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Research Article

Ethnobotanical study of traditional medicinal plants in Boreda woreda, Southern Ethiopia

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Abstract

Plants are the major and cheap sources of traditional medicine. Countries like Ethiopia with ethnic and cultural diversity own a vast treasure of indigenous knowledge of medicinal plants. However, much of this knowledge remained undiscovered for generations. The objective of this study was to investigate the traditional knowledge of medicinal values of plants in Boreda woreda in two kebeles. A survey was conducted on purposively selected five key informants of healers and 25 elders who provide traditional healing service in the locality. An informant consensus factor and preference matrix analysis was employed to analyze the data. Identification of taxonomic class of plants was carried out using expert methods and Flora of Ethiopia and Eritrea. Overall, 35 medicinal plant species belonging to 22 families were recorded. About 63% of the plants found to be herbs and 20% of them were trees, and the remaining were shrubs. About 75% of the plants were used for treatment of human ailment. Leaves of herbs were the most widely used part of the plants followed by root and stem. According to preference matrix analysis *Citrus* x *limon* (L.) Osbeck, *Nigella sativa* L. and *Ocimum forskolei* Benth., were the first three priority plants by the indigenous people for internal pain treatment. There is high level (0.78) of consensus of using medicinal plants for various diseases treatment among the community. Therefore, such high value indigenous knowledge should be conserved and the medicinal plants need to be protected.

Keywords: Biodiversity; Boreda; Ethnobotany, Hambissa; Medicinal plant

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1. Introduction

Plant as primary food producers plays an irreplaceable role in balancing ecological life cycle. Besides this vital role, plant have been used for treating various diseases (Fabricant and Farnsworth, 2001; Michael, 2006). Several studies showed that around the world people are still highly dependent on plant-derived medicines (Dawit, 1986; Mengistu, 2010; Belayneh et al.,

2012; Mirutse and Tilahun, 2013; Tilahun, and Moa, 2018). Over 80% of the world's population gets treatment directly from plant product medicines (Tilahun, and Moa, 2018). According to Zao et al. (2019), traditional medicines from plant roots, stems, leaves and fruits or

seed parts were used for treating several diseases in China. Similar practice of using different plant parts for healing of different diseases also reported in Turkey (Polat, 2019). Traditional preparation of medicine from the tissues of plants may vary from place to place. Most of the time crude extraction with water is used.

Traditional knowledge of medicinal plants is the integral part of the culture of many Asian and African countries indigenous community (Subramanyam et al., 2008). Particularly, traditional herbal healing is widely practiced throughout the rural population as their primary health-care system (Haile and Delenasaw, 2007; Mohammed and Berhanu, 2011). WHO (2019) also showed that 60-70% of the Ethiopian population use traditional medicine. There is a high expectation of enormous traditional knowledge and use of medicinal plant species in Ethiopia due to the existence of diverse languages, cultures, beliefs and significant geo-climatic diversity, which favored the formation of different habitat for medicinal plant (Cunningham, 2001).

Only few members of the communities are allowed to practice healing. The healing skills are transferred to generations through inheritance from family members. These are made through verbal communication and demonstration. As the last successor (the old person) who owned the knowledge is about to die, the training begins and usually ends with the death of the elder. This results in the loss of most of the knowledge before it is completely transferred. Beside such specific people, the larger community has some commonly held knowledge about plants. Therefore, this study aimed at assessing some commonly used medicinal plants by Boreda indigenous people. The study also tried to discover how much of the traditional knowledge is owned by ordinary people. Boreda is located in remote area. There is no direct highway or sub- way road that links the area to main cities. Hence, investigation of an original traditional knowledge from such remote area has great value for ongoing science in the field of ethno- biology.

2. Materials and Methods

2.1. Study area

This study was conducted from mid of April to end of June 2021 in Boreda area, Gamo zone, Ethiopia. Boreda woreda is located in between 6° 22′ 0″ N to 6° 42′ 30″ N longitude and 37°31′ 15″ E to 37° 48′ 45″ E (Fig.1) at average altitude of 2185masl. It is just at the upper shaft of East African Rift Valley with beautiful undulating landscape. Indigenous ethnic group (Gamo) inhabited the area for more than five hundred years (Freeman, 1999). Based on the 2007 census conducted by the CSA, the area has a total population of 67,960, of whom 34,460 are men and 33,500 women; 2,761 (4.06%) of its population are urban dwellers. The people of Boreda are settled farmers. They harvest crop like maize (*Zea mays*), teff (*Eragrostis tef*), coffee (*Coffea arabica*), and enset (*Ensete ventricosum*). Some people are engaged with cattle husbandry. The

study was conducted particularly in two adjacent kebeles known as Hamibisa and Meteka mele. According to CSA (2007) census, both kebeles have total population of 4625 (2308 men and 2317 women). The climate of the area is predominantly characterized by moist lowland and with mosaic dry lowland and moist mid highlands (Azene, 2007). The hottest and coldest months of the year are March and December, respectively. Average annual precipitation is 1180.5 mm (year 2025).

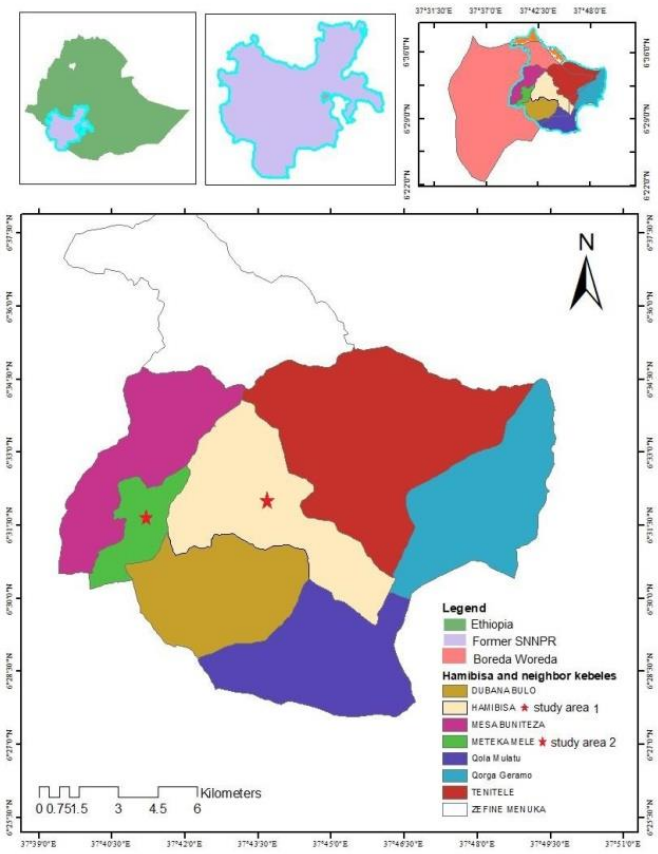

Figure 1. Map of the study areas with other neighboring kebeles (ArcGIS 10.1).

2.2. Data collection methods

To get relevant data, 30 informants with the age of 30 to 45 (8 female and 22 male) were identified and divided into two groups. Five (two from Meteka mele and three from Hamibisa) of the informants were traditional healers and the remaining (10 from Metekamele and 15 from Hamibisa) were other community members. The elites of traditional healers were purposively selected. Elder informants were selected from the community randomly. Two separated questionnaires were prepared in the local language (Gaammoththo doona); one for traditional healers and the other for the community elders who used the traditional medicinal plants for human and animal ailments. Informal interview method has been used by which plant specimen were demonstrated following Bernard (1988). Informants were asked to give information for local name of traditional medicinal plants, parts used, disease treated, and methods of preparation. Besides this, the limitations of traditional medicine and its side effects were discussed. Guided field walk method was used for some community members. Plant samples were collected from

randomly selected gardens of farmer's house. Plants were, then, pressed and preserved following appropriate herbarium techniques following Lucilene et al. (2013). Plant taxonomic identification was made through expert methods and crosschecked with Flora of Ethiopia and Eritrea.

2.3. Data analysis

2.3.1. Quantitative analysis

Microsoft Excel 2010 was used for sorting plant names for quantitative analysis based on informant's response and field observations.

2.3.2. ICF analysis

ICF analysis was carried out to identify the agreements of the informants on reported cures of plants for the group of ailments. It also measures awareness level of informants. The ICF was calculated following Troter and Logan (1986) as follows (Eq. 1).

$$\mathrm{ICF} = \frac{n_{ur} - n_t}{n_{ur} - 1} \quad (1)$$

Where ICF = Informants Consensus Factor, *nur* = number of use citation in each category, *nt* = number of species used

2.3.3. Preference ranking

Preference ranking was conducted following Martin (1995) for five important medicinal plants used to treat human and livestock disease internal parasite. Five randomly selected informants participated in this method to identify the best-preferred medicinal plants for the treatment of internal parasite. The informants were given the plants and were asked to arrange the medicinal plants based on frequency of use by assigning the highest value (5) for plant species most preferred and the lowest value (0) for the least preferred plant and value in between for the remaining. Then, the results were summarized for all respondents and ranked based on the total scores obtained for each medicinal plant.

3. Results and Discussion

3.1. Medicinal plant diversity

Overall, 35 plants belonging to 22 families were identified as Traditional medicinal plants (TMP) used by the people in the study area (Table 1). A similar study in Northern Ethiopia showed that more than 80 species of medicinal plants records (Seyoum and Zerihun, 2014) and more than 130 species in Delanta in Northern Ethiopia (Misganaw et al., 2015). This might not be surprising because in the former studies, data were collected from geographically larger areas.

The agro-climatic condition variation among the study locations can be the factors that might account for the species richness of the traditional medicinal plants in those areas. Mirutse et al. (2003) has also speculated that reduction of medicinal plant diversity induced could be driven by deforestation. In the present study, five plant species belong to Solanaceae, four to Euphorbiaceae and three to Lamiaceae families. Lamiaceae and Euphorbiacea were also reported to be among the

first three top plant families for medicinal plants sources elsewhere (Ermias et al., 2008; Seyoum & Zerihun, 2014). Nearly 63% of the TMP collected were herbs and only 20% were found to be trees (Fig.3). The present findings agree with the work of others (e.g., Mirutse et al., 2003; Misganaw et al., 2015), where herbs are found to be the most frequently used plants in traditional medicine. This high proportion of herbs in traditional medicine is due to relatively higher abundance, easy adaptability and mulifunctionality (Guo et al., 2023). About 75% of the plant samples were used to treat human ailments and about 17% of the plants were used to treat livestock ailments (Table 1).

The indigenous people has also learnt and classified the medicinal plants based on route of administration and target organ for treatment as plant for eye; plant for abdomen and plant for skin. Over 70% of the plants were administered orally to treat intestinal (internal organ) diseases. Plants like *Withania somnifora, Geranium maculatum, Ocimum lamiifolium* were used in diluted form to treat various type internal pains. About 20% of medicinal plants were also mentioned as they were used for skin care and related problems. Such plants were used for skin wound, lesion, tumor, and even as disinfectants for body and household equipment. Some of the plants used for dermal treatment were *Commelina diffusa, Croton macrostachyus* and *Euphorbia tirucalli. C. diffusa* has been identified as plant with anti-fungal properties (Prima et al., 2019). The later species were also reported for similar function in other places (Dawit et al., 2003).

Table 1. Medicinal Plants and physiognomic features with their use parts and administration route in Hamibisa kebele Gamo zone, Ethiopia

Taxonomic Name of the plant	Family	LN	HB	PU	Disease treated	TO	RA
Allium cepa (L.)	Alliaceae	Qeyshinkurt	H	Root	Coughing	Hu	Oral
Allium sativum (L.)	Alliaceae	Nech-shinkurt	H	Root	Comman cold	Hu	Oral
Aloe vera (L.) Burm.f.	Aspodelaceae	Godere-uta/rett	H	Stem	Eye disease	Hu	Ocular
Amaranthus caudatus (L.)	Amaranthaceae	Gagabsa	H	Seed	Internal organ broken	Hu	Oral
Asparagus scaberulus (A. Rich)	Asparagaceae	Sereta	S	Leaf	Diarrhea	Hu & L	Oral
Capsicum annuum (L.)	Solanaceae	Qarya	H	Fruit	Rumen disease	Hu	Oral
Citrus x limon (L.) Osbeck	Rutaceae	Lome	T	Fruit	Internal	Hu	Oral
Clinopodium nepeta (L) Kuntze	Lamiaceae	Gulo	S	Leaf	Wart	Hu	Dermal
Combretum molle R.Br. ex G. Don	Combertaceae	Ambe	T	bark	Tonsil	Hu	oral
Commelina diffusa Burm.f.	Commelinaceae	Dal'aso	H	stem	Lesion on head	Hu	dermal
Croton macrostachyus Hochst. ex Delile	Euphorbiaceae	Bisana	T	leaf	Wound	Hu	Dermal
Datura stramonium (L.)	Solanaceae	machara	H	leaf	External parasite	L	Dermal
Dirichletia glaucescens (Hiern) verdc.	Sapindaceaae	Tora-tuko	S	Leaf	Internal pain	Hu	Oral
Ehretia cymosa Wild. exRoem.&Schult.	Boraginaceae	Esirwanja	T	leaf	Tumor	L	Oral
Eragrostis tef subsp. red (Zucc.) Trotter	Poaceae	Zo'ogashe	H	seed	Internal pain	Hu	Oral
Euphorbia tirucalli (L.)	Euphorbiaceae	Qinchib	T	Stem	Wart	Hu	dermal
*Foeniculum vulgare*Mill.	Apiaceae	Caticala/ensilal	H	leaf Stem	Stomach discomfort	Hu	Oral
Jatropha curcas (L.)	Euphorbiaceae	Jatropha	MT	leaf	Cut and wound	Hu	Dermal
Linum usitatissimum (L.)	Linaceae	telba	H	Seed	Bone brake	Hu	Oral
Manihot esculenta (Crantz)	Euphorbiaceae	Mithaboye	H	Tip of stem	cholera	L(hen)	Oral
Moringa stenopetala (Baker f.) Cufod.	Moringaceae	halako	T	Root	malaria	Hu	Oral
Nigella sativa (L.)	Ranunculaceae	Tikurazmud	H	Seed	Internal parasite	Hu	Oral
Ocimum forskolei Benth	Lamiaceae	Shasha	S	root	Internal parasite	L	Oral
Ocimum lamiifolium Hochst. ex-Benth	Lamiaceae	Waselo/damakesse	H	leaf	Anemia	Hu &L	Oral
Oxalis radicosa Tent. Fl. Abyss.	Oxalidaceae	Zil'emata	H	leaf	Tumor	Hu	Dermal
Pelargonium whytei Baker	Geraniaceae	Ayin-fiqir	H	leaf	Lesion	Hu	Dermal
Ruta chalepensis(L.)	Rutaceae	Tena'adam	H	leaf	Internal parasite	Hu	Oral
Solanum coagulans Forssk.	Solanaceae	Yegomen	H	leaf	Coughing	Hu	Oral
Solanum incanum (L.)	Solanaceae	Embway	H	root	Stomach disease	Hu	Oral
Spilanthes costata Benth.	Asteraceae	Aydame	H	Leaf	Tonsil	Hu	Oral
Vachellia nilotica sbsp. nilotica (L) Del.	Fabaceae	Girar(chacha)	T	Stem tip	Eye disease	L	Ocular
Vernonia amygdalina Delile	Asteraceae	Girawa	MT	leaf	Internal parasite	L	Oral
Withania somnifera (L.) Dunal	Solanaceae	Girosana	H	root	Internal parasite	L	oral
Zingiber officinale Roscoe	Zingeberaceae	Zingibil	H	Stem	Common cold and	Hu	Oral

H= Herb, T=Tree, S=Shrub, MT= Medium Tree, Hu= Human, L=Livestock, TO=Target organism, RA=Root of administration, LN=Local name, HB=Habit, PU=Plant part use

Twenty-two plant families with their relative abundance of species is presented in Figure 2. Solanaceae family with five species leads while Amaranthaceae and other 14 families were at the bottom, each with one representative species in the study area.

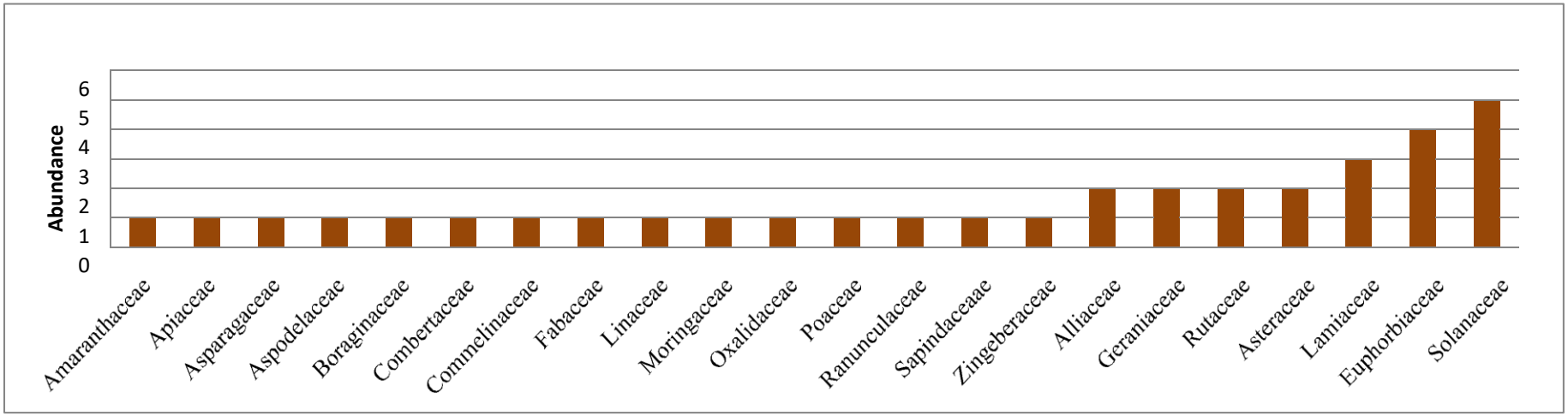

Figure 2. Medicinal plants with respect to their taxonomic family group distribution

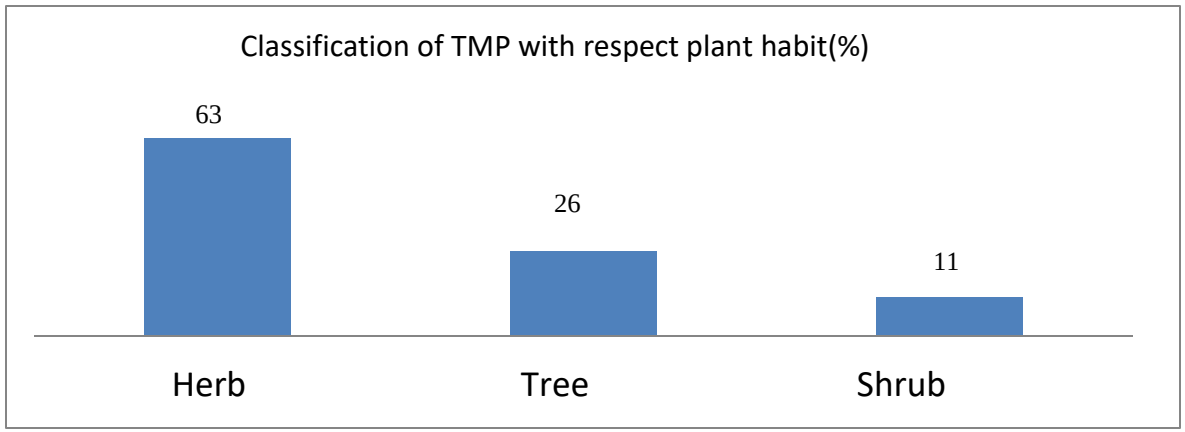

Figure 3 Medicinal plant comparisons with respect to plant habit

Traditional Medicinal Plant were highly out sourced from herbs (Fig. 3). This might be because the trees and shrubs are being used extensively for fuel and other destructive uses (Helmut, 2023).

Almost in all plant habit, the leaf parts have been used as medicine (Fig. 4). Debela et al. (2006) and Tilahun and Moa (2018) reported that root as major part of the plant used as medicine followed by leaf and shoot. Higher score observed in herbaceous plant. Surprisingly utilization of fruit as medicine was observed only in herbaceous plants. This might be due to the target sampling area which was only restricted to plants in the garden holdings.

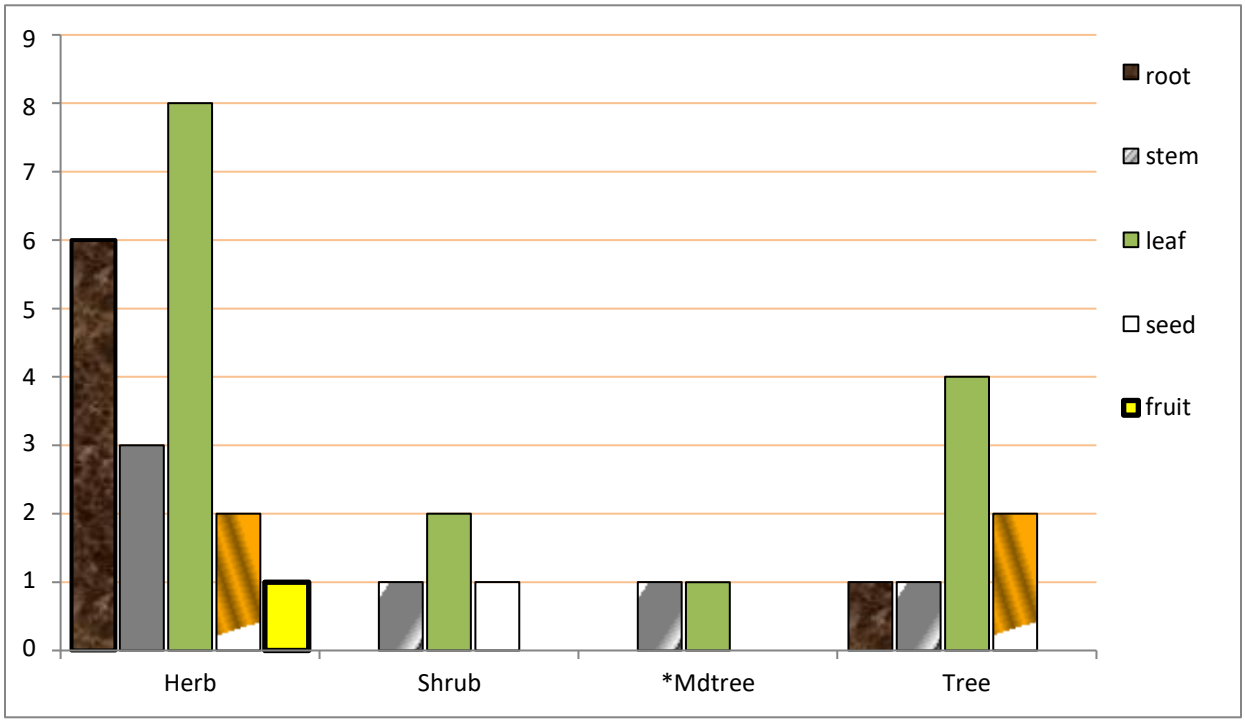

Figure 4. Plant habit and their tissue parts used for treatment (* Mdtree = medium tree)

3.2. Preference ranking of medicinal plants

In this study, five key informants (A-E) were selected to conduct ranking on medicinal plant based on priority to treat internal parasite and related pin (Table 2). *Citrus x limon* was prioritized first followed by *Nigella sativa* and *Ocimum forskolei*.

Table 2. Preference ranking of top five medicinal plants for internal parasite and related pain treatment

Plant species	Respondents(A-E)score for the plant						
	A	B	C	D	F	Total	Rank
Nigella sativa	5	4	5	4	3	21	2nd
Ocimum forskolei	2	4	4	1	4	15	3rd
Carphalea glaucescens	0	1	3	1	0	5	5th
Citrus x limon	5	3	5	4	5	22	1st
Ruta chalepenses	3	5	3	3	2	16	4th

3.3. Knowledge level of the community towards uses of 10 selected plants

Analyses on homogeneity of knowledge level for 10 randomly selected medicinal plants were carried out on randomly selected respondents. The results are presented in Table 3.

Table 3. ICF analysis for common uses of top 10 randomly selected medicinal plants

Treatment use category	Nt	%nt(sp)	ur	%(Ur)	ICF
Internal parasite	8	80	47	23.74	0.847826
Common cold	8	80	40	20.20	0.820513
Wound healing	10	100	42	21.21	0.780488
Lesion	10	100	39	19.70	0.763158
Tumor	10	100	30	15.15	0.689655
Total					0.780328

The ICF analysis result presented in Table 3 showed the informant consensus for the different ailments treated by the traditional medicinal plants in the study area. The level of informants agreement was high for most use categories (mean ICf = 0.780328). This indicates that, the informants have reflected the highest homogeneity knowledge of using different TMP species for the different human and livestock aliments. High level of consensus (ICF=0.847826) for internal parasite followed by Common cold (ICF=0.820513) and knowledge using TMP for treatment of lesion and tumor showed relatively low levels of consensus (ICF = 0.763158) and ICF=0.689655), respectively.

4. Conclusions

Despite the spatial advantages that help protect indegenous knowledge from the influence of modernization and inspite of the suitable agro-ecological climate; plants recorded in the present study is comparatevely lower than previous studies. Ordinary people have awarness of using TMP. However, indigenous knowledge is highly dependent on herbaceous plants. Besides this, the knowledge of TMP for livestock is diminishing. It is, however, promissing to know that some residue of the indigenous knowledge is still exist. Therefore, a careful conservation plan and actionis needed

to preserve medicinal plants and the indigenous knowledge. Tree species along with their medicinal value need to be conserved for the coming generations.

1. The indigenous knowledge and skill of traditional medicine practitioners must be encouraged and protected,
2. The government should play a significant role in the conservation measure to medicinal plants in study area,
3. The documentation and preparation of manual, as means to preserve local knowledge and experience should be undertaken,
4. Identification, cultivation and propagation of medicinal plants should be undertaken to sustain their availability for future generations,
5. Training should be given to the traditional healers on the use of medicinal plants based on standard measurement to reduce side effects of improper dosage, and
6. Phytochemical and pharmacological investigation should be carried out on the most frequently used species of medicinal plants in the study area.

Acknowledgement

We are grateful to Boreda woreda and Hamibisa and Meteka mele kebele officers for their cooperation during data collection. We would like to thank the informants from both kebeles for providing as genuine information.

Conflict of interest

Authors declare no conflict of interest.

References

Anteneh Belayneh, Zemede Asfaw, Sebsebe Demissew, & Negussie Bussa (2012). Medicinal plants potential and use by pastoral and agro-pastoral communities in Erer valley of Babile woreda, Eastern Ethiopia. Journal of Ethnobiology and Ethnomedicine, 8:42

Azene Bekele Tesema (2007). Useful trees of Ethiopia: Identification, propagation and management in 17 agroecological zones. Nairobi, RELMA in ICRAF Project.

Bernard H. (1988). Research methods in cultural anthropology (2nd ed.). Sage, Newbury Park, Canada.

CSA (2007). Central statistical agency of Ethiopia 2007 report. Addis Ababa, Ethiopia

Cunningham, A. B. (2001). Applied ethnobotany: people wild plant use and conservation. London and Sterling, Earthscan Publications Ltd.

Dawit Abebe (1986). Traditional medicine in Ethiopia: The attempt being made to promote it for effective and better utilization. SINET- Ethiopian Journal of Science, 9, 61-69.

Dawit Abebe, Asfaw Debella, & Kelbessa Urga (2003). Illustrated checklist of medicinal plants and other useful plants of Ethiopia. Ethiopian Health and Nutrition Research Institute, Camerapix Publishers International, Nairobi.

Debela Hunde, Zemede Asfaw, & Ensermu Kelbessa (2006). Use of traditional medicinal plants by people of Boosat sub-district, Central Eastern Ethiopia. Ethiopian Journal of Health Science, 16(2), 141-155.

Ermias Lulekal, Ensermu Kelbessa, Tamirat Bekele, & Haile Yineger (2008). An ethnobotanical study of medicinal plants in Mana Angetu district, Southeastern Ethiopia. Journal of Ethnobiology and Ethnomedicine, 4, 10. doi:10.1186/1746-4269-4-10.

Fabricant, D., & Farnsworth N. (2001). The value of plants used in traditional medicine for drug discovery. Environmental Health Perspects, 109:69–75.

Freeman D. (1999). Transforming traditions: The dynamics of cultural variation in the Gamo Highlands, Southwest Ethiopia (Unpublished Doctoral Dissemination). Microform Edition ProQuest LLC.

Guo, H., Zhou, X-B., Tao, Y., Yin, J-F., Zhang, L., Guo, X., Liu, C-H., & Zhang, Y-M. (2023). Perennial herb diversity contributes more than annual herb diversity to multifunctionality in dryland ecosystems of North-western China. Frontiers in Plant Science, 14:1099110. doi:10.3389/fpls.2023.1099110

Haile Yineger, & Delenasaw Yehwalaw (2007). Traditional medicinal plant knowledge and use by local healers of Sekoru district, Jimma zone Southwestern Ethiopia. Journal of Ethnobiology and Ethnomedicine, 3:24ss

Helmut, K. (2023). Challenges and prospects of medicinal plant sustainability in Ethiopia. Journal of Pharmacy and Pharmacology Research, 7: 233-242

Lucilene, L., Fabio, J., Luciana, G., Ana, C., Leidiana, L., & Gardene, M. (2013). Techniques for collecting and processing plant material and their application in ethnobotany research. In Ulysses Paulino Albuquerque et al. (eds.), methods and techniques in ethnobiology and ethnoecology. Springer, New York , U.S.A:

Martin, G. (1995). Ethnobotany: A method manual. Chapman and Hall, London, UK.

Mengistu Gebrehiwot (2010). An ethnobotanical study of medicinal plants in Seru Woreda, Arsi zone of Oromia region Ethiopia (Unpublished Master Thesis). Addis Ababa University.

Michael W. (2006). Plant, Medicine and Man. J Sci Food Agric 86:1797–1804

Mirutse Giday, Zemede Asfaw, Thomas Elmqvist, & Zerihun Woldu (2003). An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. Journal of Ethnopharmacology, 85 (1), 43-52.

Mirutse Gidey, & Tilahun Teklehymanot(2013). Ethnobotanical of plant used in management of livestock health problems by Afar people of Ad'ar district Afar regional state, Ethiopia. Journal of Ethnobiology and Ethnomedicine, 9, 8. doi: 10.1186/1746-4269-9-8. 9:8

Ming-ming Zhao, Ke-ru Wang, Rui Gu, & Shi-hong Zhong (2019). A comparative study on shared-use medicines in Tibetan and Chinese medicine. Journal of Ethnobiology and Ethnomedicine, 15, 43. https://doi.org/10.1186/s13002-019-0320-5.

Mohammed Seid, & Berhanu Abreha (2011). Ethnobotanical survey of traditional medicinal plants in Tehule Dere district, South Wollo. Ethiopian Journal of Medicinal Plants Research, 5(26), 6233-6242.

Polat R. (2019). Ethnobotanical study on medicinal plants in Bingol (City center) (Turkey). Journal of Herbal Medicine, 16, 100211

Prima, A., Ahmed, R., Faruk, A., Zafroon, Z., & Dash P. (2019). Pharmacological importance of *Commelina diffusa* (Commelinaceae): A review. International Journal of Life Sciences and Review, 5(1), 1-05. doi: 10.13040/IJPSR.0975-8232.IJLSR.5(1).1-05

Seyoum Getaneh, & Zerihun Girma (2014). An ethnobotanical study of medicinal plant in Debre Libanos wereda, Central Ethiopia. African Journal of Plant Science, 8(7), 366-379

Subramanyam, R., Steven, N. G., Murugesan, M., Balasubramaniam V., & Muneer M. (2008).

Consensus of the Malasars' Traditional Aboriginal Knowledge of Medicinal Plants in the velliangiri holy hills, India. J. Ethobiol. Ethnomed. 4:8

Tilahun Tolossa, & Moa Megersa (2018). Ethnobotanical study of medicinal plants used to treat human diseases in Berbere district, Bale zone of Oromia Regional State, South East Ethiopia. Evidence-based complementary and alternative medicine. Hindawi, https://doi.org/10.1155/2018/8602945

Troter, R., & Logan, M. (1986). Informant consensus: A new approach for identifying potentially effective medicinal plants. In Etkin, N. L. (ed.) Indigenous medicine and diet: bio-behavioural approaches (pp. 91–112). Redgrave Bedford Hills, New York

World Health Organization (2019). WHO global report on traditional and complementary medicine. Geneva