

**Full Length Research Paper**

Contribution of Traditional Farmers for Medicinal Plant Conservation on the Farming Site in Gozamin District, Amhara Region, Ethiopia.

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Abstract

An Ethnobotanical study on medicinal plants was carried out in Gozamin District from November 20/2009- May 1/2010. The study was aimed at documenting indigenous knowledge on medicinal plants in the farming zones. Six peasant associations (PA) were selected based on altitude range in between 1500-3200 meter above sea level. Sixty household heads (10 females & 50 males) were systematically selected from 120 household heads having well established home garden and farm fields. Ten key informants from the 60 household heads were involved in the interview for in depth collection of the information. The ethnobotanical data were collected through interviewing local farmers who were fully engaged in farming. Primary data were collected using guided field walk, group discussion, semi structured interview and participant observation in the farming zone. In total 53 species belonging to 49 genera and 32 families were used to treat human and livestock ailments. Taxa commonly used belong to 5 families such as Asteraceae, Euphorbiaceae and Fabaceae (contains 7.54 % each) and Solanaceae and Lamiaceae (contains 5.66 %, each) in number of species. Herbs formed a major component (50.94%) while shrubs, trees and climbers constitute 24.53 %, 18.89% and 5.65% respectively. The study showed that preparation and administration of medicinal plants include several methods. The most frequently used plant parts for the preparations of remedy were leaves 29 (50 %), roots 14 (24.13 %) and fruit 6 (10.34%). These medicinal plant parts were processed in various forms the major ones include Squeezing 10 (18.5%), Crashing 9 (16.66%), Boiling 8 (14.8%) and Grinding 5 (9.25%). The most common mode of administration was Oral 31 (53%), Dermal 15 (25.8%) and followed by Nasal 6 (10.34%).

Key words: Home garden, Farming zone, Gozamen district,

Introduction

Ethiopia is a land of great topographical diversity of high rugged mountains, flat topped plateaus, deep gorges, incised river valleys and rolling plains, which are responsible for tropical, subtropical and temperate climatic conditions (Dawit Abebe and Ahadu Ayehu, 1993; IBC, 2008). The altitudinal variation ranges from 116 m below sea level in the Dalol Depression of Afar Region, to 4,620 meter above sea level at Ras Dejen in the Amhara Region. The Great Rift Valley runs from northeast to southwest of the country and separates the western and southeastern highlands. The highlands on each side of the rift valley give way to extensive semiarid lowlands to the east, south and west of the country (IBC, 2008). This environmental mosaic accentuated the diversity of plants and animal life. The country is a land not only of highly varied landscapes and hence flora and fauna, but of multiplicity of ethnic groups with complex cultural diversity (Dawit Abebe and Ahadu Ayehu, 1993).

Like any other developing and least developed nations, the available modern health care services of the country are not only insufficient but also inaccessible and unaffordable to the majority (Haile Yineger *et al.*, 2008). This problem along with the rapidly increasing human population and cultural resistances towards the use of modern medicines means that the majority of the people in Ethiopia are dependent on traditional medicines of mainly plant origins so as to manage various human ailments (Dawit Abebe, 2001). It is also indicated that Ethiopia has a long historical use of traditional medicine and has developed ways to combat diseases through it. The ways are also as diverse as the different cultures. Healing in Ethiopian traditional medicine is not only concerned with curing of diseases but also with the protection and promotion of human physical, spiritual, social, mental and material wellbeing (Kebede Deribe *et al.*, 2006).

The use of traditional medicine is still widespread in Ethiopia, and its acceptability, availability and popularity is no doubt since about 90% of the populations use it for health care needs (WHO, 2002). However, according to Mirutse Giday and Gobena Ameni (2003), loss of knowledge has been aggravated by the expansion of modern education, which has made the younger generation under estimate

its traditional value. Late alone this, much ethnomedicine research in Ethiopia was conducted by selecting traditional practitioners and special informants who have using plants as a means of income by collecting from forest and elsewhere. However, in this research traditional farmers were also have Knowledge about medicinal plants in their farming system to treat both human and livestock ailments. These dimension of study was highly confirmed that it benefit in conserving medicinal plants by farmers using different level of management through traditional farming system.

Materials and Methods

Study area and ethnographic background of the local people

A reconnaissance survey was conducted between September and November 2009 to select study sites. Accordingly, Gozamin District was selected based on the existing diverse Agroclimatic Zone leading to different types of crop farming practices, natural resource management, indigenous knowledge, and practices associated with conservation and use of cultivated plants in their home garden and farm field. Gozamin District is one of the 18 Districts in East Gojjam Zone and 151 Districts in Amahara National Regional State located $10^{\circ} 36' 18''$ N and $37^{\circ} 55' 02''$ E with an altitudinal range 1000-3200 meter above sea level. The 10 year data taken from the nearest Weather station from 1999-2008 year was indicated that the mean annual maximum and minimum temperature records of the study area were 26° and 8.6° respectively, whereas the mean annual rain fall distribution is 1342 mm.

The District has a population size of 133,656 of which 66,875 males and 66,981 female: 2,583 (1.93%) of the population are urban dwellers which is less than the Zonal average of 9.88 % (CSA, 2007), more over with an estimated area of 1,218.07 square kilometer, it has an estimated population density of 109 people per square kilometer which is also less than the Zonal average of 179.96. The ethnicity of the District population is Amhara and Amharic is every body's language. sedentary rain feed agriculture is practiced and the economy of the people primarily based on mixed cereal agriculture with the farmers growing tef, finger millet, sorghum, maize, barley, wheat, as well as pulses, oil crops, vegetables and fruits.

Due to high anthropogenic effect in the study area, forests have been lost but remnant plants around holy places, inaccessible areas, and left for shade trees and on grazing lands are observed. Some of the vegetation's are *Juneperus procera*, *Hagenia abyssinica*, *Podocarpus falcatus*, *Acacia abysinica*, *Cordia africana*, *Ficus sycomorus*, *Erythrina brucei*, *Eucalyptus camaldulensis*, *Calpurnia aurea*, *Prunes africana*, *Carissa spinarum*, *Rosa abyssinica*, *Dombeya torrida*, *Maytenus arbutifolia*.

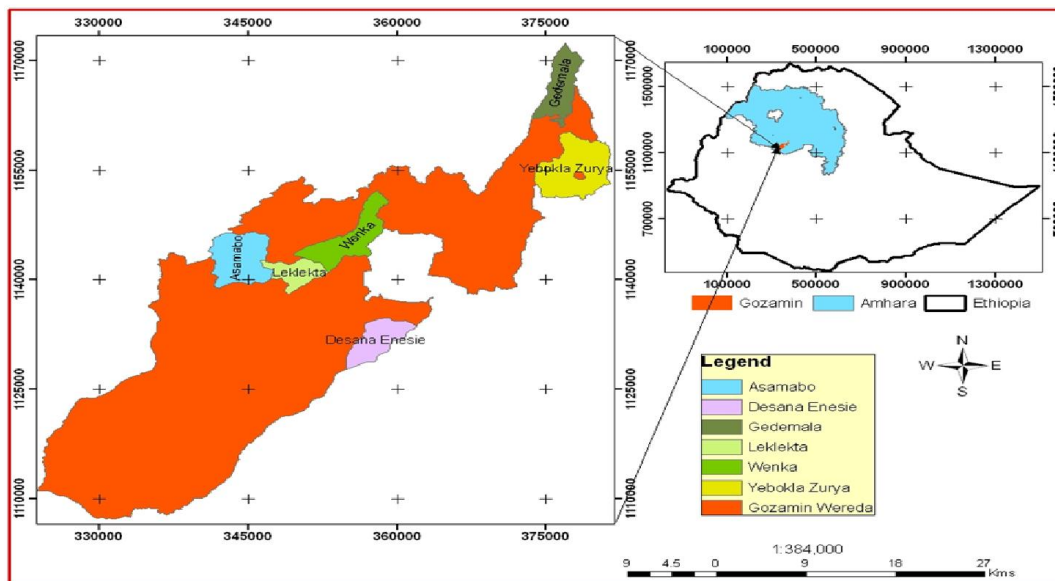


Figure 1. Map of the Study area showing the sampling sites (PA).

Methods

The District was selected purposely due to its diverse altitude range of 1000- 3200 meter above sea level. This elevation was important to see the farmer's traditional medicinal knowledge in the farming complex without stick to traditional medicinal healers. Medicinal plant data were collected from November 20, 2009 to May 1, 2010 in Six Peasant associations (PAs) selected from 26 PAs after stratified in to agro climatic zone following Azene Bekele (2007). The study sites were Dessana Enesie, Leklekita, Assamaboo and Wenka PAs that represents the Weyna Dega agroclimatology (1500-2300 meter above sea level) and Yeboklazuria and Gedemalla PAs that represent the Dega agroecology (2300-3200 meter above sea level). The name of the household leaders having well organized home garden and field crops in their farming zones and representativeness of the main cropping agroecological zone of the District were alphabetically listed and equal proportion of informants totally 60 house hold leaders were selected systematically. From

60 household heads, 10 key informants or local experts, i.e. local people who possess and share a profound indigenous knowledge of a particular aspect of local culture were selected.

The method used for ethnobotanical data collection were a pre-tested semi-structured data collection tool containing open and close-ended questions as described in Martin (1995), Alexiades (1996) and Cotton (1996). The respondents' background, health problems treated, diagnosis and treatment methods, local name of medicinal plants used, source of collection (homegarden or farm field), growth form, plant part used, methods of preparation and application, threats to medicinal plants and conservation practices of respondents were carefully recorded. Voucher specimens of the species were collected, pressed, dried, identified and deposited at the National Herbarium (ETH), Addis Ababa University.

Data analyses

Ethnobotanical data were entered in to excel spread sheet and summarized using descriptive statistics (Höft et al 1999). The spreadsheet data filter facility was employed to determine frequencies of citations so as to identify the most common ailments in the study area and popularly used medicinal plant species; to determine proportions of different variables like plant families, growth forms, source of collection, plant part used, methods of preparation and threatening factors. Preference ranking were included in pre-designed semi-structured interview items. It was conducted following Martin (1995) for five medicinal plants in treating Anthrax. Ten key informants were used based on their personal preference or perceived degree of importance in the community. Direct matrix ranking were also used to identify the best multipurpose medicinal plants by using key informants. The key informants were selected to identify the best preferred multipurpose medicinal plants by assign the highest value 5 for the most preferred plant and value 1 for list preferred. The Informant Consensus Factor (ICF) was calculated for each category to identify the agreements of the informants on the reported cures for the group of ailments. The ICF is calculated as follows: number of use citations in each category (nur) minus the number of species used (nt), divided by the numbers of use citations in each category minus one (Heinerich et al., 1998).

$$ICF = \frac{nur - nt}{nur - 1}$$

Result and Discussion

Level of management of Medicinal plants in the farming site

Medicinal plants were collected at two farming sites called Home garden and Farm field “Guaro” and “Massa” by the local people respectively [Fig.2].

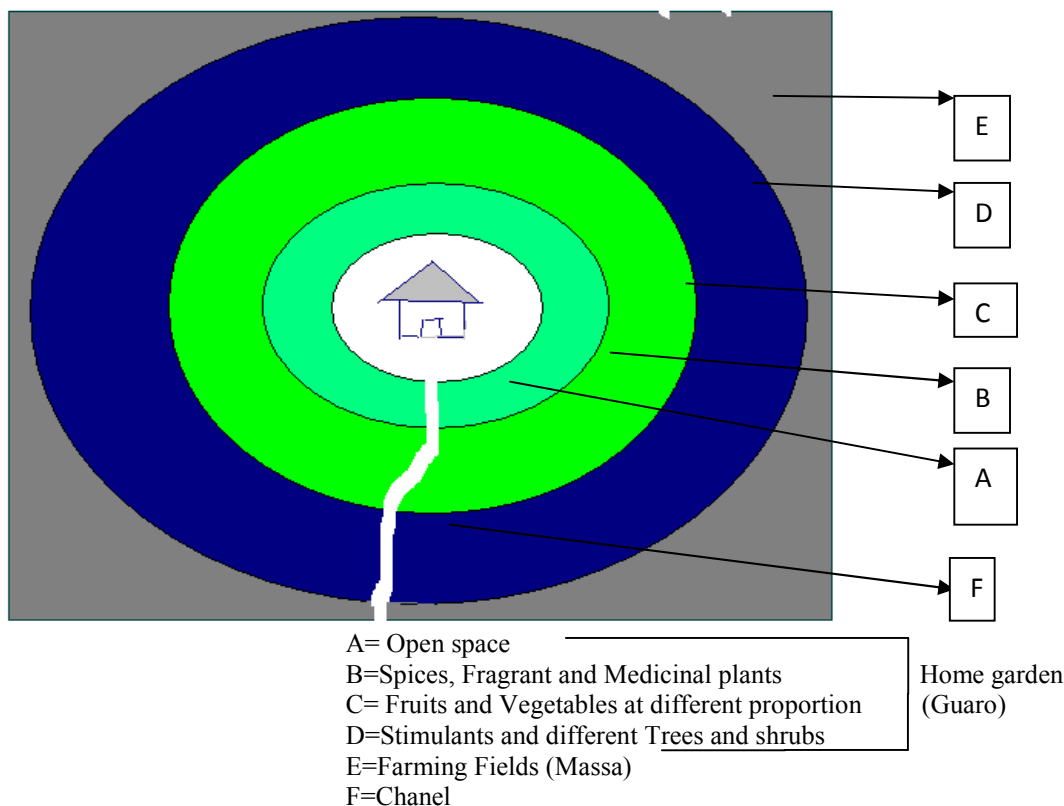


Figure 2. Model showing crop zonation in the farming site of the study area

The horizontal arrangement of plants were followed certain pattern in the study area. The patterns with reference to the living house became as follows. Cattles are penned on the dawn hillside of the house and a channel is cut in the ground to take the urine and

droppings out and dumped to the nearest side yard. Zone A, B, C and D in the sampled study sites were considered as Guaro (Homegarden). The last zonation has been considered as Massa mainly cereals, pulses oil crops and trees that constitute the agroforestry system were found. The Massa and Guaro were separated by live fences at which multipurpose plants mainly planted. A total of 52 different medicinal plant species were collected from the identified farming zones i.e., Guaro and Massa.

Level of Management

Local people in the study area give due attention for those plants that deliberately cultivated, planted and grown spontaneously in the farming site. The plants that can be grown spontaneously in the farming site were evaluated by farmers based on their use. These multi-selection criteria outlooks were contributed for the existence of plant diversity on the farming sites. Because of these diverse criteria, different levels of management were named by the farmers. These are low-level of management: In this management plants have no well-defined procedure to cultivate, have limited use and sometimes considered as weeds by some farmers, however most of them used as medicine. Plants that need Medium level of management: These plants were grown in nurseries, have got special protection and also mainly dispersed by human. Fragrant plants, medicinal plants, and different trees and shrubs that make agroforestry in the farming site were listed by farmers by this level of management. Food crops and majority of spices need high level of management in the study area and their status of cultivation is very high. These crops required high level of management during pre-harvest, during harvest and post-harvest seasons.

Diversity of medicinal plant and their status of cultivation

In total 53 species belonging to 49 genera and 32 families were used to treat human and livestock ailments [Appendix 1]. The largest species is found in Asteraceae, Euphorbiaceae and Fabaceae (contains 7.54 % each) and Solanaceae and Lamiaceae (contains 5.66 %, each). Similar families were reported in ethno medicine studies (Ermias Lulekal *et al*, 2008). The life forms were trees 10 (18.89%), shrubs 13 (24.53%), herbs 27 (50.94%) and climbers 3 (5.65%). Forty medicinal plants were reported as medicine for human ailments, 10 for livestock ailments and the remaining 2 and 1 plant are used for both human and livestock and anti-infestation respectively. [fig1].

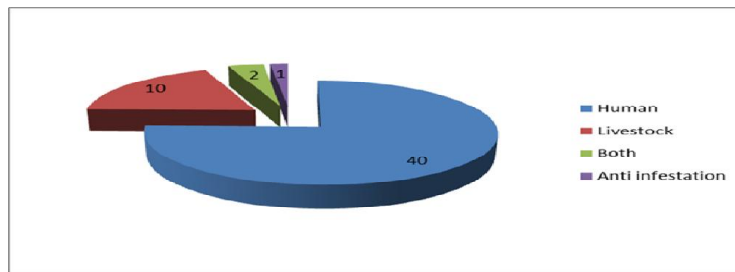


Fig 1. Number of plants used by local farmers to treat human and livestock diseases

Among the listed medicinal plant species, the majority (56.61%) was collected from home garden ‘Guaro’ and (22.64%) from Farm field ‘Massa’ and (22.64%) plants from ‘Massa’ and ‘Guaro’. Their number and status of cultivations were presented in [fig2].

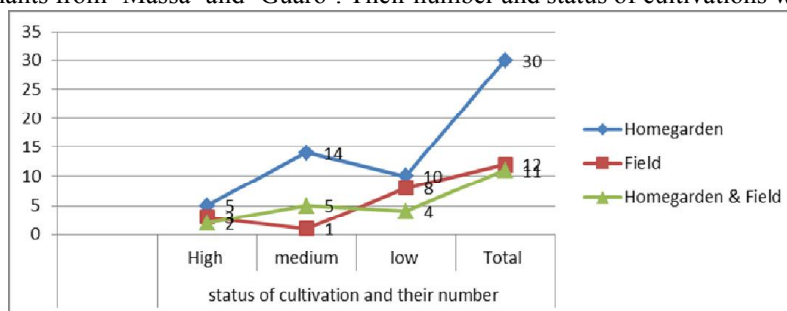


Fig 2. Farming zone, management level and number of medicinal plants

High status of cultivation in relation to medicinal plants on the farming sites were mainly contains nutraceutical that give both as food and medicine. The other medicinal plants were found on the farming sites due to multi-selection criteria of the farmers than considering as weeds. Farmers before decided to clear or weed the plants, they were evaluating the plant based on different criteria acquired through their life long experience than ordinary agriculturalists decide to reach conclusion about the plant. Greater evaluation criteria in kind and dimension have been giving a chance to the plant tolerated, managed and/or cultivated by farmers. This activity helps to conserve diverse group of plants in their yard and farm fields. Mode of processing before administering the parts of the plant were diversified but the most one were Squeezing 10(15.5%), Crashing 9 (15.5%) and Boiling 8 (13.79%) others were reported on [fig 3].

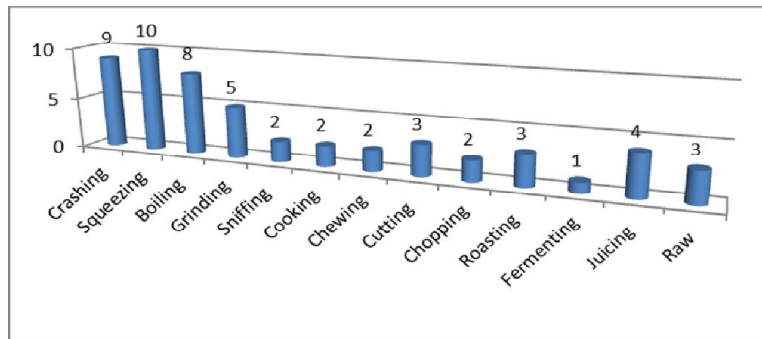


Fig 3. Forms of processing of the different parts of the plant before administering

Widely used plant parts by local people in the study area were used to treat human and livestock diseases. These include Leaf 29 (50%) and Root 14 (24.13%) others were presented on [Fig4]. Those plants their roots were used for medicinal role requires attention for conservation in the future. The modes of processing eventually were taken by human and animal through Oral 31(53%), Dermal 15 (25.8%), Nasal 6 (10.34%) and Others 2(3.44%).

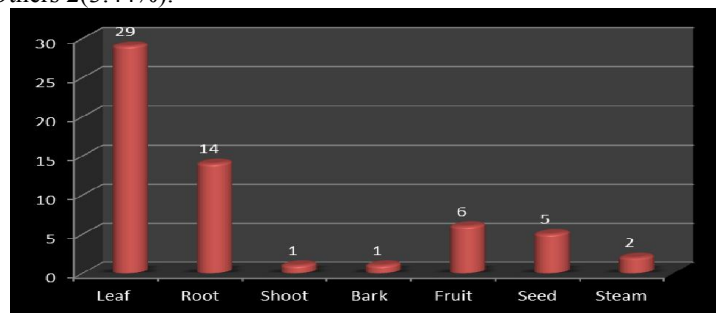


Fig 4. Number of plant parts used for treating human and livestock diseases

Preference ranking of medicinal plants used for treating Anthrax

Preference ranking of 5 medicinal plants that were reported as effective for treating Anthrax was conducted after selecting 10 key informants. The informants were asked to compare the given medicinal plants based on their efficacy in n (n-1)/2 number of comparisons. Where n refers to the number of species used to treat Anthrax. The results showed that *Lepidium sativum* L was ranked first. This plant was also reported to treat blackleg in other districts (Moa Megersa et al, 2013). The other plants were presented in Table 1.

Table1: Ranking of medicinal plants reported for treating Anthrax in the study area.

List of medicinal plants	Key informants coded A-J										Total Score	Rank
	A	B	C	D	E	F	G	H	I	J		
<i>Lepidium sativum</i> L.	4	3	2	3	3	4	3	2	3	3	30	1 st
<i>Cymbopogon citratus</i> (DC.) Stapf.	3	2	2	1	1	3	1	3	1	2	19	3 rd
<i>Leonotis ocyimifolia</i> (Burm. f.) Iwarsson	1	1	3	1	2	1	2	3	2	2	18	4 th
<i>Phytolaca dodecandra</i> L'Herit.	1	1	1	1	1	1	1	1	1	1	10	5 th
<i>Stephania abyssinica</i> (Dillo & A. Rich.) Walp.	1	3	2	3	3	1	3	1	3	2	22	2 nd

Direct matrix ranking of 5 multipurpose medicinal plants.

Key informants were participated to do direct matrix ranking exercise of five plants selected from the free exercise to give special emphasis about the plant whether the multiple use service provide to the farmer affecting the plant itself or not in the study area. The results would be essential for setting plant specific conservation priority. From the ranking exercise *Eucalyptus globulus* was providing multiple services to the community followed by *Croton macrostachyus* and *Vernonia amygdalina* other than medicinal role. The use value was assigned by researcher as 0 for no use, 1 for least use, 2 for less use, 3 for good, 4 for very good and 5 for best use. Practices of using medicinal plants for different use for other purposes were reported in (Ermias Lulekal et al, 2008; Girmay Zenebe et al, 2013 and Moa Megersa et al, 2013)

Table 2. Average score for direct matrix ranking of 5 medicinal plant species with different uses other than medicinal use

No.	Use diversity	<i>Calpurnia aurea</i>	<i>Croton macrostachyus</i>	<i>Eucalyptus globulus</i>	<i>Senna singueana</i>	<i>Vernonia amygdalina</i>
1	Farm implement	27	48	46	40	30
2	Live fence	40	48	45	30	48
3	Fire wood	5	48	50	11	35
4	Charcoal	7	20	40	9	10
5	Shade	35	40	11	50	40
6	House construction	40	20	50	30	11
7	Fodder	4	0	30	10	40
	Total score	158	224	272	180	214
	Rank	5 th	2 nd	1 st	4 th	3 rd

Based on use criteria (5 = best; 4 = Very good; 3 = good; 2 = less used; 1 = least used and 0 = no value).

Informant consensus factor (ICF)

The diseases in the study area have been grouped in to different categories based on the conditions of the disease and treatment resemblance. The medicinal plants that were presumed to be effective in treating a certain disease had higher ICF values, which indicated that these diseases were more common than those with low ICF (Table 3).

Table 3. Informant consensus factor by categories of diseases in the study area.

Category	Number of species	Number of use citation	ICF
Malaria, Fibril and Headache	4	38	0.92
Evil eye	5	49	0.91
Intestinal parasite, Diarrhea, Amoeba and Stomach ach	10	53	0.82
Cattle aliment (Anthrax, leach and liver flock)	7	52	0.89
Common cold and Cough	3	30	0.93
Snake bite, Rabies and Agricultural pest	5	23	0.78
Skin disease and Wounds	12	50	0.77
Liver diseases and Tooth ache	3	15	0.85
Reproductive and menstrual disorder	4	25	0.88

Conclusion

Indigenous knowledge is the basis for local level decision making in agriculture, healthcare, food preparation, education, natural resource management, and a host of other activities in rural communities (Nimachew *et al.* 2011). Late alone this, the skills and techniques of indigenous and local communities provide valuable information to the global community and can be a useful model for biodiversity maintaining and conservation policies. Due to the uncontrolled population growth in Ethiopia (from 18 million in 1950 to more than 97 million in 2014), the existed forests were irreversibly affected. In order to feed these highly growing people, farmers in Ethiopia were cleared a lot of forests. The annual rate of deforestation in Ethiopia between 1990 and 2010 was estimated at 141,000 ha/year. Because of this people in the study area were wise enough to use plants which grow on their farm for different purposes other than clearing them. A Multi selection criterion of the farmers was contributed for biodiversity maintenance and helps to conserve 53 different medicinal plants other than the cultivated crop in the study area.

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Appendix 1: Complete list of plants collected in the study area at different status of cultivation.

No	Scientific name	Family name	Vernacular name	Crop type	Habit	Parts used	Use	Coll. No.	Altitude	Location	State of cultivation & place	Major use classification
1	<i>Artemisia absinthium</i> L.	Asteraceae	Seret	Fragrant	S	Leaf /Stem		HR-098	2307	10020.974°N, 037040.972°E	Medium & Hg	M+ Fr
2	<i>Artemisia afra</i> Jacq. ex Willd.	Asteraceae	Chkugn		H	Leaves	M	HR-077	2196	10020.580°N, 037034.382°E	Medium & Hg	M
3	<i>Brassica nigra</i> (L.) Koch.	Brassicaceae	Senafch	Spice	H	Seed		HR-054	2307	10020.974°N, 037040.972°E	High & Hg	Sp+ M
4	<i>Brucea antidysentrica</i> J. F. Mill.	Simaroubaceae	Abalo		S	Fruit	M	HR-018	2307	10021.111°N, 037041.028°E	Low & Fie	M
5	<i>Calpurnia aurea</i> (Ait.) Benth.	Fabaceae	Dgta		S	Stem	Fi, Lf, Fw, Ch,M,S	HR-095	1856	10014.818°N, 037042.693°E	Medium & Fie.	Mp
6	<i>Capparis tomentosa</i> Lam.	Capparidaceae	Gumero		S	Spine/Root	Lf, M	HR-116	1856	10014.818°N, 037042.693°E	Low & Hg	Mp
7	<i>Carica papaya</i> L.	Caricaceae	Papaya	Fruit	T	Fruit raw	Food	HR-019	1845	10013.908°N, 037041.858°E	High & Hg	N
8	<i>Carthamus lanatus</i> L.	Asteraceae	Yeset aff		H	Root	M	HR-115	2081	10015.246°N, 037042.698°E	Low & Fie	M
9	<i>Citrus aurantium</i> L.	Rutaceae	Komtate	Fruit	T	Fruit raw	Food	HR-068	2307	10020.974°N, 037040.972°E	High & Hg	F
10	<i>Clematis simensis</i> Fresen.	Ranunculaceae	Yeazohareg		H	Leaf	M	HR-112	2081	10015.246°N, 037042.698°E	Low & Hg	M
11	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	Bsana		T	Stem	Fi, Lf, Fw,Ch,M,S, Hc,Fr	HR-022	2219	10020.804°N, 037033.472°E	Medium Hg, Fie	Mp
12	<i>Cucumis ficifolius</i> A. Rich.	Cucurbitaceae	Yemdr emboy		C	Fruit	M	HR-091	2200	10020.116°N, 037035.381°E	Low & Hg	M
13	<i>Cymbopogon citratus</i> (DC.) Stapf.	Poaceae	Tejesar	Fragrant	H	Leaf		HR-108	2216	10019.391°N, 037037.309°E	Medium & Hg	Fra + M
14	<i>Daucus carota</i> L.	Apiaceae	Carot	Vegetable	H	Root	Food	HR-069	2330	10021.260°N, 037041.150°E	High & Hg, Fe	N
15	<i>Datura stramonium</i> L.	Solanaceae	Astenagr		H	Fruit /Leaf	M	HR-037	2311	10020.986°N, 037041.029°E	Low & Hg	M
16	<i>Dracaena steudneri</i> Engl.	Dracaenaceae	Marko		T	Leaf	M, S, Lf	HR-096	2311	10020.986°N, 037041.029°E	Medium & Hg	Mp
17	<i>Erythrina brucei</i> Schweinf.	Fabaceae	Korch		T	Leaf/Stem	Lf, M,	HR-039	2200	10020.986°N, 037041.029°E	Medium & Hg, Fie	Mp
18	<i>Eucalyptus globulus</i> Labill	Myrtaceae	Nech bahrzaf		T	Leaf /Stem/flower	Fi,Lf,Fw, Ch,S,M,Fr,Fo, Hc.	HR-028	2190	10020.804°N, 037033.472°E	Medium & Hg, Fie	Mp
19	<i>Euphorbia abyssinica</i> Gmel.	Euphorbiaceae	kulqual		S	Steam exodate	Lf, M	HR-006	2215	10019.780°N, 037037.310°E	Medium & Hg	Mp
20	<i>Euphorbia petitiana</i> A. Rich.	Euphorbiaceae	Yegede wotet		S	Leaf exodate	M	HR-093	3296	10032.721°N, 037052.592°E	Low & Fie	M
21	<i>Foeniculum vulgare</i> Miller	Apiaceae	Inslal	Spice	H	Leaf		HR-114	2196	10020.580°N,	Medium & Hg	Sp+M

									037034.362'E		
22	<i>Hagenia abyssinica</i> (Brace) J. F. Gmel.	Rosaceae	Koso		T	Lf, M, S	HR-137	2605	10026.627°N, 037053.495°E	Medium & Hg	Mp
23	<i>Hygrophila schulli</i> (Hamih.) M. R. & S. M. Almeida	Acantaceae	Yemesk shoh		H	Leaf	HR-004	2188	10020.073°N, 037035.516°E	Low & Fie	M
24	<i>Jasminum grandiflorum</i> L.	Oleaceae	Tenbebel		S	Steam	HR-086	2081	10015.246°N, 037042.698°E	Low & Hg	M
25	<i>Justicia schimperiana</i> (Hochst ex Nees.) T. Anders.	Acanthaceae	Smiza		S	Stem / flower	HR-055	2307	10021.111°N, 037041.028°E	Medium & Hg	Mp
26	<i>Leonotis ocyimifolia</i> (Burm. f.) Iwarsson	Lamiaceae	Yeferes zeng		H	Leaf	HR-089	2219	10019.454°N, 037037.323°E	Low & Hg	M
27	<i>Lepidium sativum</i> L.	Brassicaceae	Feto	Spice	H	Seed	HR-071	2330	10021.260°N, 037041.150°E	High & Fie	Sp +M
28	<i>Linum usitatissimum</i> L.	Linaceae	Telba	Oil	H	Seed	HR-029	2330	10021.260°N, 037041.150°E	High & Fie	N
29	<i>Lippia adoensis</i> Hochst. ex Walp.	Verbanaceae	Dama Kese		S	Leaf / Stem	HR-009	2307	10020.974°N, 037040.972°E	Medium & Hg	Mp
30	<i>Lupinus albus</i> L.	Fabaceae	Gbto	Pulses	H	Seed	HR-136	2188	10020.073°N, 037035.516°E	High & Fie	N
31	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	Timatim	Vegetable	H	Fruit	HR-073	2081	10015.240°N, 037042.698°E	High & Hg, Fie	N
32	<i>Malva verticillata</i> L.	Malvaceae	Lut		H	Root	HR-092	3280	10032.658°N, 037052.595°E	Low & Fie	M
33	<i>Mentha spicata</i> L.	Lamiaceae	Nana	Spice	H	Leaf	HR-115	2311	10020.986°N, 037041.029°E	Medium & Hg	Sp+ M
34	<i>Momordca foetida</i> Schumach.	Cucurbitaceae	Yekura hareg		C	Root	HR-097	2215	10019.780°N, 037037.310°E	Low & Hg	M
35	<i>Myrtus communis</i> L.	Myrtaceae	Ades	Fragrant	S	Leaf	HR-105	2599	10026.985°N, 037052.861°E	Medium & Hg	Fra+M
36	<i>Nicotiana tabacum</i> L.	Solanaceae	Tmbaho	Stimulant	S	Leaf	HR-081	2416	10020.141°N, 037044.214°E	Medium & Hg	St
37	<i>Nigella sativa</i> L.	Ranunculaceae	Tkurazmud	Spice	H	Seed		2190	10020.804°N, 037033.472°E	High & Hg	Sp+M
38	<i>Otostegia integrifolia</i> Benth.	Lamiaceae	Tnjt	Fragrant	S	Stem / Leaf	HR-090	2188	10020.037°N, 037035.516°E	Medium & Hg	Fr+M
39	<i>Persea americana</i> Mill.	Lauraceae	Avocado	Fruit	T	Fruit raw	HR-017	2307	10020.974°N, 037040.972°E	High & Hg	N
40	<i>Phytolaca dodecandra</i> L'Herit.	Myrtaceae	Endod		S	Leaf/ Fruit	HR-049	2188	10020.073°N, 037035.516°E	Low & Hg, Fie	Mp
41	<i>Plantago lanceolata</i> L.	Plantaginaceae	Gorteb		H		HR-036	2190	10020.804°N, 037033.472°E	Low & Hg, Fie	M
42	<i>Psidium guajava</i> L.	Myrtaceae	Zeytun	Fruit	S	Fruit raw	HR-063	2307	10020.974°N, 037040.972°E	High & Hg	N
43	<i>Rhamnus prinoides</i> L' Herit	Rhamnaceae	Gesho	Spice	S	Seed	HR-056	2216	10019.391°N, 037037.309°E	Medium & Hg	Sp+M
44	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Yeberie mlass		H	Root	HR-087	3296	10032.721°N, 037052.592°E	Low & Fie	M
45	<i>Ruta chalepensis</i> L.	Rutaceae	Tenadam	Spice	S	Seed. Leaf	HR-107	2200	10020.116°N, 037035.381°E	Medium & Hg	Sp+M
46	<i>Senna singueana</i> (Del.) Lock	Fabaceae	Gufa		T	Stem, Stem bark	HR-100	1856	10014.818°N, 037042.693°E	Medium & Hg, Fie	Mp

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47	<i>Senra incana</i> Cav.	Malvaceae	Chfreg	S	Leaf	M	HR-083	2188	10020.073°N, 037035.516°E	Low & Fie	M
48	<i>Stephania abyssinica</i> (Dillo & A. Rich.) Walp.	Menispermaceae	Yayt hareg	C	Root	M	HR-042	2307	10021.111°N, 037041.028°E	Low & Hg, Fie	M
49	<i>Tragia doryodes</i> M. Gilbert	Euphorbiaceae	Ablalit	H	Root	M	HR-103	2081	10015.246°N, 037042.698°E	Low & Fie	M
50	<i>Urtica simensis</i> Stedel	Urticaceae	Sama	H	Leaf	F ,Lf,M	HR-030	2307	10021.111°N, 037041.028°E	Low & Hg	Mp
51	<i>Verbascum stelurum</i> Murb.	Verbanaceae	Ketetna	H	Root	M	HR-085	2219	10019.454°N, 037037.323°E	Low & Hg, Fie	M
52	<i>Vernonia amygdalina</i> Del.	Asteraceae	Grawa	T	Leaf/Ste m	Fi, Lf, Fw,Ch,M,S	HR-021	2311	10020.986°N, 037041.029°E	Medium & Hg	Mp
53	<i>Zehneria scabra</i> (Linn. f.) Sond.	Cucurbitaceae	Hareg resa	C	Leaf	M	HR-109	2216	10019.454°N, 037037.323°E	Low & Hg	M

Where, Fi=Farm implement, F=Food, Lf= Live fence, Fw=Fire wood, Ch=Charcoal, Fo = Forage/ Fodder, Hc= House contraction
 Fr= Furniture, M = Medecine, S= Shade, Hg= homegarden, Fie= Field. , Mp= Multipurpose use, Sp= Spice, Fra=Fragrant, Fra+M= Both Fragrant and Medicinal, Sp+M= Both Spice and Medicinal, O= Others, N= Nutraceutical

Appendix 2: List of medicinal plants collected from home garden and fields

No	Scientific Name	Family Name	Parts used	Rout of administration	Forms of processing	Method of preparation and application	Aliments cured
1	<i>Artemisia afra</i> Jacq. ex Wilk.	Asteraceae	Leaf	Nasal	Sniffing	By smelling the leaves	Evil eye
2	<i>Brassica nigra</i> (L.) Koch.	Brassicaceae	Seed	Oral	Grinding	The seed roasted and finely ground. Water added to the flour and let them an hour to ferment. Served as food by mixing with 'bokelt' made from chickpea or pea or bean	Malaria
3	<i>Capparis tomentosa</i> Lam.	Capparidaceae	Root	Dermal	Chopping	Root shortly cut and hanging on the neck	Evil eye
4	<i>Lipidium sativum</i> L.	Brassicaceae	Seed	Oral	Boiling	By boiling it, give to cow to drink	Anthrax
5	<i>Verbascum stelurum</i> Murb.	Scrophulariaceae	Root	Oral	Chewing	The root dug out with olive handled stick and held between teeth.	Tooth ach
6	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	Shoot	Oral	Cooking	3-7 meristems from side branches taken and cooked by adding salt and butter and drink a cup of solution once.	Malaria
			Leaf	Dermal	Cutting	If the petioles were cut it has produced watery fluid. This can be creamed over the skin.	Ring worm
7	<i>Datura stramonium</i> L.	Solanaceae	Leaf	Dermal	Squeezing	Leaf juice applied once daily mixed with butter	Hair growth stimulant
8	<i>Hagenia abyssinica</i> (Bruce) J. F. Gmel.	Rosaceae	Leaf	Oral	Squeezing	One glass of juice of fresh leaf mixed with water solution of line seed and taken once.	Tapeworm
9	<i>Myrtus communis</i> L.	Myrtaceae	Leaf	Oral	Crashing	Leaf powder Pasted with butter applied once a day	Ring worm
10	<i>Nigella sativa</i> L.	Ranunculaceae	Seed	Nasal	Roasting	Fried seeds wrapped in a piece of cloth and sniffed three times daily	Common cold
11	<i>Phytolacca dodecandra</i> L'Herit.	Phytolacaceae	Leaf	Oral	Squeezing	Juice extracted from fresh leaf and given to cow	Anthrax
12	<i>Plantago lanceolata</i> L.	Plantaginaceae	Root	Dermal	Crashing	Root powder is employed once daily to bandage wounds	Wounds
13	<i>Euphorbia abyssinica</i> Gmel.	Euphorbiaceae	Latex	Dermal	Cutting	The latex was produced during Cutting of the stem of the plant. The produced latex was mixed with crashed garlic, salt and wheat flour. Creamed the mixture once daily on infected part.	Lash
			Root	Oral	Crashing	One spoon root powder mixed with a cup of fresh milk. Give for dog	Rabbis virus

14	<i>Stephania abyssinica</i> (Dillon & A. Rich.) Walp.	Menispermaceae	Root	Oral	Crashing	Cap of root juice given once to cattle	Anthrax
15	<i>Nicotiana tabacum</i> L.	Solanaceae	Leaf	Nasal	Squeezing	Leaf juice pounded with and applied once through ear and nasal drop to expel the parasite	Leach
16	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	Leaf				
17	<i>Rhamnus prinoides</i> L'Herit		Leaf				
18	<i>Otostegia integerifolia</i> Benth.	Rhamnaceae	Leaf				
19	<i>Carica papaya</i> L.	Lamiaceae					
20	<i>Cymbopogon citratus</i> (DC.) Stapf.	Caricaceae	Fruit	Oral	Raw	The seed can be eaten together with the fleshy part.	Gastritis
21	<i>Eritrina brucei</i> Schweinf.	Poaceae	Root	Oral	Crashing	5-10 spoon of root powder mixed with 1 litter fresh water, given to cow	Anthrax
22	<i>Lupinus albus</i> L.	Fabaceae	Leaf	Dermal	Crashing	Leaf powder creamed on infected part.	Wound
23	<i>Malva verticillata</i> L.	Fabaceae	Seed	Dermal	Roasting	The seed roasted and ground. The powder creamed on infected part once daily for domestic animals.	Wound
24	<i>Momordica foetida</i> Schumach.	Malvaceae	Root	Vaginal	Raw	Root inserted in to the vagina	Abortion
25	<i>Cucumis ficifolius</i> A. Rich.	Cucurbitaceae	Root	Dermal	Crashing	Root powder creamed daily on infected part of human	Wound
		Cucurbitaceae	Fruit	Oral	Roasting	1-3 fruit roasted and can be given for sheep by adding salt.	Liver flock
			Root	Oral	Squeezing	The root dug out with horn handled knife and squeezed. One spoon of the filtrate can be given for children	Diarrhea
26	<i>Artemisia absintium</i> L.	Asteraceae	Leaf	Nasal	Sniffing	Sniffing of the fragrant leaf removes bad sprit	Evil eye
27	<i>Carthamus lanatus</i> L.	Asteraceae	Root	Oral	Crashing	The root is cut in to seven pieces about 3cm each and crashed. The root powder mixed with water. The patient Can take a cup of it. Immersing a small finger not more than that can check the volume of the solution in a cup.	Snack bite
28	<i>Clematis simensis</i> Fresen.	Ranunculaceae	Leaf	Fumigation	Fermenting	The leaf and steam chopped and mixed with water. The mixture stays 21 days to ferment and sprayed over on cereal crops.	Control pests
29	<i>Dracaena steudneri</i> Engl	Dracaenaceae	Leaf	Oral	Squeezing	The leaf squeezed and mix with 1 litter water and given to the cattle	Evil eye, from animal
30	<i>Eucalyptus globules</i> Labill.	Myrsinaceae	Leaf	Nasal	Boiling	Boiled the leaf and the patient inhaled the steam	Cough
31	<i>Euphorbia petitiiana</i> A. Rich.	Euphorbiaceae	Leaf	Dermal	Cutting	Cutting the leaf until it produces a milky latex. The milky exudates from the leaf is creamed over the infected skin	Tineacaptis (Chirt)
32	<i>Hygrophila schulli</i> (Hamih.) M. R. & S. M. Almeida	Athecantaceae	Leaf	Dermal	Grinding	Grinding the leaf and mixed with fresh butter and creamed over the infected skin	Skin diseases
33	<i>Jasminum grandiflorum</i> L.	Oleaceae	Leaf and Stem	Oral	Chopping	Cut seven apical meristems from the plant by human teeth and given to the person bitted by snake mouth to mouth	Snake bite
34	<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson	Lamiaceae	Leaf	Oral	Squeezing	Squeezing the leaf and mixed with one litter water and then give to cattle	Anthrax
35	<i>Linium usitatissimum</i> L.	Linaceae	Seed	Oral	Boiling	Drinking a cup of the mucus by removing the seed early in the morning after boiling.	Gastritis
36	<i>Menthe spicata</i> L.	Lamiaceae	Leaf exodate	Oral	Boiling	The leaves are boiled with tea and are taken orally	Urinary system
37	<i>Ruta chalepensis</i> L.	Ruthaceae	Leaf	Oral	Boiling	The stem and leaf immersed with hot tea and drink the solution.	Common cold.
38	<i>Senra incana</i> Cav.	Malvaceae	Leaf	Oral	Grinding	After grinding the dried leaf take one spoon and mixed it in a cup of water. Drink the solution after shake	Diarrhea
39	<i>Tragia doryodes</i> M. Gilbert	Euphorbiaceae	Root	Dermal	Grinding	The root grinned and bandaged on hand	Evil eye
40	<i>Zehnarina scabra</i> (Linn. f.) Sond.	Cucurbitaceae	Leaf	Nasal	Boiling	The leaf can be boiled with water and the patient fumigated by the steam or inhaled the steam	Headache , Abdominal pain
41	<i>Justicia schimperiana</i> (Hochst.)	Aca ntaceae	Root	Oral	Grinding	The roots are grinded, then take one spoon and mixed with a	Sexual transmitted

	ex Nees.) T. Anders.		Stem and leaf	Oral	Juicing	cup of water. The patient drunk the mixture	diseases
42	<i>Calpurnia aurea</i> (Ait.) Benth.	Fabaceae	Leaf	Dermal	Squeezing	Juice of seven shoot meristems that can be mixed with fresh water and drink a cup of the mixture	Hepatitis
43	<i>Citrus aurantifolia</i> (Christm.) Swingle	Rutaceae	Fruit	Dermal	Juicing	The leaf squeezed and the fluid applied over the infected part in both human and live stock	Wound
44	<i>Daucus carrota</i> L.	Apiaceae	Root	Oral	Raw	The fresh root can be eaten to stop menstruation	Menstruation
45	<i>Foeniculum vulgare</i> Miller	Apiaceae	Leaf	Oral	Boiling	The leaves boiled with tea or coffee and then drunk for stomach compliant and hypertension	Abdominal pain
46	<i>Lippia adoensis</i> Hochst. ex Walp.	Verbanaceae	Leaf	Oral	Boiling	Steaming the leaf by inserting it in boiled water and also drinking in cub	Fibril illness
47	<i>Persea americana</i> Mill.	Lauraceae	Fruit	Dermal	Juicing	The juice is creamed over hair for hair fungal treatment	Fungus
48	<i>Psidium guajava</i> L.	Myrtaceae	Fruit juice	Oral	Juicing	Drink the juice that reduces serious effect of gastritis	Gastritis
49	<i>Rumex nepalensis</i> Spreng.	Poly gonaceae	Root	Oral	Squeezing	The root squeezed and is taken by a cup	Remove placenta after birth
50	<i>Senna singueana</i> (Del.) Lock	Fabaceae	Bark	Oral	Chewing	Chewing the bark and drinking the fluid	Snake bite
51	<i>Vernonia amygdalina</i> Del.	Asteraceae	Leaf	Oral	Squeezing	Leaf extract (fluid) is taken orally (one cup)	Intestinal parasites
52	<i>Brucea antidysenterica</i> J. F. Mill.	Simaroubaceae	Fruit juice	Dermal	Crashing	Dried fruit finely Crushed and creamed on wounds (for human)	Wound
53	<i>Urtica simensis</i> Stedel	Urticaceae	Leaf	Oral	Cooking	The fresh leaves could be cooked and eaten by 'injera'	Gastritis

