

AN ETHNOBOTANICAL SURVEY ON PLANTS OF VETERINARY IMPORTANCE IN TWO WOREDAS OF SOUTHERN TIGRAY, NORTHERN ETHIOPIA

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ABSTRACT: The purpose of the survey was to document and analyze information on the traditional use of medicinal plants by farmers in Ofla and Raya-Azebo *woredas* of South Tigray Zone for the treatment and prevention of livestock ailments. Data were collected mainly through interviews carried out with randomly selected farmers of the two *woredas*. During the survey, 83 medicinal plant species were reported as being used for the treatment of 37 types of livestock ailments. A high proportion of the species (17%) were claimed to have been used as remedies for wound infections. The highest informant consensus was recorded for the plant *Achyranthes aspera* L. where 18 out of the total informants (9%) reported the use of the species as remedy against inflammation of the eye in cattle. Leaves are the most commonly sought plant parts in remedy preparations. Most of the remedies (96%) are prepared from freshly collected plant parts in remedy preparations. Most of the remedies (96%) are prepared from freshly collected plant parts in remedy preparations. Most of the remedies (96%) are prepared from freshly collected plant parts in remedy preparations. Most of the remedies (96%) are prepared from freshly collected plant parts in remedy preparations. Most of the remedies (96%) are prepared from freshly collected plant parts in remedy preparations. The majority of the plants were found to be harvested from the wild. A significant difference ($p < 0.05$) was observed between the average numbers of medicinal plants that were reported by farmers of the two *woredas*; on average two plant species were reported by the farmers from Raya-Azebo, whereas, only one plant species was reported by the farmers from Ofla. Further studies are needed to evaluate the efficacies and possible side effects of the traditional medicinal plants before they are recommend for their wider use both in the study area and elsewhere in the country.

Key words/phrases: Ethiopia, ethnobotany, ethnoveterinary, medicinal plants, Southern Tigray

INTRODUCTION

Ethiopia is one of the leading countries of Africa in livestock population. According to the Ethiopian Agricultural Research Organization (EARO) (1999), the country has about 31 million heads of cattle, 27 million sheep, 24 million goats, 7.02 million equine, 1 million camels and 56 million poultry. Livestock production is an integral part of the Ethiopian agriculture and shares about 40% of the total agricultural output (EARO, 1999).

Although Ethiopia is rich in its livestock population, it is one of the countries in the world with the lowest unit output. The poor health condition of its livestock has partially been responsible for the low productivity. Tsetse borne trypanosomiasis, contagious bovine pleuropneumonia, rinderpest and foot-and-mouth disease are among the major health problems of livestock (EARO, 1999). Modern livestock health care is still at its lowest stage in the country due to lack of adequate clinics, veterinarians and supply of drugs. Besides, most modern drugs are expensive and, as a result, not affordable by the majority of Ethiopian farmers and pastoralists. Most of the Ethiopian farmers and pastoralists, therefore, rely on their traditional knowledge, practices and

locally available materials (mainly plants) in the control of diseases of their domestic animals.

However, such rich ethnoveterinary knowledge, which has been transferred verbally from one generation to the next from time immemorial, is currently in danger of being lost. Medicinal plants, which have been used in ethnoveterinary practices, are being depleted at an alarming rate because of the continued environmental degradation in Ethiopia as a result of deforestation, overgrazing and recurrent drought as well as overexploitation and destructive harvesting of the medicinal plants themselves. Unless such medicinal plants are locally available in a reasonable amount, it becomes difficult to continue the practice. This in turn could pave a way to the deterioration or complete loss of the knowledge. Loss of knowledge has been aggravated by the expansion of modern education, which has made the younger generation underestimate its traditional values.

To our dismay, very little effort has so far been made to reverse or stop the trend. Few ethnoveterinary surveys (Lidetu Alemu, 1993; Yihenew Mekonnen, 1994; Ayalew Tolosa, 1997; Gemechu Wirtu *et al.*, 1999; Mirutse Giday, 1999) have been conducted in the country to document the medicinal plants used and the associated ethno-

veterinary knowledge. Enormous knowledge is still being lost before it is recognized and properly documented, and medicinal plants go extinct before appropriate conservation measures are taken. Thus, there is an urgent need for a documentation of the knowledge in the country and conservation of the medicinal plants, which have been used in the practice, but are currently on the verge of extinction. By reducing the loss of the medicinal plants used and the associated knowledge through conservation measures and documentation, respectively, the continuation of the ethnoveterinary practice could be guaranteed. Besides, such ethnoveterinary knowledge could serve as a lead in the development of modern herbal drugs.

Like the farmers/pastoralists, elsewhere, in the country, most of the farmers in Southern Tigray are to a large extent dependent on their ethnoveterinary knowledge and practices, which mainly involve the use of locally available medicinal plants. Such knowledge and practices are, however, currently under threat mainly because of the depletion of the locally available medicinal plants as a result of the large-scale environmental degradation and recurrent drought that have been taking place in their worst form, in this part of the country. Very little effort has so far been made to record and document the medicinal plants used and the associated knowledge. Immediate measures should, therefore, be taken to rescue the plants and the associated knowledge from further loss. But before such measures are taken, the extent of the knowledge of the ethnoveterinary practice involving medicinal plants should be investigated properly through ethnobotanical surveys.

The aim of this survey was, therefore, to document and analyze the existing ethnoveterinary knowledge and practices of farmers associated with the use of medicinal plants in two *woredas* (districts) of South Tigray Zone.

THE STUDY AREA

South Tigray is one of the four administrative zones of the Tigray Regional Administration. It is divided into eight administrative *woredas*. The area is well known for its high livestock population. Cattle, sheep, chicken, goats, equine and camels are the domestic animals commonly raised in the area. A survey conducted in 2001/02 showed that

South Tigray Zone has 631,186 heads of cattle (Central Agricultural Census Commission, 2003).

For the ethnoveterinary survey, two *woredas* of the South Tigray Administrative Zone were selected, namely the Ofla and Raya-Azebo *woredas* (Fig. 1). These *woredas* are found at close distances from the historic town of Maichew. Maichew is located at 662 kms north of Addis Ababa. In terms of the ethnoveterinary and other farming practices of the people, as well as livestock composition, the two *woredas* are believed to represent most areas of Southern Tigray: Ofla *Woreda* representing the western highland areas, and Raya-Azebo *Woreda* representing the eastern lowland areas.

Ofla

The altitudes of the areas surveyed in the *woreda* range between 2400 to 2450 meters a.s.l. *Euphorbia abyssinica* and *Becium grandiflorum* are among the dominant plant species naturally growing in the area. Tef, barley and maize are the commonly cultivated field crops.

Of all the domestic animals raised in the *woreda*, cattle population takes the lead, claimed to be 72,924 heads, followed by chicken (97,248) and sheep (49,772) (Central Agricultural Census Commission, 2003). Blackleg, pasteurellosis, anthrax, fascioliasis and trypanosomiasis are among the diseases occurring in the area (unpublished data, Ofla *Woreda* Agricultural Office). Three veterinary clinics are available in the *woreda*.

Raya-Azebo

The altitudes of the surveyed area in the *woreda* ranges between 1600 and 1830 meters a.s.l. *Euphorbia abyssinica* and *Opuntia ficus-indica* are among the frequently occurring species in the specific sites of the *woreda* covered by the ethnobotanical survey. Sorghum and maize are the widely cultivated field crops.

Similar to Ofla *woreda*, cattle (139,127), chicken (100,079) and goats (16,969) take the highest number of the livestock population in Raya-Azebo (Central Agricultural Census Commission, 2003). Sheep pox, contagious caprine pleuropneumonia (CCPP), lumpy skin disease, babesiosis, trypanosomiasis and streptotrichosis are among the prevalent diseases in the area (unpublished data, Raya-Azebo *Woreda* Agricultural Office). Five veterinary clinics are operational in the *woreda*.

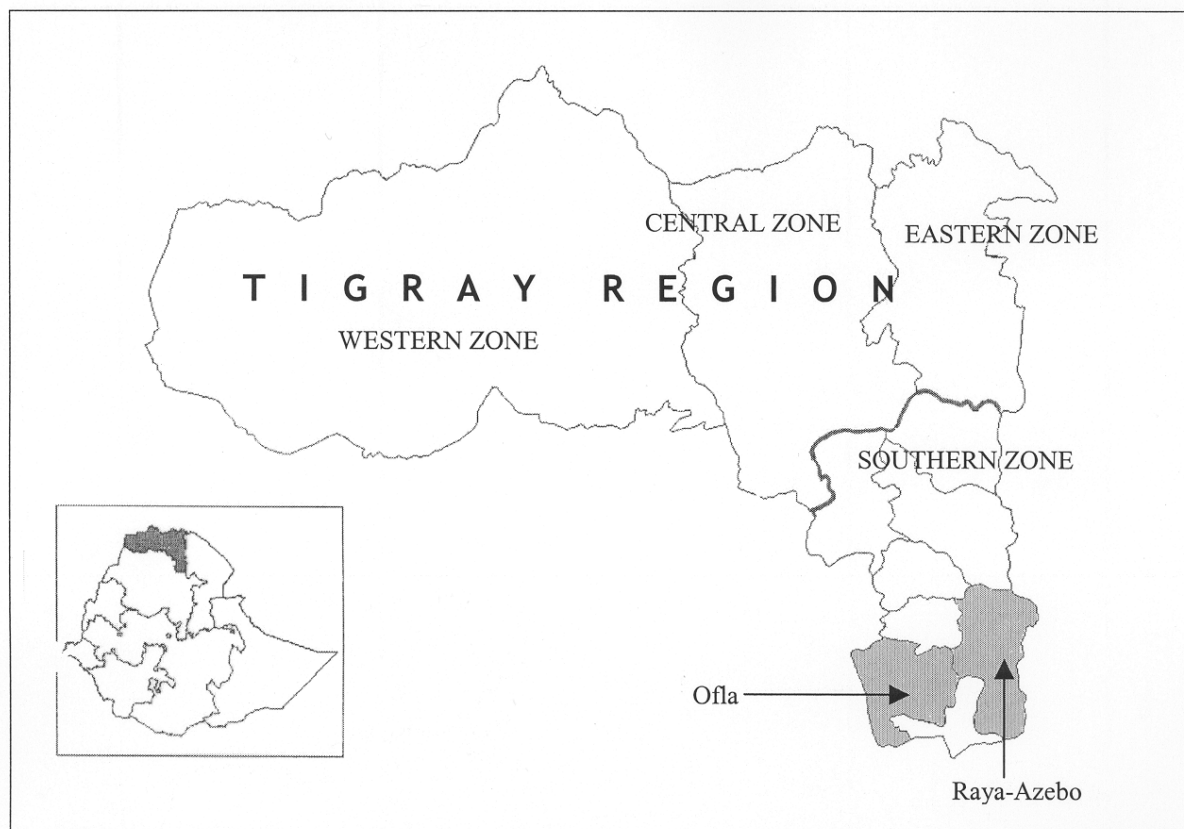


Fig. 1. Map of the study area; arrows show the surveyed *woredas*. [Modified from UNDP-EUE (1996).]

MATERIALS AND METHODS

Survey sites

For the ethnoveterinary survey, three villages were chosen from each of the selected *woredas*. They are Adi-Golo, Menkere and Hashenge from Ofla *Woreda*, and Tsegea, Ebo and Mechara from Raya-Azebo *Woreda*. The villages were chosen because of their easy accessibility.

Informants

For the survey, 202 farmers (194 males and 8 females), 146 from Ofla and 56 from Raya-Azebo, volunteered to serve as informants. The age of the informants ranged from 18 to 92. They were picked up during transect walks made to the selected villages of the two *woredas*. Initially, there was a plan to interview a comparable number of informants from Raya-Azebo *woreda*. This was,

however, not achieved as farmers were busy in different farming activities during the time where most of the interviews were conducted. Although more females than the number stated above were encountered during the visits, only few of them were willing to sit for the interview. It was learned that there were no specialized livestock healers in the study area.

Methods of data collection and analysis

Ethnoveterinary data were collected during two trips made to the survey areas in October 2001 and April 2002. These are the months where most of the seasonal herbs are found blooming. The data were collected mainly through separate interviews and discussions held with the selected informants. For this purpose, a semi-structured questionnaire was prepared before hand. The interviews were conducted in Tigrigna, a widely spoken language in the area. During the interview, data regarding

the kinds of ailments treated and the types of medicinal plants used (including their local names) in the day-to-day ethnoveterinary practices of the people in the area, the plant parts used, remedy preparations, route of administration and dosage were collected. Besides, information on marketability and cultivation practices of the medicinal plants was gathered. Veterinarians serving in the study area played a major role in translating the local disease names into their English equivalents. Herbarium specimens for most of the reported medicinal plants were gathered, properly identified and vouchers were deposited at the National Herbarium of the Addis Ababa University.

The data were summarized in a way to show the most commonly sought plant part/s (root, stem, leaf, *etc.*), the widely used solvents or diluents in remedy preparation and the frequently employed mode of administration. Data were also analyzed in order to understand the degree of local trade and habit of cultivation of medicinal plants by the farmers in the area. Knowledge of medicinal plants between farmers residing in the two *woredas* was also compared using Stata Version 6 software, and statistical significance was determined by employing the Student t-test at 95% confidence intervals.

The relative importance of each reported medicinal plant was assessed based on the proportion of informants who independently reported its use as a remedy against a particular disease/disease category following an approach used by Trotter and Logan (1986). Such agreement of informants is usually referred to as informants consensus.

RESULTS

The medicinal plants and their applications

During the survey, a total of 83 plant species (44 from Ofla and 60 from Raya-Azebo) that belong to 50 families and 75 genera were reported to have been used as treatments against 37 types of livestock ailments in the study area (Annex 1). Of the total, 21 species were found to have simultaneously been used in both *woredas* for the same or different veterinary purposes. The family

Fabaceae took a bigger proportion of the reported medicinal plants accounting for 12%, followed by Solanaceae (7%) and Lamiaceae (6%). Of the total reported species, 45.8% are herbs, 27.7% are shrubs and 26.5% are trees.

Most of the claimed medicinal plants (90%) were found to have been used as remedies against 23 types of cattle ailments, nearly two-third of the total livestock diseases reported by the informants (Table 1). A high proportion of species were claimed to have been used as remedies for the treatments of wound infections accounting for 17% of the total medicinal plants reported, followed by leech infestation (16%), strangles (15%), inflammation of the eye (14%) and anthrax (11%). Some of the claimed medicinal plants are used as treatments against several types of livestock ailments. The plants, *Solanum incanum* and *Euphorbia abyssinica*, for example, are used for the treatment of seven and five kinds of livestock ailment, respectively.

Table 1. Proportions of medicinal plants used in the treatments of the ailments of the different livestock types.

Type of livestock	No. of species reported (%)	No. of ailments treated
Cattle	75 (90%)	23
Equine	40 (48%)	7
Sheep	24 (29%)	6
Goat	24 (29%)	6
Camel	17 (20%)	3
Chicken	3 (4%)	2

Some of the reported medicinal plants in the study area were found to be popular among the farmers with relatively higher informants consensus for being used as remedies against particular type of diseases (Table 2). A highest agreement of informants was recorded for *Achyranthes aspera* L. Eighteen out of the total 202 informants (9%) reported the use of *A. aspera* as a remedy against inflammation of the eye in cattle. The species, *Nicotiana tabacum* L., *Impatiens rothii* and *Aloe* sp. also scored higher informant consensus for being used as treatments against leech infestation (6.4%), lungworm pneumonia (5.4%) and bloat (4.5%), respectively.

Table 2. List of medicinal plants reported as remedies against particular types of disease by five or more informants.

Scientific name	Local name	Type of ailment treated	No. of informant
<i>Achyranthes Aspera</i>	mechelo, gurbe	inflammation of the eye (cattle)	18 (9%)
<i>Nicotiana tabacum</i>	timbaho	leech infestation (cattle)	13 (6.4%)
<i>Impatiens rothii</i>	gurshit	lungworm pneumonia (cattle)	11 (5.4%)
<i>Aloe sp.</i>	ire	bloat (cattle)	9 (4.5%)
<i>Calpurnia aurea</i>	hitsawts, cherecnchah	mange mites (cattle, sheep, goat and equine)	7 (3.5%)
		lice infestation (chickens)	6 (3%)
<i>Ricinus communis</i>	gulee	external wound infection (cattle)	6 (3%)
<i>Meriandra bengalensis</i>	mesaguh	lung worm pneumonia (cattle, goat, sheep)	5 (2.5%)
<i>Rumex nervosus</i>	digele	strangles	5 (2.5%)
<i>Silene macrosolen</i>	saero-saero, wogert	strangles	5 (2.5%)
<i>Senecio myriocephalus</i>	tsaeda-qotsli	limping, physical damage (cattle)	5 (2.5%)

Plant parts used, preparation and route of administration

Leaves and roots are the most commonly used plant parts in the preparation of remedies accounting for 70% and 35% of the total medicinal plants, respectively, followed by seeds and fruits (16%).

The majority of the remedies (96%) are prepared from freshly collected plants in the form of juice or paste. It was revealed that about 79% of the remedies are prepared without the use of solvents or diluents. When solvents are needed, however, it is water that is frequently used. Human saliva and urine as well as milk and butter are also used as solvents or additives, to some degree, in the preparation of remedies.

Preparations of nearly half (45%) of the total reported plant remedies are given orally. Remedies of a big number of plants are also frequently applied topically on the skin and given nasally accounting for 36% and 32 % of the total reported species, respectively. For most of the diseases reported, remedies are continuously given on daily basis until a significant improvement in health conditions are noticed. Lack of consistency among the informants on the levels of daily doses for many of the remedies was frequently noted.

Comparison of the medicinal plants knowledge between farmers of the two woredas

About 70% of the farmers interviewed from the two *woredas* reported the knowledge of at least one medicinal plant; and the average number of reported medicinal plants by the same informants was between one and two.

A significant difference ($p < 0.05$) was observed between the average numbers of medicinal plants that were reported by farmers of the two *woredas*; on average, two plant species were reported by the farmers from Raya-Azebo, whereas, only one species was reported by the farmers from Ofla (Table 3).

Table 3. Number (%) of informants in the two woredas in relation to the number of medicinal plants reported by each of the interviewees.

No of plants reported	Ofla Woreda n= 146	Raya-Azebo Woreda n= 56
0	54 (36.99)	7 (12.50)
1	42 (28.77)	26 (46.43)
2	26 (17.81)	12 (21.43)
3	13 (8.90)	2 (3.57)
4	5 (3.42)	3 (5.36)
5	5 (3.42)	3 (5.36)
6+	1 (0.68)	3 (5.36)

Mean of the reported plants: Ofla = 1; Raya-Azebo = 2

Local status of the reported medicinal plants

Of the total claimed medicinal plants, more than half (60%) were found to be growing wild, and about 15% were reported to be weeds. Around 25% of the medicinal plants were reported to have been grown in and around home gardens or in cultivation fields although most of them are primarily cultivated for other purposes. Except for the cultivated and weedy species, long distance walks are required to collect medicinal plants because of their limited occurrence. According to the informants, the wild plants *Grewia villosa*, *Berberis holistii*, *Pittosporum viridiflorum*, *Maerua angolensis* and ADEMOMIN (local name) are the most scarce medicinal plants in the area.

There was no much trade to the reported medicinal plants as a result of local trade. Some of the reported medicinal plants (e.g., fruits of *Opuntia ficus-indica* and *Ziziphus spina-christi*) were sold in markets within and around the study area. They were, however, sold primarily for other purposes.

DISCUSSION

It is encouraging to find such a good number of medicinal plants (83 species) that are still in use for the treatment of several livestock diseases in the area despite the large-scale environmental degradation and recurrent droughts that have been taking place in that part of the country in their worst forms. The fact that more than half of the claimed medicinal plants are herbs could indicate their relatively better abundance in the area as compared to trees and shrubs.

Proportionally, a high number of plants were claimed to have been used for the treatments of wound infections, leech infestation, strangles, inflammation of the eye and anthrax. This might indicate the economic importance of such ailments in the area. Infection by internal parasites and anthrax were reported as two of the most economically important livestock diseases in Southern Tigray (unpublished data, Southern Tigray Zone Agricultural Office).

As compared to results of a similar study that was carried out elsewhere in the country (Mirutse Giday, 1999), informants consensus values obtained for the medicinal plants that were reported during this survey were found to be low.

One of this could probably be due to the little practice by farmers in the study area to share traditional medicinal knowledge among themselves. But results of the consensus could still be useful in prioritizing plants for further studies. According to Trotter and Logan (1986), pharmacologically effective remedies are expected to have relatively greater informant consensus. Accordingly, the plants *Achyranthes aspera*, *Nicotiana tabacum*, *Impatiens rothii* and *Aloe* sp. that were found as having relatively higher informants consensus for being used as remedies against inflammation of the eye, leech infestation, lungworm pneumonia and bloat, respectively are the ones that deserve further investigation. Previous phytochemical studies showed that the leaves of *A. aspera* contain active substances such as saponin, alkaloid and sterol (Dawit Abebe and Estifanos Hagos, 1991).

Thirty-three percent of the plant remedies that were cited during this survey were also reported by different authors to have been used medicinally elsewhere in the country (Ayalew Tolosa, 1997; Gemechu Wirtu *et al.*, 1999; Mirutse Giday, 1999) and/or in other parts of the world (Karehed and Odhult, 1997; Dwivedi, 1999; Rangnekar, 1999; Rathore *et al.*, 1999; Sikarwar, 1999). Even some of the plants that were reported by the farmers in the study area (e.g., *Aloe* sp., *Calotropis procera*, *Cucurbita pepo*, *Eucalyptus globulus*, *Impatiens rothii*, *Linum usitatissimum* and *Nicotiana tabacum*) are used exactly for the same purpose elsewhere (Ayalew Tolosa, 1997; Gemechu Wirtu *et al.*, 1999; Mirutse Giday, 1999; Rangnekar, 1999). The fact that some of the reported plants are having similar uses elsewhere might also reveal their pharmacological effectiveness.

Analysis of the data showed that leaf is the most sought plant part in the preparation of the remedies in the area. As compared to other plant parts, e.g., underground part, stem, bark, or whole plant, harvesting leaves poses relatively less danger to the existence of an individual plant. Studies indicated that removal of up to 50% of tree leaves does not significantly affect the growth of the species studied (Poffenberger *et al.*, 1992). The popularity of underground parts, barks and stems, however, could bring grave consequences to the survival of the medicinal plants (Dawit Abebe and Ahadu Ayehu, 1993).

Most preparations of the reported plants in the area were found to be drawn from a single plant. In other parts of the country, however, the use of mixtures of plants in treating a particular livestock ailment is fairly common (Ayalew Tolosa, 1997; Gemechu Wirtu *et al.*, 1999) because of the wide belief of the synergic effect of one plant on the other during the use of concoctions (Dawit Abebe and Ahadu Ayehu, 1993).

It was revealed that the farmers residing in Raya-Azebo *woreda*, part of the lowland area of Southern Tigray, have relatively better knowledge of medicinal plants as compared to the farmers in Ofra *woreda*, the highland part of the study area. The better knowledge of medicinal plants of the farmers in Raya-Azebo could be attributed to the relatively better interaction they have with the neighbouring Afar people who are basically pastoralists. Pastoral people in Ethiopia who are still having very limited access to modern veterinary services are thought to have very rich ethnoveterinary knowledge (Taffese Mesfin, 2000).

The habit of cultivating plants in or around home gardens in the area for their medicinal purpose is very limited. There is also a similar trend in other parts of the country. A survey conducted by Zemedet Asfaw (1997), which covered a large part of Ethiopia, showed that plants primarily cultivated in home gardens for their medicinal uses are few, accounting for only about 6% of the total species grown. There is, therefore, a high threat to the medicinal flora of the area as long as the majority of the medicinal plants are only obtained from the wild, a habitat where severe environmental degradation is still going on.

The threat from the local trade of medicinal plants in the area is very minimal. Most of the plants are harvested for local use and are only collected when the need arises. Other studies (Kloos, 1976; Kloos *et al.*, 1978) carried out elsewhere in the country, however, indicated a wide domestic trade of medicinal plants.

Although the reported medicinal plants were claimed effective by the informants against various types of livestock diseases, this information should not be taken for granted when recommending such plants for their wider use both in the study area and elsewhere in the country. Further investigations (field and laboratory evaluations) are, therefore, needed to be done on the reported

plants so as to confirm their efficacies and check possible side effects. Screening priorities should be given to those plants that scored relatively higher informants consensus in the study area and/or reported elsewhere for similar uses as such results might indicate their better efficacies. Attention should also be given to individual plants that were reported as having a wide range of ethnoveterinary uses.

In situ and *ex situ* conservation measures are needed to be taken for those medicinal plants, which are only found growing wild, and priorities should be given to those ones, which were reported to be found rare in the area.

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Annex 1. List of plants of ethnoveterinary importance in Southern Tigray, alphabetically arranged by their scientific names

Scientific name	Family name	Local name	Growth form	Ailment treated	Animal treated	Part used	Administration route	Voucher no.*
<i>Acacia abyssinica</i> Hochst ex Beth.	Fabaceae	chea	tree	external wound infection	cattle, equine, camel	leaf	topical	
<i>Acacia etbaica</i> Schweinf.	Fabaceae	ajo, seraw	tree	broken/dislocated bones	cattle	bark	topical	M-081-2002
<i>Acacia laeta</i> R. ex Benth.	Fabaceae	sawansa	Tree	external wound infection	camel	leaf	topical	
<i>Achyranthes aspera</i> L.*	Amaranthaceae	mechelo	scrambling herb	pneumonia	cattle	leaf	oral	M-053-2002
				inflammation of the eye	cattle	root, leaf	local (eye)	M-021-2001
				inflammation of the eye	cattle	leaf	local (eye)	
<i>Agave sisalana</i> Perrine ex Engel.*	Agavaceae	shuhqo, gorenqor	herb	lungworm pneumonia	cattle, sheep, goat	root	oral	
				leech infestation	cattle	leaf	nasal	M-035-2001
<i>Allium cepa</i> L.	Alliaceae	keih-shigurti	herb	retained fetal membrane	cattle	leaf	oral	
<i>Aloe</i> sp.*	Aloaceae	ire	herb	leech infestation	cattle	bulb	nasal	
				bloat	cattle, sheep, goat	leaf	oral	M-066-2002
				bloat	cattle	root	nasal	
				broken/dislocated bone	cattle	root	topical	
<i>Artemisia abyssinica</i> Sch. Bip. ex A. Rich.	Asteraceae	chena-barria	herb	rinderpest	cattle	root	topical	M-044-2002
				coenorosis	sheep	leaf	nasal	
<i>Asparagus africanus</i> Lam.	Asparagaceae	qastanesito	herb	broken/dislocated bones	cattle	root	topical	M-071-2002
<i>Balanites aegyptiaca</i> (L.) Del.	Balanitaceae	badeno	tree	bovine pasteurellosis	cattle	leaf	nasal	M-003-2001
				anthrax	equine, cattle, goat	bark/leaf	nasal	
				bloat	cattle, sheep, goat	leaf	oral	
				bloat	cattle, sheep, goat	bark	nasal	
<i>Barleria eranthemoides</i> C.B. Clarke	Acanthaceae	melhas-anshti	herb	external wound infection	cattle, equine, camel	bark	oral	M-060-2002
				external wound infection	cattle, equine, camel	leaf	topical	M-002-2001
<i>Becium grandiflorum</i> (Benth.) Pichi-Serrm.*	Lamiaceae	tebeb	shrub	broken/dislocated bone	cattle	leaf	topical	M-036-2002
				Inflammation of the eye	cattle	leaf	local (eye)	
				lumping due to mechanical damage	equine	leaf	topical	
<i>Berberis holstii</i> Engl.	Berberidaceae	michu-uff	herb	inflammation of the eye	cattle	root	local (eye)	M-022-2001

* Voucher specimens were collected by Mirutse Giday

♦ These are species that were reported from both *wooridas*

Annex 1 (Contd).

Scientific name	Family name	Local name	Growth form	Ailment treated	Animal treated	Part used	Administration route	Voucher no.*
<i>Bersama abyssinica</i> Fresen.	Meliastaceae	mircuruz-zibee, qorosma	tree	anthrax anthrax mange mites leech infestation leech infestation blackleg	equine, cattle, goat cattle, equine, goat cattle, sheep, goat cattle cattle cattle	root leaf stem seed leaf root, leaf milky sap milky topical	topical nasal nasal nasal nasal nasal nasal topical	M-011-2001
<i>Brassica nigra</i> (L.) Koch	Brassicaceae	senafich	herb					
<i>Cordia purpurea</i> (Poir.) Ait.	Fabaceae	shilen	shrub					M-063-2002
<i>Calotropis procera</i> (Ait.) Ait. f.	Asclepiadaceae	gelaeto	shrub					M-015-2001
<i>Calpurnia aurea</i> (Ait.) Benth.*	Fabaceae	hilsawts, cherenchah	tree	warts infestation by fleas and lice mange mites lice infestation bloat leech infestation strangles bovine pasteurellosis external wound infection	cattle, equine cattle cattle, sheep, goat chicken cattle, sheep, goat cattle equine cattle cattle, equine, camel	sap milky topical sap leaf leaf leaf leaf fruit fruit root leaf leaf, root	topical topical topical topical oral nasal oral topical topical	M-006-2001
<i>Capsicum annuum</i> L.	Solanaceae	berbere	herb					
<i>Carissa edulis</i> (Forssk.) Vahl	Apocynaceae	egam	shrub					
<i>Chenopodium murale</i> L.	Chenopodiaceae	amedmado						M-064-2002
<i>Chenopodium schradarianum</i> Schult.	Chenopodiaceae	sinhneh	herb	lice infestation	chicken	root	topical	M-012-2001
<i>Cissus quadrangularis</i> L.	Vitaceae	chewie	climbing herb	anthrax infestation by fleas and lice	cattle, goat, equine cattle	leaf stem	topical oral	M-008-2001
<i>Citrus aurantifolia</i> (Christm.) Swingle	Rutaceae	lomin	tree	mastitis leech infestation mange mites actinomycosis	cattle cattle cattle, sheep, goat cattle	stem fruit fruit leaf	oral nasal oral topical	M-024-2001
<i>Clematis simensis</i> Fresen.	Rununculaceae	hazo	climbing herb					
<i>Clutea abyssinica</i> Jaub. & Spach.	Euphorbiaceae	hirtintim	herb	infestation with internal parasites leech infestation strangles external wound infection	cattle, equine cattle equine cattle, equine, camel	leaf leaf leaf leaf	oral nasal nasal topical	M-076-2002
<i>Cordia africana</i> Lam.	Boraginaceae	awhi	tree					

Annex 1 (Contd).

Scientific name	Family name	Local name	Growth form	Ailment treated	Animal treated	Part used	Administration route	Voucher no.*
<i>Cucumis ficifolius</i> A. Rich.*	Cucurbitaceae	ramborambo	trailing herb	broken/dislocated bone retained fetal membrane	cattle	leaf	topical	M-050-2002
<i>Cucurbita pepo</i> L.*	Cucurbitaceae	duba	trailing herb	lungworm pneumonia strangles	cattle	leaf	oral	
<i>Cyphostemma adenocaulis</i> (Steud. ex A. Rich.) Descouings ex Wild & Drummond	Vitaceae	aserkuka	climbing herb	anthrax	equine, cattle, goat	fruit	nasal	M-058-2002 M-084-2002
<i>Datura stramonium</i> L.	Solanaceae	mesternagir	herb	snake poison	cattle	root	oral	
<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Fabaceae	karshamatsha	tree	bloat	cattle, sheep, goat	leaf	oral	
<i>Discopodium perminerium</i> Hochst.	Solanaceae	alhem	shrub	foot-and-mouth disease diarrhoea	cattle	bark	topical	M-072-2002
				external wound infection	cattle, equine, camel	leaf	oral	
<i>Dodonaea angustifolia</i> L. f.*	Sapindaceae	tahses	tree	strangles	equine	leaf	nasal	
				anthrax	cattle, equine, goat	leaf	oral	M-065-2002
				broken/dislocated bone limping due to mechanical damage	cattle	leaf	topical	
<i>Eucalyptus globulus</i> Labill.	Myrtaceae	isaed-bahirzaf	tree	bloat	cattle, sheep, goat	seed	oral	
<i>Euclea stipiperi</i> (A. DC) Dandy	Ebenaceae	kuleaw	shrub	inflammation of the eye	cattle	root	local (eye)	
<i>Euphorbia abyssinica</i> Gmel.*	Euphorbiaceae	qolqual	tree	bovine pasteurilosis	cattle	milky	topical	M-028-2001
				actinomycosis	cattle	sap	topical	
				blackleg	cattle	milky	topical	
				skin infection	camel, equine	sap	topical	
				strangles	equine	milky	topical	
						sap	topical	
						root	oral/nasal	
						stem, fruit	nasal	
<i>Ficus palmata</i> Forssk.	Moraceae	beles	tree	external wound infection warts	cattle, equine, camel	leaf	topical	M-083-2002
					cattle, equine	milky	topical	
<i>Grewia villosa</i> Willd.	Tiliaceae	agewdie	shrub	foot-and-mouth disease	cattle	sap	topical	M-088-2002
<i>Heliotropium cinerascens</i> Steud. ex DC.	Boraginaceae	anam-gimel	herb	bloat	cattle, sheep, goat	stem	oral	M-069-2002
<i>Hordeum vulgare</i> L.	Poaceae	Buqlee-sigem	herb	bloat	cattle, sheep, goat	leaf, root	oral	

Annex 1 (Contd).

Scientific name	Family name	Local name	Growth form	Ailment treated	Animal treated	Part used	Administration route	Voucher no.*
<i>Impatiens rothii</i> Hook. f.*	Balsaminaceae	gursitit	herb	infestation with internal parasites	cattle, equine	root	oral	
<i>Juniperus procera</i> Hochst. ex Endl.	Cupressaceae	tshidi	tree	lungworm pneumonia	cattle	root	oral	
<i>Justicia schimperiana</i> T. Anders.*	Acanthaceae	simeja	shrub	strangles blackleg	equine cattle	leaf root	nasal oral	M-010-2001
<i>Kalanchoe marmorata</i> Bak.	Crassulaceae	arearo	herb	bovine pasteurellosis	equine	leaf	oral	M-089-2002
<i>Laggera tomentosa</i> (Sch. Bip. ex A. Rich.) Oliv. & Hiern	Asteraceae	hanschansa	shrub	broken/dislocated bone	cattle	root	topical	M-045-2002
<i>Leucas abyssinica</i> (Benth.) Briq.	Lamiaceae	sewa-qerni	shrub	inflammation of the eye	cattle	leaf	Local (eye)	M-033-2002
<i>Linum usitatissimum</i> L.*	Linaceae	entatie	herb	lungworm pneumonia leech infestation	cattle cattle	seed seed	oral nasal	
<i>Muena angolensis</i> DC.	Capparidaceae	tetem-agazen	tree	retained fetal membrane anthrax	cattle	seed	oral	M-007-2001
<i>Maytenus senegalensis</i> (Lam.) Excell	Celastraceae	qebqeb	tree	mastitis	cattle	leaf	oral, nasal	
<i>Meriania bengalensis</i> Benth.*	Lamiaceae	mesaguh	shrub	inflammation of the eye diarrhoea	cattle cattle, sheep, goat	leaf leaf	local (eye) oral	M-052-2002 M-077-2002
				infestation with internal parasites lungworm pneumonia	cattle, equine cattle, sheep, goat	leaf, root leaf	oral oral nasal	
				Newcastle disease	chicken	stem leaf	nasal, by smoking nasal	
<i>Nicotiana tabacum</i> L.*	Solanaceae	timbaho	herb	leech infestation	cattle	leaf	nasal	
<i>Olea africana</i> subsp. <i>cuspidata</i> (Wall. ex DC) Cifferri*	Oleaceae	aulie, woira	tree	external wound infection inflammation of the eye	cattle, equine, camel cattle	leaf leaf	topical local (eye)	
<i>Opuntia ficus-indica</i> (L.) Müller	Cactaceae	qolqual-bahri	shrub	external wound infection	cattle, equine, camel	stem	topical	
<i>Osyris quadripartita</i> Decn.	Santalaceae	qerets	shrub	diarrhoea	cattle, sheep, goat	leaf	oral	
<i>Otostegia integrifolia</i> Benth.	Lamiaceae	chiendog	shrub	infestation by fleas and lice	cattle	leaf	nasal	M-095-2002
<i>Pappia capensis</i> Eckl. & Zeyh.	Sapindaceae	qentaso	tree	anthrax	cattle, equine, goat	leaf	oral	M-013-2001 M-062-2002
<i>Phytolacca dodecandra</i> L'Hérit.*	Phytolaccaceae	endod	shrub	mastitis anthrax blackleg	cattle cattle, equine, goat cattle	leaf root fruit	oral nasal nasal	

Annex 1 (Contd).

Scientific name	Family name	Local name	Growth form	Ailment treated	Animal treated	Part used	Administration route	Voucher no.*
<i>Pisum sativum</i> L.	Fabaceae	ater	herb	bloat	cattle, sheep, goat	leaf	oral	
<i>Pittosporum viridiflorum</i> Sims	Pittosporaceae	maileho	tree	strangles leech infestation	equine cattle	root seed	nasal oral	M-092-2002
<i>Pterolobium stellatum</i> (Forssk.) Brenan	Fabaceae	qentafe	climbing shrub	strangles bovine pasteurellosis	equine cattle	leaf leaf	nasal nasal	M-014-2001
<i>Rhamnus prinoides</i> L' Hérit.*	Rhamnaceae	gresho	tree	leech infestation	cattle	leaf	nasal	M-093-2002
<i>Rhamnus staido</i> A. Rich.	Rhamnaceae	tsedo	shrub	foot-and-mouth disease	cattle	leaf	oral	M-077-2002
<i>Rhus natalensis</i> Krauss	Anacardiaceae	atami	shrub	infection with internal parasites	cattle, equine	leaf	oral	
<i>Ricinus communis</i> L.*	Euphorbiaceae	gulee	tree-like herb	bovine pasteurellosis actinomycosis	cattle cattle	leaf leaf	topical topical	
<i>Rumex nepalensis</i> Spreng.	Polygonaceae	digele	herb	bloat external wound infection	cattle, sheep, goat cattle, equine, camel	leaf root, leaf	topical oral	M-078-2002
<i>Rumex nervosus</i> Vahl*	Polygonaceae	hohot, embacho	shrub	external bleeding external wound infection	cattle cattle, equine, camel	root leaf	topical topical	
<i>Senecio hadiensis</i> Forssk.	Asteraceae	sihum-teli	climbing herb	mange mites strangles	cattle, sheep, goat equine	leaf leaf	topical nasal	M-039-2002
<i>Senecio myriocephalus</i> Sch. Bip. ex A. Rich.	Sapindaceae	tsaeda-qotsli	shrub	inflammation of the eye broken/dislocated bone	cattle cattle	root leaf, root	local (eye) topical	M-082-2002 M-079-2002
<i>Senna occidentalis</i> (L.) Link	Fabaceae	airogit	woody herb	limping due to mechanical damage	equine	leaf	topical	
<i>Silene macrosolen</i> A. Rich.	Caryophyllaceae	sacro-saero, wogert	herb	mastitis strangles	cattle equine	leaf root	oral oral, nasal	M-005-2001
<i>Solanum giganteum</i> Jacq.*	Solanaceae	engule-abiyi	shrub	leech infestation	cattle	fruit	oral	M-038-2002
<i>Solanum incanum</i> L.*	Solanaceae	engule-nishtoy	shrubby herb	lungworm pneumonia actinomycosis	cattle, sheep, goat cattle	fruit fruit leaf	nasal nasal topical	M-023-2002 M-032-2002
				blackleg external wound infection	cattle cattle, equine, camel	leaf leaf	oral topical	

Annex 1 (Contd).

Scientific name	Family name	Local name	Growth form	Ailment treated	Animal treated	Part used	Administration route	Voucher no.*
<i>Sorghum bicolor</i> (L.) Moench <i>Trigonella foenum-graecum</i> L.	Poaceae Fabaceae	mishela abaeke	herb herb	infestation with internal parasites leech infestation mange mites strangles external wound infection infestation with internal parasites	cattle, equine cattle cattle, sheep, goat equine cattle, equine, camel cattle, equine	root leaf, root fruit fruit fruit seed seed	oral oral nasal topical nasal topical oral	
<i>Verbascum sinaiticum</i> Benth. <i>Verbena officinalis</i> L.	Scrophulariaceae Verbenaceae	ternaka atuch	woody herb herb	pneumonia leech infestation bloat mange mites	camel cattle cattle, sheep, goat cattle, sheep, goat	seed root leaf root root, leaf	oral nasal oral oral topical	M-086-2002 M-055-2002
<i>Zaleya pentandra</i> (L.) Jeffrey	Aizoaceae	areda-adgi	trailing herb	limping due to mechanical damage strangles	equine	root	topical	M-001-2001
<i>Zehneria scabra</i> (Linn. f.) Sond. <i>Zingiber officinale</i> Roscoe	Cucurbitaceae Zingiberaceae	hareg-resa zingibil	climbing herb herb	Contagious bovine pleuropneumonia (CBPP) inflammation of the eye	equine cattle cattle	root leaf rhizo me	nasal oral local (eye)	M-085-2002
<i>Ziziphus spina-christi</i> (L.) Desf. -	Rhamnaceae -	qunqur ademomin	shrub tree	inflammation of the eye retained fetal membrane anthrax blackleg mastitis external wound infection	cattle cattle equine, cattle, goat cattle cattle cattle	fruit leaf leaf leaf leaf leaf milky sap	local (eye) oral oral, nasal oral oral topical	M-025-2001 M-073-2002 M-009-2001
-	Lamiaceae	omhalia	shrub	lungworm pneumonia	cattle, sheep, goat	leaf	oral	M-090-2002