leaf of *Ocimum lamifolium* is smashed and sniffed.	Nasal
Ocimum urticifolium Roth.	Lamiaceae	Hanccabbi adii	H	L	Hu	Febrile illness	Leaf of *Ocimum urticifolium, Croton macrostachyus and Clausena anista are* smashed together and the sap is sniffed nasally	Nasal
				L	Hu	Head ache	Leaf of *Ocimum urticifolium, Carissa spinarum* and *Thalictrum rhynochcarpum* are smashed together and sniffed	Nasal
Olinia rochetiana A.Juss.	Oliniaceae	Noolee	T	L	Hu	Tooth infection	Leaf of *Olinia rochetiana* is chewed with affected tooth and the sap is swallowed.	Oral
Pavonia urens Cav.	Malvaceae	Maxxanne	H	R	Hu	Diarrhoea	Root of *Pavonia urens* is chewed with salt and swallowed.	Oral
Phoenix reclinata Jacq.	Arecaceae	Meexxi	T	LSt	Ls	Eye disease	Leaf and stem of *Phoenix reclinata* and leaf of *Premna resino*sa are chewed together and spitted on cattle eye.	Optical
Phragmanlhera macrosolen (A.Rich) ined.	Loranthaceae	Digaluu ceekaa	Ep.	L	Hu	Diarrhoea	Leaf of *Phragmanlhera macrosol*en is pounded and mixed with water. One cup of tella is used as a drink by human.	Oral
Phytolacca dodecandra L'Herit	Phytolaccaceae	Handoode dhalaa	Sh	R	Hu	Liver problem	*Phytolacca dodecandra* root is crushed and pounded, mixed with water. One third of a cupis given to human	Oral
				RL	Ls	Hyena bite	*Phytolacca dodecandra* root is smashed with its leaf, and tied on neck of cattle by clean cloth.	Neck
				R	Hu	Gonorrhea	*Phytolacca dodecandra* and *Croton macrostchys* root are powdered and 1-2 cup of coffee is given to human with coffee.	Oral
				R	Hu/	Rabies	Dried root of *Phytolacca dodecandra* is powdered and one –two cup of domestic alcohol (malakie) is taken by human, 3-4 is used for livestock.	Oral
Plantago lanceolata L.	Plantaginaceae	Qorxxobbi	H	L	Hu	Skin cut	Fresh leaf of *Plantago lanceolata* is smashed three to four drops of the exudate is added toskin cut.	Dermal
*Premna resinos*a (Hochst.)Schauer	Verbenaceae	Urggeesaa	T	R	Hu	Tooth infection	Root of *Premna resinos*a is chewed and the solution is allowed to be incotact with infected teeth.	Oral
Prunus africana (Hook.f.)Kalkm.	Rosaceae	Hoomii	T	B	Ls	Wound	Bark of *Prunus africana* is powdered and added directly on wound of donkey, mule and horse.	Dermal

Pterolobium Stellatum (Forssk.) Brenan.	Fabaceae	Harangamaa qore	Sh	R	Hu	Evil eye	Root of *Pterolobium stellatum* and root of *Ruta chalepensis* are powdered and sniffed.	Nasal
				R	Hu	Head ache	Root of *Pterolobium stellatum* and root of *Ruta chalepensis* are powdered and sniffed.	Nasal
Ricinus communis L.	Euphobiaceae	Qoobboo	Sh	Fu.	Ls	Anthrax	Dried fruit of *Ricinus communis* is powdered and mixed with water. One cup of tea is given to cattle.	Oral
				R	Ls	Sudden sickness	Root of *Ricinus communis* and root of Justica *schimperiana* are pounded mixed with cold water. 1-2 cup of tea is given to cattle.	Oral
				,,	Ls	Blotting	Root of *Ricinus communis* pounded with table salt, mixed with cold water. Half a cup is given to cattle.	Oral
				,,	Ls	Actinomycosis (Kurufsisa)	Root of *Ricinus communis is* pounded with table salt and soil. One glass of the concoction is given to cattle; half a glass is gioven to goat and sheep.	Oral
				Fu	Ls	Uleceritic lymphagities (Biichee harree)	Dried fruit of *Ricinus communis* is powdered and mixed with bark powder of *Prunus africana* and creamed to the ulcerated skin of donkey.	Dermal
				Fu	Ls	Epizoitic lymphagities (Biiichee fardaa)	Dried fruit of *Ricinus communis* is powdered and mixed with bark powder of *Prunus africana* and creamed to the ulcerated skin of horse and mule.	Dermal
Rumex nepalensis Spreng.	Polygonaceae	Tultii	H	R	Hu	Stomach ache	Root of *Rumex* nepalensis is pounded and two cup of tea is taken with coffee.	Oral
				L	Hu	Spider Poison	Leaf of *Rumex* nepalensis is directly rubbed on affected skin.	Dermal
				R	Hu	Amoeba case	Root of *Rumex* nepalensis is pounded and two cup of tea is taken with coffee.	Oral
Rumex nervosus Vahl	Polygonaceae	Dhangaggo	Sh	R	Hu	Skin rash (Shiffe)	Root of *Rumex nervosus* is dried and powdered. 3-4 spoon of the powder is mixed with butter and creamed on affected skin	Dermal
Ruta chalepensis L.	Rutaceae	Cillaattama	H	L	Hu	Stomach ache	Leaf of *Ruta chalepensis* and leaf of *Vernonia amygdalina* are smashed together and one cup of domestic alcohol is taken by human.	Oral
				BL	Ls	Cocsidiosis (Bilii)	Bark and leaf of *Ruta chalepensis* and root of *Justica schimperiana* are pounded together and given to hen with injera	Oral
				L	Hu	Cough	Leaf of *Ruta chalepensisis* pounded with *Cussonia ostiniichiov* of and eaten with injera.	Oral
				L	Hu	Infulenza	Leaf of *Ruta chalepensisis* pounded withbulb of *Allium sativum* mixed with soup and used as adrink.	Oral

Schinus molle L.	Anacardiaceae	Qundoo barbaree	T	LF	Ls	Eye disease	Leaf and fruit of *Schinus molle* are chewed and spitted on cattle,equines , goat and sheep eye.	Optical
Schrebera alata (Hochst.) Wel.	Oleaceae	Qana'ee	T	L	Hu	Tonsilites	Leaf of *Schrebera alata* is chewed and spitted on tonsilites	Oral
Sida rhombifolia L.	Malvaceae	Karaaba	H	R	Ls	Erythrob-lastosis	Root and leaf of *Sida rhombifolia* concoction is given to cattle, horse, donkey and mule for four days; one glass of tella on each day.	Oral
Snowdenia polystachya (Fresen.) Pilg.	Poaceae	Muujja	H	Ag.	Hu	Tenia pedis	Above ground part of *Snowdenia polystachya* is rubbed to the affected skin for five days.	Dermal
Solanecio gigas (Vatke.)C. Jeffery	Asteraceae	Jirma jalddeesa	Sh.	L	Ls	External parasites	Leaf of *Solanecio gigas* is used to wash hair of calf, as it kills lice.	Dermal
Solanum dasyphyllum Schumach.	Solanaceae	Hiddi hongorcaa	Sh.	Fu.	Ls	External parasites	Fruit of *Solanum dasyphyllum* is rubbed on skin of calf.	Dermal
Solanum incanum L.	Solanaceae	Hiddi loonii	Sh	Fu.	Hu	Tonsilites	Fruit liquid content of *Solanum incunum* is rinsed with balled cloth stick tip and rolled on tonsilites.	Oral
				,,	Ls	Snake poison	Snake poisoned goat eats fruit of *Solanum incunum* against the poison.	Oral
Sorghum bicolor (L.) Moench	Poaceae	Bisingaa caabbi	H	Se.	Ls	Retained placenta	Dry seed of Sorghum bicolor is mixed with salt and water,and given to cattle.	Oral
Stephania abyssinica (Dillon.& A.Rich.) Walp.	Menispermaceae	Hidda kalaala	Cl.	L	Hu	Wound	Leaf of *Stephania abyssinica* is pounded and a small amount is added to wound.	Dermal
Stereospermum kunthianum Cham.	Bignoniaceae	Botoroo	T	R	Ls	Snake bite	Root of *Stereospermum* kunthianum and dried leaf of *Calpurina aurea* powdered and mixed with water and given to cattle.	Oral
				B	Ls	Retained placenta	Bark of *Stereospermum kunthianum and Grewia ferrugineae* are crushed together and mixed with salt, eaten by cattle on dish	Oral
*Syzygium guineense (*Willd.)Dc.	Myrtaceae	Baddessa	T	B	Hu	Internal parasite	Bark of *Syzygium guineense* and exudates of *Aloe pubescens* concoction is made. 2-3 cup of coffee is taken by human.	Oral
Thalictrum rhynchocarpum Dill. & A. Rich.	*Ranunuclaceae*	Siraabuzuu	H	R	Ls	Sudden sickness	Root *of Thalictrum rhynchocarpum , Sapium ellipticum, Ricinus communis* and *Cucumis aculeatus* are powdered together and mixed with water. Half a cup is given to cattle	Oral
				,,	Ls	Blackleg (Bishftuu)	Dried root of *Thalictrum rhynchocarpum* is powdere and mixed with water. One cup is given to cattle.	Oral

				,,	Hu	Tetanus (Hadhaa)	Root of *Thalictrum rhynchocarpum and Teclea nobilis* is pounded together. 2-3 tea spoons are taken by human.	Oral
				,,	Hu	Sudden sickness	Root of *Thalictrum rhynchocarpum*, *Cucumis aculeatus* and *Premna resinos*a are pounded together and powdered. Two spoons are mixed with alcohol and used as a drink.	Oral
				,,	Ls	Diarrhoea	Root of *Thalictrum rhynchocarpum* is preserved and powdered. One glass is given to cattle.	Oral
				Ls	Ls	Cattle infection	Root of *Thalictrum rhynchocarpum* is pounded with salt, mixed with water. Half a glass is given for three days to cattle.	Oral
Teclea nobilis Del.	Rutaceae	Hadheesa	T	R	Ls	Wound	Root of *Teclea nobilis* is pounded mixed with cold water and 3 glasses given to donkey.	Skin surface
				La	Ls	Cough	*Teclea nobili* latex and leaf is pounded and the decoction is given to cattle.	
				L	Ls	Blackleg	Leaf of *Teclea nobilis* and *Thalictrum rhynochcarpum* pounded and mixed with cold water. One glass is given to cattle.	Oral
Vernonia amygdalina Del.	Asteraceae	Eebicha	Sh.	L	Hu	Malaria	Crushed leaves of *Vernonia amygdalina* concocted with leaves of *Ruta chalepensis*. One cup is served as a drink for 3-5 days with cold water in the morning.	Oral
				,,	Hu	Tooth infectiohn	To treat tooth infection leaves *Vernonia amygdalina* are chewed with bulb of *Allium sativum*	Oral
				,,	Hu	Stomach ache	Intestinal prasites can be killed by using pounded twings *Vernonia amygdalina, bullb of Allium sativum* with rhizome of *Ginger officinale* and eaten with honey.	Oral
				,,	Hu/	Evil sprit	Crushed young twinge with leaves is sprayed in home and cattle fence.	Nasal
Vernonia hymenolepis A. Rich.	Asteraceae	Sooyyoma	Sh.	L	Hu	Gonorrhea	Leaf twinge of *Vernonia hymenolepis* and bark of *Croton macrostachyus* are pounded together and mixed ground honey and 3-4 spoon is taken early in the morning for four days.	Oral
Vigna membrancea (L.) A. Rich.	Fabaceae	Hidda hantuutaa	Cl.	R	Ls	Rabies	Root of *Vigna membrancea is* dried powdered and backed with teff and given to cattle.	Oral
				RL	Ls	Epilepsy	Root and leaf of *Vigna membrancea* pounded together, dried and powdered. Two –three spoons are mixed with water and given to cattle, goat and sheep.	Oral

Zehneria scabra (l.f.) Sond	Cucurbitaceae	Qorii sinbiraa	Cl.	LB	Ls	Swelling	Leaf and bark of *Zehneria scabra* and leaf *Rumex nervosues are* pounded and rolled in clean cloth, and tied on swelling.	Dermal
				R	Ls	Rabies	Pounded root of *Zehneria scabra* is concocted with pounded root of *Ricinus communis.* One feast of the pond is given to cattle and pack animals.	Oral

Appendix 2 List of human disease in the study area

No	Local name	English name
1	Mitmitii	Amoeba case
2	Budaa	Evil eye
3	Busaa	Malaria
4	Cittoo	Scabies
5	Cophxoo	Gonorrhea
6	Dhiitoo harmaa	Breast ulcerate
7	Dhitoo	Swelling
8	Dhodhotoo	Tania versicolaries
9	Dhukkkuba ilkaanii	Teeth infection
10	Dhukkuba ijaa	Eye infection
11	Dhukkuba kalee	Kidney problem
12	Dhukkuba saree	Rabies
13	Dhukkuba sinbiraa	Hepatitis
14	Dhullaa	Swelling
15	Dingetegnaa	Sudden sickness
16	Foroforii	Tania paddies
17	Foroforii	Dandruff
18	Funuuna	Nasal bleeding
19	Gaggabdoo	Epilepsy
20	Garaa cininna	Stomach problem
21	Garaa kaasaa	Diarrhoea
22	Gonaadee	Tania paddies
23	Gonnaadee	-
24	Gubaa abidda	Fire burn
25	Gurra waransa	Ear pain
26	Hadhaa	Tetanus
27	Hadhooftuu	Liver problem
28	Harsasee	Tonsillitis
29	Hir'ina dhiigaa	Anemia
30	Idda bofaa	Snake poison
31	Inniqii	Goiter
32	Irrraa ba'uu dubartiif	Erythroblasts
33	Kintaarota	Homeoroide
34	Koosoo	Tape worm
35	Madaa	Wound
36	Mata bowoo	Head ache
37	Michii	Fibril illness
38	Mitimitii	Ascaris
39	Qakee	Cough
40	Qufaa	Influenza
41	Qurxumatii	Rheumatism
42	Raamoo garaa	Internal parasites
43	Roobbii	Ring worm
44	Seexana(Jinnii)	Evil sprit
45	Shiffee	Skin rash
46	Sibijjii	Spider poison
47	Waransa	Back pain

Appendix 3 List of livestock disease in the study area

No	Local name	English name
1	Abba sangaa	Anthrax
2	Amdarra hoolaa	FMD (Foot and Mouth Diseases)
3	Arraba iddaa	Infection
4	Biichee faradaa	Epizootic lymphagities
5	Biichee harree	Ulcertic lymphagities
6	Bishooftuu	Blackleg
7	Bofa iddda	Snake poison
8	Bokoksaa horii	Blotting
9	Cinii	External parasites
10	Cininna warabessa	Hyena bite
11	Cittoo	Scabies
12	Dhiitoo harmaa	Breast ulcer
13	Dhoooqqee goge	Retained faces
14	Dhukkuba gogaa	Lumpy skin
15	Dhukkuba ijaa	Eye problem
16	Dhukkuba saree	Rabies
17	Dil'uu	Retained placenta
18	Dingetegnaa	Sudden sickness
19	Fingillee	Avian cholera
20	Gaggabsaa	Epilepsy
21	Gandii	Trypanosomiasis
22	Garaa kaasaa	Diarrhoea
23	Gatacha	Erythroblasts
24	Gororsaa	Pasturolosis
25	Koffisa lukkuu	Newcastle disease
26	Kurufsisaa	Actinomycosis
27	Madaa	Wound
28	Madaa gatiitti	Mechanical trump
29	Maramartoo	Synerosis celebralis
30	Mugsiisaa lukkuu	Coccidiosis
31	Qufaa	Cough
32	Raamoo garaa	Internal parasites
33	Riifensa kaasaa	Anti- inflammatory
34	Ulaandhula	Leeches

Appendix 4 List of plants encountered in the study area

Scientific name	Family	Local name	Ha.	Coll. no
Acacia abyssinica Hochst ex.Benth.	Fabaceae	Laaftoo	T	EA163
Acacia seyal Del.	Fabaceae	Doddota	T	EA77
Acanthus eminens C.B.Clarke	Acanthaceae	Kosorru adii	Sh	EA151
Achyranthes aspera L.	Amaranthaceae	Darguu	H	EA34
Acmella caulirhiza Del.	Asteraceae	Gutichaa	H	EA55
Albizia schimperiana *Oliv*	Fabaceae	Imalaa	T	EA180
Aloe pubescens Reynolds	Aloaceae	Hargisa	H	EA54
Amaranthus caudatus L.	Amaranthaceae	Iyaasuu	H	EA130
Asplenium monathes *L.*	Aspleniaceae	Digaluu bakkannisaa	Ep	EA148
Bersama abyssinica Fresen.	Melianthaceae	Lolchiisaa	T	EA35
Bidens biternata(lour.)Merr.& Shrff.	Asteraceae	Maxxanne	H	EA45
Bidens pilosa L	Asteraceae	Maxxanne	H	EA119
Bridelia micrantha (Hochst.)Baill.	Euphorbiaceae	Giraabaa	T	EA1
Buddleja polystachya Fresen.	Loganiaceae	Hanfaaree	T	EA82
Brucea antidysenterica Fresen.	Simaroubaceae	Qomonyoo	Sh	EA14
Calpurnia aurea (Ait.)Benth.	Fabaceae	Ceekaa	Sh	EA65
Calpurnia subdecandra (L'Herit.) Schweick.	Fabaceae	Ceekaa qamalee	Sh.	EA4
Capparis tomentosa Lam.	Capparidaceae	Harangamaa	Sh	EA62
Cardus nyassanus (S.Moore) R.E.	Asteraceae	Qoratti harree	Sh	EA78
Carissa edulis L.	Apocynaceae	Hagamsa	Sh	EA76
Carissa spinarum L	Apocynaceae	Hagamsa	Sh.	EA115
Celtis africana Burm.f.	Moraceae	Cayii	T	EA26
Centhrus setigerus Vahl.	Poaceae	Sardoo	H	EA86
*Chionanthus mildbraedii (*Gilg&Schellenb.)Stearn	Oleaceae	Gagamaa	T	EA97
Chlorophytum somaliense Bak.	Anthericaceae	Burii	H	EA19
Chrysopogon plumulosus Hochst	Poaceae	Drimuu	H	EA145
Cirsium englerianum O.Hoffm.	Asteraceae	Kosorru harree	Sh	EA69
Clausena anisata (Willd.)Benth.	Rutaceae	Ulumaayii	Sh	EA90
Clematis simensis Fresen.	Ranunuclacea*e*	Hidda feetii	Cl.	EA50
Clerodendrum myricoides *(*Hochst.) Vattke	Lamiaceae	Maraasisaa	Sh	EA186
Combertum molle R. Br. Ex G.Don	Combertaceae	Rukeessa	T	EA29
Combertum paniculatum Vent.	Combertaceae	Baggii	Li	EA30
Commelina diffusa Burm.f.	Commelinaceae	Qorxobbii	H	EA141
Conyza abyssinica Sch. Bip.ex A. Rich.	Compositae	Kusayee durbaa	Sh	EA56
Cordia africana L.	Boraginaceae	Waddeessa	T	EA131
Crateva adansonii Dc.subsp. *adonsonii*	Capparidaceae	Harangamaa	Sh	EA33
Crotalaria incana L.	Fabaceae	Atarii kuruphee	Sh	EA134
Croton macrostchyus *Del.*	Euphorbiaceae	Bakkannisa	T	EA12
Cucumis ficifolius A. Rich	Cucurbitaceae	Hiddi hooloo	Cl.	EA120
Cussonia ostinii chio*v*	Araliaceae	Harfattu	T	EA92
Cyperus digitatus Roxb.	Cyperaceae	Caffee	H	EA68
Cynodon dactylon (L.) Prers	Poaceae	Coqorsa	H	EA83
Cynodon nlemfuensis *Vanderyst*	Poaceae	Warata	H	EA107
Cynoglossum coerulem Hochst.Dc.	Boraginaceae	Mataree	H	EA152
Datura stramonium L.	Solanaceae	Manjii	H	EA11
Diospyros abyssinica (Hiern)F.White	Ebenaceae	Lookoo	Sh	EA149
Dodonaea angustifolia L.	Sapindaceae	Ittacha	T	EA187
Dovyalis abyssinica (A.Rich.)Warb.	Flacourtiaceae	Koshomii	T	EA24
Echinops amplexicaulis Oliv.	Asteraceae	Qoree harre	H	EA42
Echinops hoehnelii Schweinf.	Asteraceae	Kosorru	Sh	EA188
Echinops kerebicho Mesfin	Asteraceae	Qarabicho	H	EA94

Echinops macrochaetus Fresen	Asteraceae	Kossorru	Sh.	EA44
Ehretia cymosa Thonn	Fabaceae	Waleena	T	EA189
Ekrbergia capensis Sparm.	Meliaceae	Somboo	T	EA70
Embelia schimperi Vatke.	Myrsinaceae	Haanquu	Sh	EA48
Erythrina brucei Schweinf.	Fabaceae	Waleensuu	T	EA40
Eucalyptus globulus Labill.	Myrtaceae	Bargamoo adii	T	EA72
Euphorbia lathyris L.	Euphobiaceae	Hadaamii	T	EA125
Ficus ingens *(Miq.)Miq.*	Moraceae	Qilinxoo	T	EA10
Ficus palmata Forssk.	Moraceae	Luugoo	T	EA137
Ficus sur Forssk.	Moraceae	Harbuu	T	EA87
Ficus sycomorus *L.*	Moraceae	Odaa	T	EA36
Ficus thonnigii Blum.	Moraceae	Dambii	T	EA118
Ficus vasta Forssk.	Moraceae	Qilxuu	T	EA57
Flacourtia indica (Burm.f.) Merr.	Flacourtiaceae	Akukkuu	T	EA99
Gardenia terniffolia Schumach&Thonn.	Rubiaceae	Gambeela	T	EA126
Gnidia glauca (Fresen) Gilg.	Thymelaceae	Qaqaroo	Li.	EA21
Gomphocarpus fruticosus(L.)Ait.F.	Ascelpidaceae	Aananno	Cl	EA75
Grewia ferruginea ex. A. Rich.	Tiliaceae	Dhoqonuu	Li.	EA43
Hyparrhenia hirta (L.) Stapf.	Poaceae	Dagala	H	EA22
Impatiens tinctoria A.Rich.	Balsaminaceae	Hansoosilla	H	EA146
Indigofera hochstetteri Bak.	Fabaceae	Qoricha hadha'a	H	EA129
Indiigofera tinctoria L.	Fabaceae	Qoricha dingetenya	H	EA102
Inula decipiens E.A.Bruce	Asteraceae	Tamboo borofaa	H	EA136
Juniperus procera L.	Cupressaceae	Gaattiraa	T	EA8
Justica schimperiana (Hochst.ex.Nees) T.Andre	Acanthaceae	Dhumuugaa	Sh.	EA66
Kalanchoe petitiana A.Rich.	Crassulaceae	Bosoqqee	H	EA101
Kniphofia foliosa Hochst.	Asphdelaceae	Leella	H	EA28
Lagera alata L.	Asteraceae	Ajoonyee	H	EA98
Leonotis ocymifolia (Burm.f.) Iwarsson	Lamiaceae	Bokkollu	Sh	EA6
Lepidium sativum L.	Brassicaceae	Feecoo	H	EA179
Linum usitatissimum L	Lineaceae	Talbaa	H	EA95
Lippia adoensis Hocht. Ex. Walp. var. *adoensis*	Verbenaceae	Kusaayee	Sh	EA84
Lippia javanica Burm.f.	Verbenaceae	kusayee	Sh	EA
Lippia javanica Burm.f.	Verbenaceae	Kusaye	Sh	EA161
Loranthus woodfordiodes Schweinf.	Loranthaceae	Digaluu bururii	Ep.	EA7
Maesa lanceolata Forssk.	Myrtaceae	Abbayyi	Sh	EA5
Malva verticillata L.	Malvaceae	Hincini	Sh	EA162
Maytenus arbutifolia (A.Rich.)Cuf.	Celastraceae	Komblolcha	T	EA64
Millettia ferruginea (Hochst.) Baker	Fabaceae	Sootallo	T	EA17
Mimusops kummel Bruce ex A. DC.	Sapotaceae	Mixoo	T	EA60
Myrsine africana L.	Myrsinaceae	Kacama	T	EA142
Nicandra physaloides (L.)Gaertn.	Solanaceae	Hawwixii	H	EA177
Ocimum lamifolium Hochst. ex. Benth.	Lamiaceae	Hancabbii diimaa	Sh.	EA89
Olea capensis L.Subsp. macrocarpa (C.H) Wright)Verdc.	Oleaceae	Gagamaa	T	EA176
Olea europaea L.Subsp. *cuspidata* (Walle.Don) Cif.	Oleaceae	Ejersa	T	EA93
Olinia rochetiana A. Juss.	Oliniaceae	Noolee	T	EA16
Osyris quadripartita Decn.	Santalaceae	Waatoo	Sh	EA67
Oxaliis corniculata L.	Oxalidaceae	Qorcha bu'aa	H	EA9
Pavonia urens Cav.	Malvaceae	Maxxannee	Sh	EA133
Pennisetum schimperi A.Rich.	Poaceae	Migira	H	EA160
Pentas lanceolata (Forssk.) Defl.	Rubiaceae	Dhumuga	Sh	EA123
Phoenix reclinata Jacq.	Arecaceae	Meexxi	T	EA178
Phragmanlhera macrosolen (A.Rich) ined.	Loranthaceae	Digaluu ceekaa	Ep.	EA79

Phytolacca dodecandra L'Herit	Phytolaccaceae	Handoode dhalaa	Sh	EA109
Plantago lanceolata L.	Plantaginaceae	Qorxxobbi	H	EA71
Podocarpus falcatus (Thumnb.)Mirb	Podocarpaceae	Birbirsa	T	EA51
Premna resinosa (Hochst.) Schauer	Verbenaceae	Urggeesaa	T	EA103
Prunus africana (Hook.f.) Kalkm.	Rosaceae	Hoomii	T	EA81
Psychotria orophila Petit	Rubiaceae	Ulaagaa	Sh	EA74
Psychotria kirkii Hiern	Rubiaceae	Muka bofaa	Sh	EA114
Pterrollobium stellatum (Forssk.) Brenan	Fabaceae	Harangamaa	Sh	EA139
Rhus natalensis Krauss	Anacardiaceae	Laboobessa	T	EA150
Rhus ruspolii Engl.	Anacardaceae	Looccuu	Sh	EA156
Rosa abyssinica Schwienf	Rosaceae	Goraa	Sh	EA25
Rubus steudneri Schweinf.	Rosaceae	Hincinii	Sh	EA31
Rumex nepalensis Spreng.	Polygonaceae	Tultii	H	EA100
Rumex nervosus Vahl.	Polygonaceae	Dhangaggoo	H	EA85
Saba comorensis (Bojer) Pichon	Apocynaceae	Damnbii	T	EA140
Salix subserrata Willd.	Salicaceae	Alaltu	T	EA153
Salvia merjamie Forssk.	Lamiaceae	Lootuu	H	EA138
Sapium ellipticum (Krauss) Pax.	Euphorbiaceae	Bosoqa	T	EA73
Schefflera abyssinica (Hochest.ex .Rich.)Harma	Araliaceae	Gatamaa	T	EA116
Schrebera alata (Hochst) Welw.	Oleaceae	Qana'ee	T	EA117
Securidaca longepedunclata Fresen.	Polygalaceae	Ameera	T	EA157
Senna occidentalis (L.) Link	Fabaceae	A/Qamale	Sh	EA158
Sida rhombifolia L.	Malvaceae	Karaaba	H	EA124
Sida schimperiana Hochst. Ex A. Rich.	Malvaceae	Ule harree	Sh	EA185
Snowdenia polystachya (Fresen.) Pilg.	Poaceae	Muujja	H	EA105
Solanecio angulatus(Vahl) C.Jeffery	Asteraceae	Raafuu osolee	H	EA27
Solanecio gigas (Vatke.) C. Jeffery	Asteraceae	Jirma jalddeesa	Sh.	EA80
Solanum dasyphyllum Schumach.	Solanaceae	Hiddi hongorcaa	Sh.	EA128
Solanum garaa Friis	Solanaceae	Hiddii sinbiraa		EA32
Solanum incanum L.	Solanaceae	Hiddi loonii	Sh	EA46
Solanum marginatum L.f.	Solanaceae	Hiddii saree	Sh	EA138
*Sorghum bicolor(L)*Moench	Poaceae	Bisingaa caabbi	H	EA18
Stephania abyssinica (Dillo&A.Rich.)Walp.	Menispermacae	Hidda kalaala	Cl.	EA52
Stereospermum kunthianum *Cham.*	Bignoniaceae	Botoroo	T	EA61
Syzygium guineense *var.* *(*Willd.)Dc.	Myrtaceae	Baddessa	T	EA47
Teclea nobilis Del.	Rutaceae	Hadheesa	T	EA49
Thalictrum rhynchocarpum Dill. & A.Rich.	Ranunuclaceae	Siraabuzuu	H	EA108
Tragia ashiae M. Gilbert	Euphorbiaceae	Hidda gulgubbe	H	EA3
Tragia brevipes Pax.	Euphorbiaceae	Gurgubbee	H	EA91
Urtica simensis Steudel	Urticaceae	Doobbii	H	EA144
Vangueria apiculata K. Schum.	Rubiaceae	Bururi	T	EA37
Vernonia amygdalina Del.	Asteraceae	Eebicha	Sh.	EA173
Vernonia glabera Vatk.	Asteraceae	Soyyoma	Sh	EA135
Vernonia hochstetteri Sch. Bip.ex Walp.	Asteraceae	Kisee	Sh	EA15
Vernonia hymenolepis A. Rich.	Asteraceae	Sooyyoma dha.	Sh.	EA39
Vernonia leopoldii (Sch.Bip.)	Asteraceae	Sooyyoma adii	Sh	EA20
Vernonia myrantha Hook.f.	Asteraceae	Reejji	Sh	EA53
Vernonia rueppellii Sch. Bip.ex Walp.	Asteraceae	Sooyyoma diimaa	Sh	EA2
Vigna membrancea **(**L.) A. Rich.	Fabaceae	Hidda hantuutaa	Cl.	EA38
Zehneria scabra(l.f.) Sond	Cucurbitaceae	Qorii sinbiraa	Cl.	EA121

Key: In bold are medicinal plants

Appendix 5 List of plants collected from home gardens in the study area

Scientific name	Family	Local name	Ha.	Coll.no
***Allium sativum** L.*	Alliaceae	Qullubbii	H	EA170
Allium sepa L.	Alliaceae	Qullubbi adii	H	-
Becium filamentosum (Forssk.) Cliob.	Lamiaceae	Basoo bilaa	Sh	EA13
Brassica oleracea L.	Brassicaceae	Goommana	H	EA127
Brassica napus L.	Brassicaceae	Sanyii raafuu	H	EA183
Carica papaya L.	Caricaceae	Paapayya	T	EA164
*Catha edulis (*Vahl) Forssk.ex Endl.	Celastraceae	Jimaa	Sh	-
Citrus sinensis (L.) Osb.	Rutaceae	Burtukaana	T	EA174
Citrus limon (L.)Burm.f	Rutaceae	Lomii	Sh	EA165
Coffea arabica L.	Rubiaceae	Buna	Sh	EA122
Cucurbita pepo L.	Cucurbitacea	Buqqee	H	EA168
Daucus carot L.	Apiaceae	Karota	H	EA111
Ensete ventricosum (Welw.) Cheesman	Musaceae	Qooccoo	Sh	-
Euphorbia tirucalli L.	Euphorbiaceae	Cadaa	S h	EA181
Heteropogon contortus (L.) Roem.	Poaceae	Nachi-sar	H	EA132
Lagenaria siceraria (Molina) Standl.	Cucurbitaceae	Buqqe hadhaa	Cl.	EA169
Lens culinaris Mill.	Fabaceae	Misira	H	EA171
Lycopersicon esculentum (l.)Mill.	Solanaceae	Timaatimii	H	-
Mangifera indica L.	Anacardiaceae	Maangoo	T	EA184
Musa paradisiaca L.	Musaceae	Muuzii	Sh	-
Nicotiana tabacum L.	Solanaceae	Tamboo nyaata	Sh	EA58
Nigella satva L.	Ranunculaceae	Abasuuda gurracha	H	EA96
Ocimum gratissimum L.	Lamiaceae	Daamakasee	Sh.	EA147
Ocimum urticifolium Roth.	Lamiaceae	Hanccabbi adii	Sh	EA182
Piper capense L.f.	Piperaceae	Mimmixa	H	EA167
Psidum gusigava L.	Myrtaceae	Zeyituna	T	EA159
Rhamnus prinoides L'Herit.	Rhamnaceae	Gesho	Sh	EA155
Ricinus communis L.	Euphorbiaceae	Qoobbo	Sh	EA106
Ruta chalepensis L.	Rutaceae	Cillaattama	H	EA166
Saccharum officinarum L.	Poaceae	Shonkoraa	H	-
Schinus molle L	Anacardiaceae	Qundoo Barbaree	T	EA110

KEY: In bold are medicinal plants

Appendix 6 Format for collecting ethnobotanical information (Checklist questioners prepared)

1 Name of the respondent----------sex----

Kebele----------occupation----------age----------other informations……..

2 What are the main human health problems in your locality or Keble?

3 What are the main livestock health problems or diseases?

4 Do you use plants to treat disease x in your locality?

A/ Name the plant----------

B/ Habitat of the plant----------

C/ Habit of the plant----------

D/ Part of the plant used----------

E/ Preparation methods----------

F/ Amount used (dose)----------

G/ Application method----------

H/ Treats to the above plant----------

I/ Method of conservation of the plant----------

J/ Other uses of the plant----------

5 How do you prevent /control those diseases?

6 How do you treat human health problems?

7 How do you treat live stock problems?

8 Which plants do you use for treating those particular diseases?

9 Local name(s) of the plants?

10 Botanical name?

11 Family name of the plant ?

12 Habit of the plant -t/s/h/c/h.p?

13 Habitat of the plant-forest/reverie/home garden/road side//rocky area/agricultural field/grazing land?

14 How widespread is the medicinal plants from your residence?

15 Plant parts used: Root/stem/root bark/leaves/small twigs with Leaves/flowers/ fruit/seed/whole plant. Others----------

16 Used alone mixed with other materials, concoction/decoction, others----------

17 Preparation for medicinal use: crushed/crushed and powdered/ crushed pounded/extract with cold water /boiled/juice/ latex/: other----------

18 Dose/amount?

19 Does the dose differ among males, females, children, elders?

20 Any noticeable side effects?

21 Any antidotes or side effects?

22 How do you preserve traditional medicines?

23 Are there restrictions /taboos in collecting medicinal plants?

24 Are medicinal plants marketable?

25 Are there threats to those medicinal plants?

26 How do you conserve traditional medicinal plants?

27 How is the knowledge of traditional medicine passed to a family member/younger? generation?

28 How dose modernization interfere with traditional medicine application and use?

29 Preference ranking----------

30 Paired comparison----------

31 Direct matrix ranking----------

32 Fidelity level index----------

<u>Identification</u>

Survey Area/woreda - Chelya Woreda

Peasant Association----------

Community/village----------

Interviewer/facilitator----------

Date/Month/Year---------/------/----------

Time: From----------.

----------Thank you----------

Appendix 7 List of informants contacted in the ethnobotanical study

S.no	Name	S	Age	Kebele	Occupatio	Other identity
1	Abdi Benti	M	27	Obora Beneso	Farming	-
2	Abebe Gezmu*	M	52	Obora beneso	Teaching	-
3	Abebe Mesfin*	M	43	Shano agelo	Farming	-
4	Abera Dadi*	M	45	Racho	Farming	-
5	Aberu Regassa	M	35	Refiso kamino	House wife	-
6	Alko Bayi*	F	45	Siree silase	House wife	Known healer of rabies
7	Arebu Adem*	M	26	Ejaji-01	Vendor	Healer of variety of diseases
8	Ayantu Oda*	F	48	Racho	House wife	Known healer of variety
9	Bayissa Diribi	M	32	Refiso kamino	Farming	Known healer of retaine placenta
10	Bedassa Benti*	M	50	Sire silase	Farming	Known healer of variety of diseases
11	Begi Muto*	M	65	Refiso kamino	Farming	-
12	Berecha Bekele	M	58	Shano agelo	Farming	Healer of variety of diseases
13	Beyene Ketema*	M	30	Refiso kamino	Farming	-
14	Birhanu Ayu	M	42	Obera keraru	Farming	-
15	Biro Gonja	M	30	Racho	Herder	-
16	Boki Kumssa*	M	52	Warjji	Farming	-
17	Dame Daka	M	23	Ejaji-01	Student	-
18	Dame Kereba*	M	80	Shano agelo	Farming	Known healer of variety of diseases
19	Daniel Tessema	M	26	Warji	Farming	-
20	Debela Ayana*	M	70	Siree silase	Farming	Known healer of variety of diseases
21	Debela Abdissa	M	28	Shano agelo	Farming	-
22	Debela Bedassa*	M	50	Obera keraru	Farming	-
23	Debissa Degefa	M	30	Warji	Farming	-
24	Dinka Mamo	M	40	Sire silase	Farming	-
25	Dinkisa Gemechu*	M	29	Sire silase	Farming	-
26	Diribi Mosisa*	M	34	Kiltu elala	Farming	Known healer of homeoroide
27	Endale Ofgea	M	24	Ejaji-01	Farming	-
28	Endale Tegegn	M	25	Ejaji-01	Student	-
29	Eshetu Dessalegn	M	60	Obera keraru	Farming	Healer of variety of diseases
30	Eyob Lulessa*	M	23	Warji	Farming	-
31	Feyisa Lelisa	M	30	Obora beneso	Farming	-
32	Feyisa Ejeta	M	21	Siree silase	Herder	-
33	Feysa Nugusse*	M	28	Kiltu elala	Farming	-
34	Fufa Tolessa*	M	57	Warji	Farming	Known healer of variety of diseases
35	Gebeyhu Birhanu*	M	40	Kiltu elala	Farming	-
63	Gebremariam Mosisa	M	49	Shano agelo	Farming	-
37	Gemechu Lemu*	M	24	Obora beneso	Farming	-
38	Gezahegn Manbegrot*	M	46	Shano agelo	Farming	Known healer of Rh+ factor
39	Giduma Gadissa*	M	29	Obera keraru	Farming	-
40	Giduma Dame	M	35	Obera keraru	Farming	-
41	Husen Aman*	M	37	Ejaji-01	Vendor	Healer of variety of diseases
42	Jembere Getachew	M	20	Kiltu elala	Farming	-
43	Ketema Daba*	M	38	Refiso kamino	Farming	-
44	Ketema Tolu	M	26	Siree silase	Farming	-
45	Ketema Tufa*	M	60	Racho	Farming	-
46	Lebeta Boru	M	38	Refiso kamino	Farming	-
47	Lejisa Eba	M	50	Siree silase	Farming	-

48	Lelissa	Chemeda	M	70	Racho	Farming	-
49	Lema	Regassa	M	26	Kiltu elala	Farming	-
50	Leta	Ayana*	M	36	Refiso kamino	Farming	-
51	Mensur	Mohamed	M	31	Refiso kamino	Farming	-
52	Miressa	Yadeta	M	38	Racho	Farming	Known healer of variety of diseases
53	Mosisa	Deressa	M	45	Obora beneso	Farming	-
54	Mulu	Walisha*	F	58	Shano agelo	House wife	Known healer of variety of diseases
55	Mulualem	Gadissa	M	32	Obera keraru	Farming	-
56	Nigatu	Deressa*	M	60	Obora beneso	Farming	Known healer of variety of diseases
57	Nuguse	Share	M	39	Shano agelo	Carpenter	-
58	Rebuma	Geleto	M	20	Kiltu elala	Farming	-
59	Regassa	Feyssa	M	55	Kiltu elala	Farming	Healer of variety of diseases
60	Rumicho	Guteta*	M	80	Warji	Farming	-
61	Saketa	Bulto*	M	55	Obera keraru	School guard	Known healer of variety of diseases
62	Shealyi	Bungul*	M	64	Ejaji-01	Farming	-
63	Sherif	Sheisa	M	30	Ejaji-01	Trader	Known healer of evil sprit
64	Sogide	Negassa*	F	52	Ejaji-01	House wife	Birth attendant and healer of varaity diseases
65	Tariku	Bultuma	M	36	Kiltu elala	Farming	-
66	Tariku	Chali	M	26	Obora beneso	Farming	-
67	Tesfaye	Busha	M	26	Racho	Farming	-
68	Tolera	Sagn	M	28	Ejaji-01	Header	-
69	Tsegaye	Tarefa	M	28	Racho	Farming	Known healer of variety of diseases
70	Workina	Tafa	M	32	Sire silase	Farming	-
71	Yadeta	Tamiru*	M	22	Obora beneso	Farming	-
72	Zerihun	Wondimu	M	62	Warji	Farming	-

Key: With * are key informants

Declaration

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

Name: Endalew Amenu

Signature_____

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

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Dr. Sileshi Nemomissa

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