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Ethnoveterinary knowledge in pastoral Karamoja, Uganda

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ABSTRACT

Ethnopharmacological relevance: The people of Karamoja of northern Uganda chiefly rely on ethnoveterinary knowledge (EVK) to control common livestock health problems. In spite of cattle's central role in Karamojong culture and livelihoods, there has been no systematic recording of their ethnoveterinary plant-based cures to date.
Aim of study: To document the remedies used to treat livestock diseases, their preparation and administration.
Methods: Data were collected using semi-structured interviews, guided questionnaires, group discussions, direct observations and collection trips.
Results: We present information on 209 plant species and 18 non-plant materials. Plant species are distributed over 116 genera and 54 families. The most common medicinal use was treatment against anaplasmosis. *Balanites aegyptiacus*, *Carissa spinarum*, *Warburgia salutaris* and *Harrisonia abyssinica* had the most uses of all species. All different plant parts were used; bark and underground parts were exploited more frequently than other plant parts. Most remedies listed used a single ingredient, typically soaked in water; only 12.8% remedies used multiple plants. The route of administration was primarily oral followed by topical applications. Almost all plants are collected from the wild; none of the few cultivated plants used had been planted for medicinal purposes.
Conclusions: The pastoralists in the study site possess a wealth of EVK which they use to maintain animal health. Their rich knowledge and high diversity of plants were recorded here for the first time.

1. Introduction

Livestock rearing is a key economic activity in Uganda, representing 7.5% of the Gross Domestic Product (World Bank, 2008). Highest livestock numbers are found in the cattle corridor which extends diagonally across Uganda, from the pastoralist Ankole area in the southwest, touching Rwanda and Tanzania, to the Karamoja region bordering Sudan and Kenya in the northeast. The cattle corridor inhabitants' (Banyankole, Iteso and Karamojong) primary income is from livestock. However, Karamojong, even have cattle at their centre, culturally and socially. Not only are cattle important monetarily, but also the people's very self-worth and existence is linked to livestock ownership. In fact, the Karamoja districts are the only ones in Uganda where there are more cattle than people, including even more sheep and goats than people (MAAIF, 2003). The Karamojong and other closely related ethnic groups within the (socio-cultural) Karamojong cluster (Gulliver, 1952), found in the semi-arid area of northeast Uganda, southeast Sudan, northwest Kenya, and southwest Ethiopia, still practice a transhumant (semi-nomadic) lifestyle. Men and their livestock become seasonal nomads in search of grazing areas during the long annual intense hot and dry season (October–May). This often stretches into drought back at the home manyatta (semi-permanent family housing units) where the women, children and elders remain during transhumant periods. External contacts and influences in Karamoja are minimal and 99% of the population exclusively rely on traditional health practices for themselves and their livestock (Gradé et al., 2007).

The Karamojong appear marginalized due to: (1) limited access to and use of allopathic livestock medicines; (2) poor veterinary service provider coverage; (3) high uncontrolled levels of both endemic and epidemic diseases; and (4) negligible economic development (Uganda Bureau of Statistics, 2002). This fosters pastoralists' long term and continued reliance on traditional animal health care practices or ethnoveterinary knowledge (EVK). EVK

Abbreviations: APG II, Angiosperm Phylogeny Group; ECF, east coast fever; EVK, ethnoveterinary knowledge; KACHEP, Karamoja Christian Ethnoveterinary Program; NGO, non-governmental organization; TK, traditional knowledge.

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covers everything traditionally known and done to keep animals healthy and productive or 'happy', as healer-shepherdesses of the Tzotzil Maya of Mexico say (Mathias and McCorkle, 2004). By far the most-studied element of EVK has been that of medicinal plants.

The reliance on EVK is reinforced by the strong dependence on livestock for livelihood and richness in both cultural history and biodiversity (Muhereza and Otim, 2002; Nanyunja and Baguma, 2005). As a consequence, Karamoja has virtually no alternatives to local medicines for livestock and human health. Their human health statistics however are considerably better than those of neighbouring Kitgum district—this suggests they have great aptitude in using indigenous health systems (Oxfam, 2001). However, rapidly decreasing trends in both Karamojong medicinal plant biodiversity and sources of income over the last 50 years were observed by Nanyunja and Baguma (2005).

Ethnoveterinary knowledge, like other traditional knowledge (TK), is passed on by word of mouth. Therefore, EVK is prone to fragmentation (Yineger et al., 2007); particularly in Karamoja where its language was first transcribed ca. 1950. As in other parts of the world, this EVK is thought to be disappearing at an alarming rate. Despite the centrality of cattle and the almost 100% reliance on EVK in Karamoja, there has been no systematic recording of veterinary cures in Karamoja to date, or even in the entire Karamojong cluster. We encountered only one article for the cluster that was written almost 30 years ago about the closely related Turkana of Kenya (Morgan, 1981).

The aim of this study was to document the indigenous veterinary knowledge of south and central Karamoja in Uganda. The study objectives were to document the remedies used to treat the known livestock diseases and other animal husbandry indications, highlighting their preparation, processing and administration.

2. Materials and methods

2.1. Study site

The region of Karamoja is located between 1°30′ – 4°N and 33°30′ – 35°E. However, the majority of our data comes from the area between 1°50′ – 2°40′N and 34°15′ – 34°55′E. Mean annual rainfall ranges from 100 to 625 mm, with the higher amounts in the surrounding mountain ranges. Daily temperatures average 30–35 °C. The region has a semi-arid to arid agroecological environment and is prone to cyclical droughts that may last 5–15 months. The terrain is flat grassland with a few scattered thorn bushes and trees, except along the seasonal rivers, where thickets and patches of gallery forests are found. The plains are punctuated by a triangle of three extinct 3000 m volcanoes each about 100 km apart from another, supporting dry montane forests (Thomas, 1943; Weatherby, 1988).

Thomas (1943) described the vegetation of Karamoja as consisting of *Acacia–Combretum–Terminalia* species associations, with a grass layer of *Hyparrhenia*, *Setaria*, *Themeda*, *Chrysopogon* and *Sporobolus* species.

The total population of the Karamoja region in Uganda is around 935,000 (UBOS, 2002). The region contains five distinct Nilotic peoples in the plains and two small Kuliak groups (Tepeth and Ik) found along the mountains (Gulliver, 1952). Karamojong is used as a generic term for the dominant plains Nilotes of Karamoja: Dodoth, Jie, and Karimojong. The Karimojong are further divided into Bokora, Matheniko and Pian ethnic groups. Our survey covered communities in administrative units of Bokora and Pian counties, named after the main ethnic group inhabitants; however other clans reside within some counties.

Bokora county population is estimated at 95,000, while Pian has around 38,000 people (UBOS, 2002). Tepeth population was last estimated to be 4000 (Weatherby, 1988). However, the Tepeth population is thinly spread around the mountains not just in Bokora county, but also in Checkwii and Matheniko counties. We therefore estimate Bokora people to be 88,000 and Tepeth total to be 10,000. All these groups share a transhumant agro-pastoral lifestyle. The Bokora and Pian ethnic groups share the same eastern Nilotic language, i.e. Ngakarimojong, with slight tonal differences. However, due to reciprocal armed cattle rustling, there are strong cultural taboos against sharing livestock information between clans (Mirzeler and Young, 2000). The Tepeth, also known as Sor, live on the three volcanic mountains described above. They have their own language (Ngitepes), unintelligible to Pian and Bokora, although most Tepeth also learn and practice Ngakarimojong. Whereas the plains people are fiercer, taller and live in huts, the Tepeth are less aggressive and many still sleep in caves (Weatherby, 1988; Gradé personal observations).

The above pastoralists of Karamoja rely almost entirely on livestock for survival and cultural events. They are semi-nomadic and have minimal formal health care infrastructure for livestock; there is only one veterinarian per 90,000 livestock (Gradé et al., 2008a). Culturally, people rarely disclose the true number of animals they own, so even this low ratio may be overestimated.

2.2. Data collection and analysis

Data for this project were collected from May 1998 to August 2005 by the first author. Data were collected using semi-structured interviews with pastoralists. These were complemented with 250-guided questionnaires in face to face interviews; 75 group discussions, direct observations, and collection trips with key informants (walk-in-the-woods) (see Martin, 1995; Phillips and Gentry, 1993; Thomas et al., 2007). Additional data were compiled from personal observations. Data collected included plants and other materials used to treat livestock ailments, disease terminology; vernacular names of the plant species together with other use purposes, and methods of drug preparation. Because most species were encountered more than once, their uses were discussed repeatedly with several informants from one or more areas allowing corroboration and expanding the list of unique preparations. Indigenous disease terminology was matched with informants' descriptions and that of veterinary extension workers. The first author, a confirmed and experienced veterinarian, further verified disease jargon via physical examination. Both indigenous and scientific terms were compiled. Together with key informants, we collected vouchers of plant species mentioned by respondents. Plants were authenticated according to Flora of Tropical East Africa by either Nairobi National Museum in Kenya (1998–2000) or Makerere University in Uganda (2000–2005). Nomenclature follows APG II format (Angiosperm Phylogeny Group, 2003). Vouchers are kept at Makerere herbarium in Kampala and the community herbarium located at partner NGO, KACHEP, in Nabilatuk, Karamoja. Data were entered into Microsoft Excel spread sheets and further managed with frequency tables in SPSS 15.

3. Results

3.1. The plants and their medical application

The informants from Karamoja provided information on 209 plant species and 18 non-plant materials (Appendix A). Identified species were distributed over 116 genera and 54 families. Trees were the most commonly used growth form, followed by herbs, then shrubs, distantly liana and vines. Fabaceae was the best-represented family, having 39 species (Fig. 1). It was also the most commonly used: it had 48 different indications for use and Fabaceae

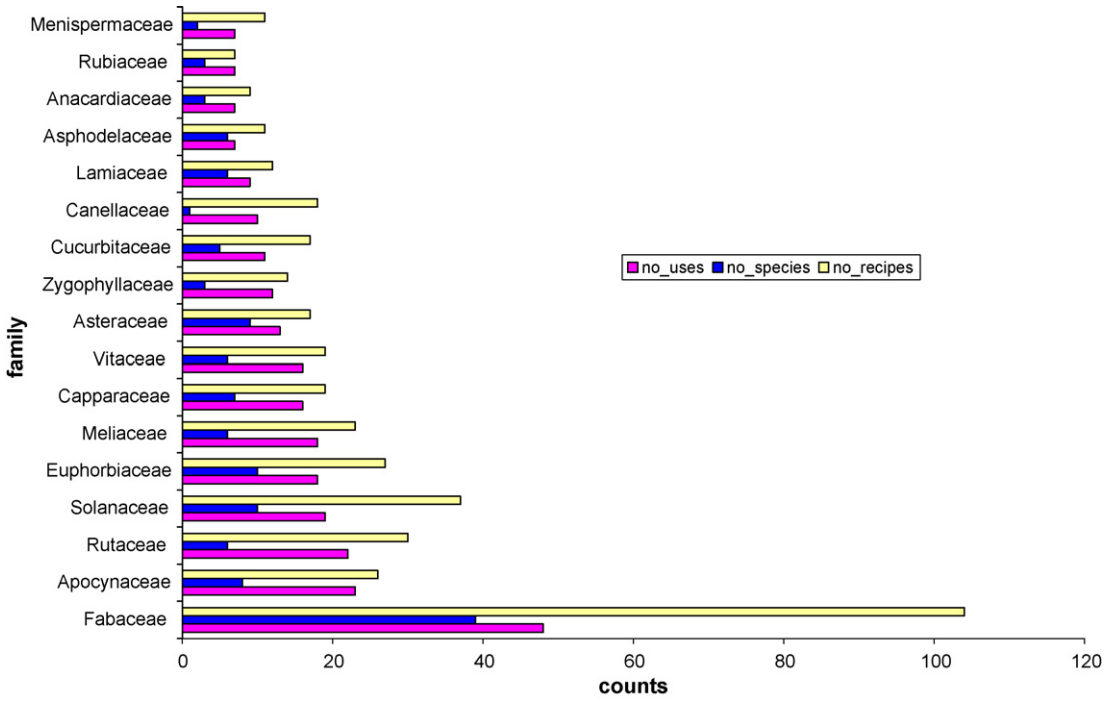

Fig. 1. Most common plant families used for EVK mentioned by respondents.

were ingredients in 104 EVK recipes. Other species-rich families include: Euphorbiaceae and Solanaceae (10 spp.), Asteraceae (9 spp.), Apocynaceae (8 spp.) and Capparaceae (7 spp.).

The most abundant genus was *Acacia*, 16 species; *Solanum* had six species, whereas *Albizia* and *Euphorbia* each had four. Analysis of ethnobotanical data revealed that *Carissa spinarum* (syn. *Carissa edulis*) (Apocynaceae) had the most uses of all species (12); the next most useful species were *Balanites aegyptiacus* (Zygophyllaceae) with 11, whereas *Warburgia salutaris* (Canellaceae) (syn. *Warburgia ugandensis)* and *Harrisonia abyssinica* (Rutaceae) both had 10 uses (Table 1). Note that the plant authors' names are not included in the text, but may be found in the tables and a complete list in Appendix A. One non-plant remedy was used to treat 11 different ailments, ABALANGIT, identified as coral reef ($CaCO_3$), a sediment rock formed by deposition of material over time (personal communication Godwin Erima; Institute of Environment and Natural Resources, Makerere University).

There were 130 separate Karamojong EVK uses listed. The most common indication was against anaplasmosis, for which 29 species were reported (Fig. 2). Anaplasmosis is a tick-borne blood parasite, as are the fifth and sixth most common uses, theileriosis (ECF) and heartwater, respectively.

Table 1
Most common species reported by respondents for Karamoja EVK.

Remedy	Family	Number of uses
Carissa spinarum L.	Apocynaceae	12
Balanites aegyptiacus Delile	Zygophyllaceae	11
Harrisonia abyssinica Oliv.	Rutaceae	10
Warburgia salutaris (Bertol.f.) Chiov.	Canellaceae	10
Azadirachta indica A. Juss.	Meliaceae	9
Euphorbia bongensis Kotschy & Peyr.	Euphorbiaceae	9
Solanum incanum L.	Solanaceae	9
Albizia amara (Roxb.) Boivin. spp. *sericocephala* (Benth.) Brenan	Fabaceae	8
Capparis sp.	Capparaceae	7
Chasmanthera dependens Hochst.	Menispermaceae	7
Cissus quadrangularis L.	Vitaceae	7
Zanthoxylum chalybeum Engl.	Rutaceae	7

Respondents from Bokora mentioned the highest number of EVK recipes, 383; respondents from Pian mentioned 194 and the Tepeth 112. Some of these citations overlap. Rarely would ethnic groups disagree with the particular plant use and occasionally, preparation. However, there was one plant on which people from different communities heavily disagreed: *Coccinia adoensis* (Cucurbitaceae), EDALDALKISIN, whose dangling, red fruits, locally named after the old mothers heavily-nursed breasts, are considered edible by one group, yet poisonous by another.

3.2. Plant parts used, preparation and administration

The most commonly used parts are bark (26.8%), underground organs (roots and tubers) (24.3), leaves (19.2) and fruit (13.7) (Fig. 3). Some preparations call for only one part whereas others allow for more. Plants used for medicine are usually processed fresh. Plant parts are commonly lightly crushed. If the preparation includes drying, it is done in the shade whereby the material is subsequently ground into powder. Crushing and grinding is done with two rocks. These grinding stones are used for the processing of food also—the exception being for producing costly and pungent oil from mature *Azadirachta indica* (Meliaceae) seeds or crushing *Nicotiana tabacum* (Solanaceae) leaves into the precious ETABA snuff; these have their own specific grinding stone. For *Azadirachta indica*, both rocks are flat and hard, so that they will not splinter or produce shards which would soak up oil. The pounding rock for making snuff must be round, smooth and white, able to fit into the hand comfortably.

Medicines are rarely stored, except for purchased strips of *Warburgia salutaris* bark or the finely crushed bark of *Albizia anthelmintica* (Fabaceae), whose powder, if stored, will be used within the month, occasionally carried to the kraals to deworm an entire flock. Likewise, *Chasmanthera dependens* (Menispermaceae) tubers may be dried and stored as powder for anaplasmosis.

Most listed remedies used a single plant ingredient (87.2%), typically soaked in water; only 12.8% of recipes were preparations that used more than one plant. Occasionally, a plant was used in combination with a non-plant ingredient, i.e. $CaCO_3$, milk, butter, yogurt, oil, blood, urine, or salt. As noted above, $CaCO_3$ was

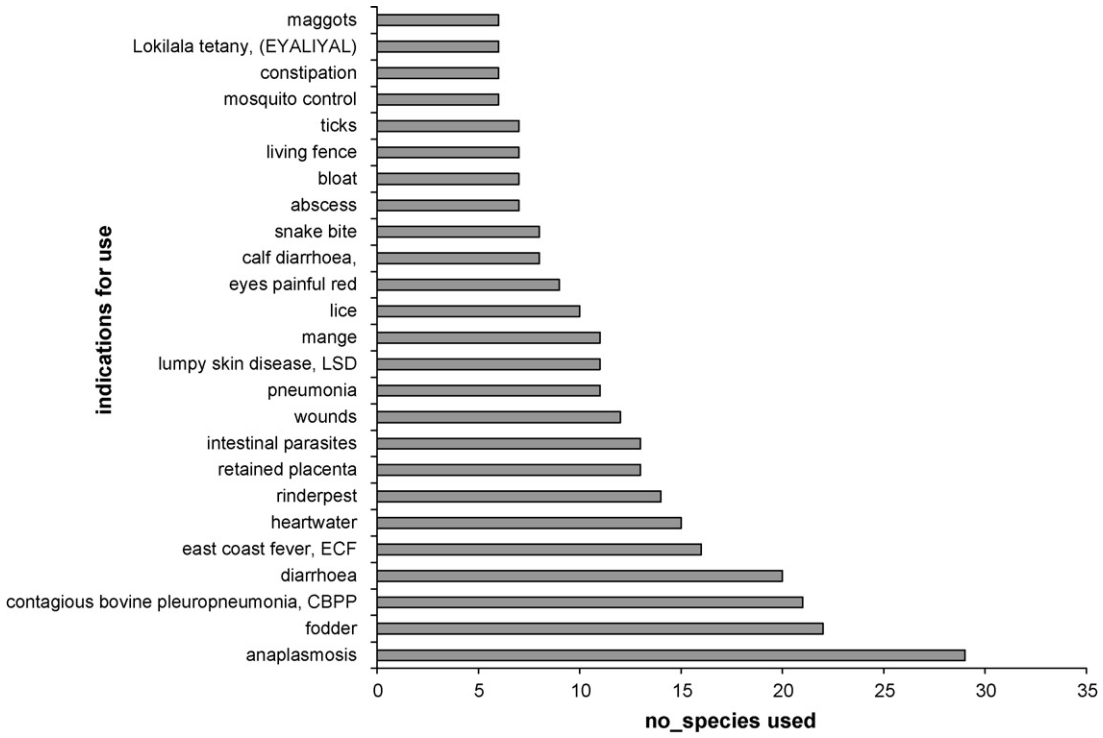

Fig. 2. Most common use indications and number of species reportedly used for animals.

the most common. Cold water extraction was by far the most common preparation used. The route of administration of the remedies was primarily oral (63.3%), followed by topical applications (27%) whereas others were applied on the eye or in the ear, nose or injected. Only 4.3% of the remedies employed more than one route. The dosage was usually dependent on the species and their age/weight.

3.3. Market availability and collection patterns of medicinal plants

Several remedies are sold. The bark of *Warburgia salutaris* is frequently available at one trading centre near one of the two mountains where it grows in the wild, sold only by one old man at the time of this study. A few respondents in 1998 claimed *Neorautanenia mitis* (Fabaceae) tubers are sporadically available, used to kill external parasites, although we never witnessed it in the market during the entire study period. However, some multi-use remedies are widely available at weekly markets and sometimes sold in shops; the most common non-plant remedy, i.e. ABALONGIT, $CaCO_3$, *Tamarindus indica* (Fabaceae) fruits and a value-added snuff form of prepared *Nicotiana tabacum* leaves, called ETABA. However, *Warburgia salutaris* is the only medicinal remedy marketed whose sole sales' appeal is for medicine (animal and human), but no other domestic use. Furthermore, the only medicinal plants cultivated or encouraged to grow at the homestead were dual-purpose plants,

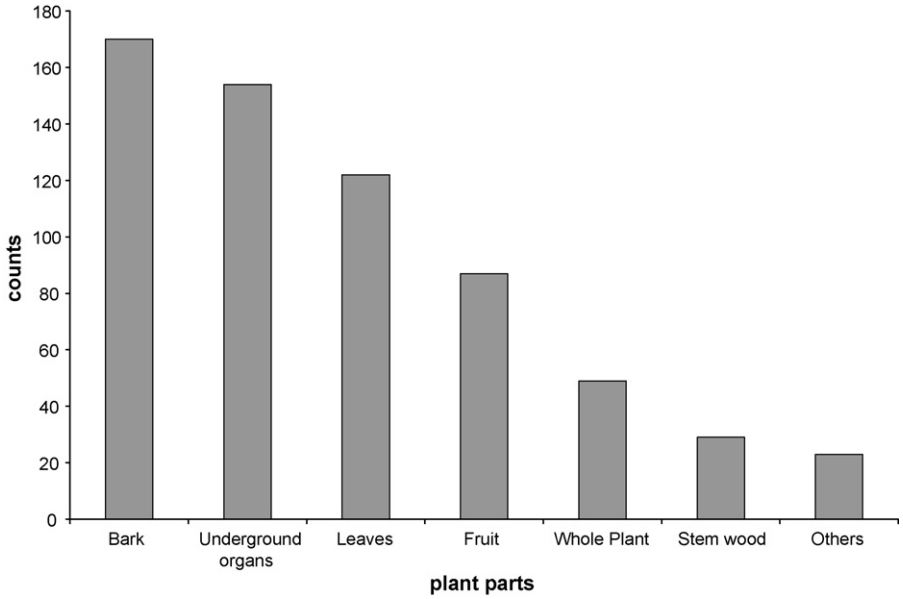

Fig. 3. Plant parts used in Karamojong EVK.

like tobacco or pumpkin. Therefore almost all remedies are collected from the wild in Karamoja.

3.4. Vernacular nomenclature of EVK treatments

Informants had at least one vernacular name for almost all (99.6%) of the plant species except for one, *Commelina simplex* (Commelinaceae), whose leaves were cooked for food. One hundred percent of the non-plant materials had a local name. The Karamojong plant names were 87% specific to one species, that is, only 24 vernacular-named plants referred to more than one botanical species. Ecucukwa had five vouchers, two were fully identified, *Aloe dawei* and *Aloe tweediae* (Aloaceae), but three other vouchers were only identified to genus level. Similarly, Etulelo (sodom's apple) had four vouchers; three were identified to species level, and one voucher was simply identified as *Solanum* sp. However, Eligoi had its four vouchers spread over three families (Apocynaceae, Asteraceae and Euphorbiaceae).

Alternatively, seven botanical species had two different Karamojong names. For example, *Warburgia salutaris* is called Abwach by the Bokora and Matheniko; however, Pian and Tepeth people tend to call it Emukwa. Likewise, *Acacia tortilis* (Fabaceae) has two vernacular names, Etir when it is a young tree, and Ewoi, which means tall, when it is a mature tree, over a few meters and the thorns and tree shape have changed. Most informants, however, are aware that it is the same tree.

4. Discussion

4.1. The plants and their medical application

This study revealed that ethnoveterinary medical practitioners residing in central and south Karamoja have a rich knowledge of livestock husbandry, especially disease and treatments. They reported a wide diversity of plant species, 209 used in the treatment of 130 different EVK uses, primarily livestock ailments. This high level of traditional knowledge (TK) held by the Karimojong may be related to their secluded lifestyle. Communities that are highly cut off from the main population centres are usually forced to depend on their TK and natural resources for healthcare (Somnasang and Moreno-Black, 2000). This TK appears to be very important for the livelihoods of the Karamojong whose way of life depends on cattle (Gradé et al., 2008a). In Karamoja, traditional medicines are the only readily available form of treatment for livestock (personal communication Inangolet Francis, government veterinary officer, Bokora). The evaluation of traditional medicines and associated TK from Karamoja may provide important bio-prospecting leads for the development of new allopathic medicines in the livestock sector. This important TK, which has been left largely undocumented, is threatened and appears to be declining everywhere in Uganda and the world (Tabuti et al., 2003b). We believe Karamoja may not escape this global trend and that this knowledge must be conserved.

The development of allopathic medicines requires assessment of these EVK medicines for effectiveness and safety. It is not possible to validate all remedies reported here. We should start with a few, chosen from those with potential impact, i.e. based on market potential, indigenous worth and their ability to control disease. That is, those plants which have a long history of use within the community (van Wyk and Wink, 2004), are used to treat many diseases, are sold in the market, or are stored at household level.

Species with a long history of use or wide usage in Karamoja include *Warburgia salutaris*, *Balanites aegyptiacus*, *Carissa spinarum* and *Harrisonia abyssinica*, furthermore *Warburgia salutaris* and *Albizia anthelmintica* have a local sales' appeal. *Warburgia salutaris*' importance and use have been documented in other cultures. According to Njoroge and Bussmann (2007), *Warburgia salutaris* is very important among Kenyan Kikuyu farmers' cattle treatments. Additionally, Kuglerova et al. (2007), showed that its bark, collected from Karamoja, had antimicrobial activity and strong anti-oxidative properties, exhibiting high potential for disease control. *Albizia anthelmintica* was shown to be efficacious against gastrointestinal parasites in dose determination studies in Karamojong field conditions (Gradé et al., 2008b).

Additional bio-prospecting studies may look at treatments against tick-borne diseases, as well as those against ticks directly. These diseases, anaplasmosis, theileriosis (ECF) and heartwater, are the most commonly treated ailments in Karamoja. Tabuti et al. (2003b) likewise found 73.5% of treatments in their study are against ECF. Tick-borne diseases not only cause high morbidity/mortality and are difficult to treat with allopathic medicines, but often cattle present mixed infections of both ECF and anaplasmosis. Therefore, traditional remedies against tick-borne disease have great market potential. Furthermore, it would be prudent to investigate remedies that attack ticks directly to aid in prevention. The most commonly mentioned anti-tick plant in this study was *Neorautanenia mitis*. The primary author, together with registered healers, has tested *Neorautanenia mitis* efficacy against both lice and ticks with positive effect (unpublished data) and a few healers have planted tubers at their homesteads.

Fabaceae family is the most commonly used and species-rich in this study, followed by Solanaceae (Fig. 1). Other Ugandan ethnobotanical studies (Okello and Ssegawa, 2007; Tabuti et al., 2003a,b) likewise had Fabaceae as the most common family, although their observations took place in areas that had different flora and lifestyles. Fabaceae was also the most common family in Wondimu et al.'s (2007) study in the nearby semi-arid Arsi Zone in Ethiopia, followed by Solanaceae and Euphorbiaceae. Fabaceae is also one of the most plentiful families according to the 'rare' and 'dated' vegetation studies in which Karamoja has been considered (Thomas, 1943; Wilson, 1962). Even though Fabaceae had more uses than other families, only one of its species was among the most useful plants (Table 1) in our study. Here, Fabaceae has very few medicinal species relative to its size as in other investigations (see Moerman and Estabrook, 2003).

4.2. Plant parts used, preparation and administration

The Karamojong employ commonly used methods of medicine preparation and administration, such as water extractions that are then given orally, similar to other African cultures (Bussman, 2006; Magassouba et al., 2007; Wondimu et al., 2007; Yineger et al., 2007; Jeruto et al., 2008; Kone and Atindehou, 2008).

This study uses a majority of mono-preparations, as is the case in a few cultures (Bussman, 2006; Jeruto et al., 2008; Kone and Atindehou, 2008). In contrast, other cultures usually use mixtures of herbal medicines for treatments (Abebe and Ayehu, 1993; Erdelen et al., 1999; Tabuti et al., 2003a, b; Okello and Ssegawa, 2007; Wondimu et al., 2007; Yineger et al., 2007; Kone and Atindehou, 2008). This means that traditional Karamojong medical practitioners, resembling allopathic medicine practitioners, use both precise, 'rifle' treatments (single remedy) and shotgun (mixed) remedies. However, precise treatment protocols are most commonly used in Karamoja. This may indicate that Karamojong may possess either more confidence or deeper EVK than those cultures that use mixtures. This is observed in classical Hahnemann homeopathy, where the highly trained and experienced practitioner carefully selects only one specific remedy whereas less trained individuals more typically use the 'shot gun' approach and combine multiple remedies until their skills develop. This multiple treatment protocol is likewise used in allopathic medical

disciplines that are not well-mapped out or fully understood, like that of brain disorders or psychotherapy.

4.3. Collection patterns and market availability of medicinal plants

Collection patterns among the Karimojong are similar to those in other areas: they harvest bark and stem, and also collect from the wild (Asfaw and Nigatu, 1995; Asfaw, 1997; Bussman, 2006; Hamilton, 2004; Giday et al., 2003; Tabuti et al., 2003a, b; Okello and Ssegawa, 2007; Yineger et al., 2007; Wondimu et al., 2007). Harvesting of bark and stem wood from woody species may result in the death of individual species (Cunningham, 1991; Hamilton, 2004). In our study, bark and roots were the most commonly used parts. As many chemicals are found in bark and roots, the Karamojong choice is correct from a plant physiology perspective. However, not all harvesters are careful to remove bark in such a way that the tree is not damaged. Therefore, efforts to encourage sustainable harvesting are warranted, through species specific strategies of bark removal and perhaps plant part substitution (Delvaux et al., in press; Zschocke et al., 2000).

Similarly, the harvesting of species from the wild is not sustainable because such species face numerous threats chief among which are unsustainable harvesting practices and intensities (Hamilton, 2004). Pragmatic initiatives should be worked out to cultivate some of these species for their protection and availability. Local NGOs, like KACHEP, have a role to play here. An opportunity exists in that some traditional medicine practitioners cultivate or protect some dual-purpose medicinal plants at their homesteads (Gradé et al., 2008c). *Neorautanenia mitis* is one such species where tubers are transplanted by a few healers near their homes. KACHEP, together with registered healers and the primary author, tested *Neorautanenia mitis* against external parasites, with positive effect.

Some of these medicinal plants and other material are sold in the local market. The remedies available at the market are *Warburgia salutaris*, *Tamarindus indica, Nicotiana tabacum* and Abalongit, $CaCO_3$. These species provide opportunities for income generation as they are already sold and thus have a market. Additionally, *Albizia anthelmintica* has a market as pastoralists frequently store in large amounts, and it has proved to be efficacious in dose determination studies in Karamojong field conditions (Gradé et al., 2008b).

4.4. Vernacular nomenclature of EVK treatments

Informants had vernacular names for almost all remedies except for one, which is higher than the only other research done in the Karamojong cluster. Morgan (1981) and Stave et al. (2007) obtained vernacular names for 70% and 90% of plants, respectively. Morgan's lower linguistic results could be due to the fact that he did not ask specialists, and, perhaps, for failing to determine use for more than half of the 512 collected species, whereby there were only 143 species with a use. Karamojong species names were 87% specific to one species; this congruence between local and scientific identification suggests local experts may be consulted for rapid and reliable identification for scientific identification (Stave et al., 2007). This compares to Morgan's (1981) Turkana study that found 73% of locally named plants were specific to one botanical species. The 13% incongruence could be for a variety of factors: similar morphology (within genera *Aloe* and *Solanum*); low use value; or those plants that had conflicting names are extremely rare. Our results might even have been higher if we had gathered data from only one ethnic group, thus reducing linguistic variability. This variability was further mitigated in that the primary author has lived in the project area for an extended time, even though most of the raw data were collected in Bokora within her first six months of the study. Overall, the Karamojong's ability to correctly classify so many plants and their level of specificity evidences their depth and breadth of ethnoveterinary knowledge.

5. Conclusions

There is a wealth of EVK in the study site that the pastoralists have available to maintain animal health in their treasured livestock herds. A large number of Karamojong plant species, mainly from the Fabaceae family are used to combat endemic diseases. Their rich knowledge and high diversity of plants used was recorded here for the first time. Documentation of Karamoja's EVK could be capitalised upon in the entire cluster to protect and safeguard its cultural heritage and biodiversity from well-meaning development organisations. Regarding cultural heritage, we recommend such organisations begin with EVK surveys to both aid with effectiveness of their work and avoid common unintended consequences of their work. Secondly, regarding biodiversity, we recommend such organisations would partner with local NGOs, like KACHEP, particularly through conservation programs for medicinal plants, to conserve this wealth of EVK. This large data list could then generate relevant information that could be integrated into community animal health worker trainings, domestication of high potential species and ultimately agroforestry schemes.

More specific actions could involve prioritising this large list and then conducting validation studies. We believe that there should be some studies of efficacy and safety of the listed species to foster wider acceptability and could start with *Balanites aegyptiacus*, *Carissa spinarum, Warburgia salutaris*, *Harissonia abyssinica* and/or *Albizia anthelmintica* and those against tick-borne diseases. If further developed, it could add useful drugs to modern veterinary pharmacopoeia. This, in turn, would safeguard intellectual property by putting it in the public domain. Market potential lies with the above plants, as well as *Tamarindus indica, Nicotiana tabacum, Neorautanenia mitis* and Abalongit coral reef ($CaCO_3$). This could enhance local product development and promotion of indigenous knowledge.

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Appendix A

Alphabetical list of inventoried EVK plants of south and central Karamoja, according to APG II, showing local name, plant habitat and status (collected and origin), indication of use (in English and Ngakarimojong), plant part used, plant preparation and administration, and the ethnic group from which the EVK originated.

Appendix A

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Abrus precatorius L., Fabaceae, JTG-371	**ESIDONGOROR**	H; W, I	Ear ache, **AYEYE**	S	Powder in ears	T
Abutilon hirtum (Lam.) sweet, Malavaceae, JTG-021	**EKWANGA**	H; W, I	Retained placenta, **ANGASEP**	B	Water extract	T
Acacia abyssinica Hochst. ex Benth., Fabaceae	**EMINIT**	S; W, I	Lumpy skin disease, **LONARU**	B	Water extract	B, P
				B, R	Water extract with *Tagetes minuta* whole plant, topically	P
				B	Water extract with *Steganotaenia araliacea* leaves and roots	P
			Snake bite, **AKONYET KE EMUN**	B	Water extract; water extract with *Steganotaenia araliacea* leaves and roots and Ekereye (ni010) roots; water extract with *Capparis fascicularis* bark and roots	B
				B	Water extract with *Steganotaenia araliacea* bark	B, P
Acacia albida Delile, Fabaceae, JTG-372	**EDUROKOIT**	T; W, I	Fodder, **AKIMUJ NGIBAREN**	F	Direct	B
Acacia brevispica Harms, Fabaceae, JTG-282	**EKUNGARIT**	T; W, I	Fodder, **AKIMUJ NGIBAREN**	wp	Direct	P
Acacia drepanolobium B.Y. Sjöstedt, Fabaceae, JTG-051, JTG-461	**EYELEL**	S; W, I	Diarrhoea, **AKIURUT**	R	Water extract	B
			Lumpy skin disease, **LONARU**	B, L	Water extract	B
			Rinderpest, **LOLEO**	B	Water extract	B
			Snake bite, **AKONYET KE EMUN**	B, L	Water extract	B, P
Acacia gerrardii Benth., Fabaceae, JTG-310	**EKIPELIMAN**	T; W, I	Cough, **ARAKUM**	B	Water extract	B
Acacia macrothyrsa Harms, Fabaceae, JTG-464	**ARATOM**	T; W, I	Lokilala tetany, **EYALIYAL**	B, L	Water extract	P
			Lumpy skin disease, **LONARU**	B, L	Water extract	T
			Skin disease with intestinal adhesions, **LONGOLESIKE**	B, L	Water extract	T
Acacia mellifera (Vahl) Benth. ssp. *mellifera*, Fabaceae	**EREGAE**	S; W, I	Otitis secondary to biting ticks, **EKONYIT**	B	Water extract	T
Acacia mellifera Benth., Fabaceae, JTG-039	**EREGAE**	S; W, I	Rinderpest, **LOLEO**	B	Water extract	B
Acacia nilotica (L.) Delile, Fabaceae, JTG-365	**EKAPELIMAN**	T; W, I	Pneumonia, **AWALA**	B	Water extract	T
			Fodder, **AKIMUJ NGIBAREN**	F, L	Direct	B
Acacia oerfota (Forssk.) Schweinf., Fabaceae, JTG-019, JTG-030	**EPETET**	S; W, I	Pneumonia, **AWALA**	B	Water extract	T
			Rinderpest, **LOLEO**	B	Water extract	B
			Trypanosomiases, **EDIIT**	R	Water extract	B
Acacia senegal (L.) Willd., Fabaceae, JTG-366, JTG-408	**EKODIOKODOI**	T; W, I	Delivery pain, **ASIYEC**	B	Water extract	B
			Fodder, **AKIMUJ NGIBAREN**	F, L	Direct	B
			Post partum pain, **AKIYEC**	B, R	Water extract	B, M, P
Acacia seyal Delile, Fabaceae, JTG-402, JTG-403	**EYELEL**	S; W, I	Diarrhoea, **AKIURUT**	R	Water extract	B
			Lumpy skin disease, **LONARU**	B, L	Water extract	P
Acacia spirocarpa Hochst. Ex A. Rich., Fabaceae	**ETIRIR**	T; W, I	Abscess, **ABUS**	L	Water extract	B, M, P
Acacia sp., Fabaceae, JTG-002	**EWALONGOR**	T; W, I	Goat pox, **ETOM**	F	Water extract with *Ocimum basilicum* whole plant & cow's manure	B
			Low milk production, **EURICIANA**	F, L	Water extract	B
			Retained placenta, **ANGASEP**	B	Water extract	B

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Acacia sp. cf. *A. elatior* Brenen, Fabaceae, JTG-052	**EMINIT**	T; W, I	Rinderpest, **LOLEO**	B	Water extract	B
Acalypha fruticosa Forssk., Euphorbiaceae	**ETETELEIT**	S; W, I	Pneumonia, **AWALA**	R	Water extract	T
			Bloody calf diarrhoea, **AREMOR KA NGAKOT**	R	Water extract with *Kigelia africana* roots	P
Achyranthes aspera L., Amaranthaceae, JTG-330	**LOKIRIKETA**	H; W, I	Ceremony, **ITIC AKIRIKET**	wp	Ritual	P
Acmella caulirhiza Delile, Asteraceae, JTG-441	**ESAA**	H; W, I	Pneumonia, **AWALA**	R	Water extract	B, M, P
Adenium obesum (Forssk.) Roem. & Schult., Apocynaceae, JTG-364	**ELEMU**	S; W, I	Mange, **EMITINA**	B	Poultice	T
Agave sp., Agavaceae, JTG-272	**AMOJO**	H; W, I	Ropes, **AUNO**	L	Pound leaf fiber, separate and form into braided rope	B
Albizia amara (Roxb.) Boivin. ssp. *sericocephala* (Benth.) Brenan, Fabaceae	**EKWAKWA**	T; W, I	**Abscess, ABUS**	L	Poultice	B
			Chronic wound, **ETOKU**	L	Oil poultice	P, T
			Mange, **EMITINA**	L	Oil extraction, topically	B, P
			Hoof disease, if severe - the digits may fall off, **LOMOKERE**	L	Oil poultice	P
			Maggots, **NGIKUR KE KWAN**	L	Water extract with *Leonitis nepetifolia* leaves	B
			Otitis with pus, often ticks, **LOMID**	L	Oil poultice	B
			Ticks, **NGIMADANG**	L	Oil poultice	B
			Wounds, **AJOME**	L	Oil extraction	B
Albizia anthelmintica Brongn., Fabaceae, JTG-019	**EKAPANGITENG**	T; W, I	Bloat and cough, **EKITUBON KA AWALA**	B	Water extract	B, P
			Intestinal parasites, **NGIKUR**	B	Water extract	B
				L	Direct	P
				R	Water extract	P
			Rinderpest, **LOLEO**	B, R	Water extract	B, P
Albizia coriaria Welw. ex Oliv., Fabaceae, JTG-447	**ECAILAIT**	T; W, I	barren cow, **ATENGINA EKOLUPANA**	B	Water extract	B
			Pneumonia, **AWALA**	B	Water extract	P
			Increase fertility, **AKIDORE**	B	Water extract	T
			Fever, **IYALAARA**	B	Water extract	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	B	Water extract	P
Albizia zygia (DC) J.F. Macbr., Fabaceae, JTG-437	**ETARAMATOKIENI**	T; W, I	Eyes painful red, **ARIBO AKONGU**	B	Powder in eye	P
			Lice, **NGILAC**	B	Water extract	B
			Mange, **EMITINA**	B	Poultice	T
Allium cepa L., Alliaceae	**EKITUNGURU**	S; W, T	Anaplasmosis, **LOPID**	R	Water extract with EUPET (ni025), sediment rock ($CaCO_3$), salt and ampicillin	P
Aloe dawei Berger, Asphodelaceae, JTG-107	**ECUCUKA**	H; W, I	Anaplasmosis, **LOPID**	L	Water extract	B
			Fly repellent, **AKIRIT NGICUC**	Exudate	Poultice	B
Aloe sp. 1, Asphodelaceae, JTG-059	**ECUCUKA**	H; W, I	East coast fever, **LOKIT**	L	Water extract	B, M, P
			Lokilala tetany, **EYALIYAL**	L	Water extract	P
Aloe sp. 2, Asphodelaceae, JTG-121	**ECUCUKA**	H; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	L	Water extract	B
Aloe sp. 3, Asphodelaceae, JTG-139	**ECUCUKA**	H; W, I	Fever, **IYALAARA**	L	Water extract	B
Aloe tweediae Christian, Asphodelaceae, JTG-412	**ECUCUKA**	H; W, I	Anaplasmosis, **LOPID**	Exudate	Water extract	B

			Fever, **IYALAARA**	L	Juice	T
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	Exudate	Water extract	T
			Wounds, **AJOME**	Exudate	Juice topically	T
Anthericum subpetiolatum Bak., Agavaceae, JTG-348	**NGIKACEKIYIM**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	R	Direct	B
Aeollanthus sp., Lamiaceae, JTG-421	**LOTUKO**	H; W, I	Trypanosomiases, **EDIIT**	R	Water extract	B
			Diarrhoea, **AKIURUT**	R	Water extract	T
Asparagus africanus Lam., Asparagaceae, JTG-316	**ESIKARAKIRU**	H; W, I	Stops the rains, **AKITOWO AKIRU**	L	Ritual	P
Asparagus racemosus Willd., Asparagaceae, JTG-440	**ESIKARAKIRU**	H; W, I	Chases rain away, **AKIRIT AKIRU**	wp	Ritual	P
			Genital diseases, **ANGAC**	R	Water extract	B, M, P
			Hydrocoel, **AAKUYE**	R	Water extract, oral and topical	T
			Swollen testis, **AKWE**	R	Water extract, oral and topical	P
Aspilia mossambicensis (Oliv.) Wild, Asteraceae, JTG-015	**EKUYON**	H; W, I	Anaplasmosis, **LOPID**	F, R	Water extract with *Solanum* spp. fruits	B
			East coast fever, **LOKIT**	R	Water extract with *Solanum incanum* fruits	B
Azadirachta indica A. Juss., Meliaceae	**EMITULAYA**	T; SW, I	Chicken mites, **APINGAC**	S	Poultice with seed cake	P
			Eye problem, **NGAKONYEN**	B, L, R	Water extract	B, P
			Fever, **IYALAARA**	B, L, R	Water extract	T
				B	Decoction	B
			Fleas, **NGIKADESIDES**	F	Grind seeds to extract oil, apply topically (goat kids)	B, P
			Genital diseases, **ANGAC**	B, L, R	Water extract	P
			Mange, **EMITINA**	F	Grind seeds to extract oil, apply topically	B
			Mosquito control, **AKIRETAKIN NGITHIRU**	F	Grind seeds to extract oil, apply topically	N
			Ringworm, **AKESIT**	F	Grind seeds to extract oil, apply topically	B
			Wounds, **AJOME**	F	Grind seeds to extract oil, apply topically	B, P
Balanites aegyptiacus (L.) Delile, Zygophyllaceae, JTG-014, JTG-034, JTG-369	**EKORETE**	T; W, I	Blind, eye turns blue, **EMUDURU**	Exudate	Powdered sap, in eye	B
			Diarrhoea, **AKIURUT**	B, R	Water extract	B
			Eye problem, **NGAKONYEN**	Exudate	Powdered sap, in eye	B
				F	Fruits mixed with ashes of *Kigelia africana* leaves, in eye	B
			Eyes painful red, **ARIBO AKONGU**	Exudate	Powdered sap, in eye	B
			Fodder, **AKIMUJ NGIBAREN**	L	Direct	B
			Joint/bone pain, **LOKOYETA**	B, R	Water extract	T
			Heartwater, **LOKOU**	Exudate	Make slurry with powdered sap, apply topically and orally	P
			Mosquito control, **AKIRETAKIN NGITHIRU**	L	Leaves fall into pond, forming a soapy substance to suffocate larvae	B
			Muscle pain, **NGAMORI LOKOYATA**	B	Water extract	B
			Spear shaft, **AMOROK AKWARA**	Branch		P
			Stomach pain, **AKOOK**	B	Water extract, oral or enema	B
Balanites orbicularis Sprague, Zygophyllaceae, JTG-060	**EJOJOR**	T; W, I	Otitis with pus, often ticks, **LOMID**	L	Paste in ear	T
Balanites rotundifolius (Tiegh.) Blatt., Zygophyllaceae, JTG-061	**EBEI**	T; W, I	Otitis with pus, often ticks, **LOMID**	L	Paste in ear	T
Barleria acanthoides Vahl, Acanthaceae, JTG-390	**EMEKUI**	H; W, I	Fattens donkey, **ITUMI NGIKOODO**	L	Direct	T

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Bidens pilosa L., Asteraceae, JTG-443	**LOMOSIKIN**	H; W, I	Eyes painful red, **ARIBO AKONGU**	R	Paste in eye	B
			Fresh wounds, **AJOME**	L	Poultice	B, M, P
Brachiaria brizantha (Hochst. ex A. Rich.) Stapf, Poaceae, JTG-381	**ELET (A)**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	wp	Direct	B
Bridelia micrantha (Hochst.) Baill., Phyllanthaceae, JTG-325	**EBOLOBOLOT**	T; W, I	Retained placenta, **ANGASEP**	B	Water extract	B
Bridelia scleroneura Müll. Arg., Phyllanthaceae, JTG-444, JTG-475	**EKWANAKALIE**	T; W, I	Retained placenta, **ANGASEP**	B	Water extract	B
Bulbostylis pusilla (Hochst. ex A. Rich.) C.B. Clarke, Cyperaceae, JTG-264	**APUNA**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	wp	Direct	P
Butyrospermum paradoxum C.F. Gaertn Hepper, Sapotaceae, JTG-417, JTG-448	**EKUNGARIT**	T; W, I	Constipation, **EGWEE**	F	Extract oil from seeds	B, P
			Diarrhoea, **AKIURUT**	B	Water extract	T
			Mange, **EMITINA**	S	Extract oil from seeds, topically	B, M, P
			Stomach pain, **AKOOK**	B	Water extract	B, M, P
Cadaba farinosa Forssk., Capparaceae, JTG-260	**ERERENG**	H; W, I	Prevent wizard from attacking animals, **AKIRETAKIN EKAPILAN ALOBAREN**	L	Ritual	B
Caesalpinia decapetala (Roth) Alston, Fabaceae, JTG-362	**EKARAO**	T; W, I	Living fence, **AWAS**	wp	Transplant	P
Calotropis procera (Aiton) W.T. Aiton, Apocynaceae, JTG-031, JTG-080	**EPUU**	H; W, I	East coast fever, **LOKIT**	wp	–	B
			Anaplasmosis, **LOPID**	wp	–	B
Capparis fascicularis DC. var. *elaeagnoides* (Gilg) DeWolf, Capparaceae, JTG-303	**EKADOLIAE**	L; W, I	Heartwater, **LOKOU**	B	Water extract	B, M, P
				B	Water extract with *Carissa edulis* bark	B, P
			Lumpy skin disease, **LONARU**	B, R	Water extract with *Steganotaenia araliacea* leaves and root, topically	T
			Snake bite, **AKONYET KE EMUN**	B, R	See ***Acacia abyssinica***	B
Capparis tomentosa Lam., Capparaceae, JTG-305	**EKADOLIAE or ERO-GOROWETE**	L; W, I	Heartwater, **LOKOU**	R	Water extract	B
			Anaplasmosis, **LOPID**	R	Water extract	B
Capparis sp., Capparaceae	**EWONOKORI**	L; W, I	Anaplasmosis, **LOPID**	B	Water extract	B
			Black quarter – 'speared or piercing', healthy animal dies suddenly, one leg becomes emphysematous, limps for a day and dies, **LOKECUMAN**	Branch	Water extract	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	B	Water extract	T
			East coast fever goats, swollen lymph nodes, **LOKIT NGAKINE**	B	Water extract	T
			Fever, **IYALAARA**	B, R	Water extract	B
			Pain killer, **ALEMAR ARIABA**	B, R	Water extract	T
			Sudden death, **ATWANARE ATIPEI**	B, R	Water extract	T
Capsicum annuum L., Solanaceae, JTG-081	**EPILIPILI**	S; W, I	Anaplasmosis, **LOPID**	F	Decoction, add sediment rock ($CaCO_3$)	P
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	F	Water extract with *Warburgia salutaris* bark, *Solanum incanum* fruits, sediment rock ($CaCO_3$) and water; water extract with *Solanum incanum* fruits	B
			Heartwater, **LOKOU**	F	Paste, nasally	B, T
				F	Pound fruit and apply to freshly branded areas	B

Caralluma dummeri N.E.Br., Apocynaceae, JTG-322	**LOKEJUKUMA**	H; W, I	Wounds, **AJOME**	F	Juice topically	P
Carica papaya L., Caricaceae	**EPAIPAI**	T; W, I	Intestinal parasites, **NGIKUR**	S	Seeds direct	M, T
Carissa spinarum L., Apocynaceae, JTG-010, JTG-428	**EKAMURIAI**	S; W, I	Anaplasmosis, **LOPID**	R	Infusion	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Decoction	T
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Infusion	B
			Chicken pox, **LONGOLESIKE**	B	Water extract	B
			Diarrhoea, **AKIURUT**	B	Water extract with *Zanthoxylum chalybeum* roots	B, P
			East coast fever, **LOKIT**	B	Water extract	B
				R	Infusion	B
			General body pains, **EPILPIL AKWAN**	R	Water extract	B
			Heartwater, **LOKOU**	B	See ***Capparis fascicularis***	P
			Lumpy skin disease, **LONARU**	B	Water extract; water extract with *Zanthoxylum chalybeum* roots	B, P
			Lokilala tetany, **EYALIYAL**	B	Water extract	B
			Muscle pain, **NGAMORI LOKOYATA**	R	Water extract	T
			Rinderpest, **LOLEO**	R	Infusion	P
			Skin disease with intestinal adhesions, **LONGOLESIKE**	B	Water extract	T
Cassia nigricans Vahl, Fabaceae, JTG-092, JTG-112, JTG-319	**EPEERU**	S; W, I	Abscess, **ABUS**	L	Powder topically	B
			Dermatophilosis, **EPAARA**	L	Water extract with *Piliostigma thonningii* bark, wash	B
			Fever, **IYALAARA**	L	Direct	T
			Intestinal parasites, **NGIKUR**	L	Water extract	B
			Meningitis, **ETERAGEGE**	L	Water extract	B, M, P
			Wounds, **AJOME**	L	Powder topically	B
Chasmanthera dependens Hochst., Menispermaceae, JTG-049, JTG-268	**LODWAR**	L; W, I	Anaplasmosis, **LOPID**	R	Water extract	B
				B, R	Water extract	B, P
			Diarrhoea, **AKIURUT**	B, R	Water extract	P
			East coast fever, **LOKIT**	B, R	Water extract	B, P
				R	Water extract	B
			Fever, **IYALAARA**	B, R	Water extract	T
			FMD prophylaxis, **AKIRIT EJOTA**	R, stem	Water extract	P
			Foot and mouth disease (FMD), **EJOTA**	R, stem	Water extract; water extract with *Tamarindus indica* fruits	P
			Lokilala tetany, **EYALIYAL**	B, R	Water extract	B
Cissus cactiformis Gilg, Vitaceae, JTG-298	**EMOROS**	S; W, I	Bloat, **EKITUBON**	Stem	Water extract	P
Cissus quadrangularis L., Vitaceae, JTG-012, JTG-400	**EGIGITH**	L; W/SW, I	Anaplasmosis, **LOPID**	L	Water extract	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	L	Water extract	B
				Stem	Water extract with *Warburgia salutaris* bark	B, P, T
			Calf diarrhoea, **AREMOR**	Stem	Water extract	B
			Intestinal parasites, **NGIKUR**	Stem	Water extract	T
			Low milk production, **EURICIANA**	Stem	Water extract	B, P
			Rinderpest, **LOLEO**	Stem	Water extract	B
			Weak calf, **ABUR**	Stem	Water extract, mixed with sour milk	B

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Cissus rotundifolia (Forsk.) Vahl, Vitaceae, JTG-267	**ETOPOTOJO**	L; W, I	Rotten wounds in mouth, **LOKITUK**	wp	Water extract, wash mouth	B
			Wounds, **AJOME**	L	Poultice with oil or water	P
Citrus sp., Rutaceae	**EMACUNGA**	T; C, I	Rinderpest, **LOLEO**	R	Paste enema	P
Clausena anisata (Willd.) Benth., Rutaceae, JTG-410	**NAWAWAYO**	S; W, I	Calf diarrhoea, **AREMOR**	R	Water extract	B
			Fever, **IYALAARA**	R	Water extract	T
Cleome gynandra L., Cleomaceae	**AKEO**	H; W, I	Trachoma, **AKIRUMIT AKONYEN**	Fl	Squeeze liquid from flower	B, M, P
Coccinia adoensis (A. Rich.) Cogn., Cucurbitaceae, JTG-339	**EDALDALAKISIN**	H; W, I	Anaplasmosis, **LOPID**	R	Infusion	B
Coffea eugenioides S. Moore, Rubiaceae, JTG-354	**EBISALUMACH**	T; W, I	Fodder, **AKIMUJ NGIBAREN**	L	Goats take direct	B
Commiphora africana (A. Rich.) Engl., Burseraceae, JTG-279	**EKADELI**	T; W, I	Fly and maggot control, A**KIRETAKIN NGICUC KA NGIKUR**	Exudate	Powdered sap, topically	B
			Living fence, **AWAS**	Branch	Transplant	B
			Fresh wounds, **AJOME**	Exudate	Powdered sap, topically	B, M, P
			Wounds, **AJOME**	Exudate	Powdered sap, topically	B
Commiphora habessinica (O.Berg) Engl., Burseraceae, JTG-023	**EKADELI**	T; W, I	Eyes painful red, **ARIBO AKONGU**	Exudate	Powdered sap, in eye	B, P
			Mange, **EMITINA**	Exudate	Powdered sap, topically	B, P
Crabbea velutina S. Moore, Acanthaceae, JTG-343	**LOTIDAE**	S; W, I	Compaction, **ETID**	F	Knick hide at level of spleen, press in fruit	B
Crotlaria sp., Fabaceae, JTG-285	**MATADO**	H; W, I	Poisonous - gives cattle foot rot, **INAK EMAARA**	F	Cattle walk on mature pods in pasture	B
Cucumis sp., Cucurbitaceae	**EKALERUK**	V; W, I	Anaplasmosis, **LOPID**	F	Water extract with *Warburgia salutaris* & sediment rock ($CaCO_3$)	B, P, T
			Bloat, **EKITUBON**	F	Mix juice in water	B, P
			East coast fever, **LOKIT**	F	Water extract with *Warburgia salutaris* & sediment rock ($CaCO_3$)	P
			Fodder, **AKIMUJ NGIBAREN**	F, L	Donkeys eat direct	P
			Rinderpest, **LOLEO**	F	Water extract with fruits, *Warburgia salutaris* bark and sediment rock ($CaCO_3$)	B
			Wounds, **AJOME**	F	*Cucumis* sp. and *Momordica foetida* fruit juices & salt, topically	B
Cucurbita maxima Duchesne, Cucurbitaceae	**AKAIDEIT**	L; W, T	Acute eye syndrome, **ADEIKIN**	S	Paste in eye	B
Cyperus fischerianus A. Rich., Cyperaceae, JTG-424	**EKIKIRAUT**	H; W, I	Snake bite, **AKONYET KE EMUN**	R	Water extract	T
				R	Powder topically	P
Cyphostemma serpens (Hochst.) Desc., Vitaceae, JTG-314	**AMANA AKURI ASANGISANG**	H; W, I	Edible insects collection, **AKIYOR NGIKONG**	wp	Trap insects in web of plants around anthill	P
Cyphostemma ukerewense (Gilg) Desc., Vitaceae, JTG-434	**AMANA-AKURI**	H; W, I	Abscess with maggots, **AKIMADYA**	wp	Poultice	T
			Fly repellent, **AKIRIT NGICUC**	R	Powder topically	B
			Intestinal parasites, **NGIKUR**	wp	Water extract	B, P
			Maggots, **NGIKUR KE KWAN**	R	Powder topically	T
				wp	Poultice	B
			Ticks, **NGIMADANG**	R	Powder topically	P
Dactyloctenium aegyptium (L.) Willd., Poaceae, JTG-383	**EKOWDA**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	F	Direct	B
Digitacia sp., Poaceae, JTG-388	**DEDE**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	wp	Direct	B
Dracaena sp. cf. *deremensis* Engl., Rutaceae, JTG-418	**EMOGOLIT**	S; W, I	Diarrhoea, **AKIURUT**	R	Water extract	T

Dregea rubicunda K. *Schum*., Apocynaceae, JTG-345	**LOKAKWAN**	T; W, I	Sore mouth in kids, **LOKITUK**	L	Gently crush leaves	T
Elaeodendron buchananii (Loes)., Celastraceae, JTG-358	**MIIRA**	T; W, I	Stimulant, **AKISIBURAKIN**	L	Direct	B
Erythrococca bongensis Pax, Euphorbiaceae, JTG-093, JTG-450	**EDIPIDIPI**	S; W, I	Intestinal parasites, **NGIKUR**	L	Water extract	B
				L, R	Water extract	T
Euphorbia bongensis Kotschy & Peyr., Euphorbiaceae	**JERIMAN**	H; W, I	Anaplasmosis, **LOPID**	wp	Water extract	P
			Bloat, **EKITUBON**	wp	Water extract	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	wp	Water extract	B, M, P
			East coast fever, **LOKIT**	wp	Water extract, oral or topical	B
			Heartwater, **LOKOU**	R	Water extract, oral or topical	B
			Lokilala tetany, **EYALIYAL**	wp	Water extract	P
			Panacea, **NGIDEKESIO DADANG**	wp	Water extract, oral or topical	B
			Rinderpest, **LOLEO**	wp	Water extract, oral or topical	P
			Ticks, **NGIMADANG**	wp	Water extract, topically	P
Euphorbia candelabrum Kotschy, Euphorbiaceae	**EPOPONG**	T; W, I	Anaplasmosis, **LOPID**	Stem	Water extract with sediment rock ($CaCO_3$)	B
				Exudate	Knick hide at lymph node, drip in latex	B
			East coast fever, **LOKIT**	Exudate	Water extract, into lymph node	T
Euphorbia cooperi N.E.Br., Euphorbiaceae	**EPONG**	T; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	Stem	Singe stem	B
Euphorbia tirucalli L., Euphorbiaceae	**ELIGOI**	S; W, I	Enlarged lymph nodes, **NGAGAWEI**	Exudate	Latex on lymph node	B
Fagaropsis angolensis (Engl.) H.M. Gardner, Rutaceae	**EKAKIRET**	T; W, I	Anaplasmosis, **LOPID**	B	Water extract	T
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	B	Water extract	T
			Lice, **NGILAC**	B	Water extract	T
			Snake bite, **AKONYET KE EMUN**	B, R	Water extract	T
Gardenia jovis-tonantis (Welw.) Hiern, Rubiaceae, JTG-431, JTG-467	**EKORE**	T; W, I	Bloat, **EKITUBON**	B	Water extract	B
			Heartwater, **LOKOU**	B	Water extract	B
			Snake bite, **AKONYET KE EMUN**	R	Water extract with *Steganotaenia araliacea* roots	T
			Snake spit, **AKONYAT EMUN**	R	Water extract with *Steganotaenia araliacea* bark and stem, bathe eye	B
			Stick for spinning milk, **EGEC**	B		P
Gloriosa superba L., Colchicaceae, JTG-336	**LOKIRITIN**	H; W, I	Clots milk, **AKISIDIK NGAKILE**	L	Add leaf to milk filled gourd, gently shake to clot, may then be eaten immediately or preserved	B
Gnaphalium purpureum L., Asteraceae, JTG-392	**EKOUTAPEM**	H; W, I	Eyes painful red, **ARIBO AKONGU**	L	Paste in eye	B, M, P
Gomphocarpus fruticosa (L.) Ait. f., Apocynaceae, JTG-411, JTG-420	**EPUURU**	S; W, I	Back pain, **ACIR**	R	Water extract	T
			Diarrhoea, **AKIURUT**	R	Water extract	T
Grewia bicolor Juss., Malvaceae, JTG-289	**EKALIYE**	T; W, I	Retained placenta, **ANGASEP**	B	Water extract	B
			Spear shaft, **AMOROK AKWARA**	B		B
			Sticks for guiding livestock, **EBALA**	B		T
Grewia mollis Juss., Malvaceae, JTG-445	**EKABOLOBOLOT or EKALIE**	T; W, I	Retained placenta, **ANGASEP**	B	Water extract	B, T
			Constipation, **EGWEE**	B	Water extract, oral or enema	B
Grewia villosa Willd., Malvaceae, JTG-101, JTG-458	**EPONGAE**	S; W, I	Lice, **NGILAC**	B	water extract, topically	B
			Retained placenta, **ANGASEP**	Stem	Water extract	B, M, P

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Gutenbergia cordifolia Benth. ex Oliv., Asteraceae	**EKOUTAPEM**	H; W, I	Pneumonia, **AWALA**	L	Direct	B
Habenaria lindblomii Schltr., Orchidaceae, JTG-432	**EDAPAL**	H; W, I	Guard dog becomes very 'tough' and alert, **ADEDING INGOK**	R	Water extract	T
Harrisonia abyssinica Oliv Rutaceae, JTG-018, JTG-297	**EKERE**	S; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Water extract	B
			Chronic neck/back wound with maggots, **EPAARA KA NGIKUR**	L, R	Poultice with amphibolitic asbestos & cooking oil	B, P
			Dermatophilosis, **EPAARA**	L, R	Poultice with oil or water	B
			Fly and maggot control, **AKIRETAKIN NGICUC KA NGIKUR**	F, L	Poultice	B, P
			Fly repellent, **AKIRIT NGICUC**	L	Poultice	P
			Mange, **EMITINA**	L, R	Poultice	B
			Heartwater, **LOKOU**	R	Water extract	B
			Maggots, **NGIKUR KE KWAN**	R	Water extract, topically	P
				B, R	Urine extract and butter, topically	P
			Rectal wound, **AJOME AKIMOJONG**	L, R	Poultice	P
			Wounds, **AJOME**	L, R	Poultice	B, P
				R	Water extract	B
				R	Powder topically	B, P
				L	Water extract, topically	P
Hibiscus trionum L., Malvaceae, JTG-292	**ETOKE**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	S	Direct	P
Homoglossum sp. (=*gladialus*), Iridaceae, JTG-438	**LOSARICHO**	H; W, I	Low milk production, **EURICIANA**	R	Water extract	T
Hoslundia opposita Vahl, Lamiaceae, JTG-301	**EPWOK**	S; W, I	Eyes painful red, **ARIBO AKONGU**	L	Powder in eye	T
			Fodder, **AKIMUJ NGIBAREN**	L	Direct	P
Indigofera spicata Forssk., Fabaceae, JTG-077	**ETERUMAN**	H; W, I	Appetite stimulant, **AKISUBURAKIN AKIMUJ**	R	Yoghurt paste	B
			Calf diarrhoea, **AREMOR**	R	Yoghurt paste	B
			Diarrhoea, **AKIURUT**	wp	Water extract	B
			Trypanosomiases, **EDIIT**	R	Water extract	B
Ipomoea longituba Hallier f., Convolvulaceae, JTG-429	**EKOLAWAS**	H; W, I	Low milk production, **EURICIANA**	R	Water extract	B
	EMATWAE	H; W, I	Constipation of goat kids, **EGWEE**	R	Water extract, enema	T
			Ticks, **NGIMADANG**	R	Poultice	B
Jatropha curcas L., Euphorbiaceae, JTG-333	**EJULUNGA**	S; SW, T	Inflammation, **ECOR**	F	Juice topically	P
			Living fence, **AWAS**	Branch	Transplant	T
			Wounds, **AJOME**	F	Juice topically	B
Kalanchoe citrina Schweinf., Crassulaceae, JTG-403	**ETABAAKWE**	H; W, I	Wounds, **AJOME**	L	Water extract, topically	B
Kigelia africana (Lam.) Benth., Bignoniaceae, JTG-009	**EDODOI**	T; W, I	Bloody calf diarrhoea, **AREMOR KA NGAKOT**	R	See ***Acalypha fruticosa***	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Paste from ashes	B
			Eye problem, **NGAKONYEN**	L	See ***Balanites aegyptiaca***	B
			Heartwater, **LOKOU**	B, F	Water extract	P
			Pinkeye, **LOKIYO**	L	Paste with leaf ash and animal butter, in eye	B
Kleinia odora (Forssk.) DC., Asteraceae, JTG-265	**ELIGOI**	H; W, I	Strengthen sick calf, **AKITOGOGONG NGITAK**	Stem	Water extract	P
Lannea humilis (Oliv.) Engl., Anacardiaceae, JTG-276	**ETOPOJO**	T; W, I	Calf diarrhoea, **AREMOR**	B	Water extract	B
			Switches, **AKITWARITWARET**	Branch		P

Leonotis nepetifolia (L.) R.Br., Lamiaceae, JTG-328	**LOLEMO**	H; W, I	Intestinal parasites, **NGIKUR**	wp	Water extract	B
			Maggots, **NGIKUR KE KWAN**	L	See ***Albizia amara***	B
				wp	Poultice	B
Maerua edulis (Gilg & Gilg-Ben.) DeWolf, Capparaceae, JTG-462	**ERUT**	H; W, I	Abscess, **ABUS**	R	Water extract	B
Maerua parvifolia Pax, Capparaceae, JTG-032, JTG-398	**EURUKANYIM**	S; W, I	Acute eye syndrome, **ADEIKIN**	L	Paste in eye	B
			Eyes painful red, **ARIBO AKONGU**	L	Masticate leaves and spit into affected eye	T
			Pinkeye, **LOKIYO**	L	Masticate leaves and spit into affected eye	B
Mammea africana Sabine, Clusiaceae, JTG-415	**ETUNGANAN**	T; W, I	Diarrhoea, **AKIURUT**	B	Water extract	T
			Fodder, **AKIMUJ NGIBAREN**	F	Direct	T
			Lice, **NGILAC**	B	Water extract, topically	T
Melia azedarach L., Meliaceae, JTG-026	**ELIRA**	T; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Water extract	B, P
			Measles, **PUURU**	R	Water extract	P
			Rinderpest, **LOLEO**	B	Water extract	P
Momordica foetida Schumach, Cucurbitaceae, JTG-332	**EYOME**	V; W, I	Bloat, **EKITUBON**	F, stem	Water extract	P
			Lice, **NGILAC**	F	Water extract, topically	T
				F	Urine extract with *Momordica foetida* juice, *Nicotiana tabacum* leaves and old ashes, wash; *Momordica foetida* juice mixed with urine or water and old ashes, wash	B
			Maggots, **NGIKUR KE KWAN**	F	Juice topically	B, T
			Pinkeye, **LOKIYO**	F	Juice in eye	P
			Wounds, **AJOME**	F	Juice topically; see ***Cucumis* sp.**	B
Neorautanenia mitis (A. Rich.) Verdc., Fabaceae, JTG-040	**EBUTO**	V; W, I	Fleas, **NGIKADESIDES**	R	Water extract, topically	B
			Lice, **NGILAC**	R	Ibid; urine extract, topically	B
			Ticks, **NGIMADANG**	R	Water extract	B
Nicotiana tabacum L., Solanaceae, JTG-474	**EPELADEK**	H; C, T	Fleas, **NGIKADESIDES**	L	Urine extract, add ash and wash	T
			Lice, **NGILAC**	L	Ibid; urine extract, topically; see ***Momordica foetida***	B
			Mosquito control, **AKIRETAKIN NGITHIRU**	L	Urine extract, add ash and wash	B
Nicotiana tabacum L., Solanaceae, fermented snuff	**ETABA**	H; C/B, T	Acute eye syndrome, **ADEIKIN**	L	Pinch of snuff placed directly in the eye, 3 days later a drop of cassava alcohol and sprinkle tetracycline powder	
			Ticks, **NGIMADANG**	L	Dissolve snuff in water, add urine, wash	P
ni001, Amaryllidaceae, JTG-118	**ABUKUT**	S; W, I	Metritis – uterus infection, **ANGASEP**	R	Water extract	B
			Pyometra – uterus infection with pus, **ANGASEP KA ABUTH**	R	Water extract	B, P
			Retained placenta, **ANGASEP**	R	Water extract	B
ni002	**AKWI-EKADETEWA**	H; W, I	Seizures, **KIPAPA**	L	Water extract	B
ni003, Vitaceae	**ARIGITH**	S; W, I	Diarrhoea, **AKIURUT**	Stem	Water extract	B
ni004	**EBOLITIS**	T; W, I	Goat pox, **ETOM**	B	Panga heated red-hot; brand skin in circumferential pattern starting just above the eyes to below the ears extending along the middle of the ribs on both sides & paralumbar fossae	B
ni005, Fabaceae, JTG-454	**ECOKE**	T; W, I	Diarrhoea, **AKIURUT**	wp	Water extract	B
			Low milk production, **EURICIANA**	B	Water extract	B
			Maggots, **NGIKUR KE KWAN**	R	Water extract, topically	T

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
ni006, Liliaceae, JTG-338	**ECOMOCOMO**	H; W, I	Yoke wounds, **APOTOSIT**	R	Poultice	B, M, P
ni007	**EKALETETE**	S; W, I	Poultry coccidiosis, **AKIURUT ANGIKOKOROI**	R	Water extract	B, M, P
ni008, Fabaceae, JTG-478	**EKARO**	T; W/SW, I	Living fence, **AWAS**	Branch	Transplant	B
ni009, Fabaceae, JTG-470	**EKARO**	T; W/SW, I	Living fence, **AWAS**	Branch	Transplant	B
ni010, Araceae, JTG-281	**EKEREYE**	H; W, I	Old people used for medicine, **NGKASIKOT KA AKIMAK**	N/A	–	B
			Snake bite, **AKONYET KE EMUN**	R	See ***Acacia abyssinica***	B
ni011	**EKOROSOT (EKAUTII)**	T; W, I	Bloody diarrhoea, **LOOKOT**	B, R	Water extract	P
ni012	**EKOTI**	T; W, I	Anaplasmosis, **LOPID**	B, R	Water extract	B
			Diarrhoea, **AKIURUT**	B, R	Water extract	P
ni013, Sapotaceae, JTG-344	**EKUNGARIT**	T; W, I	Retained placenta - smelly, **ANGASEP**	B, L	Water extract	B
ni013, Sapotaceae, JTG-344	**EKUNGARIT**	T; W, I	Retained placenta, **ANGASEP**	B	Water extract	P
ni014, Liliaceae, JTG-270	**ELEDA**	H; W, I	Yoke wounds, **APOTOSIT**	R	Poultice	B
ni015, Poaceae, JTG-382	**ELET (B)**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	wp	Direct	B
ni016	**ELIGOI**	S; W, I	Pneumonia, **AWALA**	Exudate	Water extract	P
ni017	**ELILIYOI**	V; W, I	Anaplasmosis, **LOPID**	Stem	Water extract	T
ni018	**ELILIYOI**	V; W, I	Mange, **EMITINA**	Stem	Water extract	B, P
ni019	**EMITGAZEA**	T; W, I	Rotten wounds in mouth, **LOKITUK**	B, R	Water extract	B
ni020, JTG-025	**EMPORA**	H; W, I	Fly repellent, **AKIRIT NGICUC**	L	Powder topically	D
ni021	**ENGETHO**	L; W, I	Quick delivery, **AKIDOUNIO ANGNIBERU**	Branch	Ritual	B, P
ni022	**EPERU**	H; W, I	Retained placenta, **ANGASEP**	wp	Water extract	B
ni023	**ESILANG**	H; W, I	Stomach pain, **AKOOK**	B	Water extract	B
ni024	**ETETELE**	S; W, I	Fever with lower back pain, **ACIR KA IYALAARA**	R	Water extract	P
ni025	**EUPET or ELILOI**	S; W, I	Anaplasmosis, **LOPID**	R	Water extract	B
				R	See ***Allium cepa***	P
			Calf diarrhoea, **AREMOR**	B	Water extract with sediment rock ($CaCO_3$)	P
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Water extract	B
			Rinderpest, **LOLEO**	R	Decoction, add sediment rock ($CaCO_3$)	B
ni026	**KLOROKWIN**	T; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	B, R	Water extract	B, P
ni027	**LOKAPILAN**	S; W, I	Disease prevention, **LOKIPILAK**	L, stem	Powder sprinkled over body	P
ni028	**LOKILE**	H; W, I	Low milk production, **EURICIANA**	L	Direct	B
ni029	**LOKITELIYOI**	S; W, I	Anaplasmosis, **LOPID**	R	Distill roots, inject intramuscular (IM)	B, P
			Genital diseases, **ANGAC**	R	Water extract	T
				R	Distill roots, inject IM	B
			Intestinal parasites, **NGIKUR**	R	Water extract, oral or IM	B
ni030, JTG-469	**LOKOCIL**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	L	Direct	T
			Low milk production, **EURICIANA**	L	Direct	P
			Pneumonia, **AWALA**	L	Direct	B, M, P
ni031, Orchidaceae, JTG-425	**LOKWARAS**	H; W, I	Ear ache, **AYEYE**	L	Grind leaf, drop in ear	B
ni032	**LOMANANG**	S; W, I	Bloody calf diarrhoea, **AREMOR KA NGAKOT**	R	Water extract	P
			Calf diarrhoea, **AREMOR**	R	Water extract	B
			Calf manure brown/black can have either diarrhoea or constipation, **LOGORICINO**	R	Water extract	B
ni033, Meliaceae, JTG-426	**LOMARAN**	T; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	B	Water extract	P
			Fever, **IYALAARA**	B	Water extract	B, M, P
			Tetanus, **ETEREGEGE**	B	Water extract	P

ni034, Lamiaceae, JTG-379	**LOSIRU**	H; W, I	Mosquito control, **AKIRETAKIN NGITHIRU**	wp	Smudge in fire, and/or hang near kraal	B
ni035, Fabaceae	**LOSISI**	H; W, I	Lumpy skin disease, **LONARU**	B, L	Water extract	B, P
ni036, Crassulaceae, JTG-422	**LOTUBAE**	H; W, I	Eyes painful red, **ARIBO AKONGU**	L	Paste in eye	T
			Joint/bone pain, **LOKOYETA**	L	Poultice	B, M, P
ni037, Cucurbitaceae	**NGAKAYIER**	V; W, I	Intestinal parasites, **NGIKUR**	S	Water extract of inner seed	T
ni038, JTG-419	**SHAMCOK**	T; W, I	Diarrhoea, **AKIURUT**	R	Water extract	T
Ocimum basilicum L., Lamiaceae, JTG-349	**LOSIRU**	H; W, I	Goat pox, **ETOM**	wp	See ***Acacia* sp.**	B
			Mosquito control, **AKIRETAKIN NGITHIRU**	wp	Smudge in fire, and/or hang near kraal	B
Ocimum suave Willd., Lamiaceae, JTG-423	**LOSIRU**	H; W, I	Calf diarrhoea, **AREMOR**	R	Water extract	T
			Mosquito control, **AKIRETAKIN NGITHIRU**	wp	Smudge in fire, and/or hang near kraal	B
Olea africana Mill., Oleaceae, JTG-435	**EURUPEPE**	T; W, I	Intestinal parasites, **NGIKUR**	L	Water extract	P
Olea europaea L. subsp. *africana* (Mill.) P.S. Green, Oleaceae JTG-114	**EUREPEPE**	S; W, I	Intestinal parasites, **NGIKUR**	L	Water extract	B
Opuntia cochenillifera (L.) Mill., Cactaceae, JTG-122	**EDAPAL**	T; W, I	Compaction, **ETID**	F	Water extract	B
			Low milk production, **EURICIANA**	F, stem	Water extract	B
			Retained placenta, **ANGASEP**	Stem	Decoction	T
Ormocarpum trichocarpum (Taub.) Engl., Fabaceae, JTG-370, JTG-457	**ESEPERUAI**	S; W, I	Clots milk, **AKISIDIK NGAKILE**	R	See ***Gloriosa superba***	B
			Living fence, **AWAS**	wp	Transplant	B
Ozoroa insignis Delile, Anacardiaceae, JTG-413, JTG-466, JTG-468	**EMUTORIN**	T; W, I	diarrhoea, **AKIURUT**	B	Water extract	B, T
			Eyes painful red, **ARIBO AKONGU**	R	Powder in eye	T
				B	Powder in eye	B, T
Papaver somniferum L., Papaveraceae	**BANGI**	H; W, I	Heartwater, **LOKOU**	L	Crushed leaves nasally	P
Pavetta gardeniifolia A.Rich. var. *gardeniifolia*, Rubiaceae, JTG-275	**EPWATADERE**	T; W, I	Stem used for making arrows, **EDUPARE NGIKALEYE**	Branch	Transplant	B
Phyllanthus sp., Phyllanthaceae, JTG-396	**LOMUNO**	H; W, I	Snake bite, **AKONYET KE EMUN**	wp	Water extract	B
Piliostigma thonningii (Schumach.) Milne-Redh., Fabaceae, JTG-359, JTG-446	**EPAPAI**	T; W, I	Dermatophilosis, **EPAARA**	B	Poultice; poultice with amphibolitic asbestos; see ***Cassia nigrans***	B
			Bloody diarrhoea, **LOOKOT**	B, F	Water extract	P
			Diarrhoea, **AKIURUT**	B, F	Water extract	B
				B	Water extract	T
			Trypanosomiases, **EDIIT**	F	Water extract	B
Plumbago zeylanica L., Plumbaginaceae, JTG-040	**ETETILEIT**	S; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	R	Water extract	B
			Pneumonia, **AWALA**	R	Water extract	B
Protea gaguedi J.F. Gmel., Protaceae, JTG-409	**LOLAC**	T; W, I	Anthrax, **LOTIDAE**	B, L	Water extract	B, T
			Lice, **NGILAC**	B, L	Water extract, topically	B, T
Psorospermum febrigum Spach, Clusiaceae, JTG-439	**EMOCOC**	T; W, I	Mange, **EMITINA**	F	Juice topically	B
Rhus vulgaris Meikle, Anacardiaceae, JTG-274, JTG-433	**ETOPOJO or LOKOCHIL or AKADETEWA**	S; W, I	Diarrhoea, **AKIURUT**	R	Water extract	T
			Fever, **IYALAARA**	B	Water extract	B, M, P
			Fodder, **AKIMUJ NGIBAREN**	F	Direct	P
			Lumpy skin disease, **LONARU**	F, L	Water extract	T
Saba comorensis (Bojer) Pichon, Apocynaceae, JTG-452	**EKUMUNE**	T; W, I	Back pain, **ACIR**	F	Juice and fruit flesh	T
Sansevieria robusta N.E.Br., Ruscaceae, JTG-351	**AMOJO**	H; W, I	Ropes, **AUNO**	L	Pound leaf fiber, separate and form into braided rope	P

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Sanseveria suffruticosa N.E.Br., Ruscaceae, JTG-271	**ECOKILET**	H; W, I	Ropes, **AUNO**	L	Ibid – for small ruminant	P
Sarcostemma viminale (L.) R.Br., Apocynaceae, JTG-273	**ELIGOI or ELIGOI LODIM**	H; W, I	Bloat, **EKITUBON**	wp	Water extract	B
			Intestinal parasites, **NGIKUR**	Stem	Water extract	B
			Thirst, **AKURE**	L, R	Direct	T
Senna obtusifolia (L.) H.S. Irwin & Barneby, Fabaceae, JTG-376	**ETIATIA**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	wp	Direct	B
Senna occidentalis (L.) Link, Fabaceae, JTG-290	**ETIATIA**	H; W, I	Constipation, **EGWEE**	R	Water extract, oral or enema	P
			Heart problems, **ETAU**	R	Water extract	B
			rotten wounds in mouth, **LOKITUK**	F, L	Water extract, wash mouth	B
Senna sp., Fabaceae	**ETIATIA**	H; W, I	Fever, **IYALAARA**	R	Water extract	B, M, P
			Rotten wounds in mouth, **LOKITUK**	F, L	Water infusion with salt, wash mouth	P
			Pneumonia, **AWALA**	R	Water extract	B, M, P, T
Sesamum angustifolium Engl., Pedaliaceae, JTG-374	**LOMAIDAE**	H; W, I	Tuberculosis, **LOKUDI**	R	Water extract	B
Sesamum sp., Pedaliaceae, JTG-378	**LOMAIDAE**	H; W, I	Retained placenta, **ANGASEP**	R	Water extract	P
			Tuberculosis, **LOKUDI**	R	Water extract	B
Sida ovata Forssk., Malvaceae, JTG-299	**IKWANGA**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	L	Direct	P
			Retained placenta, **ANGASEP**	L	Water extract	B
Solanum aculeatissimum Jacq., Solanaceae, JTG-473	**ETULELO**	S; W, I	Anaplasmosis, **LOPID**	F	Water extract	B
Solanum cyaneopurpureum De Wild., Solanaceae, JTG-286	**ESIDIKELELE**	H; W, I	Clots milk, **AKISIDIK NGAKILE**	F	See ***Gloriosa superba***	P
Solanum dasyphyllum Schumach. & Thonn., Solanaceae, JTG-451	**ETULELO**	H; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	F	Water extract	B
			Heartwater, **LOKOU**	F	Water extract	B
			Poultry respiratory infection, **AWALA ANGIKOKOROI**	F	Juice	T
Solanum giganteum Jacq., Solanaceae, JTG-337	**ETERAE**	H; W, I	Back pain, **ACIR**	F	Flesh around seeds consumed direct	B
Solanum incanum L., Solanaceae, JTG-001, JTG-024, JTG-287	**ETULELO**	H; W, I	Abscess, **ABUS**	F	Juice topically	P
			Anaplasmosis, **LOPID**	F	Water extract	B
			Anthrax, **LOTIDAE**	F, R	Water extract	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	F	Water extract	B
				F	See ***Capsicum annuum* decoction**	B
				F	See ***Capsicum annuum* extraction**	B
			Diarrhoea, **AKIURUT**	R	Water extract	B, T
			east coast fever, **LOKIT**	F	See ***Aspilia mossambicensis***	B
			Heartwater, **LOKOU**	F	Juice in eye	B
			Mange, **EMITINA**	F	Juice topically	T
			Otitis with pus, often ticks, **LOMID**	F	Juice in ear	B
Solanum sp., Solanaceae	**ETULELO**	H; W, I	Anaplasmosis, **LOPID**	F	Water extract with sediment rock ($CaCO_3$), *Warburgia salutaris* bark	P
				F	Water extract with sediment rock ($CaCO_3$)	B
			East coast fever, **LOKIT**	F	Water extract	P
				F	Water extract with sediment rock ($CaCO_3$), *Warburgia salutaris* bark	B
			Heartwater, **LOKOU**	F	Water extract with sediment rock ($CaCO_3$)	T
			Liver flukes, **LOKURUT**	F	Ibid	B
			Rinderpest, **LOLEO**	F	Water extract with sediment rock ($CaCO_3$), *Warburgia salutaris* bark	B

Sphaeranthus suaveolens DC., Asteraceae, JTG-472	**ABIR**	H; W, I	Fleas, **NGIKADESIDES**	wp	Water extract, topically	B, T
			Lice, **NGILAC**	wp	Water extract, topically	B, T
Sphaeranthus ukambensis Vatke & O.Huffm., Asteraceae, JTG-327, JTG-373	**ABIR**	H; W, I	Bloat, **EKITUBON**	wp	Water extract	B, P
			Measles, **PUURU**	wp	Water extract, oral and topical	P
Steganotaenia araliacea Hochst., Apiaceae, JTG-317	**ELAMORU**	T; W, I	Lumpy skin disease, **LONARU**	B, R	Water extract	B, P
				L, R	See ***Acacia abyssinica***; see ***Capparis fascicularis***	T
			Snake bite, **AKONYET KE EMUN**	B	Water extract	B
				L, R	Water extract	B, P
				R	See ***Gardenia jovis-tonantis***	B
				B	See ***Acacia abyssinica***	B
				L, R	See ***Acacia abyssinica***	B
			Snake bite with head trouble, **AKONYET KE EMUN AKOU**	B, R	Water extract	P
			Snake spit, **AKONYAT EMUN**	B, stem	See ***Gardenia jovis-tonantis***	B
Synadenium grantii Hook f., Euphorbiaceae, JTG-013, JTG-329	**LOTOME or LONGARWE**	S; W, I	East coast fever, **LOKIT**	Exudate	Touch red-hot metal at lymph node (LN), smear latex topically and inside LN	B
				Exudate	Knick hide at LN, smear latex	P
			Living fence, **AWAS**	Stem	Transplant	B
			Spearhead gum, **AKWARA**	Exudate	Fresh sap as glue	T
Tagetes minuta L., Asteraceae, JTG-361, JTG-442	**ABIR or LOSISI**	H; W, I	Lumpy skin disease, **LONARU**	wp	See ***Acacia abyssinica***; water extract	P, T
			Lice, **NGILAC**	wp	Water extract	P, T
			Mange, **EMITINA**	wp	Poultice	P
			Poultry respiratory infection, **AWALA ANGIKOKOROI**	wp	Water extract	B, T
Talinum caffrum (Thunb.) Eckl. & Zeyh., Portulacaceae, JTG-341	**EKURI**	H; W, I	Low milk production, **EURICIANA**	R	Water extract	T
Tamarindus indica L., Fabaceae	**EPERDURU**	T; W, I	Calves that have lost appetite with diarrhoea, **LOLEO**	F (if none, use L)	Infusion	P
			Foot and mouth disease (FMD), **EJOTA**	F	See ***Chasmanthera dependens***	P
			Rotten wounds in mouth, **LOKITUK**	F (if none, use L)	Water extract	P
Tephrosia sp. 1, Fabaceae, JTG-397	**EDODO**	H; W, I	Poisonous - gives cattle foot rot, **INAK EMAARA**	F	Cattle walk on mature pods in pasture	P
Tephrosia sp. 2, Fabaceae, JTG-092	**EPEERU**	H; W, I	Abscess, **ABUS**	L	Poultice	B
			Anaplasmosis, **LOPID**	wp	Water extract	T
			Fever, **IYALAARA**	L	Paste	B
			Intestinal parasites, **NGIKUR**	L	Water extract	B
Tephrosia vogelii Hook.f., Fabaceae	**FISHBIN**	S; C, I	Ticks, **NGIMADANG**	L	Water extract	P
Terminalia brownii Fresen., Combretaceae, JTG-269, JTG-436	**EPIE or EKUYON**	T; W, I	Anaplasmosis, **LOPID**	B	Paste	P
			East coast fever, **LOKIT**	B	Paste	B
			Kidney disease, **ENGALURA**	B	Water extract	B
			Liver disease, **LOLIBAKONYEN**	B	Water extract	T
				B	Paste	B
			Pneumonia, **AWALA**	B	Water extract	B, M, P
Tinospora caffra (Miers) Troupin, Menispermaceae, JTG-016	**ELIGOG**	T; W, I	Anaplasmosis, **LOPID**	R	Water extract	B
Trichilia prieureana A. Juss, Meliaceae, JTG-355	**LOMARAN**	T; W, I	Chest pain, **EKORE**	B	Water extract	B
			East coast fever, **LOKIT**	B	Water extract	B

Appendix A (*Continued*)

Species, family, voucher	Local name	Habitat; status	Indications, local name	Part used	Preparation and administration	Ethnic group
Trichilia prieuriana A. Juss. subsp. *vermoesenii* J.J.de Wilde, Meliaceae, JTG-426	**LOMARAN**	T; W, I	Anaplasmosis, **LOPID**	B	Water extract	B
				B	Paste	P
			East coast fever, **LOKIT**	B	Paste	B
			Heartwater, **LOKOU**	B	Water extract	B
Turraea floribunda Hochst., Meliaceae, JTG-353	**DOKTOR**	T; W, I	Panacea, **NGIDEKESIO DADANG**	B	Water extract	B, M, P
Urena lobata L., Malvaceae, JTG-385	**ACEKDIPONG**	H; W, I	Fodder, **AKIMUJ NGIBAREN**	L	Direct	B
Warburgia salutaris (Bertol. f.) Chiov., Canellaceae, JTG-037, JTG-416	**ABWACH or EMUKWA**	T; W/B, I	Anaplasmosis, **LOPID**	B	Decoction; see ***Cucumis* sp.**; decoction, add sediment rock ($CaCO_3$); see ***Solanum* sp.**	B
			Black feces, greenish urine, **EDIT**	B	Water extract	B
			Contagious bovine/caprine pleuropneumonia, **LOUKOI**	B, R	Water extract	T
				B	Water extract; decoction, add sediment rock ($CaCO_3$); see ***Capsicum annuum***	B
			Compaction, **ETID**	B	Water extract	T
			Constipation, **EGWEE**	B	Water extract	T
			East coast fever, **LOKIT**	B	See ***Cucumis* sp.**; see ***Solanum* sp.**	B
			Fever, **IYALAARA**	B	Water extract	P
			Heartwater, **LOKOU**	B	Water extract	B
			Lokilala tetany, **EYALIYAL**	B	Water extract	B, P
			Rinderpest, **LOLEO**	B	See ***Cucumis* sp.**; see ***Solanum* sp.**	B
Withania somnifera (L.) Dunal, Solanaceae	**LOPISERU**	H; W, I	Contagious bovine/caprine pleuropneumonia, **LOUKOI**	wp	See ***Cissus quadrangularis***	B, P, T
Ximenia americana L., Olacaceae, JTG-300	**ELAMAI**	T; W, I	Cures leather, **AKIMANYIMANY EJAMU**	F	Crush fruits and seeds, scrape fresh hide clean and stretch out	P
Zanthoxylum chalybeum Engl., Rutaceae, JTG-003, JTG-347	**EUSUGU**	T; W, I	Anaplasmosis, **LOPID**	B, R	Water extract	B
			Calf diarrhoea, **AREMOR**	R	Sour milk extract	P
			Diarrhoea, **AKIURUT**	R	Water extract	B
				R	See ***Carissa edulis***	P
			Fever, **IYALAARA**	B	Water extract	P
			Headache, **LOKOU**	B	Water extract	P
			Liver disease, **LOLIBAKONYEN**	B, R	Water extract	B, M, P
			Lumpy skin disease, **LONARU**	R	See ***Carissa edulis***	P
Ziziphus mauritiana Lam., Rhamnaceae, JTG-005	**EKALE**	T; W, I	Constipation, **EGWEE**	B	Water extract	P
			Vomiting, nausea with salivation, **LOJELJEL**	B	Water extract	P

ni – not fully identified.
Habitat: L – liana; H – herb; S – shrub; T – tree; V – vine or creeper.
Status collected: B – available at market; C – cultivated; SW – semi-wild; W – wild.
Status origin: I – indigenous; int – introduced.
Part used: B – bark; F – fruit; Fl – flower; R – root or tuber; S – seed; branch – straight woody branch 1–3 cm diameter; exudates – latex, sap; stem – herbaceous branch; wp = whole plant—any and all parts of herb without the roots.
Preparation: decoction – hot water extraction, boiled in water; direct – no preparation needed; extract – soaked in water (or other mentioned liquid); infusion – warm water extraction, steeped without boiling; poultice – ingredients with a small amount of water (or other mentioned liquid) to form a suspension, used topically; paste – same as poultice, but not used topically; ritual – use with ceremony; (–) not given. Specific preparations detailed on first mention, thereafter noted *see botanical* spp. where initially mentioned. Semicolons used to separate multiple preparations if same disease, same plant part and same ethnic group.
Ethnic group: B – Bokora; D – Dodoth; M – Matheniko; P – Pian; T – Tepeth.
Local names **in bold CAPITAL LETTERS**.

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