

Utilization of Traditional Medicinal Plants and Management in Darge-Walga Town, Abeshige District, Gurage Zone, Ethiopia

Dagne Abebe and Belachew Garedew

Department of Biology, Natural and Computational Sciences, Wolkite University, P.O. Box 07, Wolkite, Ethiopia

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Abstract: This ethnobotanical study was carried out to identify and document medicinal plant practice in the Abeshige district, Gurage Zone of SNNP Region. Ethnobotanical information of medicinal plants was gathered through a semi-structured interview, field observation, group discussion and market survey. A total of 89 medicinal plants belonging to 47 families were reported and documented. Out of these medicinal plants, 75 species (84.26%) were reported to treat human ailments, 9 species (10.11%) livestock ailments and 5 species (5.67%) both human and livestock ailments. About 70 species (78.65%) of the plant taxa were collected from the wild and 17 species (19.1%) from home gardens and the remaining 2 species (2.25%) were collected from both wild and home garden. Herbs were found to be the most widely used life forms and this accounts for 33 species (37.1%) followed by 26 species (29.2%) shrub and 20 species (22.5%) tree. The most frequently used plant parts were reported to be the leaves which was 40 taxa (44.94%) and then the roots 24 taxa (26.96%). Crushing and pounding a single plant part or a mixture of plant parts of different taxa widely used method of preparation. The different use categories of medicinal plant in the area included food, firewood, charcoal, construction and furniture. Religious teachings, Agricultural expansion, overgrazing, fire wood collection, charcoal production, cutting down trees for construction and furniture were major conservation threats which leads to the loss of indigenous knowledge. But some people were found to protect medicinal plants in home garden and agricultural fields. Therefore, in addition to the aforementioned positive attitude of the local communities supplementary environmental education with regard to sustainable uses of medicinal plants could be useful.

Corresponding Author:

Dagne Abebe

Department of Biology, Natural and Computational Sciences, Wolkite University, P.O. Box 07, Wolkite, Ethiopia

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INTRODUCTION

Historical accounts of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000 to 4000 BC in china and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians^[1]. This time, the chemical and genetic constituents of plants are being increasingly exploited for human benefit^[2]. Right from its beginning, the documentation of traditional knowledge, especially on the medicinal use of plants has provided many important drugs to treat human and live-stock ailments in modern day which are constant interest as sources of novel foods and medicines^[3]. According to WHO^[3] and Samuelsson^[4] as many as 80% of the world's people depend on traditional medicine to meet their primary health care needs. The high cost of drugs and the inability of many developing countries to purchase modern drugs have forced local communities to look for products in the form of medicinal plants that are proved to be effective, safe, inexpensive and culturally acceptable^[5, 6]. Traditional medicinal consultancy including the consumption of the medicinal plants has a much lower cost than modern attention^[7, 8].

Traditional medicine still remains the main resources for a large majority of the people in Ethiopia for treating health problems^[9]. Ethiopia is believed to be home for about 6,500 species of higher plants with approximately 12% of these endemic^[10-13]. Tanto *et al.*^[14], shows that about 887 plant species are reported to be utilized in the traditional medicine. Among these, about 26 species are endemic and they are becoming increasingly rare at the verge of extinction. In many developing countries including Ethiopia, most of the information's are still in the hands of traditional healers and knowledge of healers are either lost or passed to generation orally^[9, 15, 16].

In addition, to the natural factors, different human activities are causing major global reduction of plant diversity including the medicinal plant species. Similarly, as in every parts of the country in the study area, managing traditional medicinal plants are faced with the problem of continuity and sustainability. Moreover, the presence of natural and anthropogenic factors affecting the losses of valuable medicinal plants, the objective of the study was to explore the use and management of traditional medicinal plants and documentation of the indigenous knowledge in Abeshige district, Gurage Zone, Ethiopia.

MATERIALS AND METHODS

Description of the study area: The study was conducted in Gurage Zone, Abeshige district which is located in SNNP region of Ethiopia. The district is bounded by Wolkite town on east. The altitudinal range of the district falls between 1000-2012 m above sea level and it receives high amount of rainfall with an average of 1182-2211 mm annually.

Study design: Both qualitative and quantitative research design were applied. Qualitative research design was used to explore the perception of local community towards the use and management practice of medicinal plants. Whereas, quantitative research design was used to quantify some numerical data obtained from sample survey and data sources were generated through qualitative analysis of key-informants interview, field observation and focus on group discussion.

Sample size and sampling method: Out of 22 kebeles of the district, 6 kebeles which have different ethnic groups were selected to conduct the study. Both purposive and random sampling methods were employed. Twenty two individuals between the ages of twenty one to seventy were selected per kebele. To determine the sample size of the study, the researchers have been applied the formula provided by Israel. A 91% confidence level and the estimated proportion of informants present in the population (p = 50%) and acceptable sampling error (e = 9%):

$$n = \frac{N}{1+N(e)^2} = \frac{138240}{1+138240(0.09)^2}, n = \frac{138240}{1120.744} = 124$$

Where:

n = The sample size

N = Total population

e = Level of sample error

Ethnobotanical data collection: The reliable ethno botanical data were collected from January 2019 up to June, 2019. To do so, the valuable techniques employed for data collection from the local practitioners and elder people were semi-structured interview, group discussion, market survey, field observation and guided field walk.

Plant specimen collection and identification: At the end of the interview, the reported medicinal plants were collected from natural vegetation and home garden. Sample specimens of the plants cited for their medicinal use were collected, numbered, pressed and dried for identification. Plant identification were performed both in the field and using the Flora of Ethiopia and Eritrea and also by comparison with authenticated specimens at the national herbarium of Ethiopia.

Ethnobotanical data analysis: The data was mainly analyzed and summarized by descriptive statistics, preference ranking, paired comparison and direct matrix ranking.

Descriptive statistics: 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.

Preference ranking: About 12 informants were selected to identify the best-preferred medicinal plant species for treatment of diseases. Each informant was provided with medicinal plants reported to cure the disease with each leaf of medicinal plant used being paper tagged name and asked to assign the highest value for plant species most preferred, against the illness and the lowest value for the least preferred plant and in accordance of their order for the remaining ones. The medicinal plants believed to be most effective to treat the diseases were given the highest value (5) and the least effective got the lowest value (1). The value of each species was summed up and the rank for each species was determined based on the total score.

Paired comparison: Used for evaluating the degree of preferences. A list of the pairs of selected items with all possible combinations was made and sequence of the pairs and the order within each pair was randomized before every pair presented to selected informants and their responses recorded and total value was summarized. In this study, informants indicate the efficacy and popularity of medicinal plants species used to treat diseases and rank was made based on the report of the informants. As traditional healers treat disease, the local informants were endowed with the knowledge of disease treatment.

Direct matrix ranking: Employed in order to compare multipurpose use of a given species and to relate the extent of its utilization versus its dominance. Based on information gathered from informants, multipurpose tree species was selected out of the total medicinal plants and use diversities of these plants were listed for 12 selected key informants to assign use values to each species (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used).

RESULTS AND DISCUSSION

Socio demographical character: The highest percentage from age group was 31-40 (26.7%) and the lowest were 61-70 (7.4%) which indicates that the younger class of the community (between the age of 20-30) have no knowledge on use of traditional medicinal plants and this may be due to lack of interest to learn from their elders.

Table 1: Distribution of plant species in the study area

Family	Frequencies	Percentage
Asteraceae	8	9.00
Lamiaceae	6	6.75
Cucurbitaceae	5	5.61
Euphorbiaceae	5	5.61
Fabaceae	5	5.61
Solanaceae	5	5.61
Rutaceae	4	4.50
Poaceae	3	3.37
Polygonaceae	3	3.37
Ranunculaceae	3	3.37
Amaranthaceae	2	2.24
Apiaceae	2	2.24
Boraginaceae	2	2.24
Brassicaceae	2	2.24
Rosaceae	2	2.24
The remaining 32 families	32	36

Therefore, more knowledge acquired by the elders was not transferred well. Among the participated respondents 59.3% were male and the remaining 40.7% were female. Six ethnic groups (Wolayta, Amhara, Hadiya, Gurage, Oromo and Tigre) were involved and from which the largest ethnic groups were Gurage, Amhara and Oromo. Those all people have different attitude on the use and management of traditional medicinal plants. Thus, variation in ethnic groups played an important role in diversification of knowledge on use and management practice of medicinal plants in the study area.

Distribution of medicinal plants in the study area: A total of 89 plant species were identified and distributed in to 47 families which have medicinal value for treating 64 different health problems (Appendix 1). A total of 75(84.26%) plant species were collected to treat human disease, 11(12.36%) plant species for animal ailments and 3(3.37%) plant species were collected to treat both human and animal diseases.

The family Asteraceae was accounted the highest number composing 8 species (9%) and followed by Lamiaceae composing 6 species (6.75%), Euphorbiaceae, Fabaceae, Cucurbitaceae and Solanaceae families composing 5 species (5.61%), Rutaceae 4 species (4.5%) and each, Poaceae, Ranunculaceae and Polygonaceae families contains 3 species (3.37%) and five families contains 2 species (2.24%) while the remaining thirty two families contains 36% plant species (Table 1).

The species of Asteraceae family used highly for medicinal purpose the result was in line with the finding by Mesfin *et al.*^[11], Andarge *et al.*^[6], Birhanu *et al.*^[17], Meragiaw *et al.*^[18] that Asteraceae family the highest used by the communities for treatment of different ailments. However, it was disagreed by the

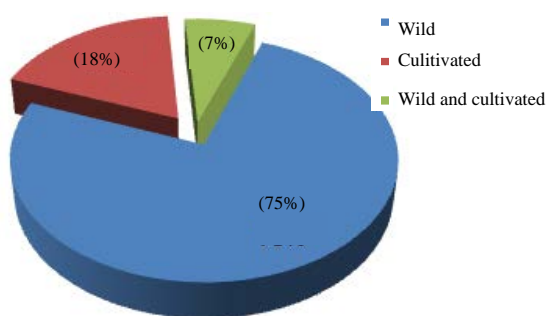


Fig. 1: Distribution of medicinal plants in different habitats

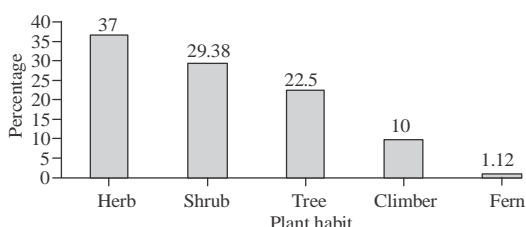


Fig. 2: Growth forms of medicinal plants used for human and livestock ailments in the study area

findings of different researchers that Lamiaceae is the dominant family^[19, 20] and also Fabaceae was dominant family^[21-25].

The presence of knowledge and practice on medicinal plants by Abeshige district healers shows that the indigenous people of the study area still depend on the traditional medicinal plants.

Habitat variation of medicinal plants: Majority of medicinal plants were obtained from wild, home garden, agricultural field and road side. Hence, the current finding revealed that most of the medicinal plants obtained from wild 67 species (75.3%) followed by cultivated one 16 species (18%) (Fig. 1). Based on the fact, high number of medicinal plant species obtained from wilds suggests that wild is a good option for healers to hide their knowledge from other people. The finding of the present study was agreed with study conducted in other part of Ethiopia by Addisie *et al.*^[26], Yirga *et al.*^[27], Megersa *et al.*^[21], Abera^[28], Mesfin *et al.*^[11], Kefalew *et al.*^[20], Temam and Dillo^[29], Ayalew *et al.*^[23], Garedew and Abebe^[30] which revealed that frequently medicinal plant were collected from the wild in the nearby forest and grassland areas and almost above half of the medicinal plants were collected from the natural habitat.

Plant habit (growth forms): Of the total 89 medicinal plants collected 33 species (37.1%) were herbs followed

by 26 species (29.38%) shrubs and 20 species (22.5%) trees (Fig. 2). This shows that most widely used medicinal plants habit in the study area are herbs followed by shrubs. Relatively high number of herbs and shrubs for medicinal purpose has also been reported previously by Hunde^[31], Teklay *et al.*^[32], Abera^[28], Mesfin *et al.*^[11], Andarge *et al.*^[6], Birhanu *et al.*^[17], Mekuanent *et al.*^[33], Meragiaw *et al.*^[18], Temam and Dillo^[28] whereas the result were dissimilar with finding by Ayalew *et al.*^[23], Teklehaymanot^[24] that shrub were the dominant habit.

Plant parts used: The most widely used part of plant for the preparation of herbal remedies in the town was leaf 37 (41.6%) followed by root 21 (23.6%), fruit 7 (7.86%) and bark 6 (6.74%) (Fig. 3). Plant part such as seed, bud, twig, stem, tuber and sap were also used rarely.

Leaf is the most cited plant part in medicine preparation agreed with reports on medicinal plants by Tamene^[34], Amenu^[35], Megersa *et al.*^[21], Regassa^[22], Teklay *et al.*^[32], Abera^[28], Mesfin *et al.*^[11], Andarge *et al.*^[6], Meragiaw *et al.*^[18], Temam and Dillo^[29], Teklehaymanot^[24]. Whereas, studies carried out in different parts of the country that documented as root to be the most extensively used plant part in the preparation of herbal remedies^[36-38, 19, 39] which is indicated the second most cited plant part to be used in the present study area.

Since, Herbal preparation that involves roots, rhizomes, bulbs, barks, stems or whole parts have negative effects on the survival of the mother plants. The fear of destruction of medicinal plants due to the nature of plant parts collected for the purpose of medicine seems to be minimal in the area where this study was conducted. As regards of conservation, the traditional medicine practice has little contribution to destruction of the plant species, mainly because collection of leaves does not pose a greater danger to the existence of an individual plant as compared to the collection of underground parts, stem or whole plant.

Preparation method of medicinal plants: The local people employ various methods of preparation of traditional medicines for different types of ailments. The preparations vary based on the type of disease treated and the actual site of the ailment. The principal method of traditional medicine preparation reported was crushing, squeezing and pounding (Table 2). This crushing mode of remedy preparation was in line with the finding of Regassa^[22]. This may be due to the possibility of effective extraction of plant ingredients when pounded or crushed and squeezed, so that, its curative potential would increase.

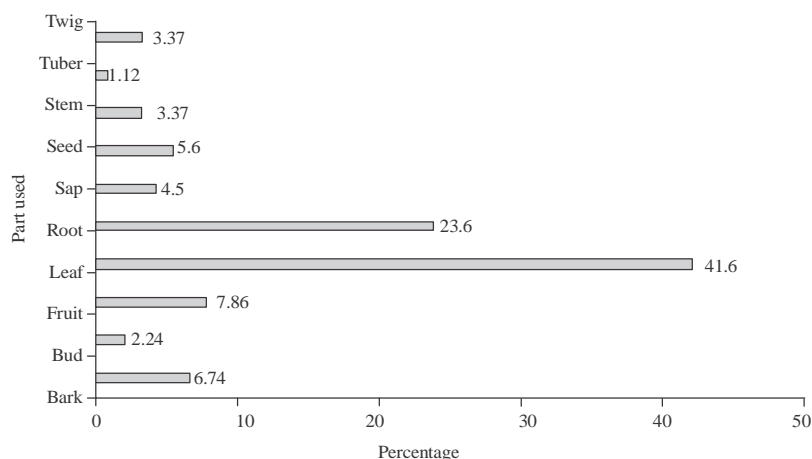


Fig. 3: Plant parts used for traditional medicine preparation

Table 2: Preparation methods of herbal medicine reported by people of Abeshige district

Forms of preparation	Frequency	Percentage
squeezing	9	10.11
crushing	21	23.6
pounding	17	19.1
Crushing/squeezing	19	21.34
Crushing/cooking/boiling	9	10.11
Crushing/smoking	4	4.49
Peeling/chewing/attaching	8	9
Heating	2	2.25
Total	89	100

Preparations may involve using a single plant part or mixtures of different organs of the same plant. In this study, the local people also use some other products (water, oil, sugar, salt, milk, honeys) as an additives to improve the flavor and reduce adverse effects such as vomiting and diarrhea, so that, the efficacy of the traditional medicine would be maintained or increased. Such additives were also reported by some previous researchers^[30, 34, 40, 41].

Dosage and route of administrations: The dosage of medicine to administer is given by observing and guessing the age and the physical appearance of the patient. Lack of the standard dosage may affect the health of the patients. As reported by Abebe and Ayehu^[42] the lack of precision in the dosage is one of the major drawbacks of practicing traditional remedy. As regards to route of administration include through oral, dermal, auricular, nasal, vaginal, anal and through eye. Overall, oral was reported as a dominant (51.7%) followed by dermal route (23.6%) (Fig. 4) both oral and dermal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power. This finding agrees with some previous

reports^[11, 19, 23-25, 29,30, 34, 41-44]. There was also other route of administrations including eye, teeth and carrying in pocket accounting 10.1% of the total routes of administrations.

Conditions of preparation of remedies: Herbal remedies are prepared using fresh material 68(76.4%) while 12 (13.5%) were used in the case of dried plant material and 9(10.1%) either fresh or dried (Fig. 5). Similarly, a study conducted by Sori *et al.*^[45] showed that using fresh materials for different health problems is more than dry materials or dry or fresh. This may be due to the high chemical component of fresh material than the dried one.

Medicinal plant: About 64 different human and animal ailments were recorded that was reported by the indigenous people of Abeshige district. Of these diseases, 54(84.38%) are human diseases, 8(12.5%) animal diseases and 2 diseases (i.e., Rabies and snake bite) are both human and animal diseases. In similar fashion different studies results reveal that majority of medicinal plants used for treatment of human diseases^[22, 32]. Due to the presence of many traditional plants, people in the study area still depend on traditional medicine to treat those diseases. According to Tanto *et al.*^[8], Bizuayehu and Garede^[25], Garede and Abebe^[30], Garede and Bizuayehu^[41], Abebe and Garede^[44], 80% of Ethiopian population depends on traditional medicines for their primary health care.

The number of medicinal plants used for treating evil eye was 11 species (12.38%) common in human followed by gastric pain in human 8 species (9%), fever in human (7.87%) and malaria (6.74%) (Table 3).

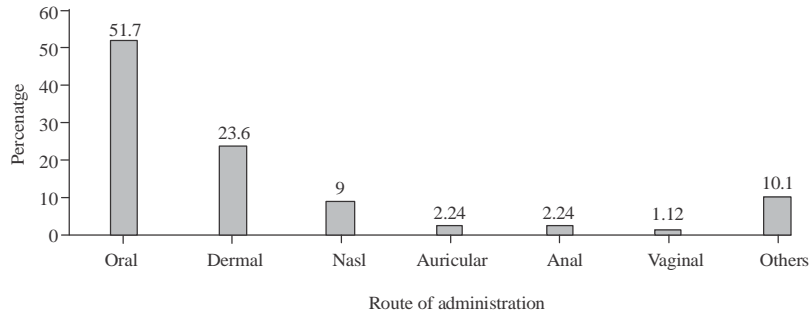


Fig. 4: Percentage distribution of route of administration of plant remedies used for human and livestock

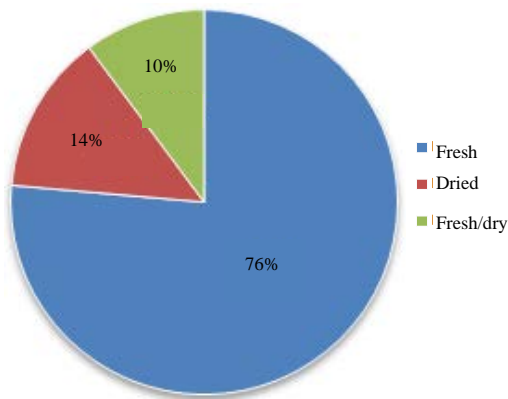


Fig. 5: Conditions of preparation of herbal remedies

Preference ranking: Preference ranking of seven medicinal plants that were reported for treating stomach ache was conducted after selecting five key informants. *Withania somnifera* ranked first indicating that it is the most effective in treating stomach ache followed by *Rumex nepalensis* and the least effective was *Rubus aethiopicus* (Table 4). The local people have also prized the high preference of Gizawa by their own statements by saying “Gizawa eyale dejish lemin yimotal lijish” which is to mean that “why your children do dies, while Gizawa grows in your yards!” This result was disagreed with Teklay *et al.*^[32] that *Solanum giganteum* has high preference by healers; *Croton macrostachyus* used for malaria treatment^[28].

Direct matrix ranking: The majority of the community relies on wild plants for various purposes such as charcoal, construction, fencing, firewood, forage, furniture making and medicinal. Four commonly reported multipurpose species and seven use-categories were involved in direct matrix ranking with four informants.

As Table 5 shows that *Cordia africana* ranked first and hence it is the most preferred plant by local people for various uses and is the most threatened species as the

Table 3: Most common diseases in human and livestock and medicinal plants used to treat (h-human, l-livestock, H&L-human and livestock)

Major diseases	No. of medicinal plants used	Percentage	Disease treated
Evil eye	11	12.38	H
Gastric	8	9	H
Fever	7	7.87	H
Stomach ache	6	6.74	H
Bleeding/Wound	5	5.61	H
Catarrh	5	5.61	H
Spider disease	4	4.5	H
Eye	4	4.5	H
Malaria	6	6.74	H
Toothache	4	4.5	H
Hepatitis	4	4.5	H
Rainbow	2	2.24	L
Amoeba	4	4.5	H&L
Headache	2	2.24	H&L
Herpes	1	1.12	H
Animal Catarrh	3	3.37	H
Animal fever	2	2.24	H
Gogsa	2	2.24	L
Anthrax	1	1.12	L
Eye disease	2	2.24	H
Rabies	3	3.37	L
Snake bite	3	3.37	L
Total	89	100	

informants reported which is evidently shown by its scarce distribution in the area except in some protected coffee forests. This scarcity of *Cordia africana* is due to over harvesting for not only medicinal but also for other uses particularly for timber production. *Olea welwitschii* ranked second, *Croton macrostachyus* ranked as third, *Vernonia amygdalina* obtained the fourth. The result was in line with the finding by Teklay *et al.*^[32] that *Cordia africana* has the highest direct matrix (Table 6).

Paired comparison: For medicinal plants that were identified by the informants to be used in treating evil eye, which was the most common disease for which patients visited the traditional medicinal practitioners rather than modern clinics. A pair wise comparison was made among

Table 4: Preference ranking of medicinal plants used for treating stomachache

List of medicinal plants	R ₁	R ₂	R ₃	R ₄	R ₅	Total	Ranks
<i>Rubus aethiopicus</i>	3	2	2	1	2	10	7th
<i>Withania somnifera</i>	5	5	4	5	5	24	1st
<i>Dodonaea angustifolia</i>	2	2	2	2	3	11	6th
<i>Ruta chalepensis</i>	3	3	3	4	4	17	4th
<i>Rumex nepalensis</i>	5	4	5	4	5	23	2nd
<i>Silene macrosolen</i>	2	2	4	3	2	13	5th
<i>Zingiber officinale</i>	5	4	4	5	4	22	3rd

Table 5: Direct matrix ranking of four plant species by four informants based on seven use criteria (5 = best; 4 = Very good; 3 = good; 2 = less used; 1 = least used and 0 = no value)

Use categories	Cordia africana				Vernonia amygdalina				Croton macrostachyus				Olea welwitschii			
	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄
Charcoal	2	2	2	2	1	1	2	1	3	3	3	2	5	5	5	5
Fire wood	3	3	3	2	4	1	3	2	5	4	3	3	3	4	3	4
Construction	3	2	3	3	2	1	1	1	3	2	2	2	3	4	3	3
Fencing	5	4	3	4	5	5	5	5	5	5	5	5	4	5	4	5
Medicinal	5	5	5	5	0	2	1	1	1	2	2	1	3	4	2	2
Furniture	5	4	4	5	5	5	5	5	1	2	2	1	1	2	2	1
Fodder	4	4	5	4	1	1	2	1	4	3	2	5	5	5	3	4
Ind. total	27	24	25	25	18	16	19	16	22	21	19	19	24	27	22	24
Grand total	101	69	81	97												
Rank	1st				4th				3rd				2nd			

Table 6: Paired comparison of medicinal plant species used to treat evil eye

Medicinal plants	Informants labeled 1-5					Total	Rank
	I ₁	I ₂	I ₃	I ₄	I ₅		
<i>Ruta chalepensis</i>	4	5	3	4	5	21	2nd
<i>Allium sativum</i>	3	4	4	3	3	17	5th
<i>Verbascum sinaiticum</i>	4	3	3	3	3	16	6th
<i>Justicia schimperiana</i>	3	2	4	3	4	16	6th
<i>Capparis tomentosa</i>	5	4	5	4	5	23	1st
<i>Artemisia absythinica</i>	5	3	3	3	4	18	4th
<i>Clerodendrum myricoides</i>	4	3	4	4	4	19	3rd

five of them (Table 7). It was found that *Capparis tomentosa* species stood first for the treatment of evil eye and *Justicia schimperiana* and *Verbascum sinaiticum* were the least preferred species to treat the disease in the area. This rank may be due to the efficacy and low abundance of the plant in the context of local environment.

Threats to medicinal plants and indigenous knowledge:

As observed during market survey, business obtained from charcoal and fire wood severely accelerated the high rate exploitation of *Olea welwitschii*, *Phoenix reclinata*, *Albizia gummifera* and *Croton macrostachyus*. According to Balemie *et al.*^[43], Mesfin *et al.*^[11], Birhanu *et al.*^[17] and Meragiaw *et al.*^[18], rapid increase in population, the need for fuel, urbanization, timber production, over harvesting, destructive harvesting, invasive species, commercialization, honey harvesting, 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. 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, religious and awareness factors, 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^[17, 18].

As informed by respondents, they do not grow medicinal plants used to treat important human and animal diseases in home garden in order to keep their medicinal value in secret because they believe that if everyone knows the plant name to treat diseases, the medicine they give become less curative. Religious concerns also disregard traditional medicinal plants in the area as if it is wrong fortune the healers portray to gain business benefit. They also cite from the 'Holly Bible' by saying that "sir mashoch ena kitel betashoch atihunu tebilo tetsifual" and so, they teach the local peoples not to use traditional medication using plants. Thus, a number of combined conditions stated above resulted in overall loss of taxa and indigenous knowledge in the area. Evidently, more medicinal plants were used in the past than today.

CONCLUSION

The present study showed that 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. Thus, local peoples know when where and how to use the various plant resources around their locality.

A large member of the population of the study area used medicinal plants for treating some common human and livestock ailments who can't buy the modern medicines with a relatively higher price. Based on this fact, 89 medicinal plants were recorded from which 75(84.26%) species were noted to treat human ailments. Majority of the medicinal plant species obtained from the wild 67(75.3%). A total of 64 ailments of human and livestock which are being treated by traditional medicinal

plants. Herbal remedies are prepared from fresh materials 68(76.4%) and herbs are highly utilized 33(37.1%) for medicinal purpose. Leaf part of 37(41.6%) medicinal plants were used for the treatment of human and animal ailments that most administered via oral (51.7%).

The major threat of medicinal plants arises from agricultural expansion, firewood, charcoal, timber production, construction and erosion of indigenous knowledge emanate from secrecy, oral based knowledge transfer, unavailability of the plant species, influence of modern education and awareness factors are the major ones.

ACKNOWLEDGMENTS

We acknowledge all respondents of Darge-Walga Kebele for their transparent information.

APPENDIX

Appendix 1: List of Medicinal Plants Used for Treatment of Human and livestock ailments in Yeki districts, Southwest Ethiopia: - Hb = Habit (T = Tree; Sh = Shrub; H = Herb; Cl = Climber; Fe = Fern); Hab = Habitat (Wi = Wild; Cu = Cultivated; Wc = Wild and cultivated); PU = Part Use (L = Leaves; R = Roots; L and R = leaf and root; WP = Whole Plant); RA = Route of Administration (Or = Oral, Dr = Dermal; Oc = Ocular; Na = Nasal; An = Anal; Au = Auditoria); Language (Am-Amharic; Gg-Guragegna; Oro-Oromigna)

Local name	Scientific name	Family	Ha	Hab	Disease treated	PU	Mode of preparation and application	RA
Abaryet (Gg), Abalo (Am)	<i>Brucea antidysentrica</i> <i>J.F.Mill.</i>	Simaroubaceae	T	Wi	Kestedemena	R	Crushing the root and squeezing	Or
Anterfa/Am./	<i>Euphorbia schimperiana</i> <i>Scheele</i>	Euphorbiaceae	H	Wi	Kintarot Kuakucha	sap	Squeezing and Painting the sap on the wound	An & Dr
Embuay	<i>Solanum americanum</i> <i>Mill.</i>	Solanaceae	H	Wi	Gastric inflammation	L	Prepared as food and eaten	Or
Shore	<i>Canthium moligocarpum</i> <i>Hiern</i>	Rubiaceae	Sh	Wi	Amoebic diarrhea, Kurtemat	B	Pounding, squeezing and mixing with honey	Or
Agam (Am)	<i>Carissa spinarum</i> L.	Apocynaceae	S	Wi	Likift	R	Crushing the root and smoking	Na
Arg (Gg)	<i>Clerodendrum myricoides</i> <i>(Hochst.) R.Br.exVatke</i>	Lamiaceae	Sh	Wi	Mich	R	Crushing the root and smoking	Or/Na
Misirich (AM)					Headache and evil eye	L	Fresh leaf squeezed by hand	Or/Na
Mekmeko (AM)	<i>Rumex abyssinicus</i> Jacq.	Polygonaceae	H	Wi	Kuakucha	R	Washing the body with pounded root	Dr
Gufa	<i>Solanecio mannii</i> (Hook. f.) C. Jeffrey	Asteraceae	Sh	Wi	Bile disease	L	Feeding the crushed leaf	Or
Aregresa (etsesabeq) (Am)	<i>Zehneria scabra</i> (L. fil) sonder	Cucurbitaceae	Cl	Wi	Uterus disease,	L	Chopping and squeezing the leaf	Or
Azaza (Gg), Ate faris (AM)	<i>Datura stramonium</i> L.	Solanaceae	H	Wi	Michyemtawkebt Gendi	L	The leaf squeezed and mixed with milk	Or
Atkuar, seged	<i>Nuxia congesta</i> R. Br. ex Fresen	Loganiaceae	T	Wi	Deafness	L	The leaf crushed with palm seed and boiled with selit oil	Au
Avocado (Am)	<i>Persea americana</i> Mill.	Lauraceae	T	Cu	Fore for	L	Washing head removed off hair with	Dr
Yeazohareg (Am)	<i>Clematis simensis</i> Perr. and Guill	Ranunculaceae	Cl	Wi	Almazbalechira	St	Pounding the stem and applying on the skin	Dr
Bagi; gabai(Am)	<i>Cumbirtum Peniculatum</i> Vent.	Cumburtaceae	Cl	Wi	Eye disease	Sap	Cutting the stem and dropping the sap in eye	Oc
Ballessi /OR/ Amsaanketikit	<i>Asplenium aethiopicum</i> (Burm.f.) Bech.	Aspleniaceae	Fe	Wi	Diarrhea Tibige(leg swelling)	R B	Crushing and then squeezing the root Pounding the dried bark and then painting on lag	Or Dr
Begd Zemedie; Yemogn Fqr (Am.)	<i>Cyathula uncinulata</i> (Schrad.) Schinz.	Amaranthaceae	H	Wi	Shererit	L	Squeezing and then painting the wound	Dr
Bissana (Am) Mesana;	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	T	Wi	Lechirt, bleeding Malaria	L B	Squeezing and attaching the leaf on the wound Crushing and mixing with water or tela	Dr Or
Borino /oro/ Tikurenchet	<i>Prunus Africana</i> (Hook.f.) Kalkm	Rosaceae	T	Wi	TB	R	Crushing and squeezing the root	Or
Aqoma Qill /Am)	<i>Lagenaria siceraria</i> (Molina) Standi.	Cucurbitaceae	H	Wi	Ear wound	L	Crushed and squeezed leaf leaf applied on ear	Au
Botoro/oromic/ Arziniya; Hultebsa; Zana (amha.)	<i>Stereospermum</i> <i>kunthianum</i> Cham.	Bignoniaceae	T	Wi	Teeth ache	B Sap	Chewing the peeled bark	Or

Appendix 1: Continue

Local name	Scientific name	Family	Ha	Hab	Disease treated	PU	Mode of preparation and application	RA
Tabagidii (Oro)	<i>Dicrocephala integrifolia</i> (L.f) Kuntze	Asteraceae	H	Wi	Yewafbeshita, Ear, Wound	L	Crushing and squeezing the leaf drop on the wound	Dr
Cheyanche (Gg)	<i>Artemisia absyinnica</i>	Asteraceae	H	Wc	Evil eye	L	Crushing and squeezing the leaf the drinking	Or
Chikugn (Am)	Sch. Bip. ex A. Rich.					R	Smoking the root	Na
Dama (Gg)	<i>Ocimum lamifolium</i>	Lamiaceae	Sh	Wi	Stomach ache	L	Crushing and squeezing	Or
Damakese (Am)	Hochst. Ex Benth.				Mich	L	Crushing and squeezing leaf then drinking	Na
Digita (Am)	<i>Calpurnia aurea</i> (Alt.) Benth.	Fabaceae	Sh	Wi	Chife	L	Drying and grinding the dried leaf then mixing with hyenas feces and butter and painting on the wound. Mixing with milk and drinking	Dr
					Forofor			Or
					Michlemetawkebt			
Duba	<i>Cucurbita maxima</i> Duch.	Cucurbitaceae	Cl	Wc	Kosso	Se	Heating the seed and eating	Or
Embuacho	<i>Rumex nervosus</i> (Vahl)	Polygonaceae	Sh	Wi	Kakucha	R	Crushing the root and washing the body	Dr
Yeqola Endahula	<i>Kalanchoe petitiiana</i> A. Rich.	Crassulaceae	H	Wi	Yekodaibach	L	The heated leaf applied on the place	Dr
Endod	<i>Phytolacca dodecandra</i> L.Herit.	Phytolacaceae	Sh	Wi	Yeger lab, Ekek	Se	Washing with the fresh crushed seed	Dr
Enjory	<i>Rubus aethiopicus</i> R.A.Grah.	Rosaceae	Sh	Wi	Yeafkusil, Stomach ache	L	Peeling and Chewing the leaf. Then, swallowing the liquid	Or
Ensilal	<i>Foeniculum vulgare</i> Miller	Apiaceae	H	Wi	Kulalit	L	Squeezing the leaf and drinking	Or
Feto	<i>Lepidium sativum</i> L.	Brassicaceae	H	Cu	Lemich; Gunfan	Fr	Crushing and painting on the skin	Dr
Fiyelefej (Am)	<i>Clutia abyssinica</i> Jaub and Spach	Euphorbiaceae	Sh	Wi	Likift	R	Peeling the root and smoking	Na
Embuay (Am)	<i>Solanum giganteum</i> Jacq.	Solanaceae	Sh	Wi	korekor	Fr	Crushing and mixing with water then painting	Dr
					Sheep cough		Crushing and squeezing the fruit	Or
Gesho (Am)	<i>Rhamnus prinoides</i> L'Herit	Rhamnaceae	Sh	Cu	Tonsil	L	Crushing and chewing fresh leaf	Or
Girawa (Am)	<i>Vernonia amygdalina</i> Del.	Asteraceae	Sh	Wi	Bleeding	L	Squeezing the fresh leaf and attaching on wound	Dr
Gizawa (Am)	<i>Withania somnifera</i> (L.)	Solanaceae	Sh	Wc	Abdominal pain	Fr	Crushing the fruit	Or
Gorteb (Am)	<i>Plantago lanceolata</i> L.	Plantaginaceae	H	Wi	Shifta	L	Squeezing with endod and painting	Dr
Abish (Am)	<i>Trigonella foenum -graceum</i> L.	Fabaceae	H	Cu	Bloody diarrhea	Fr	Crushing with nechshinkurt and zinjib and boiling with butter	Or
Gumero (Am)	<i>Capparis tomentosa</i> Lam.	Capparidaceae	Cl	Wi	Evil eye	R	Crushing and squeezing the root or moking	Or
Haddessa/Oro/	<i>Vepris dainellii</i> (Pichi-Serm.) Kokwaro	Rutaceae	T	Wi	Gogsa	L	Crushing and squeezing	Or
Cassava	<i>Manihot esculenta</i> Crantz	Euphorbiaceae	Sh	Wc	Blood pressure	R	Peeling and heating the root then chewing	Or
Kebericho (Am)	<i>Echinops kebericho</i> Mesfin.	Asteraceae	H	Wi	Snake bite; Likift	R	Crushing and smoking the root with devil bone	Na
Gim kese (Am)	<i>Bothriocline schimperi</i> Oliv and Hiern ex Benth.	Asteraceae	H	Wi	Bleeding	L	Squeezing the fresh leaf and attaching/ tying on the wound	Dr
Yahiya joro (Am)	<i>Verbascum sinaiticum</i> Benth.	Scrophulariaceae	Sh	Wi	Evil eye	R	Crushing and squeezing the root	Or
Kitkita (Am)	<i>Dodonaea angustifolia</i> L. f.	Sapindaceae	T	Wi	Kurtet	R	Pounding and squeezing the root	Or
Kontir /kenta/	<i>Pterolobium stellatum</i> (Forssk.)Brenan	Fabaceae	Sh	Wi	Yebegekek	L	Washing the sheep with squeezed leaf	Dr
					Stomach ache		Peeling the root bark and crushing	Or
					Diarrhea	R	then mixing with chemo	
					Teeth ache		Chewing the peeled internal part of root	
Kulkual (Am)	<i>Euphorbia ampliphylla</i> Pax	Euphorbiaceae	T	Wi	Chirt	L	Crushing and squeezing the leaf	Dr
Kundo Berbere	<i>Piper nigrum</i> L.	Piperaceae	Cl	Wc	Tonsil	Se	Crushing and chewing the seed	Or
Limich (Am)	<i>Clausena anisata</i> (Willd.)Benth.	Rutaceae	Sh	Wi	Mich, Head ache	L	Boiling the leaf and applying through nose	Na
Azamr (Am)	<i>Bersama abyssinica</i> Fresen.	Melanthaceae	T	Wi	Sheregna	B	Drying and crushing the bark	Pocket
Lomi (Am)	<i>Citrus aurantifolia</i> (Christm.)	Rutaceae	Sh	Cu	Snake venom	R	Chewing the root bark or crushing	Or
Merko (oro)	<i>Dracaena steudineri</i> Engl.	Dracaenaceae	T	Wi	Gastic inflammation	Twig	Peeling and chewing the twig	Or
					Gendi		Crushing with nechshinkurt, kebiricho and zinjibil and squeezing and squeezing	
Muz	<i>Musa x paradisiacal</i> L.	Musaceae	H	Cu	Chife	Fr	Peeling and panting with banana	Dr
Nech Bahirzaf	<i>Eucalyptus globules</i> Labill.	Myrtaceae	T	Cu	Common cold	L	Peeling the leaf and smoking	Na
Nech Shinkurit (Tuma)	<i>Allium sativum</i> L.	Alliaceae	H	Cu	Malaria, Gastric inflammation, Evil eye	Bu	The bulb is mixed coocked with different food	Or
Hareg	<i>Microglossa pyrifolia</i> (lam.) o. kuntze	Asteraceae	Sh	Wi	Head ache	L	Crushing and squeezing then applying through nose	Na
Papaya	<i>Carica papaya</i> L.	Carricaceae	T	Cu	Malaria	L	Squeezing and boiling	Or
					Menstruation problem	Se	Pounding dried seed with nechshin kurt and zinjibil	
Ras Kimir /yeferes Zeng/	<i>Leonotis ocymifolia</i> (Burml. f.)	Lamiaceae	Sh	Wi	Mich	L	Crushing and squeezing	Or

Appendix 1: Continue

Local name	Scientific name	Family	Ha	Hab	Disease treated	PU	Mode of preparation and application	RA
Serdo	<i>Cydon dactylon</i> (L.) Pers.	Poaceae	H	Wi	Sherarit	L	Chewing and then applying on the wound	Dr
Simiza/sensel/	<i>Justicia schimperiana</i> (Hochst.ex Nees) T. Anders	Acanthaceae	Sh	Wi	Evil eye Rabies	R L	pounding the root and squeezing Crushing the root with the root of amera and arte, then squeezing	Or
Sesa (Am)	<i>Albizia gummifera</i> (J. F. Gmel.) C. A. Sm.	Fabaceae	T	Wi	Legubet (Liver) Lewefbeshita	B	Crushing, filtering and drinking	Or
Shenkora (Am)	<i>Saccharum officinarum</i> L.	Poaceae	H	Cu	Malaria, gonorrhea	St	Peeling and pounding and painting	Dr
Shiferaw (Am)	<i>Moringa stenopetala</i> (Bak. f.) Cuf.	Moringaceae	T	Wc	Lecheguara (gastric inflammation) blood pressure, Lechegura	Fr	Peeling the external part and chewing Or the internal part	Or
Senafich (Am)	<i>Brassica nigra</i> (L.) Koch	Brassicaceae	H	Cu	Malaria	Fr	Chopping with the meat of rock hyrax and preparing as wat	Or
Telenj (Am)	<i>Achyranthes aspera</i> L.	Amaranthaceae	H	Wi	Eye disease of cattle	R	Crushing in fresh and mixing with water	Or
Teliba (Am)	<i>Linum usitatissimum</i> L.	Linaceae	H	Cu	Eye disease of cattle	R	Chewing and applying on the cattle eye	Oc
Tenadam (Am)	<i>Ruta chalepensis</i> L.	Rutaceae	H	Cu	Malaria, Chegura	Se	Crushing by mixing with nech	Or
EtseYesus	<i>Stephania abyssinica</i> (Dillon and Rich.) Walp..	Menispermaceae	Cl	Wi	Yehodkurtet Lebuda	L	Crushing and squeezing by hand	Or
Timbaho (Am)	<i>Nicotiana tabacum</i> L.	Solanaceae	H	Cu	Aba gorba	L	Crushing and mixing with foods given to cattle	Or
Tinjut (Am)	<i>Otostegia integrifolia</i> Benth	Lamiaceae	S	Wi	Snake bite; Cattle cough	L	Pounding and smoking; Pounding and squeezing then, applying through nose	Na
Tosign (Am)	<i>Thymus schimperi</i> Ron.	Lamiaceae	H	Wi	Lemich, Gunfan	L	Heating the leaf and washing the body with it	Dr
Tult	<i>Rumex nepalensis</i> spreng.	Polygonaceae	H	Wi	Gunfan	L	Boiling the leaf with tea	Or
					Abortion	R	Crushing and squeezing	Or
							Peeling the external part of the root, tying one end on hip and inserting the other end into vagina	Va
Wanza (Am)	<i>Cordia Africana</i> Lam.	Boraginaceae	T	Wi	Kintarot	B	Crushing the bark with the root bark of tinjut and painting by mixing with butter	An
Wogert (Am)	<i>Silene macrosolen</i> A. Rich.	Caryophyllaceae	Sh	Wi	Stomach ache	R	Boiling and drinking by mixing with honey	Or
Woinagift (Am)	<i>Inula confertiflora</i> A. Rich.	Asteraceae	Sh	Cu	Cattle eye	L	Crushing the leaf and mixing with water	Oc
Damot Woira	<i>Olea welwitschii</i> (Knobl.) Gilg and Schellenb.	Oleaceae	T	Wi	Aynulemiyalekis	Twig	Chopping the twig with the twig of embucho and squeezing, filtering the liquid and painting	Oc
Tontan	<i>Pycnostachys reticulata</i> (E. Mey.) Benth.	Lamiaceae	H	Wi	Eye disease	L	Pounding, squeezing and applying only the liquid part	Oc
Yemidir Embuay (Am)	<i>Cucumis ficifolius</i> A. Rich.	Curcubitaceae	Cl	Wi	Shitale	R	Crushing and heating then, squeezing by mixing with water and salt	Or
Yesetqest/ qestencha	<i>Asparagus africanus</i> Lam.	Asparagaceae	H	Wi	Begunje	L	Pounding and painting	Dr
Mukereba, Gamie;	<i>Ehretia cymosa</i> Thonn.	Boraginaceae	Sh	Wi	Cheguara	Twig	Pounding and squeezing on porridge	Or
Yumbao/ shekicho	<i>Momordica foetida</i> Schumach.	Cucurbitaceae	Cl	Wi	Bleeding	L	Crushing the leaf and attaching on the wound	Dr
Areg Resa; Mar Qura								
Zembaba	<i>Phoenix reclinata</i> Jacq.	Aracaceae	T	Wi	Rabies	Bud	Pounding and squeezing the bud by mixing with the bud of yudo	Or
Zigba (Am.)	<i>Podocarpus falcatus</i> (Thunb.) Mirb.	Podocarpaceae	T	Wi	Common cold Lung , Diabetes	Sap	Crushing the sap by mixing with twig of kulkual and del. Then mixing with tazmamar	Or
Zinjibil (Am)	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	H	Cu	Hodekurtet	Tub	Chewing the ginger tuber and swallowing the liquid	Or
Etse Siol	<i>Ranunculus multifidus</i> Forssk.	Ranunculaceae	H	Wi	Almazbalechira Waf Tirs (teeth)	St	Pounding and rubbing the place	Dr
							Crushing and attaching	Or
							Crushing and chewing on diseased teeth	Oc
Sire bizu	<i>Thalictrum rhynchoarpum</i> Dill. and A. Rich.	Ranunculaceae -	H	Wi	Eye Gogs	R	Crushing and squeezing the root	Or
Amera/ kankasha/ (Oro)	<i>Lonchocarpus laxiflorus</i> Guill. and Perr.	Fabaceae	T	Wi	Rabies	R	Pounding and squeezing the root	Or
							Crushing and squeezing the root with the root of sensel and sirte	Or
Kemun	<i>Cuminum cyminum</i> L.	Apiaceae	H	Wi	Kulalit	Fr	Crushing with the bark of bisana root and eating by mixing with honey	Or
Laluncha /Oro/ Durachet/Am/	<i>Brachiaria semiundulata</i> (A. Rich) Stapf	Poaceae	H	Wi	Kuakucha	Sap	Cutting the stem and painting the sap	Dr

REFERENCES

01. Dery, B.B., R. Ofsynia and C. Ngatigwa, 1999. Indigenous knowledge of medicinal trees and setting priorities for their domestication in Shinyanga region, Tanzania. International Center for Research in Agroforestry, Nairobi, Kenya.
02. Gerique, A., 2006. Integrative assessment and planning methods for sustainable agroforestry in humid and semiarid regions. *Introduction Ethnobotany Ethnoecology*, 1: 1-20.
03. WHO., 2005. National Policy on Traditional Medicine and Regulation of Herbal Medicines: Report of a WHO Global Survey. World Health Organization, Geneva, Switzerland, ISBN-10: 9241593237, Pages: 168.
04. Samuelsson, G., 2004. *Drugs of Natural Origin: A Textbook of Pharmacognosy*. 5th Edn., Swedish Pharmaceutical Press, Stockholm.
05. Rao, M.R., M.C. Palada and B.N. Becker, 2004. Medicinal and aromatic plants in agroforestry systems. *Agrofor. Syst.*, 61: 107-122.
06. Andarge, E., A. Shonga, M. Agize and A. Tora, 2015. Utilization and conservation of medicinal plants and their associated Indigenous Knowledge (IK) in Dawuro Zone: An ethnobotanical approach. *Int. J. Med. Plant Res.*, 4: 330-337.
07. Bishaw, M., 1990. Attitudes modern and traditional medicinal practitioners towards cooperation. *Ethiopian Med. J.*, 28: 63-72.
08. Tanto, T., M. Giday, N. Aklilu and T. Hunduma, 2003. Medicinal plant Biodiversity, National biodiversity strategy and action plan project (UN published). Institute of Biodiversity and Conservation, Addis Ababa, Ethiopia.
09. Yineger, H., E. Kelbessa, T. Bekele and E. Lulekal, 2008. Plants used in traditional management of human ailments at Bale Mountains National Park Southeastern Ethiopia. *J. Med. Plants Res.*, 2: 132-153.
10. Tefera, B., 2007. Study on actual situation of medicinal plants in Ethiopia. Japan Association for International Collaboration of Agriculture and Forestry, Addis Ababa, Ethiopia.
11. Mesfin, F., T. Seta and A. Assefa, 2014. An ethnobotanical study of medicinal plants in Amaro Woreda, Ethiopia. *Ethnobotany Res. Appl.*, 12: 341-354.
12. UNEP., 1995. *Global Biodiversity Assessment*. Cambridge University Press, New York, USA., ISBN-13: 9780521564816, Pages: 1152.
13. Belayneh, A., Z. Asfaw, S. Demissew and N.F. Bussa, 2012. Medicinal plants potential and use by pastoral and agro-pastoral communities in Erer Valley of Babile Wereda, Eastern Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 8, No. 1. 10.1186/1746-4269-8-42
14. Tanto, T., M. Giday and N. Aklilu, 2002. National Biodiversity Strategy and Action Plan (BSAP) project: Resource base of medicinal plants of Ethiopia. Institute of Biodiversity and Conservation, Addis Ababa, Ethiopia.
15. Kidane, B., T. Van Andel, L.J.G. Van Der Maesen and Z. Asfaw, 2014. Use and management of traditional medicinal plants by Maale and Ari ethnic communities in Southern Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 10, No. 1. 10.1186/1746-4269-10-46.
16. Bedri, A., S. Belay, W. Nigatu and A. Asmare, 2004. Survey results: Socio-economic study of medicinal plants. Addis Ababa University, Addis Ababa.
17. Birhanu, T., D. Abera, E. Ejeta and E. Nekemte, 2015. Ethnobotanical study of medicinal plants in selected Horro Gudurru Woredas, Western Ethiopia. *J. Biol. Agric. Healthcare*, 5: 83-93.
18. Meragiaw, M., Z. Asfaw and M. Argaw, 2016. The status of ethnobotanical knowledge of medicinal plants and the impacts of resettlement in Delanta, northwestern Wello, northern Ethiopia. *Evidence-Based Complementary Altern. Med.*, Vol. 2016. 10.1155/2016/5060247.
19. Tolossa, K., E. Debela, S. Athanasiadou, A. Tolera, G. Ganga and J.G. Houdijk, 2013. Ethno-medicinal study of plants used for treatment of human and livestock ailments by traditional healers in South Omo, Southern Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 9, No. 1. 10.1186/1746-4269-9-32
20. Kefalew, A., Z. Asfaw and E. Kelbessa, 2015. Ethnobotany of medicinal plants in Ada'a District, East Shewa Zone of Oromia regional state, Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 11, 10.1186/s13002-015-0014-6
21. Megersa, M., Z. Asfaw, E. Kelbessa, A. Beyene and B. Woldeab, 2013. An ethnobotanical study of medicinal plants in Wayu Tuka district, East Welega zone of Oromia Regional State, West Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 9. 10.1186/1746-4269-9-68.
22. Regassa, R., 2013. Assessment of indigenous knowledge of medicinal plant practice and mode of service delivery in Hawassa city, southern Ethiopia. *J. Med. Plants Res.*, 7: 517-535.
23. Ayalew, S., A. Kebede, A. Mesfin and G. Mulualem, 2017. Ethnobotanical study of medicinal plants used by agro pastoralist Somali people for the management of human ailments in Jeldesa Cluster, Dire Dawa Administration, Eastern Ethiopia. *J. Med. Plants Res.*, 11: 171-187.

24. Teklehaymanot, T., 2017. An ethnobotanical survey of medicinal and edible plants of Yalo Woreda in Afar regional state, Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 13, No. 1. 10.1186/s13002-017-0166-7.
25. Bizuayehu, B. and B. Garedew, 2018. A review on the ethnobotanical study of medicinal plants used for the treatment of gonorrhea disease in Ethiopia. *Indian J. Natural Prod. Resour. (IJNPR.)*, 9: 183-193.
26. Addisie, Y., Y. Debebe, P.K. Ashok, T. Zewdneh and A. Assefa, 2012. Traditional medicinal plants used by people in libo-kemkem district, south gondar, ethiopia. *Asian J. Agric. Sci.*, 4: 171-176.
27. Yirga, G., M. Teferi and M. Kasaye, 2011. Survey of medicinal plants used to treat human ailments in Hawzen district, Northern Ethiopia. *Int. J. Biodivers. Conserv.*, 3: 709-714.
28. Abera, B., 2014. Medicinal plants used in traditional medicine by Oromo people, Ghimbi district, Southwest Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 10. 10.1186/1746-4269-10-40
29. Temam, T. and A. Dillo, 2016. Ethnobotanical study of medicinal plants of Mirab-Badwacho district, Ethiopia. *J. BioSci. Biotechnol.*, 5: 151-158.
30. Garedew, B. and D. Abebe, 2018. Ethnomedicinal plants used for the treatment of gastro-intestinal parasitic diseases in human in Yeki district, Southwest Ethiopia. *Afr. J. Pharm. Pharmacol.*, 12: 298-309.
31. Hunde, D., Z. Asfaw and E. Kelbessa, 2004. Use and management of ethnoveterinary medicinal plants by indigenous people of Boosat, Welenchita area. *Ethiopian J. Biol. Sci.*, 3: 113-132.
32. Teklay, A., B. Abera and M. Giday, 2013. An ethnobotanical study of medicinal plants used in Kilte Awulaelo district, Tigray region of Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 9. 10.1186/1746-4269-9-65.
33. Mekuanent, T., A. Zebene and Z. Solomon, 2015. Ethnobotanical study of medicinal plants in Chilga district, Northwestern Ethiopia. *J. Nat. Remedies*, 15: 88-112.
34. Tamene, B., 2000. A floristic analysis and ethnobotanical study of the semi-wet land of Cheffa Area, South Wello, Ethiopia. M.Sc. Thesis, Addis Ababa University, Addis Ababa, Ethiopia.
35. Amenu, E., 2007. Use and management of medicinal plants by indigenous people of Ejaji area (Chelya Woreda), West Shoa, Ethiopia: An ethnobotanical approach. M.Sc. Thesis, Addis Ababa University, Ethiopia.
36. Addis, G., D. Abebe and K. Urga, 2001. A survey of traditional medicinal plants in Shirka district, Arsi zone, Ethiopia. *Ethiop. Pharmaceut. J.*, 19: 30-47.
37. Cox, P.A. and M.J. Balick, 1994. The ethnobotanical approach to drug discovery. *Sci. Am.*, 270: 82-87.
38. Kloos, H., A. Tekle, L.W. Yohannes, A. Yosef and A. Lemma, 1978. Preliminary studies of traditional medicinal plants in nineteen markets in Ethiopia: Use patterns and public health aspects. *Ethiopian Med. J.*, 16: 33-43.
39. Bekele, G. and P.R. Reddy, 2015. Ethnobotanical study of medicinal plants used to treat human ailments by Guji Oromo tribes in Abaya District, Borana, Oromia, Ethiopia. *Univers J. Plant Sci.*, 3: 1-8.
40. Giday, M. and G. Ameni, 2003. An ethnobotanical survey of plants of veterinary importance in two woredas of southern Tigray, Northern Ethiopia. *SINET. Ethiopian J. Sci.*, 26: 123-136.
41. Garedew, B. and B. Bizuayehu, 2018. A review on ethnobotanical study of traditional medicinal plants used for treatment of liver problems in Ethiopia. *Eur. J. Med. Plants*, 26: 1-18.
42. Abebe, D. and A. Ayehu, 1993. Medicinal Plants and Enigmatic Health Practices of Northern Ethiopia. Birhanena Selam Printing Enterprise, Addis Ababa, pp: 37-114.
43. Balemie, K., E. Kelbessa and Z. Asfaw, 2004. Indigenous medicinal plant utilization, management and threats in Fentalle area, Eastern Shewa, Ethiopia. *Ethiop. J. Biol. Sci.*, 3: 37-58.
44. Abebe, D. and B. Garedew, 2019. Ethnobotanical survey of plants traditionally used for malaria prevention and treatment in indigenous villages of Tepi town South West Ethiopia. *J. Pharmacogn. Phytother.*, 11: 9-16.
45. Sori, T., 2004. Medicinal plants in the ethno veterinary practices of borana pastoralists, Southern ethiopia. *Int. J. Applied Res. Veterinary Med.*, 2: 220-225.