MedCrave
Step into the World of Research

Biodiversity International Journal

Research Article

Open Access

CrossMark

Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia

Abstract

In Ethiopia the majority of rural populations traditionally use many plants as sources of medicine for different human and livestock aliments. Traditional knowledge of medicinal plants is however fragile and easily forgettable as most of indigenous knowledge transfer in Ethiopia is based on oral transmission. This study was therefore designed to assess medicinal plants used as traditional medicine by local communities in Selale mountain ridge, North Shoa, Ethiopia. One hundred informants were selected from 10kebeles in two districts of North Shoa by using snow ball sampling method. Semi-structured interview questions and guided field work were used for ethnobotanical data collection.

Totally, 79 medicinal plants belonging to 37 families were recorded. The most frequently used plant part for remedial preparation was leaves (43%) followed by root (26%). The highest informant consensus factor ICF (84%) was associated with gastro intestinal disorders and parasitic infections followed by dermatological problems (82%). The fidelity level (FL) of *Rhamnus prinoides* and *Verbena officialis* were calculated 100% for tonsillitis, while the FL of *Hagenia abyssinica* and *Datura stramonium* were also found 100% for abdominal and dermal diseases, respectively. This study generally recognizes a rich heritage of indigenous medicinal plant use and knowledge in the study area. Efforts are needed to enhance *in-situ* and *ex-situ* conservation of these valuable medicinal plants in the area.

Keywords: ethnobotany, North Shoa, medicinal plants, traditional healers

Volume 2 Issue 6 - 2018

Hailu Atnafu, Tesfaye Awas, Sisay Alemu, Sisay Wube

Forest and Range lands Biodiversity Directorate, Ethiopian Biodiversity Institute, Ethiopia

Correspondence: Hailu Atnafu, Forest and Range lands Biodiversity Directorate, Ethiopian Biodiversity Institute, P.O.Box 30726, Adiss Ababa, Ethiopia, Email hailuetnafu@gmail.com

Received: November 29, 2018 | **Published:** December 13, 2018

Introduction

Traditional medicine is the major source of treatment for large portions of human populations in developing countries. It is estimated that 80% of developing countries population rely on traditional medicine, mostly plant drugs, for their primary health care needs.[1] Particularly in resource poor communities, local therapy using traditional medicine is the only means of treatment.[2] Herbal remedies are becoming popular throught the world because, though allopathic medicine can cure a wide range of disease, its high prices and occasional side effects are causing many people to return to herbal medicines which tend to have fewer side effects.[3]

In Ethiopia, traditional medicine using medicinal plants is used by large populations to treat different human and livestock aliments. Despite modern medicine become more widespread in the county, about 80 to 90 % of Ethiopia population relies on traditional medicine to meet their primary health care needs.[4–6] The current health care system in Ethiopia is a primary health care focused system that improves access to modern medicine more than ever.[7] However, the majority of populations still continue to use traditional medicine. This is because traditional medicine is the most affordable and easily accessible source of treatment to the poor community[2] and cultural acceptance of traditional medicine.[8]

Use of medicinal plants as a source of traditional medicine has been inherited through generations in Ethiopia. It is an important component of the health care system in the county. The skills are however fragile and easily forgettable as most of indigenous knowledge transfer in Ethiopia is based on oral transmission.[9] With the current rate of modernization, it's logical to assume that traditional knowledge on medicinal plants is under the threat of extinction.[1] Caring comprehensive studies are therefore important to document traditional knowledge on medicinal plants uses. Based on the above insight, the present study is aimed to document and underlines the importance of traditional knowledge used for the treatment of different human and livestock diseases in Selale Mountain Ridges, North Shoa.

Materials and methods

Study area

The study was conducted in two districts which are found in North Shoa Zone, Ethiopia. The first called Girrar Jarso and is located 112km north of Addis Ababa, the capital of Ethiopia. This district occupies 9º035' to 10º000'N latitude and 38º039' to 38º039'E longitude with altitudinal range from 1300 to 3419 meters above sea level. The total area of the district is about 42763 hectare.[10] The second district called Dagam and is located 120km North of Addis Ababa. This district occupies about 670.2km^2 with altitudinal range from 1500 to 3541meters above sea level.

Participants

Five key informants living in four different sub districts were initially recruited with the help of head of the local agricultural office and two local elderly people. These five (4male and 1female) informants were known in the community as traditional medicine practitioners, and identified here as key informants for the study. Further informants were thereafter selected from each sub districts based on snow ball sampling. This sampling method is effective and convenient as it utilized local knowledge to identify appropriate informants.[11] Accordingly, a total of 48 were recruited at the Girar Jarso district for the study. The age of the informants ranges from 22 to 80. Educational level of informants varies from illiterate to high school completion.

The same procedure was followed at Dagame district. Accordingly, five (all men) traditional medicine practitioners were first selected from different subdistricts with the help of the woreda agriculture office expert, and 52 community members were selected based on snow ball sampling for ethnobotany data collection. The age of the informants ranges from 19 to 65. Educational level of informants varies from illiterate to high school completion.

Data collection

Field work was conducted in April, 2017 and ethnobotanical data collection was made for 20 days during the same month, 2017. Semi structured interviews and guided field work with the informants were carried out to obtain ethnobotanical data. Interviews were based on a check list of questions prepared beforehand in English and translated to the local language, Oromifa.

In each district, interviews were made with identified key and all other informants in his/her home garden. The information collected included local name of the traditional medicinal plant, diseases treated, parts used, condition of plant used, method of preparation, route of administration, and the ingredients added.

Guided field walks were made with two key informants to the surrounding forest and agricultural areas. Voucher specimens were thus collected from all plants identified as a medicinal plants by those key informants. Identification of specimen was made at the herbarium of Ethiopian Biodiversity Institute (EBI) with the help of taxonomic experts, and using taxonomic keys; Flora of Ethiopia and Eritrea (FEE, 1989-2009) based on their morphological characteristics. The speciemen were deposited at the herbaria of EBI.

Informant consensus factor

The informant consensus factor for most frequently reported disease categories was calculated in order to evaluate the reliability of the information provided by the informants. The following formula recommended by[12] was used to calculate Informants' Consensus Factor (ICF):

$$ICF=\frac{Nur-Nt}{Nur-1}$$

Where,

Nur: Number of use-reports for a particular use category

Nt: Number of taxa used for a particular use category by all informants

Fidelity level index

Fidelity level index (FL) is used to quantify the importance of a given species for a particular purpose in a given cultural group. In this study, FL was calculated for frequently reported human disease by the informants to quantify the importance of the species for a particular disease. To calculate FL, the formula recommended by[13] was used as follows:

$FL = Ni/N \times 100$,

Where;

FL=Percentage of Fidelity Level,

Ni=The number of informants that claimed the use of plant species to treat a particular disease.

N=The total number of informants who mentioned the plant for any given major ailment

Preference Ranking

The preference ranking was determined by purposively using five key informants to prioritize the five traditional medicinal plant species used for preventing diarrhea according to Cotton.[14] Diarrhea was preferred for ranking because it is an emerging disease in the society.

Data analysis

Descriptive statistics were used for qualitative and quantitative data analysis by using Microsoft Excel 2010. The statistical tools were used to identify the most common ailments in the study area including, popularly used medicinal plant species, proportions of different variables like plant families, plant parts used, methods of preparation and percentage frequency. Statistical Package for Social Science (SPSS) version 17 was also used to estimate Pearson's correlation between the age of respondents and the number of medicinal plant named by them. The same software was also used to carry out the t-test among educational status and number of medicinal plant named by them, and between gender group and number of medicinal plant noticed by them.

Result

Socio demographic and knowledge characteristics of respondents

In the present study, a total of 101 respondents were studied. Among the participants, 28%were females and the remaining were males. The age of participants ranged from 19 to 80, with the mean age of 43.6 (±13.4). From the total respondents, 69% were farmers, 17% house wives, 2% government employees and 5 students. Regarding educational status, the majority of respondents (44%) were illiterate while 38 (38%) and 16(16%) respondents attended primary and secondary school, respectively. Only 2 respondents were attended higher education (Table 1).

Table 1 Socio demographic characteristics of participants

Characteristic	Number of respondents	Percent
Sex		
Male	73	72
Female	28	28
Age of respondent		
18-28	11	11
29-39	25	25
40-50	45	45
>51	20	19
Occupation of respondent		
Farmer	70	69
Merchant	2	2
Government employee	2	2
Housewife	17	17
Student	5	5
Unemployed	1	1
Others	4	1
Education of respondent		
Illiterate	45	44

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114

Table Continued....

Characteristic	Number of respondents	Percent
Primary school	38	38
Secondary school	16	16
Higher education	2	2

No significant correlation (Spearsman correlation, r=0.12, α=0.05, p=0.23) was found between the age of informants and number of species reported by them. Besides, the t-test between male and female informants and the number of medicinal plant species they listed did not show a significant difference (P > 0.05). The t-test also confirmed that there was no significant difference on the number of medicinal plant species mentioned by the educated and illiterate informants (Table 2).

Medicinal plant species diversity

The local healers in the study area used a total of 79 medicinal plant species for treatment of different human and livestock aliments. These medicinal plants are distributed in 37 families. Among the families, Lamiaceae was represented by 8 (25%) species followed by 7 (19.4%) species of Asteraceae (Table 3). Only one fern species was recorded in the present study. Among the medicinal plants, 73 species were used for the treatment of human aliments and 6 species for livestock and 3 species used for treat both human and animal aliments. People in the study area give first priority for some traditional medicinal plant species to treat human ailments rather than modern drugs. *Datura stramonium* and *Malva verticillata*, *Hagenia abyssinica* and *Glinus lotoides, Vernonia amygdalina* and *Ricinus communis*, and *Zingiber officinale* are found to be the most important medicinal plant species rather than the locally available modern drugs to treat dandruff, tape worm, amoebiasis and unexplained stomach ache, respectively.

Table 2 Statistical test of significance and independent t test on the number of medicinal plant mentioned by informants.

Parameter	Informant group	N	Mean	t	P value
Gender	Male	72	9.47	0.77	0.44
	Female	28	8.71		
Education	Educated	56	8.05	-0.61	0.53
	Illiterate	44	8.68		

Table 3 Medicinal plants used for treat human and livestock aliments

Genera, species and family names	Family	Local names	Disease treated	Part(s) used	Preparation and routs of application
Acacia abyssinica Hochst. Ex Benth.	*Fabaceae*	Laftoo	Goiter	leaf	Leave is smashed and the sap is applied topically
			Wound	Stem bark	Stem bark powdered and applied the paste topically
Achyranthes aspera L.	*Amaranthaceae*	Telenj	Wound	Leaf	Crushed leaves applied on the cut or wound
Acmella caulirhiza Del.	*Asteraceae*	Gutichaa	Tonsillitis	Flower	Fresh flower is chewed and spitted on tonsillitis
Ajuga integrifolia Buch.-Hamn.	*Lamiaceae*	Armagusa	Epilepsy	leaf	Pounding the dried leaves, mix the pounded leaves with nut oil and make the patient to eat it
			Tonsilities		Squeezing the leaf and drinking the juice
Allium cepa L.	*Alliaceae*	Key shinkurit	Asthma	root	Root juice is mixed with water and given to drink
			Whooping cough		Crushed or copped bulb is given to eat orally
			Stomach ache (parasite)		Smashed bulb mixed with butter is given to eat with injera (Ethiopian bread)
Allium sativum L.	*Alliaceae*	Nech shinkurit	Malaria	bulb	Depulped and boiled bulb mixed with honey and is given for drink orally
			Common cold		Boiled bulb vapour is inhaled orally and nasally
			For evil eye		smashed bulb together with rhizome of *Ginger officinale* is given to inhale nasally
Aloe sp	*Alliaceae*	Eret	Ear pain	leaf	Leaf is put on fire to get it warm. The juice from the warm leaf is then poured into the ear
Amaranthus caudatus L.	*Amaranthaceae*	Iyyaasuu	Diarrhea	Leaf	Pounded dry leaf boiled, and is given for drink
Anamhinum forskaolii Schult.	*Asclepiadaceae*	Anbelbelit	Epidemic disease	root	Smoking the dried leaves, and inhale it
Andrachne aspera Spreng.	*Phyllanthaceae*	Tekeze	Snake bite	root	Root is given for chewing, followed by lots of water to drink
Artemisia abyssinica Sch. Bip. Ex A. Rich	*Asteraceae*	Arti	Unidentified gastrointestinal disorder	leaf	Rubbed leaves is put on nose to inhale and/or
					Fresh leaves juice is given for drink
			For evil sprit		Dried leave smoke is fumigated
			Nose bleeding		Fresh leaves grind with *Allium sativum* is put on nose to inhale

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114

Table Continued....

Genera, species and family names	Family	Local names	Disease treated	Part(s) used	Preparation and routs of application
Artemisia afra Jack. ex Wild	*Asteraceae*	Godoo	Unidentified gastrointestinal disorder	root	Crushed root is put on fire and inhaled through mouth and nose
			Pesticide		The root is put on fire and allow to fumigate the house
Bersama abyssinica Fresen.	*Melianthaceae*	Lolchisa	wound	bud	Fresh Shoot apex (bud) juiced and applied on the wound
Buddleja polystachya Fresen.	*Loganiaceae*	Amfar	Scabies, Itching	Leaf	Dried leaves powdered and the paste mixed with butter; the cream is then applied topically
Carisssa spinarum L.	*Apocynaceae*	Hagamsa	Sexual impotency	Root	Pounded fresh root mixed with local beer (Tella) is given for drinking
Catha edulis (Vahl) Forssk. ex Endl.	*Celastraceae*	Chatae	Urine retention	Leaf	Dried leaf pounded and mix with leaves of *Vernonia amygdalina*. The mix then boiled together and the filtrate is served as a drink
Clutia lanceolata Forssk.	*Euphorbiaceae*	Feyele feji	Hemorrhoid	Leaf	Powdered dry leaf homogenized with water and the filter is given nasally
Coffee Arabica L.	*Rubiaceae*	Buna	Diarrhea	seed	Roust the seed, pounded and mixed with honey then swallowed it
			Wound		Roust the seed, pounded and applied on the wound
Cordia africana Lam.	*Boraginaceae*	Wanza	Jaundice	bark	Bark of C. africana powdered together with the stem bark of *Croton macrostachyus*, the paste is then boiled with milk and given orally
			Spider poison	Leaf	Dried leaf is burned and the remaining ash is mixed with butter and creamed on affected part.
Croton macrostachyus Del.	*Euphorbiaceae*	Bakkanissa	Gonorrhea	Shoot bud	The fresh bud is powdered and mixed with water and butter. The mix is then filtered and the liquid is given orally
			Ring worm		Fresh shoot squeezed and the juice with water applied topically
			Skin rash (chiffe)		Fresh shoot is cut and the fluid applied to the rash
Cucumis ficifolius A. Rich.	*Cucurbitaceae*	Yemdir embuai	Retained placenta	Root	Crushed root mixed with water is prepared for drink
Cymbopogon citratus (DC) Stapf	*Poaceae*	Tej sar	Unidentified gastrointestinal disorder	leaf	Squeezing the leaves mixed together with *Artemisia absinthium* and drink the juice
Cynodon dactylon L. Peers	*Poaceae*	Ceqosa	Bone fracture (for cattle)	Leaf and shoot	Harvesting leaves and shoot of *C. dactylon* and feed it to the cattle
			Snake bite		Above ground part is rubbed to the affected skin
Cynodon nemfuensi L.	*Poaceae*	Ceqorsaa	Skin alergy	leaf	Fresh leave is given for chewing and spitting the juice topically
Datura stramonium L.	*Solanaceae*	Astnagrit	Dandruff	Leaf	Fresh leaf juice is applied directly on the scalp
			Skin disease	Seed	Powdered seeds applied directly on the skin
Discopodium penninervium Hochst.	*Solanaceae*	Rejii	Febrile Illness	Leaf	Crushed leaf is put on fire and is made to inhale orally or nasally
Dodonia angustifolia L.F.	*Sapindaceae*	Kitecha	Stomach ache	leaf	Crushing the leaves and put it on the nose (inhaling)
			Diarrhea		Fresh leaf soaked in water for some hours is given for drinking
Dovialis abyssinica (A. Rich) Warb.	*Flacouticeae*	Koshim	Stomach ache	fruit	Boiling the fruit with water, and drink it when it get cold

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114

Table Continued....

Genera, species and family names	Family	Local names	Disease treated	Part(s) used	Preparation and routs of application
Echinops kebericho Mesfin.	*Asteraceae*	Kerbericho	Internal parasite	root	Dried root is powdered and mixed with water; and is give for drinking
			Febrile Illness		Dried leaves fumigated nasally and orally
Eucalyptus globulus Labill.	*Myrtaceae*	Bargamoo Adii	Influenza	Leaf	Leaves are boiled in water and the vapour inhaled orally and nasally
			Acute febrile illness		Leaves are boiled in water and the vapour inhaled orally and nasally
Euphorbia tirucalli L.	*Euphorbiaceae*	Qinchibae	Wart (kintarot)	Leaf	Dried leaf pounded and mixed with leaf of *Coffea arabica* and rubbed on affected part
Feoniculum vulgare Miller	*Apiaceae*	Eselale	Stomach ache	leaf	Fresh leave juice is given for drink
			Diuretic	Whole plant	whole plant juice with water is given orally
Glinus lotoides L.	*Molluginaceae*	Meteree	Tapeworm	Fruit	Dried fruit mixed with *Guizotia abyssinica* and grounded, the paste is given orally before food
Guizotia schimperi Sch. Bip. Ex Walp,	*Asteraceae*	Adaa	Eye infection	Flower	Fresh flower juice is mixed with water and applied through eye
Hagenia abyssinica JF. Gmel	*Rosaceae*	Kosso	Tapeworm	Fruit	Dried fruit powder cooked with food is given orally
				seed	Roasted and powdered seed is juiced in water and given to drunk
Justica shimperiana (Hochst. Ex Nees) T. Anders.	*Acanthaceae*	Sensel	Typhoid	Leaf	Crush and squeeze then drink with coffee
			Coccidiosis (for hen)	leaf	Fresh leaf juice with water is given orally for hen
Kalanchoe petitiana A. Rich.	*Crassulaceae*	Bosoqee	Gonorrhea	Leaf	Fresh leaf juice is applied on the wound
			For evil sprit	Root	Chewing the root
Lagenaria siceraria (Molina)Standl.	*Cucurbitaceae*	Buqqe Hadhaa	Scabies	fruit	Inner part of fresh fruit of is creamed on affected head skin.
Laggera crispate (Vahl) Hepper & Wood	*Asteraceae*	Keskese	Unidentified gastrointestinal disorder	leaf	Chewing the leave and swallow the juice
			Asthma		Fresh leaves soaked in water is given nasally
			Dandruff		Rubbed leave applied directly on the scalp
Leonotis ocymifolia (Burm. F.) Iwarsson	*Lamiaceae*	Yeferes zeng	Diarrhea	Leaf & fruit	Dried leaf and fruit powder mixed with honey is given for drink
			Acute Febrile Illness (AFI)		Matured seeds put on fire and the smoke is inhaled orally and nasally
Lepidium sativum L.	*Brassicaceae*	Feto	Unidentified gastrointestinal disorder	Seed	dried seed powder mixed with *Hordeum vulgare* and water is given orally
			Tonsil		Powdered seeds mixed with water is given for drink
Leucas martinicensis (Jacq.) R. Br.	*Lamiaceae*	Bokelu	Askaris	Leaf	Fresh leaf juice is given for drinking
Lippia adeonsis Hochst. Ex walp	*Verbenaceae*	Kesse (kussaye)	Acute Febrile Illness (AFI)	leaf	Rubbed leave is given to put on nose and inhaling
Maisa lanceolata Forrsk.	*Myrsinaceae*	Abbayii	Elephantiasis	Bark	Pounded bark mix with butter and applied topically
Malva verticilliata L.	*Malvaceae*	Liti	Diarrhea	root	Dried root together with *Calpurnia aurea* root soaked in water for hours is given orally
			Dandruff		Crushed and water soaked root is applied as a hair wash
Nicotiana tabacum L.	*Solanaceae*	Timbaho	Leech infection	Leaf	Fresh leaf juice with water is given orally

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114

Table Continued....

Genera, species and family names	Family	Local names	Disease treated	Part(s) used	Preparation and routs of application
			Acute Febrile Illness (AFI)		Boiled the leaves and inhale the smoke
Ocimum lamiifolium Hochst. Ex Benth.	*Lamiaceae*	Hanccabbi dimma	Influenza	leaf	Squeezing leave and drink the juice with coffee, or apply the rubbed leaves in to the nose
			Unidentified gastrointestinal disorder		Squeezing the leaves, adding the juice into coffee and drink it, or placed the dried leaves on fire and inhale the smoke
Ocimum urticifolium Roth.	*Lamiaceae*	Hanccabbi adii	Febrile illness	Leaf	Fresh leaf together with *Croton macrostachyus* and Clausena anista are smashed and the sap is sniffed nasally
Olea europea subsp. Cuspidate (Wall. Ex. G.Don) Cif.	*Oleaceae*	Ejersa	Irritation of eye	Shoot	Fresh shoot is smashed and the juice is mixed with water and applied on affected eye
			Unidentified gastrointestinal disorder	Leaf	Smoking the dried leaves on fire and inhale through nose and mouth
Otostegia fruticosa (Forssk.) Schweinf.ex Penzig L,Herit	*Lamiaceae*	Tinjutii	Febrile Illness	Leaf	Dried leaves fumigated nasally and orally
			Insecticide		Dried leaves fumigated nasally and orally
Pentas schimperiana (A. Rich.) Vatke	*Rubiaceae*	Dibexxo	Epilepsy	Root bark	Dried root bark is powdered and mixed with Water; the preparation is then given for drinking
Plantago lanceolata L.	*Plantaginaceae*	Qorxxobbi	Skin cut	Leaf	Fresh leaf juice is added to skin cut.
Plectocephalus varians (A. Rich) C. Jeffrey ex Cufod.	*Asteraceae*	Etse Yohannes	Hemorrhoid	Root	Fresh root juice is given orally and nasally
Plectranthus barbatus Ander.	*Lamiaceae*	keskeso	Insect repellant	Leaf	Dried leaf is used as fumigant
			Abortion	Leaf	Chopped leaves mixed with water is given to the woman for drinking
Phytolacca dodecandra L'Herit	*Phytolaccaceae*	Endod	Rabis	Leaf and root	chopped root and leave mixed with honey is given orally
			Scabies	Fruit	Smashed fruit mixed with water is given as hand wash
Pteris dentate Forssk.	*Pteridaceae*	Fern	Fire burn skin	Leaf	Powdered leave put on hot plate for some minute is applied on the affected area
Ricinus communis L.	*Euphorbiaceae*	Gulo (Amh)	Amoebiasis	Seed	Dried seed is given for chewing
Rhamnus prinoides L'Herit	*Rhamnaceae*	Gesho	Tonsillitis	seed	Chewed by mother, and the child swallow the juice
Rumex abyssinicus Jacq.	*Polygonaceae*	Mekmeko	Hypertension	Root	Fresh root juice is given to drink with coffee
Rumex nepalensis Spreng.	*Polygonaceae*	Shulti	Unidentified gastrointestinal disorder (megagna)	root	chewing the root, swallowing the juice and spitting the rest
			Skin problem	leaf	Fresh leaves juice applied directly on the skin
			Malaria		Fresh leave smashed with *Lepidium sativum* seeds and *Allium sativum* bulb and the preparation is given to eat
Ruta chalepensis L.	*Rutaceae*	Tena adamii	Unidentified gastrointestinal disorder	Leaf	Fresh leaves smashed and the juice with coffee is given for drink orally
			For evil eye		Pounded dried leaves is given to inhale nasally
Salvia nilotica Jacq.,	*Lamiaceae*	Hulegeb	Tonsilitis	Root	Fresh root is given for chewing

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114

Table Continued....

Genera, species and family names	Family	Local names	Disease treated	Part(s) used	Preparation and routs of application
Securidica longipeduculata Fresen.	*Polygalaceae*	Etsemanaay	Internal parasite	root	Pounded root mixed with water and is given to drink
Sida massaica Vollesen	*Malvaceae*	Chifrig	Round worm	Whole plant	The whole plant grounded and homogenized in water, and the filter is then given for drinking
			Eye infection	Leaf	A drop of fresh leaf juice is applied on the affected eye
			Acute Febrile Illness (AFI)		Smoking the root on fire and inhale the smoke through mouth and nose
Silene marosolen A. Rich.	*Caryophyllaceae*	Wegeret	Unexplained stomach ache	root	Smoking the root on fire and inhale the smoke through mouth and nose
			Snake bite		Chewing fresh root and swallowing the juice
Solanum anguivi Lam.	*Solanaceae*	Zerch embuaye	Prevent conceive	Leaf and bark	Pounding the leaves and stem bark together and taken through mouth
Solanum dasyphyllum Schumach.	*Solanaceae*	Hidi	Eye disease	Leaf	Chewing and applying fresh juice on infected eye
			Snake bite	root	Fresh root is given to chewing
Solanum incanum L.	*Solanaceae*	Embuay	Tonsillitis	fruit	Fruits are squeezed and the juice collected in a cup. The juice is applied as a mouth wash
Stephania abyssinica (Dill & Rich). Walp.	*Menispermaceae*	Yayet joro	Wound	root	Crushed root applied on the cut or wound
Tavverniera abyssinica A.Rich	*Fabaceae*	Dingete	Internal parasite	root	Fresh root is given to chew and swallow only the juice
Thymus schimperi Ronninger	*Lamiaceae*	Tosign	Whooping cough	leaf	Boiled leaves with *Guizota abyssinica* is given to drink as tea
			Hypertension		Fresh leaf juice is given with tea
Trigonella foenum-graecum L.	*Fabaceae*	Abish	Peptic ulcer disease	seed	Crushed seed boiled in water and given for drink
			Spinal pain		Powderd seed boiled and given for drinking
			Tonsil		Powdered seeds mixed with water is given for drink
Urtica simenesis Steudel.	*Urpisaeae*	Dobi	skin problem	leaf /root	smashed leaves/ chewed root is used to rub the affected area
			Gastritis	leaf	Boiled leaves is given to eat with injera (Ethiopian bread) orally
			throat infection (for child)	leaf	Squeezing the leaves and spitting the juice on the child
Verbascum sinaiticum Benth.	*Scrophulariaceae*	Ye ahiya joro	Snake bite	Root	Fresh root is given for chewing and swallowing the juice
			Swelling (for cattle)	Leaf	Pounding dried leaves, and applied the past on the topically on the cattle
Verbena officinalis L.	*Verbenaceae*	Atuch	Tonsillitis	leaf	Squeezing the leaves and drinking the juice
Vernonia amygdalina Del.	*Asteraceae*	Girawa	Ameobiasis	Leaf	Fresh leaf mixed with honey is given for eating
Withania somnifera (L.) Dunal	*Solanaceae*	Kumo	Epidemic disease	root	Squeezing the root and drinking the juice
			Malaria	leaf	Leaves are made powdered and juiced with water, and drunk
Zingiber officinale Roscoe	*Zingibilaceae*	Zingibil	Unexplained stomach ache	rhizome	chewing the rhizome and swallowing the juice
			Tonsillitis		chewing the rhizome and swallowing the juice

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114

Most of (73.2%) the traditional plant species identified in the study were wild while 8 species (11.2%) are cultivated and the remaining 14 (19.7%) were obtained both from wild and cultivation (Figure 1).

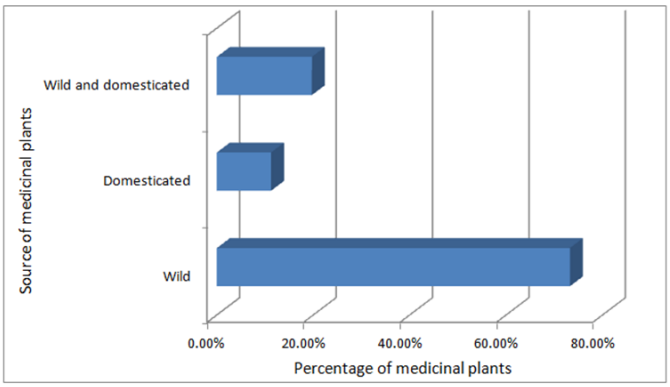

Figure 1 Source of medicinal plants.

Plant part(s) used

Plant parts used for remedies indicated that leaf (43.2%) is the most widely used plant part followed by root (26.8%). While seed and bark constitute 8% and 3 %, respectively (Figure 2).

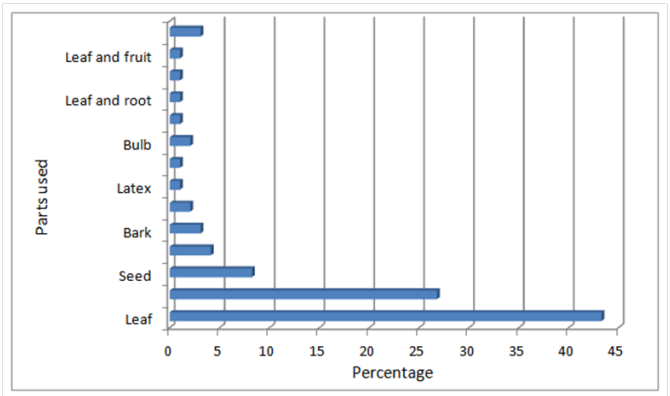

Figure 2 Plant parts used for preparation of remedies.

Preparation and mode of remedies administration

As indicated in Figure 3, the most common type of preparation was squeezing (35.4%) followed by powdering (21.8%) and Chewing (11.8%). The majority of local prepared remedies were applied orally (59.1%) followed by dermal (20.4%) and oral and nasal together (9.1%) (Figure 4).

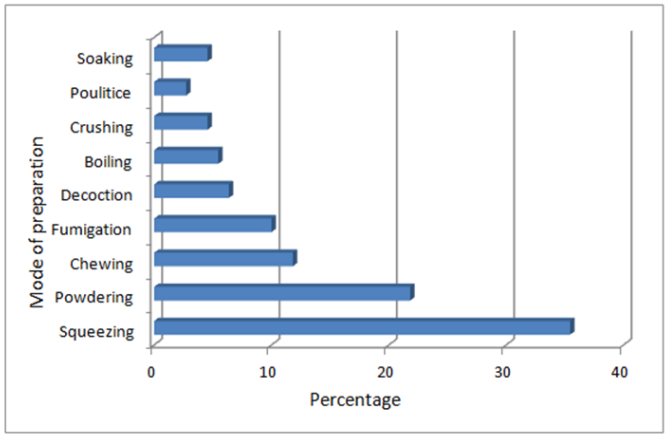

Figure 3 Types of remedial preparations.

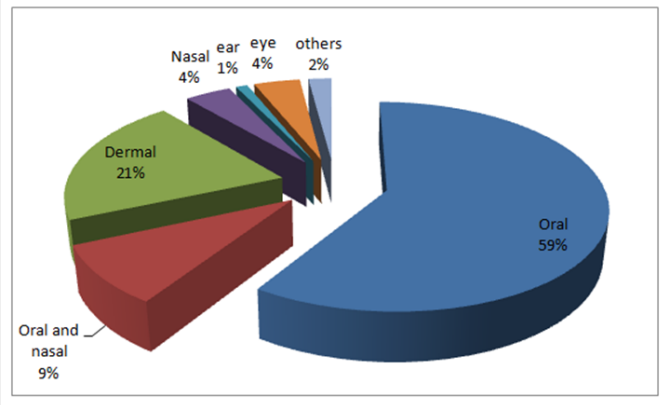

Figure 4 Types of remedial application.

Informant consensus factor

Informant consensus factor was calculated for frequently reported diseases categories and presented in Table 4. Results revealed that the highest percentage (84%) of ICF was linked to problems associated with gastro intestinal disorder and parasitic infection followed by dermatological problems (82%). The least (33%) ICF was associated with poisoned by animals and/or insects.

Table 4 Informant consensus factor of medicinal plants for frequently reported diseases

Category of diseases	Diseases included	Nt	Nur	ICF
Gastro intestinal disorder and parasitic infection	Abdominal pain, diarrhea, amoebiasis, ascariasis, and, tape worm	27	161	0.84
Dermatological problems	Scabies, dandruff, eczema, leprosy, ringworm, wound, cut and wart	21	115	0.82
Throat and respiratory disease	Asthma, tonsillitis, common cold, and cough	26	117	0.78
Emergency diseases	Febrile illness, Evile eye and evile sprit	11	38	0.73
Internal disease	Malaria and hemorrhoids	12	41	0.72
Organ diseases	Ear lesion, conjunctivitis and sexual impotency	9	18	0.52
Poison	Snake biting and spider biting	6	8	0.29

Fidelity level index (FL)

The fidelity level (FL) of medicinal plants for frequently reported disease were calculated and presented in Table 5. Accordingly, the FL of *Rhamus prinoides* and *Verbena officialis* was calculated 100% for the disease of tonsilities, while the FL of 100% were also calculated for *Hagenia abyssinica* and *Datura stramonium* for the abdominal and dermal diseases, respectively. The FL of *Ocimum lamiifolium* and

Croton macrostachyus was found to be 96 and 90%, for the treatment of Febrile Illness and sexual disease, respectively.

Table 5 Fidelity level values of medicinal plants for frequently reported disease

Medicinal plant	Disease treated	Ni	N	FL (%)
	Febrile Illness			
Lepidium sativum		65	68	95
Ocimum lamiifolium		73	76	96
	Tonsilities			
Rhamnus prinoides		26	26	100
Verbena officialis		12	12	100
	Abdominal (Gastritis, Tapeworm,, askaris)			
Leucas martinicensis		35	41	85
Hagenia abyssinica		27	27	100
	Dermal			
Datura stramonium		14	14	100
Rumex nepalesis		21	22	95
	Sexual diseases			
Croton macrostachyus		48	53	90
Kalanchoe petitiana		15	21	71

Preference ranking

Preference ranking values of five medicinal plant species used to treat Diarrhea showed that *Coffee Arabica* ranked first and followed by *Malva verticilliata* (Table 6). Informants stated that *Coffee Arabica* stops diarrhea when the patient is swallowing the seed after it is rusted, pounded and mixed with honey.

Table 6 Preference ranking of medicinal plant to treat Diarrhea (R stands for respondents /informants; 5= most preferred, 1= least preferred)

Plant Species	Respondents						
	R1	R2	R3	R4	R5	Total	Rank
Amaranthus caudatus	3	3	4	5	2	17	3
Coffee Arabica	5	4	5	4	5	23	1
Dodonia angustifolia	1	2	1	1	3	8	5
Leonotis ocymifolia	2	1	2	3	1	9	4
Malva verticilliata	4	5	3	4	4	18	2

Discussion

The vast majority of the human population in Ethiopia is dependent on traditional medicine and its practitioners.[15] However, despite some studies that had been conducted in Northern,[16] Northwestern,[7] Central,[11] Western[17] and Southern[18] Ethiopia, the use of traditional medicine as human and livestock remedies is not exhaustively documented in the country. It is otherwise very important as most of information about medicinal plants is still in the hands of traditional practitioners and could be lost when they pass away. The present study actually shows the absence of correlation between the age of respondents and the number of medicinal plants mentioned by them. Previous studies from different places of the country also showed the same result [eg. 2;21]. Youngesters in rural areas of the country mostly cooperates with elders in everyday activities including during farming and field collection of medicinal plants. This could have give the younger a chance to learn about medicinal plants and their usage from their elders and therefore be one the reason that the young noticed as many medicinal plants as of elders in the present study. As explained,[11] elder traditional medicinal plant practitioners in the central part of Ethiopia deliberately transmit their knowledge to their chosen young ones. This condition plus the exchange of knowledge among the young in school and religious places[19] could also be another reason explaining the present result.

As with other regions in Ethiopia, local inhabitats in North Shoa district have been using medicinal plants traditionally to treat human and livestock aliments from the time of immemorial. The present study reveals a total of 79 medicinal plant species from the study area that are used by traditional practitioners for treatment of 47 human and 5 animal diseases. Most of medicinal plants identified in the present study belongs to Lamiaceae family (25%) followed by Asteraceae (19.4%), which are among the most represented families in the flora of Ethiopia.[20,21] Plants medicinal behavior often comes from metabolites, mostly secondary metabolites. Secondary metabolites are organic compounds that are formed during metabolism, and unlike primary metabolites, they are not found in every plant.[22] In this respect, a previous study by Maffei[22] identified Lamiaceae family as plants that concentrate very active biological compounds (secondary metabolites) as a function of their life strategies. Apart from curing capacity, the preference of wide use of medicinal plants that belong to these families in the study area could therefore be due to availability and wide distribution these families.

The majority of medicinal plants identified in the present study are used to treat human aliments (93.5%) rather than that of livestock. Previous ethnobotanical studies in Ethiopia have also revealed the same result.[23,24] This may be due the fact that the occurrence of human disease is more frequent than that of livestock because of hygiene and other socio economic reasons. Moreover, in common with other rural parts of the country, the lack of adequate modern health care centers in the study area could have made traditional medicine as the most affordable and easily accessible source of treatment to the poor community.[2] About 80 to 90 % of Ethiopia population relies on traditional medicine to meet their primary health care needs.[6]

In the study area, most of medicinal plants are collected from wild habitats (74%) though some medicinal plants such as *Ruta chalepensis*, *Rhamnus prinoides, Eucalyptus glubulus, Allium cepa* and *Allium sativum* were grown in home gardens. This result is in line with previous ethnobotanical studies in Ethiopia.[16,24] Wild areas are the storehouse of medicinal plants in Ethiopia.[25] This could be due to continual adaptation and availability of medicinal plants in wild areas which might in turn result in local people to be less interested to grow them *ex-situ*. However, considering the great socio economic and cultural importance of medicinal plants to the rural community, some mode of *in-situ* or *ex-situ* conservation effort need to be launched as natural or human induced activity may result in destruction of such resources.

The most commonly used plant parts for herbal preparations in the study area were leaves (43%) followed by roots (26.8%). The leaves may contain most of the bioactive secondary metabolites compared to other parts, and hence could have better curing capacity. Other studies in Ethiopia also reported that leaves were commonly used plant parts for remedial preparation in their study area.[17,26,27] The most frequent use of leaves compared to other plant parts in the study area could have a positive implication on sustainable utilization of medicinal

plant resources as high treat to the plant comes with roots, barks and shoot harvests.

In the study area, the most common preparation of remedies was extracting juice by squeezing, followed by powdering. Preparing plant remedies by squeezing or powdering is advantageous over using decoction since heat may affect the active constituents of the remedies. This result is in line with previous findings in which squeezing was the most common type of preparation.[17,24] Following the preparation methods, remedies are mostly administered through oral followed by dermal application. This could be related to the nature of the most frequent disease affected local people. In the study area, gastro intestinal disorder and endoparasites are the most prevalent diseases affected local community, and this may be the reason for dominance of oral administration. As mentioned by Endalew,[28] both oral and dermal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power.

Moreover, results of the present study suggest that diseases that were frequent in the study area (gastro intestinal disorder and endoparasites, and dermatological disease) have higher informant consensus factor (0.84 and 0.82). The dominance of these disease categories may be associated with inadequate sanitation problem in the study area. The ICF value estimated in the present study generally ranges from 0.29 to 0.84. According to Gazzaneo,[29] the higher ICF value implies the existence of information exchange between informants, or the presence of well-defined selection criteria in the community. In addition, the less ICF values (values between 0 and 0.65) indicated the minimal networking of indigenous people in sharing of their knowledge on medicinal practices which is usually the case with traditional healers. This is mainly because of the interest of each healer to keep his knowledge secretly from other healers for fear of piracy.[19]

The fidelity level (FL) value of medicinal plants estimated in the present study for frequently reported diseases reveals a range of values. The variation in fidelity value of medicinal plants was related to their frequent application for different disease control. The fidelity level of *Rhamnus prinoides* and *Verbena officialis* for tonsillitis were calculated at 100%, while the fidelity level of *Hagenia abyssinica* and *Datura stramonium* were found 100% for their use to treat abdominal (Gastritis, Tapeworm and Askaris) and dermal diseases, respectively. Higher fidelity levels identified for these species could be an indication of the potential of these plants for treatment of the respective disease category. According to Trotter,[12] plants scoring high fidelity level values are thought to have better potency having biological active ingredients in treatment as compared to plants with less fidelity values. Moreover, the preference ranked medicinal plant species used to stop diarrhea would become therapeutic agents for emergency cases.

Conclusion and recommendations

The present study showed the wide use of medicinal plants in North Shoa for meeting the primary health care needs of the local community. Cultural acceptability, easy accessibility and affordability combined with limited access to modern health care service could be taken as the main factors for the continuation of use of traditional medicine. Most of the reported medicinal plants were wild and some of them were reported to be rare. This implies the need for conservation efforts to be taken in order to safeguard these valuable resources. Remedy preparations mostly from leaves, roots and barks were found to be used to treat a variety of human and animal aliments. Medicinal plants such as *Rhamnus prinoides* (against tonsillitis), *Hagenia abyssinica* (against tape worm) and *Datura stramonium* (against dermal disease) were the most preferred and highest fidelity level, an indication of their high healing potential. The present study generally recognizes a rich heritage of indigenous medicinal plant use and knowledge in the study area. However, further studies should be conducted on the reported medicinal plants in the present study in order to confirm them scientifically and use them in modern drug development.[30]

Acknowledgments

None.

Conflicts of interest

The authors declare that there is no conflicts of interest regarding the publication of this article.

References

1. Mahmoud T, Gairola S. Traditional knowledge and use of medicinal plants in the Eastern Desert of Egypt: a case study from Wadi El-Gemal National Park. *Journal of Medicinal Plants Studies*. 2013;1(6):10–17.
2. Haile Y, Dilnesaw Y. Traditional medicinal plant knowledge and use by local healers in Sekru distrikct, Jimma zone, South western Ethiopia. *J Ethnobiol Ethnomed.* 2007;3:24.
3. Kala CP. Current status of medicinal plants used by traditional Vaidyas in Uttaranchal state of India. *Ethnobot Res Appl.* 2005;3:267–278.
4. Baye H, Hymete A. Lead and cadmium accumulation in medicinal plants collected from environmentally different sites. *Bull Environ Contam Toxicol*. 2010;84(2):197–201.
5. Bradley E, Thompson J, Byam P, et al. Access and quality of rural healthcare: Ethiopian Millennium Rural Initiative. *Int J Qual Health C*. 2011;23(3):222–230.
6. Elias A, Tesfaye G, Bizatu M. Aspects of common traditional medical practices applied for under-five children in Ethiopia, Oromia Region, Eastern-Harargie District, Dadar Woreda. *Journal of Community Medicine & Health Education*. 2013;3:6.
7. Samuel M, Leul L, Belaynew W, et al. Knowledge, attitude and utilization of traditional medicine among the communities of Merawi town, Northwest Ethiopia: a cross-sectional study. *Evidence based complementary and alternative medicine.* 2015.7.
8. Gakunga N, Mugisha K, Owiny D. et al. Effects of crude aqueous leaf extracts of *Citropsis articulata* and *Mystroxylon aethiopicum* on sex hormone levels in male albino rate. *International Journal of Pharmaceutical Science Invention*. 2014;3:5–17.
9. Abebe D, Ayehu A. Medicinal plants and enigmatic health practices of Northern Ethiopia Addis Ababa: Berhanina Selam Printing Enterprise. 1993.
10. WFEDO. Annual Statistical Bulletin of Girarjarso woredaWoreda, Unpublished. North Shoa Zone, Ethiopia. 2010.
11. d'Avigdor E, Hans W, Zemede A, et al. The current status of knowledge of herbal medicine and medicinal plants in Fitche, Ethiopia. *Journal of Ethnobiol Ethnomed*. 2014;10:38.
12. Trotter R, Logan M. Informant Consensus: A New Approach for Identifying Potentially Effective Medicinal Plants. In: Etkin NL, editors. *Plants in Indigenous Medicine and Diet: Biobehavioural Approaches*. Redgrave Publishers, Bedfort Hills, New York; 1986. p. 91–112.
13. Friedman J, Yaniv Z, Dafni A, et al. A preliminary classification of the healing potential of medicinal plants, based on the rational analysis of an ethnopharmacological field survey among Bedouins in Negev Desert, Israel. *J Ethnopharmacol*. 1986;16(2–3):275–287.

14. Cotton CM. Ethnobotany: principles and applications. Wiley, Chichester; 1996.

15. Messeret S. The role of health professionals in the development of traditional medicine in Ethiopia. In: Dawit Abebe, editors. Proceedings o f the workshop on Development and utilization of Herbal Remedies in Ethiopia. Ethiopian Health and Nutrition Research Institute, Addis Ababa; 1996. p. 15–1 8.

16. Gidey Y. Assessment of medicinl traditional medicinal plants in Enderta district, South-eastern Tigray, Northern Ethiopa. *Afr J plant sci.* 2010;4(7):255–260.

17. Balcha A. Medicinal plants used in traditional medicine by Oromo people, Ghimbi District, Southwest Ethiopia. J *Ethnobiol Ethnomed*. 2014;10:40.

18. Abbink J. Medicinal and ritual plants of the Ethiopian South West: an account of recent research. *Indg Know Dev Mon.* 1995;3:6–8.

19. Chekole G. Ethnobotanical study of medicinal plants used against human ailments in Gubalafto District, Northern Ethiopia. *Journal of Ethnobiology Ethnomedicine*. 2017;13(1):55.

20. Hedberg I, Friis I, Person E, editors. Flora of Ethiopia and Eritrea. Lycopodiaceae to Pinaceae. Department of Systematic Botany, Uppsala University, Uppsala and The National Herbarium, Addis Ababa University, Addis Ababa; Ethiopia. 2009.

21. Hedberg I, Friis I, Edwards S, editors. Flora of Ethiopia and Eritrea. Asteraceae Part 2 Volume 4. Department of Systematic Botany, Uppsala University, Uppsala and the National Herbarium, Addis Ababa University, Addis Ababa; Ethiopia. 2004.

22. Maffei ME. Sites of synthesis, biochemistry and functional role of plant volatiles. *S Afr J Bot*. 2010;76(4):612–631.

23. Getaneh E, Zemede A, Abiyu E, et al. Ethnobotanical Study of traditional medicinal plants and their conservation status in Mecha woreda, West Gojam Ethiopia. *Int J Pharm & H Care Res*. 2014;2(3):137–154.

24. Mirutse G, Zemede A, Thomas E, et al. An ethnobotanical study of medicinal plants used by the zay people in Ethiopia. *J. Ethnopharmacol*. 2003;85(1):43–52.

25. Ermias L, Ensermu K, Tamrat B, et al. An ethnobotanical study of medicinal plants in Mana Angetu district, Southeastern Ethiopia. *J Ethnobiol Ethnomed.* 2008;4:1–10.

26. Kalayu M, Gebru T, Teklemichael T. Ethnobotanical Study of Traditional Medicinal Plants Used by Indigenous People of Gemad District, Northern Ethiopia. *Journal of Medicinal Plants Studies*. 2013;1(4):32–37.

27. Gidey M, Asfaw T, Emqvist T, et al. An ethnobotanical study of medicinal plants used by rhe Zay people in Ethiopia. J ethnopharmacol. 2003;85(1):43–52.

28. Endalew A. Use and management of medicinal plants by indigenous people of ejaji area (chelya woreda) West Shoa, Ethiopia: an ethnobotanical approach. MSc Thesis. Addis Ababa University, Ethiopia; 2007.

29. Gazzaneo LR, Lucena RF, Albuquerque UP. Knowledge and use of medicinal plants by local specialists in a region of Atlantic forest in the state of pernambuco (Northeastern Brazil). *J Ethnobiol Ethnomed.* 2005;1:9.

30. Stepp JR, Moerman DE. The importance of weeds in ethnopharmacology. *J Ethnopharmacol*. 2002;75(1):19–23.

Citation: Atnafu H, Awas T, Alemu S, et al. Ethnobotanical study of medicinal plants in selale mountain ridges, North Shoa, Ethiopia. *Biodiversity Int J.* 2018;2(6):567–577. DOI: 10.15406/bij.2018.02.00114