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Ethnoveterinary medicinal plants at Bale Mountains National Park, Ethiopia

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Abstract

An ethnobotanical study on veterinary medicinal plants of Bale Mountains National Park and adjacent areas was conducted from July 2003 to June 2004. Semi-structured interviews and observations were used to generate ethnoveterinary data from traditional healers residing in the park and buffer zones. A total of 25 animal ailments were reported, of which blackleg, Darissaa and hepatitis were the most frequently reported ailments. Seventy four veterinary medicinal plant species that were distributed among 64 genera and 37 families were recorded. The most utilized growth forms were herbs (35 species, 47.3%) followed by shrubs (28 species, 37.84%). Roots (54 species, 41.54%) followed by leaves (47 species, 36.15%) were the most frequently used plant parts for ethnoveterinary medicine. Usually, fresh materials (53 species, 43.44%) were preferred for medicine preparations. The most frequently used route of drug administration was oral (65 species, 42.76%) followed by dermal (55 species, 36.18%). Indigenous knowledge was mostly transferred to an elect of a family member in word of mouth indicating that it was prone to fragmentation or loss.

Keywords: Medical practitioners; Indigenous knowledge; Remedy; Ailment

1. Introduction

Ethiopia is known for its large livestock population in Africa, even though the leading position is now overtaken by Sudan (FAOSTAT, 2006). But, the quality of livestock performance has remained poor as a result of a number of animal diseases and this has a direct effect on the economic development of the country. This condition has been aggravated by the inadequate provision of modern medicines, which in turn is caused by lack of sufficient money to import those medicines by the government, and lack of access to the available medicines as a result of the poor infrastructures to the rural poor (Tafesse Mesfin and Mekonen Lemma, 2001).

These situations have forced the majority of livestock owners in Ethiopia to rely chiefly on traditional animal health practices (ethnoveterinary medicine) to control common health problems of their livestock (Gemechu Wirtu et al., 1999). In such circumstances ethnoveterinary medicines like medicinal plants, surgery techniques and others provide readily available low cost alternatives to the poor society of developing nations (ITDG and IIRR, 1996). And in fact, most of the *materia medica* used in ethnoveterinary medicines is derived from plants (Mathias-Mundy and McCorkle, 1989).

Despite the fact that ethnoveterinary medicine has been very crucial for the animal healthcares of most developing countries, it has not yet been well documented and much effort is needed in research and integration activities in these countries (Dawit Abebe and Ahadu Ayehu, 1993; Mathias and McCorkle, 1997). To the best of our knowledge, there was no scientific record on the ethnoveterinary medicinal plants in the current study area. This research work was therefore, conducted to document the indigenous knowledge on utilization, management and conservation status of ethnoveterinary medicinal plants, and to identify threats to these plants in the study area.

2. Materials and methods

2.1. Study area

The study area is located in Ethiopia, Oromiya National Regional State, Bale Zone between latitudes 06°05′–07°54′N and longitudes 039°33′–039°59′E. The altitudinal range of the

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area lies between 2441 and 3600 m a.s.l. The lava outpourings of the Miocene and Oligocene geological periods were responsible for the formation of the Bale Mountains (Mohr, 1963). The trachytic and basaltic rocks formed from these trapean lavas weather predominantly to the fairly fertile loam soils that are of reddish-brown to black in colour (Miehe and Miehe, 1994).

The study area has a very high rainfall distribution (bimodal) from March to October, with the highest rain falling in April and from July to October. The dry season then extends from November to February. The mean annual rainfall is 1218.64 mm. The mean annual minimum and maximum temperatures of the area are 2.36 °C and 15.5 °C, respectively. Four distinct vegetation zones, each with its own unique flora and fauna, have been formed as a result of altitudinal and climatic variations in the area. These are the grasslands of Gaysay valley and Dinsho, the *Juniperus procera* L. (Cupressaceae) – *Hagenia abyssinica* (Bruce) J.F. Gmel. (Rosaceae) forests, the *Erica*ceous or heather belt, and the Afro-Alpine moorlands of the plateau and the central peaks (Miehe and Miehe, 1994; Williams, 2002).

Oromos are the dominant ethnic group in spite of the fact that many other people with different ethnic backgrounds have settled in the area. Pastoralism and cultivation of crops like wheat and barely are the major economic activities of the local people (Miehe and Miehe, 1994). According to CSA (2004), the human population of the three districts: Sinana Dinsho, Adaba and Goba in which ethnobotanical information was gathered is 1,86,967, 1,30,677 and 86,163, respectively.

2.2. Site selection

A reconnaissance survey was made from July 30, 2003 to August 2, 2003 to obtain an impression on the general physiognomy of the vegetation and identify sampling sites in the study area. Based on the reconnaissance survey, sampling sites for ethnobotanical data collection were selected conveniently from three districts that contain and/or border the Bale Mountains National Park (BMNP), i.e., Adaba, Sinana Dinsho and Goba Districts. The fieldwork was done in August, September and November 2003, and January and June 2004.

2.3. Informant selection

A total of 49 traditional medicine practitioners (8 females and 41 males) were chosen systematically following Martin (1995) and Kebu Balemie et al. (2004). This was done with the help of local administrators and local people from the three districts in a total of 16 kebeles (peasant associations) that were found within or bordering the park area. Information regarding the depth of traditional knowledge of each practitioner was first gathered from the local people in each kebele. The same information was collected from the local administrators of each kebele. The information obtained from the local people and the administrators was then crosschecked and mostly similar responses from the two groups were used to identify knowledgeable practitioners. During this activity a considerable effort was made to involve equitable numbers of female practitioners but this was not possible due to the relative scarcity of female practitioners in all the kebeles considered. This case was also true in most other parts of the country, and traditional healers were thus mostly males as it was indicated by Debela Hunde et al. (2004), Getachew Addis et al. (2001) and Kebu Balemie et al. (2004).

2.4. Semi-structured interview

Semi-structured interviews were conducted following Cotton (1996). These interviews were made with the help of translators who were conversant with the local language (*Oromiffa*). But before conducting the interview, verbal informed consent was sought and the objectives of the study were briefed for the traditional healers. After consent was sought, the interviews were conducted to collect relevant data on: address, age, sex, level of education and occupation of informants as well as animal health problems (indications) treated, local name of plants used, botanical name, family, growth form, source (wild/cultivated), status (degree of scarcity), plant part used, methods of preparation, form used (fresh/dried), route of administration, threats to medicinal plants, conservation efforts, beliefs and indigenous knowledge transfer. These interviews were done mostly in the field in order to avoid the probable confusions with regard to the identity of the medicinal plants. Some of the ethnomedicinal information was also recorded from the best three knowledgeable traditional medicine practitioners with the help of a tape recorder. Moreover, the morphological characteristics, habitats and habits of medicinal plants were observed and recorded during and after the interviews.

2.5. Informant consensus

In order to evaluate the reliability of the information recorded during the interview, the same informant was met during two different field trips and interviewed for the same ideas and questions as before. Consequently, the ideas of the informant in the two interviews that were not in agreement with each other were rejected since they were considered as irrelevant information. Only the relevant ones were taken into account and analyzed. The responses of each informant regarding remedies used to treat a given ailment were also crosschecked and enumerated to identify the most popularly used medicinal plant species. This method was adopted from Alexiades (1996).

2.6. Plant specimen collection and identification

Voucher specimens of plants were collected from the study area, allotted collection numbers, pressed, and dried for identification at the National Herbarium (ETH), Addis Ababa University. GPS readings of latitudes and longitudes were also taken at the sites where each medicinal plant was collected. Some of the plants were identified in the field while most were identified at the National Herbarium by comparing with already identified herbarium specimens and using taxonomic keys in the Flora of Ethiopia and Eritrea (Hedberg and Edwards, 1989, 1995; Edwards et al., 1995, 2000). These voucher specimens were eventually kept at the National Herbarium.

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Table 1
Common livestock ailments and number of medicinal plant species used to treat ailments

Livestock disease	Frequency of report	No. of plant species used
Blackleg (*Dhukuba Gorbe or Aba Gorba*)	16	19
Darissaa (*Gamoji or Zalaqa*)	16	17
Hepatitis (*Dhukuba Alati*)	16	17
Diarrhoea (*Albati*)	9	12
Nose swelling in mules (*Chachabsa*)	6	6
Evil spirit (*Wan Laffa*)	4	6
Anthrax (*Dhibee Sanga*)	3	3
Scabies (*Chixxo*)	3	3
Swelling (*Gubbaa*)	3	4

2.7. Data analysis

The collected ethnoveterinary data were analyzed using common statistical software packages, namely Microsoft Excel spread sheets and SPSS 12.0.1. Chi-square test was used to evaluate the average number of medicinal plant species reported and used by each informant in the three districts, to determine if there is any significant difference between female and male practitioners with respect to the knowledge and use of medicinal plants, and to evaluate the status of medicinal plant resources with respect to plant part collected for medicinal purposes, plant form used and source of collection (wild/cultivated).

The Spearman rank correlation test was used to determine whether there was a significant correlation between the age of informants and the number of ethnoveterinary medicinal plant species reported and used by each informant.

3. Results

3.1. Common animal health problems in the study area

A total of 25 animal ailments were reported by the traditional medicine practitioners of the study area. The frequency of the most cited ailments and the number of medicinal plant species used are also given in Table 1. The most recurrently reported animal health problems with a frequency of report 16 were blackleg, *Darissaa* (*Gamoji or Zalaqa*) and hepatitis (*Dhukuba Alati*). The local people used about 19 medicinal plants to treat the first illness while each of the latter two diseases was treated using 17 medicinal plant species. Diarrhoea (*Albati*) was the next ailment with frequency of report 9 and treated with 12 medicinal plant species.

3.2. Ethnoveterinary medicinal plants used by the local people

Seventy four plant species of veterinary medicinal importance were gathered and documented throughout the study period (Appendix A). There was no significant correlation (Spearman correlation test $r = 1.00$ and -0.030, respectively, $p = 0.840$) between the age of informants and the total number of ethnoveterinary medicinal plants reported and used by each informant. The average number of medicinal plants known and used by female and male practitioners was similar ($\chi^2 = 9.262$, d.f. = 17, $p = 0.932$).

These medicinal plants were distributed among 64 genera and 37 families. The family Asteraceae had the highest number of species (14) than the other families. The next highest family in terms of species number was Solanaceae (5). Fabaceae and Lamiaceae were the third, each with 4 species. The rest of the families were represented by at most three species. The majority of these plants were wild (78.57%) followed by cultivated (16.67%) while about 4.76% were reported as wild or cultivated. Highly significant ($\chi^2 = 94.318$, d.f. = 9, $p = 0.000$) difference was observed between wild and domestic collections with respect to the status of ethnoveterinary medicinal plants. About 80.95% of the ethnoveterinary medicinal plants reported as rare and very rare were wild plants.

The majority of informants (36.73%) mentioned *Clematis hirsuta* Perr. & Guill. as medicinal for the treatment of various animal ailments. This species was thus the most popular remedy in the study area. This was followed by *Allium sativum* L. (32.65%), *Rumex nepalensis* Spreng. (32.65%), *Verbascum sinaiticum* Benth. (30.61%) and *Withania somnifera* (L.) Dun. (26.53%) (Table 2).

The average number of ethnoveterinary medicinal plant species reported and used by each informant was not significantly ($\chi^2 = 40.625$, d.f. = 34, $p = 0.202$) different among the three districts: Adaba (7.80 ± 0.917), Goba (6.88 ± 1.076) and Sinana Dinsho (7.97 ± 1.068). The largest number of medicinal plant species was collected from Sinana Dinsho District (61 species, 54.46%) followed by Goba District (37 species, 33.04%). The least number of species was collected from Adaba District (14 species, 12.5%). Out of the total medicinal plant

Table 2
Plant species recognized as medicinal by informants

Plant species	Family	No. of informants	Percent
Clematis hirsuta Perr. & Guill.	Ranunculaceae	18	36.73
Allium sativum L.	Alliaceae	16	32.65
Rumex nepalensis Spreng.	Polygonaceae	16	32.65
Verbascum sinaiticum Benth.	Scrophulariaceae	15	30.61
Withania somnifera (L.) Dun.	Solanaceae	13	26.53
Leonotis ocymifolia (Burm.f.) Iwarsson	Lamiaceae	12	24.49
Asparagus africanus Lam.	Asparagaceae	11	22.45
Hagenia abyssinica (Bruce) J.F. Gmel.	Rosaceae	11	22.45
Cucumis ficifolius A. Rich.	Cucurbitaceae	10	20.41
Olinia rochetiana A. Juss.	Oliniaceae	10	20.41
Vernonia amygdalina Del.	Asteraceae	10	20.41
Nigella sativa L.	Ranunculaceae	9	18.37
Rumex abyssinicus Jacq.	Polygonaceae	9	18.37

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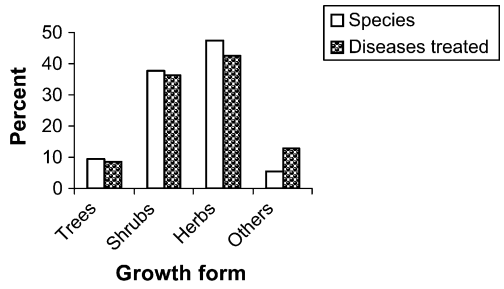

Fig. 1. Percentage distribution of the growth forms of medicinal plants and proportion of diseases treated by each growth form.

species documented, six species were reported as medicinal in all of the three districts. Other than the 6 species, 22 species were reported as medicinal in both Sinana Dinsho and Goba Districts. Likewise, 6 species were reported as medicinal in both Adaba and Sinana Dinsho Districts.

Analysis of the growth forms of these medicinal plants revealed that, herbaceous species constituted the largest number or proportion with 35 species (47.3%). The next largest growth form was represented by shrubs with 28 species (37.84%). Most of the reported ailments were also treated mostly using herbs followed by shrubs (Fig. 1).

With regard to the plant parts used for medicinal purposes, medical practitioners mostly harvested roots (54 species, 41.54%) followed by leaves (47 species, 36.15%) (Fig. 2). Part of the plant collected for medicinal purposes has shown highly significant ($\chi^2 = 148.296$, d.f. = 54, $p = 0.000$) difference on the status of the medicinal plant resources. About 52.38% of the reportedly rare and very rare ethnoveterinary medicinal plants were harvested for their roots.

The local people employed several methods in order to prepare ethnoveterinary medicines from these plants. However, concoction (63 species, 19.44%) followed by crushing (54 species, 16.67%) and crushing and homogenizing with water (53 species, 16.36%) were the most frequently used methods of ethnoveterinary medicine preparation (Table 3). The majority of these preparations were drawn from mixtures of different plant species for the treatment of a single ailment.

As shown in Fig. 3, oral (65 species, 42.76%) administration was the most dominant route of drug application. This was

Table 3
Methods of traditional medicine preparation

Method of preparation	Number of species	Percent
Concoction	63	19.44
Crushing	54	16.67
Crushing and homogenizing with water	53	16.36
Decoction	42	12.96
Powdering	36	11.11
Pounding	24	7.41
Steam bath	14	4.32
Squeezing	12	3.70
Burning	12	3.70
Smoke bath	11	3.40
Chewing	2	0.62
Stem cutting	1	0.31

followed by dermal (55 species, 36.18%) and then nasal (26 species, 17.11%) administrations.

The majority of ethnoveterinary remedies were prepared from fresh materials (53 species, 43.44%). Of course, 34 species (27.87%) were used in dried forms whereas 35 species (28.89%) were utilized in either fresh or dried forms. A significant ($\chi^2 = 13.197$, d.f. = 6, $p = 0.040$) difference was observed between fresh and dried plant forms used with respect to the status of ethnoveterinary medicinal plants in the study area. About 81% of the reportedly rare and very rare medicinal plant remedies were used in fresh.

3.3. Major threats to ethnoveterinary medicinal plants

Many medicinal plants in the study area were highly threatened with anthropogenic and natural factors. The majority of ethnoveterinary medicinal plants (52 species, 27.08%) were reported to be threatened with agricultural expansion. Deforestation for various purposes was the next severe threat that was responsible for the decline of about 45 medicinal plant species (23.44%) in the area. The third major factor affecting about 45 medicinal plant species (23.44%) was drought while the rest of the threats had reportedly affected a small number of medicinal plant species (Fig. 4).

Analysis of data regarding the status of medicinal plants showed about 35 (47.5%) of the medicinal plant species to be abundant whereas 3 (4.05%) species to be very rare (Fig. 5). The presence of the Bale Mountains National Park might have

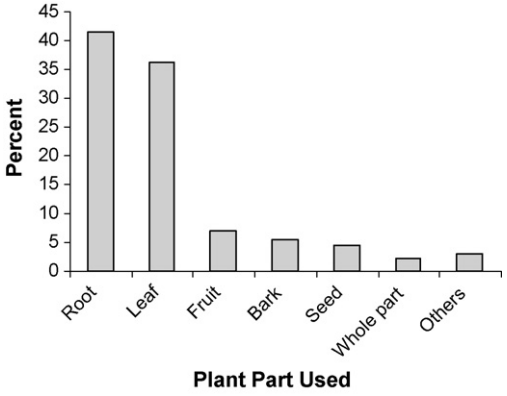

Fig. 2. Percentage distribution of the plant parts used for medicinal purposes.

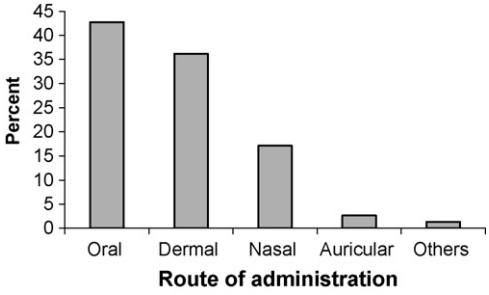

Fig. 3. Percentage distribution of the routes of administration of plant remedies.

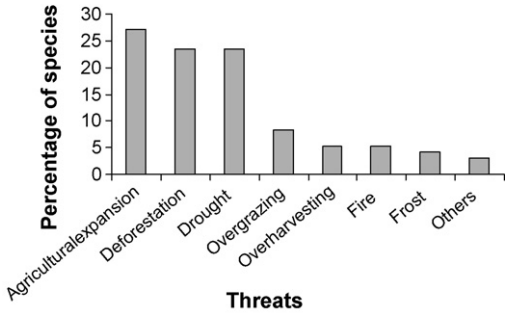

Fig. 4. Percent of veterinary medicinal plants affected by the different threat factors.

been the major reason for the availability of the medicinal plants reported as abundant and less abundant.

3.4. Medicinal plant conservation efforts of the local people

About 44.19% of the informants interviewed had some kind of awareness in conserving some medicinal plant species that were relatively scarce in their surroundings. These informants were practicing some conservation activities like cultivation in and around home gardens of about 32.35% of the total medicinal plant species. They also provided advisory services to the community during informal and formal meetings and cultural celebrations so that the community would refrain from destructive uses of these plants. *In situ* protection of plants (i.e., constructing small fences around them, refraining from excessive cutting and avoiding root removal), control and protection of fire and cultivation of some plants as live fence were also some of the admirable activities of these people. Moreover, some of them were keen to inform responsible bodies or authorities if somebody was found cutting prohibited trees like *Hagenia abyssinica* and *Juniperus procera*.

The rest of the informants were not practicing any pronounced conservation effort. They simply went to the field, home garden, or farmland to collect medicinal plants as their need arose and did not bother about the long-term survival of these plants. Most of these informants gave the reason that the medicinal plants were easily accessible in or near the BMNP and hence no need of personal effort to conserve these plants.

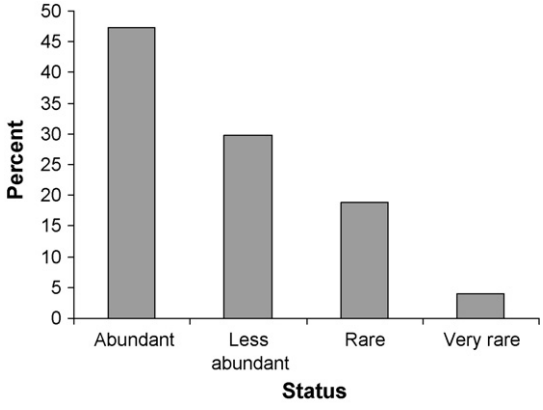

Fig. 5. Status of medicinal plants upon the perception of informants.

3.5. Beliefs and indigenous knowledge transfer

Medical practitioners of the study area adhered to certain beliefs while collecting and applying medicinal plants. For instance, the act of sexual intercourse was totally prohibited and body cleansing was one of the prerequisites. Covering the mouth with a clean sheet of cloth was another precondition. The perception of the local people with regard to the time of medicinal plant collection was very diverse. Consequently, there was no universally accepted fixed time for collection and this differed from person to person and hence was highly dependent on individual beliefs. Some said collection should be done before 4:00 p.m. Some others preferred the morning time up until 9:00 a.m. or afternoon after 4:00 p.m. The morning or night times were convenient for others. Still others argued that the best time of collection was early in the morning or early afternoons. Keeping the time for *Tahara* (i.e., time for washing genital organs before collection) was also applied by almost all the practitioners.

Moreover, a kind of *Kuran* praying ceremony was one portion of the healing procedure that was conducted by almost all of the practitioners. Calling the name of the plant was strictly prohibited during the application of plant remedies. Individuals without any knowledge of practicing traditional medicines were also not allowed to collect any sort of plant for medicinal purposes. In addition, no one was allowed to cut any plant in places where *geda* systems were celebrated. Unless and otherwise all these belief-laws were respected the probability of being affected with *Jinni* (evil spirit) would have been very high and the healing power of the medicinal plant collected would have either declined or been totally lost. Everybody was thus aware of all these situations and was self-enforced not to act against these belief-laws.

The majority of the local healers (95%) used to collect medicinal plants lonely with a great secrecy and no one was allowed to see except some family members during this activity. Accordingly, most healers pass on their knowledge orally to an elect of their family like their husband or wife and to an intelligent son or daughter. The selection of the elect was based upon his/her good conduct and ability of keeping all the secrecy with regards to the medicinal plant use knowledge. Only very few practitioners (2%) had the experience of teaching the indigenous medical knowledge and showing the medicinal plants to all members of their family including either wives or husbands. Some practitioners had reported that the indigenous knowledge would be passed onto elder sons or daughters if and only if they were willing to pay for the service. About 3% of the traditional medical practitioners were also not willing to pass on their plant use knowledge even to their families.

According to the information from most of the respondents (90%), the indigenous plant use knowledge transfer was mainly by word of mouth rather than through a well-organized written script. This by itself was a major factor for the fragmentation and loss of the indigenous knowledge system and eventually medicinal plants.

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4. Discussion and conclusions

This study revealed that ethnoveterinary medical practitioners residing in the Bale Mountains National Park and adjacent areas had a rich heritage of medical knowledge, from whom about 25 indications and a total of 74 medicinal plants of veterinary importance were recorded. Interestingly, female traditional medicine practitioners were as knowledgeable as male practitioners in the study area. The informant consensus on these medicinal plants could confirm the efficacy of these plants against some animal ailments. The majority of ethnoveterinary medicinal plants were collected from wild and this was indicative of the harvesting impact on wild plant resources of the area. The dominance of wild collections was not an exception to the current study area. Rather it was common to some other areas where similar studies were conducted in Ethiopia (Getachew Addis et al., 2001; Kebu Balemie et al., 2004) and outside Ethiopia (Tabuti et al., 2003).

The most frequently utilized growth forms for medicinal purposes were herbs followed by shrubs. This could be attributed to the existence of few tree species in the study area that might have forced traditional healers to depend more on herbs than on trees.

The current investigation showed roots as the most collected plant parts for medicinal purposes and this situation could be a severe threat for some rare and slowly reproducing medicinal plants at least in the long run. However, the collection of leaves for medicine preparation could be regarded as sustainable as far as some leaves are left over on the parent plant. Similar results were also reported by Tabuti et al. (2003) and Debela Hunde et al. (2004). Nevertheless, this finding was not in line with the study conducted in Southern Tigray, Northern Ethiopia by Mirutse Giday and Gobena Ameni (2003) in which leaves were reported as the most frequently sought plant parts for ethnoveterinary remedy preparations. This could be attributed mainly to the differences in the vegetation distribution and abundance between Northern Ethiopia and the current study area, which is found in the Southeastern Ethiopia.

The majority of ethnoveterinary medicine preparations were drawn from mixtures of different plant species for the treatment of a single ailment and a similar result was reported by Dawit Abebe (1986). The result of the current study, however, was contrary to the findings of van der Merwe et al. (2001) in South Africa and Mirutse Giday et al. (2003) in the islands of lake Ziway, Ethiopia, where most of the remedies were prepared from a single species. This could also be ascribed to the differences in the socio cultural landscapes, indigenous knowledge on synergetic effect of different medicinal plants and vegetation types between the current study area and South Africa as well as the islands of lake Ziway.

Various methods of ethnoveterinary medicine preparations were apparent in this study. However, the most frequently used methods were concoction followed by crushing, as well as crushing and homogenizing with water. The prepared medicines were mainly administered through oral, dermal and nasal routes. This result was in line with the findings by Kebu Balemie et al. (2004) and Teshale Sori et al. (2004).

The result of this study revealed that medicinal plants were mostly collected and utilized in fresh forms due to the fear of the decline or loss in their medicinal properties. Similar results were reported by Mirutse Giday and Gobena Ameni (2003). The dependency of most healers on fresh materials could aggravate the decline of rare medicinal plant species from the study area since the demand would increase the frequency of harvest.

Habitat loss and degradation as well as overharvesting are the most serious threats to medicinal plants as a whole (Hamilton, 1997). The major threats to ethnoveterinary medicinal plants palpable in the study area were agricultural expansion and intensification, deforestation for various purposes and recurrent drought for herbaceous species.

A number of beliefs associated with ethnoveterinary medical practices were evident in this study. The majority of these beliefs had an indirect contribution to the conservation of plants of medical importance since they limited excessive harvesting of these plants in one way or another. Thus these beliefs could be considered as the major parts of traditional medicinal plant conservation activities of the local people.

The accumulated ethnomedical knowledge was held in a great secrecy among the majority of practitioners. Oral transfer of this indigenous knowledge to an elect of family member was evident in the current study. The absence of well organized written scripts for the documentation and transfer of this medical wisdom resulted in the fragmentation or loss of the ethnomedical lore and medicinal plants. These findings were in agreement with the studies done in some other areas in Ethiopia (Amare Getahun, 1976; Bayafers Tamene, 2000; Mirutse Giday et al., 2003).

With regard to the activities of some medicinal plants species, Geremew Tafesse et al. (2005) reported significant anti-fertility and anti-implantation effects from the aqueous and ethanol extracts of the leaves and roots of *Leonotis ocymifolia*. However, this study is not relevant to the claimed traditional use of this plant by the Bale practitioners to treat anthrax (*Dhibe Sanga*) and *Badhaftu* indicating the need for biological activity studies for such uses.

Allium sativum was used in the study area to treat evil eye (*Buda*), *Badhaftu*, hepatitis (*Dhukuba Alati*), blackleg (*Dhukuba Gorbe* or *Aba Gorba*), *Naqarsa* and *Darissaa* (*Gamoji or Zalaka*). The bulb of this plant is used elsewhere in Ethiopia to treat jaundice and cutaneous leishmaniasis (Getachew Addis et al., 2001). Alliin and allicin are steroid compounds known to occur in this plant (Glasby, 1991). Alliin has platelet aggregation inhibitor and antithrombotic activities. Allicin has antidiabetic, antihypertensive, antibiotic and antithrombotic activities (Harborne and Baxter, 1993). Riggs et al. (1997) reported the antitumour activities of this plant species. The authors further suggested that *Allium sativum* might provide a new and effective form of therapy for transitional cell carcinoma of the bladder. Extracts of *Allium sativum* have also shown strong antithrombotic activities (Awe et al., 1998). These activities of the plant may validate its traditional use in the study area.

Traditional medicine practitioners of Bale used *Rumex nepalensis* to treat diarrhoea (*Albati*), blackleg (*Dhukuba Gorbe* or *Aba Gorba*) and swelling (*Gubbaa*). Elsewhere in Ethiopia,

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this plant was used to treat colic in livestock (Gemechu Wirtu et al., 1999), and as an antidote for poisoning as well as a laxative (Amare Getahun, 1976). The anthraquinones: emodin and physcion have been extracted from this plant (Glasby, 1991). Emodin has antileukaemic and antitumour activities, and physcion has cathartic activity (Harborne and Baxter, 1993). The methanol extract of *Rumex nepalensis* roots (tested at 200–1000 μg/disc) showed significant concentration-dependent antibacterial activity (Ghosh et al., 2003). These biological activities could justify the ethnoveterinary use of the plant by the practitioners.

The aqueous leaf extract of *Vernonia amygdalina* had been known for its blood sugar lowering effect (Akah and Okafor, 1992). Extracts of this plant species had shown antithrombotic activities (Awe et al., 1998). According to Taiwo et al. (1999), extracts from *Vernonia amygdalina* sticks showed antibacterial activities. These activities could justify the traditional use of *Vernonia amygdalina* leaves in Bale to treat diarrhoea (*Albati*), scabies (*Chixxo*) and hepatitis (*Dhukuba Alati*).

Withaferine A is considered to be the most active compound among the many active phytochemicals found in *Withania somnifera* (Mahadevan et al., 2003). Bhattacharya et al. (1995) reported *Withania somnifera* to have putative nootropic activity in an experimentally validated Alzheimer's disease. These authors further described the effect of this plant species as a promoter of learning and memory. The root extract exhibited a nootropic-like effect in naïve and amnesic mice (Dhuley, 2001). Naidu et al. (2006) found the root extract as a useful drug for the treatment of drug-induced dyskinesia, one of the major side effects of long-term neuroleptic treatment. The extract from this plant species also showed a significant arterial blood pressure lowering effect in 'normotensive' pentobarbital anaesthetized dogs (Ahumada et al., 1991). Bhattacharya et al. (1987) proved the putative antistress activity of two compounds isolated from the root of *Withania somnifera.* Singh et al. (2003) also observed significant antistress activity of a withanolide-free hydrosoluble fraction isolated from the roots of this plant. Kulkarni et al. (1998) confirmed the anticonvulsant activity of the plant root extract. These studies validated the ethnoveterinary use of *Withania somnifera* to treat evil spirit (*Wan Laffa*) by the traditional healers in the study area.

The volatile oil of *Nigella sativa* seeds was found to have a promising antibacterial activity for *Shigella*, *Vibrio* and *Escherichia* drug resistant strains (Ferdous et al., 1992). Chowdhury et al. (1998) also confirmed the anti-shigella activity of the volatile oil of *Nigella sativa* seeds against *Shigella flexneri* Y SH-4 (a drug resistant strain). The essential oil from the seeds of this plant species contains many components but the major component that gives much of the biological activity of the seeds is thymoquinone. The essential oil has antiinflammatory, analgesic, antipyretic, antimicrobial and antineoplastic activity and it has been reported to protect nephrotoxicity and hepatotoxicity (Ali and Blunden, 2003).

Hajhashemi et al. (2004) identified 20 compounds from the steam-distilled essential oil of the seeds. The major components of the oil were *para*-cymene and thymoquinone. The authors also identified significant antiinflammatory and analgesic effects from the essential oil. The essential oil and acetone extract of this plant species showed potent antifungal, antibacterial and antioxidant activities (Singh et al., 2005). The antiinflammatory effect of thymoquinone was also recently confirmed with the work of Tekeoglu et al. (2006). The aforementioned activities of *Nigella sativa* could suggest the potential antimicrobial activities of this plant species used by traditional healers to treat one of the most frequently reported diseases (blackleg) in the study area.

In conclusion, rich indigenous knowledge and high diversity of ethnoveterinary medicinal plant species was recorded from the study area. However, such vital resources were found to be under threat due to several anthropogenic and natural factors. This was worsened by the poor conservation practices of traditional medicine practitioners in the study area. Therefore, attention should be given to conserve and ensure the sustainable use of these resources.

Acknowledgements

We are grateful for the traditional medical practitioners of the study area for their dedicated contribution in sharing their yearly accumulated indigenous knowledge. We would like to thank the World Bank for provision of financial support through the Conservation and Sustainable Use of Medicinal Plants Project in Ethiopia. The field assistants and language translators Mr. Mebratie Alebel and Mr. Kebede Shibru are truly thanked. The staff members of the National Herbarium are also thanked for their kind cooperation while using herbarium materials.

Appendix A

See Table A1.

Table A1
List of ethnoveterinary medicinal plant species, use and application

Scientific name	Family	Local name	Herb.Vouc.	Indication	Use	Form used
Clematis hirsuta Perr. & Guill.	Ranunculaceae	Fittii	Haile 26	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Roots of *Clematis hirsuta*, and *Sida schimperiana* A. Rich. (Malvaceae) are crushed, powdered and mixed with water for oral and nasal administration	Dried
Allium sativum L.	Alliaceae	Qulubi Adi	Haile 57	Hepatitis (*Dhukuba Alati*)	The crushed bulbs are mixed with salt and water and given orally	Fresh
Rumex nepalensis Spreng.	Polygonaceae	Shabbee	Haile 29	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Crushed root is administered orally and nasally	Fresh
Verbascum sinaiticum Benth.	Scrophulariaceae	Abokena	Haile 59	*Darissaa* (*Gamoji or Zalaqa*)	Crushed root is mixed with cold water and administered orally to horses	Fresh
Withania somnifera (L.) Dun.	Solanaceae	Hunzo	Haile 66	Evilspirit (*Wan Laffa*)	Roots are crushed in fresh and mixed with water for oral administration	Fresh
Leonotis ocymifolia (Burm.f.) Iwarsson	Lamiaceae	Bokolu	Haile 65	Anthrax (*Dhibe Sanga*)	Crushed root is mixed with cold water for oral administration	Fresh
Asparagus africanus Lam.	Asparagaceae	Seriti	Haile 80	Rabies (*Dhukuba Sere*)	Crushed and powdered leaves are mixed with cold water and administered orally	Fresh or dried
Hagenia abyssinica (Bruce) J.F. Gmel.	Rosaceae	Hexxo	Haile 51	*Darissaa* (*Gamoji or Zalaqa*)	Stem barks of *Withania somnifera* and *Hagenia abyssinica* are crushed, boiled with water and administered orally	Fresh
Cucumis ficifolius A. Rich.	Cucurbitaceae	Hanchote	Haile 138	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Crushed roots are mixed with cold water and administered orally	Fresh
Olinia rochetiana A. Juss.	Oliniaceae	Gunnaa	Haile 32	*Darissaa* (*Gamoji or Zalaqa*)	Its leaves are mixed with leaves of *Zehneria scabra* (Linn.f.) Sond. (Cucurbitaceae), boiled with butter and given nasally	Fresh or dried
Vernonia amygdalina Del.	Asteraceae	Ebicha	Haile 115	Hepatitis (*Dhukuba Alati*)	Crushed leaves are boiled with water for oral administration	Fresh
Nigella sativa L.	Ranunculaceae	Habsuda Guracha	Haile 100	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Seeds are pounded together with leaves of *Allium sativum* and *Ruta chalepensis* L. (Rutaceae), mixed with water for drinking	Fresh or dried
Rumex abyssinicus Jacq.	Polygonaceae	Hoficho	Haile 31	Lung disease (*Somba*)	Its root is powdered with leaves of *Gomphocarpus fruticosus* (L.) Ait. f. (Asclepiadaceae), mixed with water for oral administration	Dried
Clutia abyssinica Jaub. & Spach.	Euphorbiaceae	Muka Foni	Haile 9	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina* and *Clutia abyssinica*; and root of *Ocimum lamifolium* are crushed in fresh and mixed with cold water for oral intake	Fresh
Cyathula polycephala Bak.	Amaranthaceae	Hatcho	Haile 113	*Darissaa* (*Gamoji or Zalaqa*)	Its roots are pounded with bulbs of *Allium sativum* and mixed with cold water for nasal administration	Fresh or dried
				Gara Gelcha	The roots of *Cyathula. polycephala* and roots s or leaves of *Phytolacca dodecandra* are crushed in fresh and mixed with water for oral administration	Fresh
Kalanchoe petitiana A. Rich.	Crassulaceae	Anchura	Haile 28	Abdominal constipation	Roots of *Kalanchoe petitiana* and *Verbascum sinaiticum* are crushed and mixed with water and soap for oral administration	Fresh

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				Darissaa (*Gamoji or Zalaqa*)	Root of *Kalanchoe petitiana* is crushed with root of *Verbascum sinaiticum*, mixed with soot and water for nasal administration	Fresh
Kalanchoe petitiana A. Rich.	Crassulaceae	Anchura	Haile 28	Swelling (*Ibach*)	Crushed root is tied over the cut surface until the accumulated fluid is removed out	Fresh
Silene macrosolen A. Rich.	Caryophyllaceae	Wagarti	Haile 16	Hepatitis (*Dhukuba Alati*)	Crushed roots of *Silene macrosolen, Verbascum sinaiticum* and *Carduus nyassanus* are administered orally	Fresh
				Darissaa (*Gamoji or Zalaqa*)	Crushed roots of *Silene macrosolen* and *Carduus nyassanus* are administered orally	Dried
Cynoglossum coeruleum Hochst.	Boraginaceae	Qarchaba, Dingetegna, Mathane	Haile 74	Diarrhoea (*Albati*)	**C**rushed roots of *Rumex nepalensis*, *Carduus nyassanus* and *Cynoglossum coeruleum* are mixed with water and administered orally	Fresh
Discopodium eremanthum Chiov.	Solanaceae	Merero	Haile 67	Scabies (*Chixxo*)	Leaves of *Discopodium eremanthum, Vernonia amygdalina* and *Sonchus bipontini* are crushed and mixed with water for painting over the wound up to healing	Fresh
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Root of *Cucumis ficifolius* and *Allium sativum* are crushed with leaves of *Nicotiana tabaccum* and *Discopodium eremanthum* and placed on cut skin part. The rest is given with water orally	Fresh or dried
Zehneria scabra (Linn.f.) Sond.	Cucurbitaceae	Harolla/Etse sabek	Haile 124	*Darissaa* (*Gamoji or Zalaqa*)	Its leaves are mixed with leaves of *Olinia rochetiana*, and roots of *Withania somnifera* and *Allium sativum*, boiled with butter and given nasally	Fresh or dried
Carduus nyassanus (S. Moore) R.E. Fries	Asteraceae	Korehare	Haile 49	*Darissaa* (*Gamoji or Zalaqa*)	Crushed roots of *Silene macrosolen* and *Carduus nyassanus* are administered orally	Dried
				Diarrhoea (*Albati*)	Crushed roots of *Rumex nepalensis, Carduus nyassanus* and *Cynoglossum coeruleum* are mixed with water and administered orally	Fresh
				Hepatitis (*Dhukuba Alati*)	Crushed roots of *Silene macrosolen, Verbascum sinaiticum* and *Carduus nyassanus* are administered orally	Fresh
				Rabies (*Dhukuba Sere*)	The roots of *Asparagus africanus* and *Carduus nyassanus* are crushed and mixed with water for oral administration	Fresh or dried
				Gubbaa	Crushed root mixed with water and administered orally	Fresh or dried
Euphorbia schimperiana Scheele	Euphorbiaceae	Guri	Haile 117	Anthrax (*Dhibe Sanga*)	Fruits of *Euphorbia schimperiana* and root of *Cyathula polycephala* are crushed and mixed with cold water for oral administration	Fresh
Ficus palmata Forssk.	Moraceae	Lugo	Haile 103	*Darissaa* (*Gamoji or Zalaqa*)	Leaves of *Ficus palmata* and *Rhamnus prinoides* are crushed in fresh and boiled with water for drinking	Fresh
Salvia merjamie Forssk.	Lamiaceae	Okotu/Okota	Haile 162	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Root is taken from 7 points, pounded, mixed with *Allium sativum*, salt and water and trembled for drinking	Fresh
Solanecio gigas (Vatke) C. Jeffrey	Asteraceae		Haile 3	Hepatitis (*Dhukuba Alati*)	Crushed leaves are mixed with cold water and administered orally. Some amount is painted over body parts	Fresh

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Table A1 (*Continued*)

Scientific name	Family	Local name	Herb.Vouc.	Indication	Use	Form used
Solanum incanum L.	Solanaceae	Hiddi Xiqo	Haile 42	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Crushed leaves are mixed with cold water and painted over body parts of the animal	Fresh
Solanum marginatum L.f.	Solanaceae	Hiddi	Haile 68	Dermatophytes *[Ikek* (Horse's)]	Leaves of *Bersama abyssinica, Calpurnia aurea* and *Prenanthes subpeltata*; and fruits of *Solanum marginatum* are crushed, boiled and painted over the body of the horse	Fresh
Inula confertiflora A. Rich.	Asteraceae	Haxxawii	Haile 39	*Gonde* (due to eating poisoning plant)	Crushed leaves are mixed with salt and water for oral administration	Fresh
Phytolacca dodecandra L'Hérit.	Phytolaccaceae	Handode (Or.), Yemehan Endod (Amh)	Haile 174	*Chachabsa*	Its leaves are crushed together with leaves of *Clematis hirsuta* and root of *Verbascum sinaiticum*, mixed with cold water and taken via left nostril	Fresh
				Gara Gelcha	The root of *Cyathula polycephala* and root or leaves of *Phytolacca dodecandra* are crushed in fresh and mixed with water for oral administration	Fresh
Sonchus bipontini Asch.	Asteraceae	Raafu Simbra/Feyisso/kartassa	Haile 81	Scabies (*Chixxo*)	Leaves of *Discopodium eremanthum, Vernonia amygdalina* and *Sonchus bipontini* are crushed and mixed with water for painting over the wound upto healing	Fresh
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Roots of *Cucumis ficifolius* and *Sonchus bipontini* are crushed together and mixed with water for oral administration	Fresh
Calpurnia aurea (Ait.) Benth.	Fabaceae	Chekata	Haile 137	Dermatophytes *[Ikek* (Horse's)]	Leaves of *Bersama abyssinica, Calpurnia aurea* and *Prenanthes subpeltata*; and fruits of *Solanum marginatum* are crushed, boiled and painted over the body of the horse	Fresh
Crepis rueppellii Sch. Bip.	Asteraceae	Mucharae, Kartassa/Mucha Rabe	Haile 45	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina, Millettia ferruginea* and *Gomphocarpus fruticosus;* and roots of *Juniperus procera, Cupressus lusitanica* and *Crepis rueppellii* are powdered and mixed with water for drinking	Fresh
				Hepatitis (*Dhukuba Alati*)	Crushed and powdered leaves of *Cheilanthes farinosa* and *Rhamnus prinoides*; and whole parts of *Crepis rueppellii* are brushed over the body	Fresh or dried
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Roots of *Crepis rueppellii, Clematis hirsuta* and *Sida schimperiana* are crushed, powdered and mixed with water for oral and nasal administration	Dried
Juniperus procera L.	Cuprussaceae	Hindesa Adi	Haile 53	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina, Millettia ferruginea* and *Gomphocarpus fruticosus*; and roots of *Juniperus procera, Cupressus lusitanica* and *Crepis rueppellii* are powdered and mixed with water for drinking	Fresh
Kniphofia foliosa Hochst.	Asphodelaceae	Lela	Haile 54	Hepatitis (*Dhukuba Alati*)	Crushed leaves are boiled with water for oral administration	Fresh or dried

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				Gubbaa	Crushed roots of *Lobelia rhynchopetalum, Kniphofia foliosa* and *Rumex nepalensis* are mixed with water for oral intake	Fresh
				Poisons (*Hudhaa*)	Crushed root is mixed with water, and administered orally. The swollen part is then made in contact with glowing iron (Cross like) for an instant	Fresh or dried
Nicotiana tabaccum L.	Solanaceae	Tambo (tambaho)	Haile 77	*Badhaftu*	Leaves of *Artemisia absinthium*, *Nicotiana tabaccum* and *Leonotis ocymifolia*; and bulbs of *Allium sativum* are crushed and tied over the wound after contacting swollen site to glowing iron	Fresh
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Root of *Cucumis ficifolius* and *Allium sativum* are crushed with leaves of *Nicotian tabaccum* and *Discopodium eremanthum* and placed on cut skin part. The rest is given with water orally	Fresh or dried
Ocimum lamifolium Hochst.	Lamiaceae	Qorsa Alati	Haile 178	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina* and *Clutia abyssinica;* and root of *Ocimum lamifolium* are crushed in fresh and mixed with cold water for oral intake	Fresh
				Hepatitis (*Dhukuba Alati*)	Crushed root is mixed with water, applied nasally and dermally	Fresh
					Crushed root is boiled with water and administered orally	Fresh or dried
Rhamnus prinoides L'Herit.	Rhamnaceae	Gesho	Haile 143	*Darissaa* (*Gamoji or Zalaqa*)	Leaves of *Ficus palmata* and *Rhamnus prinoides* are crushed in fresh and boiled with water for drinking	Fresh
				Hepatitis (*Dhukuba Alati*)	Crushed and powdered leaves of *Cheilanthes farinosa* and *Rhamnus prinoides*; and whole parts of *Crepis rueppellii* are brushed over the body	Fresh or dried
Ruta chalepensis L.	Rutaceae	Siliti	Haile 21	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Its leaves are pounded together with *Allium sativum* and *Nigella sativa*, mixed with oil and gas for drinking	Fresh or dried
					Leaves of *Erythrina brucei, Vernonia myrantha*, *Ruta chalepensis, Nicotiana tabaccum, Cymbopogon citratus*; roots of *Salvia merjamie*, *Cucumis ficifolius, Rumex nepalensis,* and *Allium sativum* and fruits of *Nigella sativa* are crushed and mixed with saltwater for drinking	Fresh
Sida schimperiana Hochst. ex A. Rich.	Malvaceae	Korsa Shote-lay/Haxxarnur	Haile 134	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Roots of *Crepis rueppellii*, *Clematis hirsuta* and *Sida schimperiana* are crushed, powdered and mixed with water for oral and nasal administration	Dried
Sonchus bipontini Asch.	Asteraceae	Raafu Sim-bra/Feyisso/kartassa	Haile 81	Scabies (*Chixxo*)	Leaves of *Discopodium eremanthum, Vernonia amygdalina* and *Sonchus bipontini* are crushed and mixed with water for painting over the wound up to healing	Fresh
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Roots of *Cucumis ficifolius* and *Sonchus bipontini* are crushed together and mixed with water for oral administration	Fresh

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Table A1 (*Continued*)

Scientific name	Family	Local name	Herb.Vouc.	Indication	Use	Form used
Bersama abyssinica Fresen.	Melianthaceae	Lolchisa (Abalo)/Horoqa	Haile 104	Dermatophytes *[Ikek* (Horse's)]	Leaves of *Bersama abyssinica, Calpurnia aurea* and *Prenanthes subpeltata*; and fruits of *Solanum marginatum* are crushed, boiled and painted over the body of the horse	Fresh
Cupressus lusitanica Mill	Cuprussaceae	Hindesa	Haile 98	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina, Millettia ferruginea* and *Gomphpcarpus fruticosus*; and roots of *Juniperus procera, Cupressus lusitanica and Crepis rueppellii* are powdered and mixed with water for drinking	Fresh
Cycniopsis humifusa (Forssk.) Sengl.	Scrophulariaceae	*Qorsa alati*	Haile 61	Hepatitis (*Dhukuba Alati*)	Root Concoction with *Vernonia amygdalina*, is mixed with water for drinking	Fresh
Cymbopogon citratus (DC.) Stapf	Poaceae	Iticho (Or.), Tejisar (Amh)	Haile 158	Hepatitis (*Dhukuba Alati*)	Crushed root is mixed with water and administered orally and nasally. The residue is rubbed over backbone area	Fresh
					Freshly crushed root is mixed with salt and water and administered orally	Fresh
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Leaves of *Erythrina brucei, Vernonia myrantha, Ruta chalepensis, Nicotiana tabaccum, Cymbopogon citratus;* roots of *Salvia merjamie, Cucumis ficifolius, Rumex nepalensis*, and *Allium sativum* and fruits of *Nigella sativa* are crushed and mixed with saltwater for drinking	Fresh
Erythrina brucei Schweinf.	Fabaceae	Walena	Haile 140	*Darissaa* (*Gamoji or Zalaqa*)	Crushed leaves are mixed with cold water and administered orally to horses	Fresh
				Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Leaves of *Erythrina brucei, Vernonia myrantha, Ruta chalepensis, Nicotiana tabaccum, Cymbopogon citratus;* roots of *Salvia merjamie, Cucumis ficifolius, Rumex nepalensis*, and *Allium sativum* and fruits of *Nigella sativa* are crushed and mixed with saltwater for drinking	Fresh
				Eye problem (*Dhukuba Ija*)	Leaves are pounded, mixed with small amount of water and applied directly to the eye	Fresh or dried
Maesa lanceolata Forssk.	Myrsinaceae	Abeyi	Haile 52	*Chachabsa*	Leaves of *Maesa lanceolata* and *Berula erecta* are crushed in fresh and inserted into affected site after cutting the skin	Fresh
Alchemilla abyssinica Fresen.	Rosaceae	Hindrif/Endrif	Haile 18	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Crushed root of *Rumex nepalensis* and *Alchemilla abyssinica* is mixed with water and given orally and nasally. Swollen site is cut with a blade before serving the medicine	Fresh
Artemisia absinthium L.	Asteraceae	Enari	Haile 114	*Badhaftu*	Leaves of *Artemisia absinthium, Nicotiana tabaccum*, and *Leonotis ocymifolia*; and bulbs of *Allium sativum* are crushed and tied over the wound after contacting swollen site to glowing iron	Fresh
Lotus corniculatus L.	Fabaceae	Garasita/Loya	Haile 83	Hepatitis (*Dhukuba Alati*)	Crushed leaves are mixed with salt and water for oral administration	Fresh

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Millettia ferruginea (Hochst.) Bak.	Fabaceae	Birbira	Haile 141	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina, Millettia ferruginea* and *Gomphpcarpus fruticosus*; and roots of *Juniperus procera, Cupressus lusitanica* and *Crepis rueppellii* are powdered and mixed with water for drinking	Fresh
Pittosporum viridiflorum Sims	Pittosporaceae	Ara	Haile 249	*Darissaa* (*Gamoji or Zalaqa*)	Stem bark is crushed, powdered and mixed with water for oral administration	Dried
Salvia nilotica Jacq.	Lamiaceae	Merga, Sayneqel	Haile 64	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Both the root and leaves are crushed, mixed with water and salt and 1 liter is administered orally	Fresh
Vernonia myrantha Hook.f.	Asteraceae	Rangii	Haile 38	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Leaves of *Erythrina brucei, Vernonia myrantha, Ruta chalepensis, Nicotiana tabaccum, Cymbopogon citratus*; roots of *Salvia merjamie*, *Cucumis ficifolius, Rumex nepalensis*, and *Allium sativum* and fruits of *Nigella sativa* are crushed and mixed with saltwater for drinking	Fresh
Achyranthes aspera L.	Amaranthaceae		Haile 91	*Darissaa* (*Gamoji or Zalaqa*)	Crushed root is mixed with water and administered nasally	Fresh
Agrocharis melanantha Hochst.	Apiaceae		Haile 35	Epilepsy (*Wan Qabana or Elbissa*)	Crushed root is squeezed and the juice is taken nasally	Fresh
Artemisia abyssinica Sch. Bip. ex A. Rich.	Asteraceae	Chuqune	Haile 50	Epilepsy (*Wan Qabana or Elbissa*)	Chewing crushed fresh root and administering the juice via left nostril	Fresh
Asplenium aethiopicum (Burm.f.) Becherer	Aspleniaceae		Haile 72	Evilspirit (*Wan Laffa*)	Roots of *Withania somnifera* and *Asplenium aethiopicum* are crushed in fresh and mixed with water for oral administration	Fresh
Basananthe hanningtoniana (Mast.) W.J. de Wilde	Passifloraceae		Haile 106	*Darissaa* (*Gamoji or Zalaqa*)	Crushed leaves are boiled with water and administered orally	Fresh
Berula erecta (Hudson) Coville	Apiaceae	Gonde	Haile 132	*Chachabsa*	Leaves of *Maesa lanceolata* and *Berula erecta* are crushed in fresh and inserted in to affected site after cutting the skin	Fresh
Cheilanthes farinosa (Forssk.) Kaulf.	Sinopteridaceae		Haile 157	Hepatitis (*Dhukuba Alati*)	Crushed and powdered leaves of *Cheilanthes farinosa* and *Rhamnus prinoides*; and whole parts of *Crepis rueppellii* are brushed over the body	Fresh or dried
Dryopteris inaequalis (Schlecht.) Kuntze	Aspidiaceae	Bul'aa/Kumbuta/Okotu	Haile 73	*Rajjoo*	Washed and crushed root is boiled with water and salt for oral administration	Fresh
Gomphocarpus fruticosus (L.) Ait. f.	Asclepiadaceae	Anano	Haile 116	Diarrhoea (*Albati*)	Leaves of *Vernonia amygdalina, Millettia ferruginea* and *Gomphpcarpus fruticosus*; and roots of *Juniperus procera, Cupressus lusitanica* and *Crepis rueppellii* are powdered and mixed with water for drinking	Fresh
				Lung disease (*Somba*)	Roots of *Prenanthes subpeltata, Cymbopogon citratus*, and *Rumex abyssinicus*; and leaves of *Gomphpcarpus fruticosus* are powdered and mixed with water for oral administration	Dried
Haplosciadium abyssinicum Hochst.	Apiaceae		Haile 129	Evilspirit (*Wan Laffa*)	Crushed whole parts of *Haplosciadium abyssinicum* and *Polygala steudneri* are administered orally. Some amount is painted over the body.	Fresh

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Table A1 (*Continued*)

Scientific name	Family	Local name	Herb.Vouc.	Indication	Use	Form used
Lobelia rhynchopetalum Hemsl.	Lobeliaceae	Tarura	Haile 160	*Gubbaa*	Crushed roots of *Lobelia rhynchopetalum, Kniphofia foliosa* and *Rumex nepalensis* are mixed with water for oral intake	Fresh
Polygala sphenoptera Fresen.	Polygalaceae		Haile 6	Evilspirit (*Wan Laffa*)	Crushed leaves are mixed with cold water and administered orally. Some amount is painted over body parts	Fresh
Polygala steudneri Chod.	Polygalaceae		Haile 102	Evilspirit (*Wan Laffa*)	Crushed whole parts of *Haplosciadium. abyssinicum* and *Polygala steudneri* are administered orally. Some amount is painted over the body	Fresh
Prenanthes subpeltata Stebbins	Asteraceae	Anano	Haile 82	*Darissaa* (*Gamoji or Zalaqa*)	Powdered root is mixed with water for nasal or auditory administration	Dried
				Dermatophytes *[Ikek* (Horse's)]	Leaves of *Bersama abyssinica, Calpurnia aurea* and *Prenanthes subpeltata*; and fruits of *Solanum marginatum* are crushed, boiled and painted over the body of the horse	Fresh
				Lung disease (*Somba*)	Roots of *Prenanthes subpeltata*, *Cymbopogon citratus*, and *Rumex abyssinicus*; and leaves of *Gomphpcarpus fruticosus* are powdered and mixed with water for oral administration	Dried
Rosa abyssinica Lindley	Rosaceae	Gora	Haile 142	Hepatitis (*Dhukuba Alati*)	The crushed leaves of *Rosa abyssinica* and bulbs of *Allium sativum* are mixed with salt and water and given orally	Fresh
Senecio fresenii Sch. Bip. ex Oliv & Hiern	Asteraceae		Haile 41	Blackleg (*Dhukuba Gorbe or Aba Gorba*)	Crushed roots are mixed with cold water and administered orally	Fresh
Senecio ragazzii Chiov.	Asteraceae	Beredu	Haile 4	Evil eye (*Buda*)	Leaves of *Senecio ragazzii* and bulbs of *Allium sativum* are boiled with water and given orally. The residue is used to wash the body of the animal	Fresh
Solanecio angulatus (Vahl) C. Jeffrey	Asteraceae	Raffu, Rafu Osole	Haile 47	Hepatitis (*Dhukuba Alati*)	Leaves are mixed with water and pounded for brushing it over the skin of the animal	Fresh
Trichilia prieuriana A. Juss.	Meliaceae	Anonu	Haile 156	Diarrhoea (*Albati*)	Crushed roots are mixed with roots of *Withania somnifera* for oral administration	Fresh
Vernonia hymenolepis A. Rich.	Asteraceae	Agadena	Haile 48	Hepatitis (*Dhukuba Alati*)	Crushed leaves are boiled with water and administered orally	
Veronica gunae Schweinf. ex Fries	Scrophulariaceae		Haile 159	Anthrax (*Dhibe Sanga*)	Crushed roots are mixed with cold water for drinking	Fresh

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