Ethnobotanical study of medicinal plants used by local people in Menz Gera Midir District, North Shewa Zone, Amhara Regional State, Ethiopia

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This study was conducted in Menz Gera Midir (Ethiopia) to document medicinal plants and related indigenous knowledge of local people. Data were collected from 72 (12 of them key) informants using semi-structured interview, group discussion and guided field walk. Priority ranking, paired comparison and direct matrix ranking were used in data analysis. A total of 155 medicinal plant species, 104 (67.1%) from natural vegetation and 51 (32.9%) from home gardens were collected. From the total species, 115 were reported to cure only human diseases, 10 species for livestock ailments and 30 for both. Asteraceae contributed 16 species and ranked first followed by Lamiaceae with 12 species. Frequently used plant parts were leaves (43.9%) and roots (31%). The recurrent mode of preparation was pounding (27.9%) followed by powdering (16%) and mostly administrated through oral drinking (33%) and dermal cream (15.7%). Paired comparison revealed that Cucurbita pepo was the most preferred species to treat headache. However, Olea europaea subsp. cuspidata was reported as the most multipurpose plant species. Priority ranking indicated that Lupinus albus was the rarest medicinal plant in the study area. The medicinal plant resources of the area were threatened by agricultural expansion, charcoal making, firewood collection and overgrazing.

Key words: Ethnobotany, indigenous knowledge, medicinal plants, Menz Gera Midir.

INTRODUCTION

Historically, relationship between plants and human are not only limited to the use of plants for food, clothing and shelter but also includes their use for religious ceremonies, ornamentation and healthcare (Schultes, 1992). Traditional people around the world acquire unique knowledge of plant resources on which they depend for food, medicine, cultural and religious practice (Martin, 1995). Ethnobotany is then the way of scientific investigation on the use of these plants in traditional culture for food, medicine, magic, rituals, building,
Household utensils and implements, musical instruments, firewood, pesticides, clothing, shelter and other purposes (Urga et al., 2004).

Medicinal plants preferably have significant contributions in the healthcare scheme of local communities as the main resource of medicine for the mainstream of the rural population (Hailemariam et al., 2009). About 80% of the world’s population relies chiefly on traditional medicine for their healthcare practices (Brown, 1992). This is because the traditional systems are culturally more acceptable and convene the psychological needs of people than modern medicine (Brown, 1992). Thus, medicinal plants are widely used for the treatment of numerous human and livestock ailments in different parts of the world.

Ethiopia has a long history of traditional medication and developed practices to treat diseases using diverse cultural systems found in the country (Shimeils et al., 2012). Healing in Ethiopian traditional medicine is not only concerned with curing of diseases but also with the protection and promotion of human physical, spiritual, social, mental and material wellbeing (Bishaw, 1991). It was widely believed in Ethiopia that the skill of traditional health practitioners is ‘given by God’ and knowledge on traditional medicines is passed orally from father to a favorite child, usually a son or is acquired by some spiritual procedures. Traditional healing knowledge is maintained by certain families or social groups (Gidaya et al., 2009), although needed to meet the goals of a wider coverage of primary healthcare delivery in all countries.

In Ethiopia, 80% of the population use traditional medicine due to the cultural acceptability of healers and local pharmacopeias, the relative low cost of herbal medicine and the limited access to modern health facilities (Deribe et al., 2006). In addition, there is cultural diversity and the use pattern of the various flora differ accordingly (Balemie et al., 2004). Although the medicinal plants were playing a key role for the development and advancement of modern drugs (Heinrich, 2000), both human and natural factors are heavily contributing to the loss of these plants and cause gradual displacement of associated indigenous knowledge.

Ethiopian people used to transfer indigenous knowledge about traditional medicinal plants mostly in a secret way from generation to generation orally. So then, there is a gap in the documentation and records about traditional knowledge on medicinal plants, even if they are serving as remedies for both human and livestock diseases. Whereas, the knowledge and use of plants is an integral part of many ethnic rural cultures in Ethiopia, the extent of which has not yet been studied in depth (Abbink, 1995). For instance, the ethnobotanical study in the people of Menz Gera Midir has remained unexplored and no documentation has been done on the medicinal plants and the associated knowledge available before this study.

Therefore, this study was conducted to document medicinal plants used by local people and the associated indigenous knowledge acquired regarding the methods to preparation, prioritize for use and the routes of administration in Menz Gera Midir District, Ethiopia.

**MATERIALS AND METHODS**

**Description of the study area**

Menz Gera Midir is one of Districts found in North Shewa (Figure 1) in the Amhara Regional State. It is located 282 km Northeast of Addis Ababa, capital city of Ethiopia. The total area coverage is 116,816 hectare comprising 20 kebeles (small administrative
category next to District). The estimated population was 93,738 (47,994 female and 45,744 male) and 99.56% of them are Orthodox Christianity followers belonging to the Amhara ethnic group and speaking Amharic as their native language. The elevation of study area ranges from 1680 to 3600 m. a. s. l. and lies between 10°5' to 10°32' N and 38° 28' to 38° 49' E. The soil types of the study area was 61.8% Brown, 18.2% Clay, 13% Red and 7% Gray, and has major agro-climatic zones described as WURCH (Afroalpine), DEGA (highland area) and WEINA-DEGA (middle altitude). Data obtained from the unpublished National Meteorological Service (NMSA) Agency showed that the annual rainfall was 888 mm and the distribution is bimodal and minimum and maximum temperatures was 8.7°C and 20°C, respectively (NMSA, 2013). The vegetation of the area is dry evergreen Afromontane type characterized by the presence of major tree species that include Juniperus procera, Acacia abyssinica, Podocarpus falcatus, Olea europea subsp. cuspidata, Hagenia abyssinica, Eucalyptus globulus and Afro-alpine type with most conspicuous giant lobelia (Lobelia rhynchopetalum) and sub-afr alpine ecosystem. The current land use in the study area was predominantly (85%) smallholder agriculture with an average landholding size of one hectare per household. The seed farming complex was a common practice where barely (Hordeum vulgare), wheat (Triticum spp.), faba bean (Vicia faba) and lentil (Lens culinaris) are the dominant crops. In addition, livestock rearing was also an integral part of the agricultural system in the study area.

Study sites and informant selection

In the Menz Gera Midir District, about 20 kebeles were found. Out of these, 12 kebeles were selected purposely through guidance of District’s Tourism Office employees based on availability of traditional healers and plant species for the study. These kebeles are: AREGO, ATEDAS-GEANBO, DERGAGN, GEYA, KELADUHA, KEWOSA, MESALE MARIAM, NEGASI AMBA, SHOLA, SRA GEDEL, TSEHAY SINA and WEZED. A total of 72 informants (47 male and 25 female) aged between 20-90 years (12 of them were key informant taking 1 from each kebele) were selected by the recommendation of elders and local authorities. Out of total informants, 38 completed grade 3-12 and the remaining 34 were illiterate. All informants (62 married, 5 divorced and 5 single) are Orthodox Christian Religion followers and native Amharic speakers.

Ethnobotanical data collection

The data were collected from November 2012 to January 2013 using ethnobotanical data collection techniques such as semi-structured interview, group discussion and guided field walk. Informants were interviewed at least twice for same question to evaluate reliability of the information.

Data analysis

In this study, both qualitative and quantitative analytical tools were used for data analysis following approaches of Martin (1995) and Cottin (1996). The Informant Consensus Factor (ICF) was calculated for each disease category to identify the agreements of the informants on the reported cures for eight human disease categories. The ICF was calculated as follows: number of use citations in each category (Nur) minus the number of species used (Nt), divided by the numbers of use citations in each category minus one (Heinerich et al., 1998). Priority ranking were conducted by asking people to list plants that are becoming increasingly rare in their communal forests. Therefore, a set of eight medicinal plants were selected from the lists reported by most informants as scarce in the study area. Then, selected plants were presented to eight randomly selected key informants to rank them according to their degree of scarcity using numerical value (1, 2, 3, and so on). The most scarce medicinal plant species were given the highest value while abundant one was assigned a value of 1. Then, the numbers were summed and ranked. For the degree of informants herbal remedies preference to treat headache in the study area, paired comparison was done (Martin, 1995). For this purpose, eight key informants were randomly selected and allowed to show their responses independently for pairs of medicinal plants that are noted for treating headache. All possible combinations were made and sequence of pairs and order within each pair was randomized before every pair was presented to selected informants. Their responses were recorded carefully and then the total values were summarized and ranked based on the informants report. Specificity for a certain disease was then also checked by fidelity level calculation (Friedman et al., 1986). The medicinal plants which have multipurpose nature for local people were checked using direct matrix ranking method. According to informants’ indication, eight multipurpose plant species were selected for seven use diversities. Then eight key informants were asked to assign use values: 5= excellent, 4= very good, 3 = good, 2 = less used, 1= least used, 0 = not used, for each species based on the multiple purpose. Finally, ethnobotanical data were entered in to excel spreadsheet and interpreted using tables, and descriptive statistics.

RESULTS

Taxonomic diversity of medicinal plants

A total of 155 medicinal plant species distributed in 133 genera and 65 families were collected, identified and documented (Appendix 1). From the total families, 61 (93.84%) were angiosperms, 2 (3.08%) gymnosperms and 2 (3.08%) were cryptograms. Among the angiosperms, the most dominant (92%) group were the dicotyledons, whereas 8% were monocotyledons. Asteraceae was found to be the most dominant family that contained 16 medicinal plant species under 13 genera followed by Lamiaceae, which had 12 species distributed in 10 genera. Out of the total collected medicinal plants, 13 species are endemic to Ethiopia and 5 species are placed under the near endemic category since they were found both in Ethiopia and Eritrea. Herbs constituted the largest category of medicinal plants (68; 43.9%) species followed by shrubs (47; 30.3%) in the study area. The natural vegetation of the study area was categorized visually into six major groups based on the dominance of the plant species:

1) The J. procera- dominated plant community type was predominantly found in three Kebeles (KEWOSA, MESALE MARIAM and SRA GEDEL) and around few churches at an altitudinal range of 2700-2930 m. a.s.l. Under this, 4 species of medicinal plants were obtained;

2) The Lobelia rhynchopetalum-dominated community type was mainly dominated by a single species and found in DERGAGN Kebele, located at the mountain tops (3458 m. a. s. l.);
(3) The *E. globulus*-dominated community type was the plantation found in almost all parts of the study area. This species has been widely planted in the area as it is one of the good money generating species for the farmers in the locality. *A. africanus* and *P. sphacelatum* were common herbaceous medicinal plants found in this community;

(4) The *O. rochetiana* and *R. vulgaris*–dominated plant community type is more diversified and found in SRA GEDEL Kebele, particularly at GAJELO forest. It is located at an altitude ranging between 2500-2850 m a.s.l. It encompasses 14 medicinal plant species and the most dominant one are *Carissa spinarum*, *Clutia abyssinica*, *Maesa lanceolata*, *Maytenus arbutilfolia*, *Podocarpus falcatus*, *Pteridium aquilinium*, and *Vernonia amygdalina*;

(5) The other plant community type in the study area was the *Dodonaea angustifolia* and *Rumex nervosus*-dominated type. This plant community encompasses 38 species of medicinal plants distributed in three Kebeles (MESALE MARIAM, SRA GEDEL and KEWOSA) at altitude ranging between 2197-2860 m a.s.l. The medicinal plants found in this community type were *Croton macrostachyus*, *Cyphostemma adenoacule*, *Euclea divinorum*, *Euphorbia abyssinica*, *Myrsine africana*, *Ostostegia integrifolia*, *Premna schimperii*;

(6) The *Helichrysum* sp.–dominated community contains mainly a single species and dominantly found in WEZED Kebele at an altitude ranging from 2850-3010 m a.s.l. This plant community type harbours the medicinal plants *Dovyalis abyssinica*, *Hagenia abyssinica*, *Inula confertiflora*, *Laggera tomentosa* and *Vernonia bipontini*.

Furthermore, home gardens were also another source of medicinal plant in the study area. Some of medicinal plant species obtained in the home garden includes *Foeniculum vulgare*, *Achyranthes aspera*, *Allium sativum*, *Artemisia rehan*, *Ruta chalepensis*, *Brassica oleracea*, *Capsicum annuum*, *Catha edulis*, *Cucurbita pepo*, *Daucus carota*, *Euphorbia amyphllyda*, *Kalanchoe petittiana*, *Leonotis ocymifolia*, *Lippia adoensis*, *Malus sylvestris*, *Ocimum lamifolium*, *Opuntia ficusindica*, *Phytolacca dodecandra*, *Ricinus communis*, *Sansevieria ehrenbergii*, *Urtica simensis*, *Zehneria scabra* *Allium cepa*, *Citrus aurantifolia*, *Citrus limon*, *Citrus medica*, *Lagenaria siceraria*, *lycopersicon esculentum*, *Myrtus communis* and *Saccharum officinarum*.

**Distribution of medicinal plants and indigenous knowledge**

This study revealed that medicinal plants were unevenly distributed in the different plant community types. Of the 155 medicinal plants, 104 (67.1%) species belonged to 86 genera and 52 families found in the wild vegetation whereas 51 (32.9%) species which belong to 47 genera and 28 families were obtained from home garden (Appendix 1). Most of the traditional knowledge of medicinal plants is passed orally and through secret along the family line from parents. Of the total informants, 73.6% gained their medicinal plant knowledge from families and some others by observation (19.4%) and learning (7%) from the other people. Out of the total identified medicinal plants, 115 (74.2%) species belonging to 101 genera and 51 families were those cited as traditional medicine for human ailments, whereas 10 (6.45%) species belonging to 10 genera and 9 families are used to treat merely livestock ailments. Only 30 (19.35%) species under 30 genera and 21 families were used for both livestock and human ailments. The local people were frequently using leaves (43.9%) followed by roots (31%) to prepare plant remedy. As informants mentioned, plant remedies were used in fresh form (67; 43.2%), while (49; 31.6%) were used in the dried form and (39; 25.2%) in either of the two.

In the study area, traditional healers used different ways of medicinal plant remedy preparation. Among these principal methods, pounding ranked first (27.9%), followed by powdering (16%), and squeezing (15.3%) and cooking was the least (0.34%). The prepared remedies were mostly taken oral drinking (33%) followed by dermal application in the form of cream (15.7%) and eating (11.9%). Dosage was estimated using spoon, cup, cans, and glass for liquids, and for powders spoonful counting or in some cases handful (EFEIGN) was used. The dosage is mostly age and patient status dependent.

**Human and livestock ailments treated by medicinal plants**

In the present study, 83 ailments (68 in human, 6 in livestock and 9 in both humans and livestock) were reported to be treated by medicinal plants (Table 2; Appendix 1). The informants also cite top commonly known medicinal plants in the study area using ranks and *C. ficifolius* were cited by 50 (69.44%) informants and ranked 1st, *Artemisia abyssinica* was cited by 49 (68.05%), and *L. ocymifolia* by 48 (66.66 %) (Table 1).

The abundance and scarcity of medicinal plants in the study area was checked by preference ranking exercise conducted on eight species by eight key informants. The results showed that *L. albus* was the scarcest medicinal plant, cultivated only by limited number of individuals in their home garden who asserted that they get the seeds from around Bahir Dar (Table 3).

Moreover, paired comparison was also made to determine the most preferred medicinal plants among the five species that were used to treat headache in the study area. Traditional healers are well experienced to treat headache using different herbal medicine in the study area. Then, the paired comparison techniques were done to select the most promising medicinal plant form the others to treat it.

Thus, eight key informants participated in this activity...
and indicated that *C. pepo* was used more to treat headache followed by *M. salicifolia* (Table 4). Medicinal plants in the study area had also multiple uses for the community. Direct matrix ranking showed that *O. europaea* subsp. *cuspidata* ranked first due to the multipurpose role it has for the community and this was followed by *E. globulus* and *J. procera* (Table 5). The fidelity level of the data was calculated based on the diseases frequently reported by informants and traditional use of medicinal plant for treatments. The diseases include evil eye, "EYNEWOG", wound, eczema, stomach ache; eye disease, fibril illness and common cold which were confirmed to frequently occur in the area. Consequently, traditional healers employed their indigenous knowledge to manage these frequent diseases using selected medicinal plant species (Table 5).

In Menz Gera Midir District, there are natural and human made factors that cause the threat on medicinal

| Medicinal plant              | Number of informants | % of informants |
|------------------------------|----------------------|-----------------|
| *Cucumis ficifolius*         | 50                   | 69.44           |
| *Artemisia abyssinica*       | 49                   | 68.05           |
| *Leonotis ocymifolia*        | 48                   | 66.66           |
| *Allium sativum*             | 46                   | 63.9            |
| *Clematis sinensis*          | 45                   | 62.5            |
| *Ruta chalepensis*           | 45                   | 62.5            |
| *Gomphocarpus purpurascens*  | 40                   | 55.55           |
| *Verbascum sinaticum*        | 33                   | 45.83           |
| *Vernonia bipontini*         | 33                   | 45.83           |
| *Withania somnifera*         | 32                   | 44.44           |

Table 2. Informant consensus factor for eight disease categories

| Category of diseases                        | Number of species | Number of use citation | ICF |
|---------------------------------------------|-------------------|------------------------|-----|
| Skin diseases                               | 64                | 382                    | 0.83|
| Ailments associated with organs and throat  | 20                | 80                     | 0.76|
| Gastrointestinal tract diseases             | 46                | 328                    | 0.86|
| Organ diseases                              | 34                | 123                    | 0.73|
| Genitourinary problems                      | 17                | 57                     | 0.71|
| Acute sickness                              | 45                | 250                    | 0.82|
| Birth problems                              | 5                 | 8                      | 0.43|
| Others: rabies, anemia and fibril illness   | 10                | 33                     | 0.72|

Table 3. Ranking of scarce medicinal plants in the study area

| Medicinal plant          | Key Informants (1-18) | Total score | Rank |
|--------------------------|-----------------------|-------------|------|
| *Milletia ferruginea*    | I1 5 2 3 13 4 4 2 2 3 | 27          | 6th  |
| *Capparis tomentosa*     | I2 5 5 4 5 3 4 3 3 3 3| 32          | 3rd  |
| *Tragia cinerea*         | I3 4 5 4 4 3 3 3 4 4 | 30          | 4th  |
| *Lupinus albus*          | I4 5 5 5 4 5 5 4 5 4 | 37          | 1st  |
| *Sansevieria ehrenbergii*| I5 5 3 3 4 3 4 3 3 3 | 28          | 5th  |
| *Cyphostemma adenocaule* | I6 4 3 2 3 2 4 3 4 2 | 25          | 7th  |
| *Cucumis ficifolius*     | I7 4 5 3 1 2 3 4 2 4 | 24          | 8th  |
| *Withania somnifera*     | I8 5 5 5 4 3 4 5 4 4 | 35          | 2nd  |

I, Informants.
plants. This study confirms that the most threatening factor for medicinal plants and the associated indigenous knowledge disappearance are anthropogenic factors such as deforestation and overexploitation of landscape for charcoal, fire wood, for construction overgrazing, and agricultural expansion. Informants ranked agricultural expansion as the most serious threat for medicinal plants followed by charcoal making (Table 7).

Local people in the area have strong and actual belief on healing power of plants and they know their habitats, distribution, harvesting techniques, time of harvest and the status of a plant. The healers also know the site in which medicinal plants were found and the parts to be harvested. Plant apex, main root and regenerating parts are not harvested. This is to keep and increase the regeneration capacity of the plant. Therefore, the appropriate way of harvesting technique has direct or indirect contribution for the conservation of medicinal plants, since they limit excessive loss of these plants in one way or another.

Furthermore, sites dominated by *O. rochetiana* and *R. vulgaris* plant community types and church forests were protected in SRA GEDEL Kebele. In these areas, medicinal plants are sheltered and conserved. On the other hand, it was also observed that the local farmers make use of their indigenous knowledge in protecting important plant species on their farm lands, home gardens, and as live fence. In some cases, few traditional healers cultivate very rare species in their home gardens like *L. albus*.

### DISCUSSION

Menz Gera Midir District has relatively high taxonomic diversity in medicinal plants with 155 species reported under 133 genera and 65 families. Asteraceae was the family with the highest number of medicinal plants, which is largely a result of the abundance and wide distribution of members of the family in the flora of Ethiopia and Eritrea (Tadesse, 2004). It is also reported to be the family that encompasses large number of medicinal plant species along with the Lamiaceae and Fabaceae in the nearby Minjar-Shenkora District (Alemayehu et al., 2015).

In the study area, wild medicinal plant species were more dominant (104, 67.1%) and harvested from the natural vegetation. Similarly, ethnobotanical studies undertaken elsewhere in Ethiopia (Birhane et al., 2011; Yirga et al., 2011; Alemayehu et al., 2015; Meragiaw et al., 2016) have repeatedly shown that wild areas are primary sources of medicinal plants. In addition to this, farmlands and home gardens maintain a considerable number (51, 32.9 %) of species used in traditional herbal medicine. Informants during interview and group discussion categorized the medicinal plants of the area into common, medium and rare species. From the total medicinal plant species, 27.74% were recorded as rare, 29% as common and 42.26% as medium in the study.
area. As compiled from informant's interview, indigenous knowledge on medicinal plants was differing among age and gender. Although elders are generally considered to be more knowledgeable than the younger (Hailemariam et al., 2009), the traditional medicine practitioners in the study area were more dominated by male individuals with religious education as found in other areas (Giday et al., 2009). Investigations in different parts of Ethiopia showed that transfer of indigenous knowledge between generations was affected by modernization like access to modern education and ignoring the traditional knowledge in addition to health services expansion (Balemie et al.,

| Disease treated | Medicinal plants          | Ni | N | Ni/N | Ni/N x 100 (%) |
|-----------------|---------------------------|----|---|------|----------------|
| Wound           | Aloe pulcherrima          | 4  | 5 | 0.8  | 80             |
|                 | Datura stramonium         | 14 | 18| 0.78 | 78             |
|                 | Lagdera tomentosa         | 10 | 15| 0.67 | 67             |
| Evil eye        | Capparis tomentosa        | 15 | 15| 1    | 100            |
|                 | Withania somnifera        | 16 | 16| 1    | 100            |
| Eczema          | Clematis simensis         | 20 | 25| 0.8  | 80             |
|                 | Gomphocarpus purpurascens | 10 | 30| 0.3  | 30             |
|                 | Urta simensis             | 5  | 7 | 0.71 | 71             |
| “EYNEWOG*       | Otostegia integrifolia    | 8  | 15| 0.53 | 53             |
|                 | Verbascum sinaiticum      | 13 | 20| 0.65 | 65             |
| Common cold     | Thymus schimperi          | 4  | 5 | 0.8  | 80             |
|                 | Artemisia abyssinica      | 24 | 25| 0.96 | 96             |
| Stomach ache    | Cucumis ficifolius        | 25 | 25| 1    | 100            |
|                 | Ruta chalepensis          | 20 | 25| 0.8  | 80             |
|                 | Allium sativum            | 21 | 25| 0.84 | 84             |
|                 | Lepidium sativum          | 12 | 18| 0.67 | 67             |
| Fibril illness  | Leonotis ocymifolia       | 23 | 25| 0.92 | 92             |
|                 | Eucalyptus globules       | 3  | 6 | 0.5  | 50             |
| Eye disease     | Inula confertiflora       | 3  | 4 | 0.75 | 75             |
|                 | Vernonia bipontini        | 10 | 23| 0.43 | 43             |

Table 7. Ranking of threats to medicinal plants.

| Major threats               | Key Informants (I1-18) | Total score | Rank |
|-----------------------------|------------------------|-------------|------|
| Agricultural expansion      | I1 1 2 3 4 5 6 7 8    | 34          | 1st  |
| Drought                     | I1 2 3 4 5            | 17          | 5th  |
| Construction material       | I1 2 3 4             | 16          | 6th  |
| Charcoal making             | I1 2 3 4             | 29          | 2nd  |
| Overgrazing                 | I1 2 3 4             | 18          | 4th  |
| Fire wood collection        | I1 2 3 4             | 27          | 3rd  |

5: very highly destructive; 4: highly destructive; 3: medium; 2-destructive; 1, less destructiveness.
Mostly traditional knowledge was transferred between family members from parents (73.6%) secretly and orally to more favoured individuals. The findings of Gebeyehu et al. (2014), in Mecha District, West Gojjam confirmed this reality. The second (19.4%) source of knowledge acquisition was observation and learning from the other people. In this case, knowledge was gained from other knowledgeable individuals by payment or careful repeated observation from friends. Currently, 75% of the traditional healers involved in this study planned to transfer their medicinal plant knowledge to their sons (16.7%) to daughters, 8.3% are positive to transfer to any member of the community without compensation. The types of medicinal plants used by local people in Menz Gera Midir were herbs 68 (43.87%) followed by shrubs 47 (30.32%). This result agrees with the findings of other researchers (Friedman et al., 1986; Addisie et al., 2012). This is due to the fact that herbs can grow everywhere and dominate during the wet seasons as compared to others such as trees, shrubs and woody climbers/lianas.

The current study confirmed that considerable number of medicinal plant species were collected and documented for treatment of human and livestock ailments. Out of the collected medicinal plants, more species were reported as being used to treat human diseases compared to medicinal plant species used for livestock ailments. Fewer numbers (6 of livestock diseases) and 10 medicinal plants were reported as compared to humans (68 diseases and 115 species). This showed that people of the study area are more conscious and give more attention for their ailments than the livestock diseases (Megersa et al., 2013). Traditional healers are dominantly using the leaves (43.9%) because of presence of high bioactive compounds which increase efficacy of remedies followed by roots (31%). This is consistent with other findings (Hailiemariam et al., 2009; Chekole et al., 2015; Adefa and Abbraha, 2011) elsewhere in Ethiopia. On the contrary, the numbers found in some other parts of the country reported that roots are the most widely used plant parts for medicinal value (Birhane et al., 2011; Mesfin et al., 2009; Flatie et al., 2009). Most of the plant remedies are prepared by pounding (27.9%) followed by powdering (16%) which is positively supported by the finding of Getaneh and Girma (2014) in Deber Libanos District. However, squeezing came in the first place as a way of preparation in Mecha District (Chekole et al., 2015). The prepared remedies were efficiently used in fresh (43.22%) form followed by dried (31.61%) and either of the two (25.17%) to treat ailments. Different findings were also reported in consonance with this study (Meragiaw et al., 2016; Megersa et al., 2013; Yineger et al., 2008).

The routes of administration mostly depend on the nature of ailments to be treated. The most popular way of administration of traditional herbal/plant medicines are oral (47.96%) followed by dermal (28.57%). Various ethnomedical reports elsewhere in Ethiopia have indicated that oral administration is the predominant route (Hailiemariam et al., 2009; Birhane et al., 2011; Yirga et al., 2011; Mesfin et al., 2009). The dosages of remedies are not yet standardized. Because healers are using equipment which are available near their homes for measuring the doses of traditional herbal medicines. However, the dosage is age, physical and health condition dependent of the patient.

Thus, this is expected to cause risk due to under dose and over dose during treatment of patients. Then, lack of precision and standardization has been mentioned as drawbacks of traditional medication (Sofowora, 1982; Abebe, 1986; Araya et al., 2015). Sometimes traditional healers impose the restrictions when certain types of remedies are taken by patients. For instance, patients who take a remedy against impotency prepared from the root of M. ferruginea were instructed that their body parts should not touch water for 24 hours to increase efficacy of the remedy. Healers also advise patients to take additives like milk, coffee, tea, tela, butter and honey to improve medication efficacy and reduce the adverse effects of remedies during traditional medication.

The use of medicinal plants was calculated on frequently reported diseases with respect to medicinal plant species. The fidelity level of Capparis tomentosa and W. somnifera for evil eye and C. ficifolius for stomach ache was scored 100. Since these plant species are highly known by the healers and also have high efficacy to treat these diseases. Furthermore, there is no any modern drug that used to heal evil eye. Priority ranking confirmed the existence of some medicinal plants which are referred by local people at scarce situations. The scarcity is resulted because of anthropogenic and natural factors like deforestation for agricultural expansion, fire wood collection, fire, overgrazing and urbanization as major threats of medicinal plants in Ethiopia (Gebeeyehu et al., 2014; Getaneh and Girma, 2014; Alemayehu et al., 2015; Kewessa et al., 2015; Chekole et al., 2015).

In the area, informants reported that several medicinal plants have already disappeared from their common habitats and some of them are at risk of extinction. The first factors for the declining of medicinal plants were agricultural expansion followed by charcoal making in the study area. Other reports (Mesfin et al., 2009; Meragiaw et al., 2016) indicated that agricultural expansion was the major threat on medicinal plants both in Wonago and Northwestern Wello districts. In most situations, the home gardens maintain threatened medicinal plants by protecting from grazing and unwise harvesting. This is a good opportunity for wise use and better transfer of the indigenous knowledge to the younger generation. However, in-situ conservation in the natural environment is the best recommended method to save important medicinal plant species for keeping them in their natural condition.
Conclusion
The results of this study indicated that the potential and abundance of medicinal plant species (155) in the Menz Gera Midir District is an important resource for the present and future generations.

The higher proportion (74%) of these plants was used to treat human ailments further indicates the important role that the medicinal flora has for the healthcare of the immediate society and others. The number of human and livestock ailments (83 diseases) treated with medicinal plants also indicates how important these plants are to the society in Menz Gera Midir District.

From this, we can conclude that the community in this area was achieving alternative relief of diseases if the modern therapy is lacking. The natural vegetation in Menz Gera Midir is rich in medicinal plants (104 species) although a good number of species (51 species) were available in the home gardens. The results also showed that herbs are the leading remedies in the area while shrubs and trees also had their contributions.

The traditional healers revealed that the leaves are the most frequently used plant parts with roots having their shares to prepare mostly in fresh condition and predominantly administered through oral route. Traditional healers’ indigenous knowledge has variation among age and gender in which elders and men are solely shelf their knowledge on herbal medicine and transfer through strict secret. However, modern education is partially contributing to the undermining of traditional knowledge acquisition in younger generation.

The results further showed that many wild medicinal plant species are under threat by the various natural and human factors sending signals for the attention needed to conserve these medicinal plants.

CONFICT OF INTEREST
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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REFERENCES
Abbink J (1995). Medicinal and ritual plants of the Ethiopian Southwest: an account of recent research. Indigenous knowledge and development monitor 3(2):6-8.
Abebe D (1986). Traditional medicine in Ethiopia: the attempts being made to promote it for effective and better utilization. SINET 9(Suppl):61-69.
Adefa M, Abraha B (2011). Ethnobotanical survey of traditional medicinal plants in Tehulder district, South Wollo, Ethiopia. Journal of Medicinal Plants Research 5(26):6233-6242.
Alemayehu G, Asfaw Z, Kelbessa E (2015). Ethnobotanical study of medicinal plants used by local communities of Minjar-Shenkora District, North Shewa Zone of Amhara Region, Ethiopia. Journal of Medicinal Plants Studies 3(6):01-11.
Alexiades M (1996). Collecting ethnobotanical data: An introduction to basic concepts and techniques. Selected Guidelines for Ethnobotanical Research: A Field Manual; Alexiades, MN, Ed. i9780893274047
Araya S, Abera B, Giday M (2015). Study of plants traditionally used in public and animal health management in Sisharti Samre District, Southern Tigray, Ethiopia. Journal of ethnobiology and ethnomedicine 11(1):22.
Baleme K, Kelbessa E, Asfaw Z (2004). Indigenous medicinal plant utilization, management and threats in Fentalle area, Eastern Shewa, Ethiopia. Ethiopian Journal of Biological Sciences 3(1):37-58.
Birhane E, Aynenku E, Mekuria, W, Endale D (2011). Management, use and ecology of medicinal plants in the degraded dry lands of Tigray, Northern Ethiopia. Journal of Medicinal Plants Research 5(3):309-318.
Bishaw M (1991). Promoting traditional medicine in Ethiopia: A brief historical review of government policy. Social science and medicine 33(2):193-200.
Brown K (1992). Medicinal plants, indigenous medicine and conservation of biodiversity in Ghana. Centre for Social and Economic Research on the Global Environment. Working Paper GEC 92-36. University of East Anglia, UK.
Chekole G, Asfaw Z, Kelbessa E (2015). Ethnobotanical study of medicinal plants in the environs of Tara-gedam and Amba remnant forests of Libo Kemkem District, northwest Ethiopia. Journal of ethnobotany and ethnomedicine 11(1):4.
Cotton CM (1996). Ethnobotany: Principles and Applications. John Willey and Sons LTD. New York.
Deribe T, Amberbir A, Getachew B, Mussema Y (2006). A historical overview of traditional medicine practices and policy in Ethiopia. Ethiopian Journal of Health Development 20(2):127-134.
Flatie T, Gedif T, Asres K, Gebre-Mariam T (2009). Ethnomedical survey of Berta ethnic group Assosa Zone, Benishangul-Gumuz regional state, mid-west Ethiopia. Journal of Ethnobotany and Ethnomedicine 5(1):14.
Friedman J, Yaniv Z, Dafni A, Palewitch D (1986). A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. Journal of ethnopharmacology 16(2-3):275-287.
Gebeeyehu G, Asfaw Z, Enyw A, Raja N (2014). Ethnobotanical study of traditional medicinal plants and their conservation status in Mecha Wereda West Gojam Zone of Ethiopia. International Journal of Pharmacueticals and Health Care Research 2(3):137-154.
Getanesh S,irma Z (2014). An ethnobotanical study of medicinal plants in Debre Libanos Wereda, Central Ethiopia. African Journal of Plant Science 8(7):366-379.
Giday M, Asfaw Z, Woldu Z, Teklehaimanot T (2009). Medicinal plant knowledge of the Bench ethnic group of Ethiopia: an ethnobotanical investigation. Journal of Ethnobiology and Ethnomedicine 5(1):34.
Gidaya M, Asfaw Z, Woldu Z (2009). Medicinal plants of the Meinit ethnic group of Ethiopia: an ethnobotanical study. Journal of Ethnopharmacology 124(3):513-521.
Hailemariam T, Demissew S, Asfaw Z (2009). An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta Special Woreda, southern nations, nationalities and peoples regional state, Ethiopia. Journal of Ethnobiology and Ethnomedicine 3(1):26.
Heinrich M (2000). Ethnobotany and its role in drug development. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product
Derivatives 14(7):479-488.
Kewessa G, Abebe T, Demessie A (2015). Indigenous knowledge on the use and management of medicinal trees and shrubs in Dale District, Sidama Zone, Southern Ethiopia. Ethnobotany Research and Applications 14:171-182
Martin GJ (1995). Ethnobotany: A Method Manual. Chapman and Hall, London, UK.
Megersa M, Asfaw Z, Kelbessa E, Beyene A, Woldeab B (2013). An ethnobotanical study of medicinal plants in Wayu Tuka district, east Welega zone of oromia regional state, West Ethiopia. Journal of ethnobiology and ethnomedicine 9(1):68.
Mekelle E (2012). Traditional medicinal plants used by people in Libo-Kemkem district, south Gondar, Ethiopia. Asian Journal of Agricultural Sciences 4(3):171-176.
Meragiaw M, Asfaw Z, Argaw M (2016). The status of ethnobotanical knowledge of medicinal plants and the impacts of resettlement in Delanta, northwestern Wello, northern Ethiopia. Evidence-Based Complementary and Alternative Medicine 2016.
Mesfin F, Demissew S, Teklehaimanot T (2009). An ethnobotanical study of medicinal plants in Wonago Woreda, SNNPR, Ethiopia. Journal of Ethnobiology and Ethnomedicine 5(1):28.
Schultes RE (1992). Ethnobotany and technology in the Northwest Amazon: A partnership. Sustainable harvest and marketing of rain forest products P 45.
Shimeles ND, Asticioli S, Baraldo M, Tirillini B, Lulekal E, Murgia V (2012). Researching accessible and affordable treatment for common dermatological problems in developing countries. An Ethiopian experience. International journal of dermatology 51(7):790-795.
Sofowora A (1982). Medicinal plants and traditional medicine in Africa. John Wiley and Sons, New York, in association with Spectrum Books Ltd, Ibadan, Nigeria pp. 142-145
Tadesse M (2004). Asteraceae (Compositae). In: Flora of Ethiopia and Eritrea, vol. 4, Part 2, Hedberg I, Friis I, and Persson, E eds. Addis Ababa University, Ethiopia, Uppsalan University, Sweden.
Urga K, Ayale A, Merga G (2004). Traditional medicine in Ethiopia proceedings of a national work shop held in Addis Ababa, Ethiopia, 30 June-2 July 2003. Addis Ababa, Ethiopia.
Yineger H, Yewhalaw D, Teketay D (2008). Ethnomedicinal plant knowledge and practice of the Oromo ethnic group in southwestern Ethiopia. Journal of Ethnobiology and Ethnomedicine 4(1):11.
Yirga G, Teferi M, Kasaye M (2011). Survey of medicinal plants used to treat human ailments in Hawzen district, Northern Ethiopia. International Journal of Biodiversity and Conservation 3(13):709-714.
### Appendix 1. Medicinal plants distribution and use by local people in the study area

| S/N | Scientific Name       | Family  | Local Name | Habit | Habitat | Ab | PU | CP        | Disease/symptoms claimed to be treated              | Route | Altit (m) | Geographical Location | Collection Number |
|-----|-----------------------|---------|------------|-------|---------|----|----|----------|---------------------------------------------------|-------|------------|-----------------------|------------------|
| 1   | *Acacia abyssinica*   | Fabaceae| GIRAR      | T     | HG      | M  | Fr | F/D      | Orchitcil                                         | Oral  | 2433       | 10° 13'15.4"N 039° 32' 47.3E | SW101            |
| 2   | *Achyranthes aspera* L.| Amaranthacea | TELENGZ | H     | HG      | C  | R and L | F        | Stabbing pain, Uvulillia                          | Dermal, Nasal | 2933       | 10° 17'52.7"N 039° 34' 54.8E | SW017            |
| 3   | *Acokanthera schimperi* Schweinf. | Apocynaceae | MIRIENZ | T     | W      | M  | R  | D        | Intestinal parasite, Evil eye                     | Oral, Nasal | 2371       | 10° 12'44"N 039° 32' 23.2E | SW108            |
| 4   | *Allium cepa* L.      | Alliaceae | KEY SHINKURT | H | HG     | C  | Bu | F        | Tinea versicolor                                | Dermal | 2310       | 10° 13'22.2N 039° 31' 47.8E | SW055            |
| 5   | *Allium sativum* L.   | Alliaceae | NECH SHINKURT | H | HG     | C  | Bu | F        | Jaundice, Malaria, Ascaries, "Eeyenewog", Cocoides | Oral  | 2956       | 10° 21'05.1N 039° 34' 42.6E | SW030            |
| 6   | *Aloe pulcherrima* Gilbert and sebsebe | Aloeaceae | SETIE - IRET | H | HG | Ra | Lt | F        | Wound, Diarrhoea                                 | Dermal Oral | 2960       | 10° 17'59.5N 039° 34' 52.4E | SW075            |
| 7   | *Aloe debrana* Christian | Aloeaceae | WONDIE – IRET | H | W     | C  | Lt | F        | Stomach ache, Vomiting and Diabetes              | Oral  | 2972       | 10° 18'05.6N 039° 39' 53.9E | SW078            |
| 8   | *Artemisia abyssinica* Sch.Bip. | Asteraceae | CHIKUGN | H | W     | C  | F  |          | Common cold, Evil eye, Typhus                    | Nasal Neck | 2894       | 10° 17'40.9N 039° 35' 04.8E | SW018            |
| 9   | *Artemisia rehart* Chiov. | Asteraceae | ARTI | H | HG     | C  | R  | F        | Abdominal pain and Stomach ache                   | Oral  | 2921       | 10° 17'50.2N 039° 34' 55.6E | SW132            |
| 11  | *Asplenium aethopicum* (Burm.f.) | Aspleniaceae | - | H | W     | C  | L  | D        | Uvulillia                                        | Dermal | 2917       | 10° 17'53.4N 039° 34' 53.3E | SW064            |
| 12  | *Berberis holstii* Engl. | Berberidaceae | ZINKELA | S | W      | M  | R  | D        | Heart disease                                    | Oral  | 2961       | 10° 18'04.4N 039° 34' 53.5E | SW131            |
| 13  | *Bersama abyssinica* Fresen. | Melianthaceae | AZAMIR | S | W      | M  | L and R | D        | Hypertension, Cough and Ascaris                   | Oral  | 2490       | 10° 13'34.6N 039° 33'29.9E | SW125            |
| 14  | *Brassica carinata* A. Br. | Brassicaceae | GOMENZER | H | HG     | C  | L  | F        | Jaundice                                         | Oral  | 3074       | 10° 18'31.2N 039° 39'22.7E | SW153            |
| 15  | *Brassica oleracea* L. | Brassicaceae | TQL GOMEN | H | HG     | C  | L  | F        | Gastritis                                        | Oral  | 2884       | 10° 18'31.2N 039° 39'22.7E | SW135            |
| 16  | *Buddleja polystachya* Fresen. | Loganiaceae | ANFAR | T | HG     | M  | L  | F        | Leech                                            | Oral  | 2927       | 10° 17'53.4N 039° 34'54.1E | SW071            |
| 17  | *Capparis tomentosa* Lam. | Capparidaceae | GUMER0 | S | W | Ra | R | D        | Evil eye, kin disease, "EYENEWOG"                 | Oral Neck | 2197       | 10° 12'31.2N 039° 39'14.7E | SW096            |
| 18  | *Capsicum annuum* L. | Solanaceae | KARIA | H | HG | M  | Fr | F        | Malaria                                          | Oral  | 2801       | 10° 23'27.3N 039° 29'45.3E | SW152            |
| No | Scientific Name | Family         | Genus          | Species   | Common Name                        | Disease/symptom                      | Route | Code Number | Reference Code |
|----|-----------------|----------------|----------------|-----------|-----------------------------------|-------------------------------------|-------|-------------|----------------|
| 19 | Carissa spinarum L. | Apocynaceae     | AGAM           | S         | Evil eye, Wound, “EYENEWOG”       | Oral and Nasal                      |       | 2798        | SW050          |
| 20 | Carthamus tinctorius L. | Asteraceae      | SUF            | H         | Cough                              | Oral                               |       | 2207        | SW090          |
| 21 | Cassipourea malosa* Aubl. | Rhizophoraceae | WERER          | T         | Leech                              | Nasal                              |       | 2320        | SW087          |
| 22 | Catha edulis* (Vahl) Forsk. ex Endl. | Celastraceae | CHAT           | T         | Asthma                             | Oral                               |       | 2936        | SW083          |
| 23 | Chenopodium ambrosioides L. | Chenopodiaceae  | AMEDMADO       | H         | Wound                              | Dermal                             |       | 3077        | SW141          |
| 24 | Citrus limon* (L.) Burm.f. | Rutaceae       | BETRE LOMI     | T         | Liver disease                      | Oral                               |       | 2277        | SW150          |
| 25 | Citrus aurantifolia* (Christm.) Swingle | Rutaceae      | LOMI           | T         | Tinea versicolor, Cancer           | Dermal                             |       | 2320        | SW053          |
| 26 | Citrus medica* L. | Rutaceae       | TRINGO         | T         | Loss of appetite                   | Oral                               |       | 2278        | SW147          |
| 27 | Clematis sinensis Fresen. | Ranunculaceae  | YEAZO AREG     | Cl        | Wart, Eczema, Retained placenta, KUNKHIR | Dermal                             | Oral  | 2856        | SW020          |
| 28 | Clerodendrum myricoides (Hochst.) Valke | Lamiaceae     | MISRICH        | S         | Evil eye, Jaundice                 | Oral and Nasal                     |       | 2432        | SW094          |
| 29 | Clitia abyssinica + Jaub. and Spach. | Euphorbiaceae | FYELEFEG       | S         | Evil eye, Jaundice, “EYENEWOG”     | Oral and Nasal                     |       | 2830        | SW044          |
| 30 | Coffea arabica* L. | Rubiaceae      | BUNNA          | T         | Common cold                        | Oral                               |       | 2275        | SW063          |
| 31 | Cordia africana Lam. | Boraginaceae   | WANZA          | T         | Tumour and Wart                    | Dermal                             |       | 2435        | SW137          |
| 32 | Croton macrostachybus Del. | Euphorbiaceae | BISANA         | T         | Evil eye, Jaundice, Eye disease    | Oral, Nasal,Ocular                 |       | 2363        | SW060          |
| 33 | Cucumis ficifolius+ Rich. | Cucurbitaceae | YEMDIR EMBWAY  | H         | Stomach ache, Gonorrhoea, Rabies   | Oral                               |       | 2299        | SW057          |
| 34 | Cucurbita pepo* L. | Cucurbitaceae  | DUBA           | Cl        | Headache                           | Dermal                             |       | 2800        | SW161          |
| 35 | Cyathula polycephala Bak. | Amaranthaceae  | CHEGOGOTE      | H         | Fibril illness                      | Oral                               |       | 2289        | SW099          |
### Appendix 1. Contd.

| No. | Plant Name                  | Family       | Genus | Species | Synonym | Part       | Condition           | Location | Pressures (mmHg) | Notes          |
|-----|-----------------------------|--------------|-------|---------|---------|------------|---------------------|----------|------------------|----------------|
| 36  | *Cyathula uncinulata* (Schrad.) Schinz | Amaranthaceae | YEKIL FIKIR | H       | W       | C         | R       | F                 | Stabbing pain | Dermal 2830 | 10° 14'12.5N 039° 30'38.7E | SW046 |
| 37  | *Cymbopogon citrates* (DC.) Stapf. | Poaceae      | TEJESAR | H       | HG      | Ra        | R       | D                 | Evil eye      | Oral and Nasal 3069 | 10° 18'25.6N 039° 39'20.4E | SW129 |
| 38  | *Cyphostemma adenocaulé* (Stud. et A. Rich.) | Vitaceae     | ASERKUSH TEBETEBKUS | Cl      | W       | Ra        | R       | L                 | Rabies, Congenital abnormality | Oral, Dermal 2273 | 10° 13'18.1N 039° 31'49.1E | SW085 |
| 39  | *Cyphostemma cyphopetalum* (Fresen.) | Vitaceae     | GINDOSH | Cl      | W       | Ra        | R       | D                 | Cancer         | Dermal 2437 | 10° 13'20.5N 039° 33'05.9E | SW151 |
| 40  | *Datura stramonium* L. | Solanaceae | ASTENAGER | H       | HG      | M         | Se and | L                 | Tumour         | Oral 2909 | 10° 17'40.6N 039° 34'59.3E | SW022 |
| 41  | *Daucus carota* L. | Apiaceae     | KARROT   | H       | HG      | M         | R       | F                 | Kidney problem and Night blindness | Oral 3071 | 10° 18'25.9N 039° 39'21.6E | SW128 |
| 42  | *Dodonaea angustifolia* L.f. | Sapindaceae | KITKTA   | S       | W       | M         | L       | D                 | Eczema         | Dermal 2832 | 10° 14'12.2N 039° 30'38.6E | SW045 |
| 43  | *Dovyalis abyssinica* (A. Rich.) Warb. | Flacouriaceae | KOSHIM   | S       | W       | M         | L and | Fr                | Fibril illness, Boules | Dermal 2813 | 10° 31'10.5N 039° 46'57.7E | SW126 |
| 44  | *Echinops kebericho*** Mesfin | Asteraceae | KEBERICHO | H       | W       | Ra        | R       | D                 | Evil eye       | Oral and Nasal 2890 | 10° 17'42.1N 039° 35'07.9E | SW019 |
| 45  | *Echinops longisetus*** A. Rich. | Asteraceae | KOSHELIE | S       | W       | C         | L       | D                 | Wound          | Dermal 2828 | 10° 17'54.5N 039° 34'51.6E | SW142 |
| 46  | *Eucalyptus globulus* Labill. | Myrtaceae    | NECH BAHIRZAF | T       | W       | C         | L       | F                 | Fibril illness, "GOLEBA" | Oral and Nasal 2718 | 10° 31'11.3N 039° 47'09.6E | SW005 |
| 47  | *Euclea divinorum* Hiern. | Ebenaceae    | DEDHO    | S       | W       | M         | Br L   | F and | D                 | Intestinal parasite, Skin disease | Oral 2411 | 10° 12'56.9N 039° 32'32.3E | SW107 |
| 48  | *Euphorbia abyssinica* Gmel. | Euphoiaceae  | YEBEREHA KULKUAL | T       | W       | M         | Lt     | F                 | "KUNCHIR"     | Dermal 2270 | 10° 12'32N 039° 31'48.7E | SW114 |
| 49  | *Euphorbia ampliphylla* Pax | Euphoiaceae  | KULKUAL  | T       | HG      | C         | Lt     | F                 | Ascaries, Syphilis | Oral 2927 | 10° 17'53.3N 039° 34'52.8E | SW065 |
| 50  | *Euphorbia tirucalli* L. | Euphoiaceae  | KINCHIB  | S       | W       | Ra        | Lt     | F                 | Cancer, "Kunchir" | Dermal 2299 | 10° 13'22.2N 039° 31'47.8E | SW086 |
| 51  | *Ferula communis* L. | Apiaceae     | DOG      | H       | W       | Ra        | R       | D                 | Impotency      | Oral 2800 | 10° 14'05.8N 039° 30'42''E | SW049 |
| 52  | *Ficus sur* Forssk. | Moraceae     | SHOLA    | T       | W       | Ra        | Fr     | F and | D                 | Constipation   | Oral 2407 | 10° 12'56.9N 039° 32'38.8E | SW106 |
| 53  | *Ficus vasta* Forssk. | Moraceae     | WARKA    | T       | W       | Ra        | L       | Br and | L                 | AZURIT, Eye disease | Oral Ocular 2300 | 10° 12'39.7N 039° 32'07''E | SW117 |
| 54  | *Foeniculum vulgare* Mill. | Apiaceae     | ENSILLAL | H       | HG      | M         | L, St. Wh | F and | D                 | Urinary retention, Tonsillitis, Gonorrhea, Wart | Oral Dermal 2930 | 10° 18'01.9N 039° 34'36.6E | SW039 |
### Appendix 1. Contd.

| No. | Latin Name                        | Family       | Common Name | Habit | Location | Mode of Action | Disease | Note          | Latitude   | Longitude  | Reference      |
|-----|-----------------------------------|--------------|-------------|-------|----------|----------------|---------|---------------|------------|------------|----------------|
| 55  | *Gomphocarpus purpurascens*** A. Rich. | Asclepiadaceae | TIFRNO      | S     | W        | C             | L and Lt | F Ring worms, Ring worms, Rf factor | 10° 18'52.7N | 039° 40'18'E | SW011         |
| 56  | *Guizotia schimperi* Sch. Bip. ex Walp. | Asteraceae    | MECH        | H     | W        | C             | L       | F Tape worm  | 10° 20'58.9N | 039° 34'42.7E | SW031         |
| 57  | *Hagenia abyssinica* (Bruce) J.F. Gmel. | Rosaceae      | KOSSO       | T     | W        | M             | L and F | I Allergic dermatia, Wound, Tape worm | 10° 30'26.3N | 039° 46'49.2E | SW016         |
| 58  | *Haplocarpha schimperi* (Sch. Bip. Beauv.) | Asteraceae    | GETIN       | H     | W        | C             | L       | F Skin cut   | 10° 18'55N   | 039° 40'00.4E | SW163         |
| 59  | *Helichrysum sp.* | Asteraceae | NECHLO      | S     | W        | C             | L       | F Impotency  | 10° 30'18.7N | 039° 46'49.6E | SW134         |
| 60  | *Heteromorpha arborescens* (Spreng.) | Apiaceae      | YEGIB-MIRKUZ | S     | W        | Pa            | L       | F Inborn Physical abnormality | 10° 13'11.7N | 039° 32'43.8E | SW104         |
| 61  | *Hordeum vulgare* L. | Poaceae | GEBS        | H     | W        | C             | Se      | D Diarrhoea  | 10° 31'07.6N | 039° 46'54.8E | SW159         |
| 62  | *Impatiens rathii* Hook.f.  | Balsaminaceae | GISILT     | H     | W        | M             | R       | F Fire burn  | 10°15'09.1N  | 039° 30'35.9E | SW061         |
| 63  | *Indigofera vohemarensis* - Ball. | Fabaceae      | KUAKUCHA    | H     | W        | M             | R       | F Blood Complication | 10° 13'13.9N | 039° 32'55.9E | SW121         |
| 64  | *Inula confertiflora*** Rich. | Asteraceae    | WOYNAGIFT (EGA) | S     | W        | C             | L       | D Eye disease | 10° 20'59.4N | 039° 34'48.9E | SW028         |
| 65  | *Jasminum abyssinicum* Hochst. ex DC. | Oleaceae | TEMBELEL    | Cl    | W        | M             | L       | F Tape worm, Blotting | 10° 14'16.1N | 039° 30'42.1E | SW047         |
| 66  | *Juniperus procerka* Hochst. ex Endl. | Cupressaceae | YABESHA TID | T     | W        | C             | L       | F “Goleba”  | 10° 31'02.9N | 039° 47'06E  | SW067         |
| 67  | *Justicia schimperiana* Hochst.ex Nees | Acanthaceae  | SENSEL      | S     | W        | M             | L       | F Jaundice   | 10°13'34.9N  | 039° 33'31.8E | SW081         |
| 68  | *Kalanchoe petilliana***+ A. Rich. | Crassulaceae | ENDAHAHUL A | H     | HG       | C             | L and R | F Tape worm, Bone fracture, Rabies | 10° 17'51.6N | 039° 34'54.4E | SW066         |
| 69  | *Lagenaria sic vara* (Molina) Standl. | Cucurbitaceae | QIL         | Cl    | HG       | M             | L       | F Ear lesion  | 10° 13'34.7N | 039° 33'32.6E | SW133         |
| 70  | *Laggera tormentosa*** (Sch. Bip. ex A. Rich.) Oliv. and Hiern | Asteraceae | KESKESO     | H     | W        | C             | L       | F and D Typhus , Wound, Common cold | 10° 20'59.4N | 039° 34'49.2E | SW027         |
| 71  | *Launaea petilliana* (A. Rich.:) N. Killian | Asteraceae | YEBEG WOTET | H     | HG       | M             | R       | F Stomach ache | 10° 21'47.1N | 039° 34'53.4E | SW024         |
| 72  | *Lens culinaris* Medik | Fabaceae | MSR         | H     | W        | C             | Se      | D Herpes zoster | 10° 18'44.4N | 039° 40'28.8E | SW010         |
### Appendix 1. Contd.

| Plant Name | Family | Common Name | Uses | Condition | Route | Uses (Specific) |
|------------|--------|-------------|------|-----------|-------|-----------------|
| *Leonotis ocymifolia* | Lamiaceae | RAS KMR | S | HG | C | L | F | Acute mountain sickness, Fibril illness, "Goleba" | Oral | 10° 18′44.3N 039° 40′32.2E | SW014 |
| *Lepidium sativum* L. | Brassicaceae | FETO | H | HG | C | Se | D | Abdominal pain, Coccoides | Oral | 10° 18′25.5N 039° 39′20.5E | SW012 |
| *Linum usitatissimum* L. | Linaceae | TELBA | H | W | C | Se | D | Gastric | Oral | 10°18′53.6N 039° 40′16.3E | SW015 |
| *Lippia adoesra* Hochst. ex Walp. | Verbenaceae | KESSIE | H | HG | C | R | D | Smallpox | Oral and Nasal | 10°17′54.4N 039° 34′50.9E | SW098 |
| *Lobelia rhynchopetalum* Hemsl. | Lobeliaceae | JIBRA | H | W | M | R | D | Evil eye, “Eyewog” | Oral and Nasal | 10°25′31N 039° 47′49.5E | SW146 |
| *Lupinus albus* L. | Fabaceae | GBTO | H | HG | Ra | Se | F/D | Hypertension | Oral | 10° 18′26.7N 039° 39′20E | SW158 |
| *Lycopersicon esculentum* Mill. | Solanaceae | TIMATIM | H | HG | M | L and St | F | Gonorrhoea | Oral | 10° 13′23.1N 039° 31′48.7E | SW056 |
| *Maesa lanceolata* Forsk. | Myrsinaceae | KELAWA | S | W | M | L | F | Tape worm | Oral | 10° 31′02.4N 039° 47′07E | SW084 |
| *Malus sylvestris* Miller | Rosaceae | APPLE | T | HG | M | Fr | F | Diabetes | Oral | 10° 17′51.5N 039° 34′47.9E | SW156 |
| *Malva parviflora* Hojer | Malvaceae | ALENKUATA | H | HG | C | L | F | Wound | Dermal | 10° 17′53.4N 039° 34′53E | SW072 |
| *Maytenus arbutifolia* (A. Rich.) Wilczek | Celastraceae | ATAT | S | W | M | R | D | Kidney problem | Oral | 10° 30′03.4N 039° 47′06E | SW139 |
| *Mentha spicata* L. | Lamiaceae | NANA | H | HG | Ra | L | D | Headache | Oral | 10° 18′26N 039° 39′21.7E | SW136 |
| *Millettia ferruginea* (Hochst.) Bak. | Fabaceae | BIRBIRA | T | W | Ra | R | D | Impotency | Oral | 10° 12′32.2N 039° 31′45.6E | SW032 |
| *Momordica foetida* Schumach. | Cucurbitaceae | KURA HARG | Cl | W | Ra | L and R | D | Intestinal parasite, Syphilis | Oral, Dermal | 10° 13′31N 039° 33′21.7E | SW123 |
| *Musa x paradisiaca* L. | Musaceae | MUSE | H | HG | M | Fr | F | Eczema | Dermal | 10° 12′32.2N 039° 31′45.9E | SW145 |
| *Myrica salicifolia* A. Rich. | Myricaceae | SHINET | T | W | M | Br | F and D | Headache, Intestinal parasite | Oral, Dermal | 10° 14′20.3N 039° 30′46.5E | SW051 |
| *Myrtus communis* L. | Myrtaceae | ADES | S | HG | Ra | L | D | Dandruff | Dermal | 10° 13′22N 039° 31′48.8E | SW089 |
| *Myrsine africana* L. | Myrsinaceae | QECHEMO | S | W | M | Fr | F | Tape worm | Oral | 10° 13′12.2N 039° 32′44.5E | SW103 |
| *Nicotiana tabacum* L. | Solanaceae | TINBAHO | H | HG | M | L | F | Leech | Nasal | 10° 17′52.7N 039° 34′34.2E | SW009 |
### Appendix 1. Contd.

| No. | Species | Family | API | W | M | R | D | Symptom | Route | Latitude | Longitude | Notes |
|-----|---------|--------|-----|---|---|---|---|---------|-------|----------|-----------|-------|
| 92  | Nuxia congesta RBr. ex Fresen. | Loganiaceae | ATQUAR | T | W | M | R | D | Evil eye | Oral and Nasal | 2924 | 10° 17'54.5N 039° 34'53.9E | SW155 |
| 93  | Ocimum lamillilium* Hochst. ex Benth. | Lamiaceae | DAMA KESSIE | S | HG | M | L | F | Fibril illness | Oral | 3068 | 10° 18'26N 039° 39'23.7E | SW154 |
| 94  | Olea europaea subsp. cuspidata (Wall. ex G. | Oleaceae | WEYRA | T | W | M | L | D | Eye disease | Ocular | 2921 | 10° 17'52N 039° 34'53.9E | SW040 |
| 95  | Olinia rocheliana A. Juss. | Oliniaceae | TIFIE | S | W | M | L | D | Wart, Eczema | Dermal | 2830 | 10° 14'13.7N 039° 30'38.9E | SW042 |
| 96  | Opuntia ficus-indica* (L.) Miller | Cactaceae | BELES | S | HG | Ra | Fr | F | Heart failure | Oral | 2933 | 10° 17'53N 039° 34'55.1E | SW130 |
| 97  | Osyris quadrifartita Decn. | Santalaceae | KERET | S | W | M | L | F | Circumcision wound, Toothache | Dermal | 2963 | 10° 17'47.6N 039° 35'05.5E | SW021 |
| 98  | Otostegia fruticosa (frossk.) ex Penzig | Lamiaceae | BARIANATRA | S | W | M | R | D | Evil eye | Oral and Nasal | 2437 | 10° 13'15.2N 039° 32'47.3E | SW102 |
| 99  | Otostegia integrifolia* + Benth. | Lamiaceae | TNJUT | S | W | M | L | F | Acute mountain sickness “EYENEWOG” | Oral | 2358 | 10° 13'25.9N 039° 31'47.7E | SW059 |
| 100 | Pennisetum sphacelatum’ (Nees) Th. Dur. and Schinz | Poaceae | SINDEDO | H | W | C | R | D | Blood Complication | Neck | 2974 | 10° 18'03.6N 039° 34'52.4E | SW077 |
| 101 | Periploca linearifolia Quant. Dill. and A. Rich. | Asclepiadaceae | MOIDER | CI | W | Ra | R | D | Evil eye | Oral and Nasal | 2446 | 10° 13'33.6N 039° 33'24.4E | SW124 |
| 102 | Peucedanum winkleri Wolff | Apioideae | QERSHASHIBA | H | HG | M | R | D | Evil eye | Oral and Nasal | 2928 | 10° 17'51.8N 039° 34'54.3E | SW140 |
| 103 | Phagnalon abyssinicum* Sch. Bip. | Asteraceae | NIBASEL | H | W | M | L | F | Blotting and Urinary retention | Oral | 2987 | 10° 19'17.8N 039° 35'05.0E | SW079 |
| 104 | Phoenix reclinata Jacq. | Arecaceae | SENIEL | T | W | Ra | R | F | Impotency | Oral | 2455 | 10° 13'01.9N 039° 32'41.7E | SW144 |
| 105 | Phytolacca dodecandra* L’Hérît | Phytolaccaceae | MEHAN ENDOD | S | HG | C | L | F | Jaundice | Oral | 2927 | 10° 17'53.7N 039° 34'53.7E | SW004 |
| 106 | Pistacia falcata Mart. | Anacardiaceae | TANA GEBEZ | T | W | Ra | R | D | Evil eye | Oral and Nasal | 2303 | 10° 12'42.1N 039° 33'44.4E | SW112 |
| 107 | Plantago lanceolata L. | Plantaginaceae | GORTEB | H | W | C | L | F | Wound | Dermal | 2855 | 10° 17'35N 039° 35'03E | SW041 |
| 108 | Plectranthus punctatus + (L. f.) L’Herit. | Lamiaceae | TIBTIBO | H | W | M | L | F | Diarrhoea “EyeneWog” | Oral | 2940 | 10° 21'19.1N 039° 32'06.6E | SW026 |
### Appendix 1. Contd.

| No. | Plant Name | Family | Code | State | Part | Use | Route | Latitude | Longitude | Other Notes |
|-----|------------|--------|------|-------|------|-----|-------|-----------|------------|-------------|
| 109 | Podocarpus falcatus | Podocarpaceae | ZGBA | T | M | L,Fr,Br | F and D | Inborn physical abnormality, Eye disease, Melasma | Dermal Ocular | 2718 | 10° 31'11.3N 039°47'09.6E | SW082 |
| 110 | Polygala rupicola + A. Rich. | Polygalaceae | ETSE LBONA | H | W | M | R,St | F/D | Snake bit | Oral | 2331 | 10° 13'23.4N 039° 31'47.2E | SW058 |
| 111 | Polygonum aviculare L. | Polygonaceae | KECHKECH | H | W | C | L | D | Eczema | Dermal | 2798 | 10°23'27.6N 039° 29'43.9E | SW069 |
| 112 | Premna schimperi Engl. | Lamiaceae | CHOCHO | S | W | M | L | F | Tinea pedis | Dermal | 2333 | 10° 12'42.1N 039° 32'15.E | SW118 |
| 113 | Pteridium aquilinum L. | Pteridaceae | EMSE FER | H | W | Ra | L | D | Fire burn | Dermal | 2750 | 10° 31'11.4N 039° 47'06.8E | SW160 |
| 114 | Ranunculus stagnalis | Ranunculaceae | GUDGN | H | W | C | L | F/D | Wart and “Kunchir”, Eczema | Dermal | 2951 | 10° 21'07.1N 039° 34'42.9E | SW029 |
| 115 | Pterolobium stellatum | Fabaceae | KENTEFA | S | W | M | | | | Dermal | 2248 | 10° 12'32.4N 039° 31'46.1E | SW080 |
| 116 | Rhhamnus prinoides* L'Herit | Rhamnaceae | GESHO | S | HG | C | L and Fr | F and D | Scabies, Uvulitia | Dermal Oral | 2937 | 10° 17'52.2N 039° 34'54.2E | SW007 |
| 117 | Rhus natalensis Krauss | Anacardiaceae | CHAKMA | S | W | Ra | L | F | Tape worm | Oral | 2451 | 10° 13'28.1N 039° 33'11.8E | SW100 |
| 118 | Rhus retinorhoea Oliv. | Anacardiaceae | TLEM | S | W | M | L | F | Inborn abnormality | Physical | Dermal | 2292 | 10° 12'43.4N 039° 32'02.2E | SW116 |
| 119 | Rhus vulgaris Oliv. | Anacardiaceae | EMBIS | T | W | C | R | D | Evil eye | Neck | 2800 | 10° 23'28N 039° 29'44.9E | SW068 |
| 120 | Ricinus communis* L. | Euphorbiaceae | GULO | H | HG | M | Fr and L | F and D | Cancer, Anal eropli | Dermal Anal | 2922 | 10° 17'53.4N 039° 34'53.8E | SW038 |
| 121 | Rosa abyssinica Lindley | Rosaceae | KEGA | S | W | M | Fr | F | Ascaries | Oral | 2815 | 10° 30'53.4N 039° 46'57.7E | SW127 |
| 122 | Rosa x richardi“Rehd. | Rosaceae | TIGIEREDA | S | HG | Ra | R | F/D | Eye disease | Neck | 2923 | 10° 17'53.6N 039° 34'48.2E | SW138 |
| 123 | Rubus steudneri Schweinf. | Rosaceae | ENGORY | S | W | Ra | L | F | Anemia | Oral | 2265 | 10° 12'31.9N 039° 31'47.8E | SW093 |
| 124 | Rumex abyssinicus Jacq. | Polygonaceae | MEKMEKO | H | W | M | R | F | Tinea versicolor, Hypertension | Dermal | 2961 | 10° 18'28.7N 039° 34'52.1E | SW006 |
| 125 | Rumex nepalensis Spreng. | Polygonaceae | TULT | H | W | C | R | F | Acute mountain sickness haemorrhage | Oral Dermal | 3121 | 10° 18'56.4N 039° 40'57.6E | SW013 |
| 126 | Rumex nervosus + Vahl | Polygonaceae | EMBACHO | S | W | M | L | F | Circumcision wound, Leech | Dermal Oral | 2836 | 10° 15'00.8N 039° 31'03.2E | SW052 |
| 127 | Ruta chalepensis* L. | Rutaceae | TENADAM | H | HG | C | Fr | F | Hypertension, Diabetes | Oral Dermal | 3098 | 10° 18'56.5N 039° 40'08.3E | SW002 |
### Appendix 1. Contd.

| No. | Common Name | Family | Genus | Species | Synonyms | Parts | Action | Route | Total Dose | Dosage | Ref.
|-----|-------------|--------|-------|---------|----------|-------|--------|-------|------------|--------|--------
| 128 | *Saccharum officinarum* L. | Poaceae | Poa | Poa | | | | | | | |
| 129 | *Salvia nilotica* Juss. ex Jacq. | Lamiaceae | Salvia | Salvia | | | | | | | |
| 130 | *Salvia schimperi* Benth. | Lamiaceae | Salvia | Salvia | | | | | | | |
| 131 | *Sansevieria ehrenbergii* Schweinf. ex Baker | Dracaenaceae | Sansevieria | Sansevieria | | | | | | | |
| 132 | *Satureja abyssinica* (Benth.) Brig. | Lamiaceae | Satureja | Satureja | | | | | | | |
| 133 | *Schinus molle* L. | Anacardiaceae | Schinus | Schinus | | | | | | | |
| 134 | *Sida schimperiana* Hochst. ex A.Rich. | Malvaceae | Sida | Sida | | | | | | | |
| 135 | *Sideroxylon oxyacanthum* *Baill.* | Sapotaceae | Sideroxylon | Sideroxylon | | | | | | | |
| 136 | *Silene macrosolen* A. Rich. | Caryophyllaceae | Silene | Silene | | | | | | | |
| 137 | *Solanecio gigas* **+** (Vatke) C. Jeffrey | Asteraceae | Solanaceae | Solanecio | | | | | | | |
| 138 | *Solanum anguivi* Lam. | Solanaceae | Solanum | Solanum | | | | | | | |
| 139 | *Solanum benadrense* Chiov. | Solanaceae | Solanum | Solanum | | | | | | | |
| 140 | *Solanum marginatum* **+** L.f. | Solanaceae | Solanum | Solanum | | | | | | | |
| 141 | *Sphenosyllis* Stenocarpa (Hochst. ex A. Rich.) | Fabaceae | Sphenosyllis | Sphenosyllis | | | | | | | |
| 142 | *Stephania abyssinica* (Dillon. & A. Rich.) | Menispermaceae | Stephania | Stephania | | | | | | | |
| 143 | *Tagetes minuta* ‘L.’ | Asteraceae | Tagetes | Tagetes | | | | | | | |
| 144 | *Tephrosia bracteolata* Guill. & Perr. | Fabaceae | Tephrosia | Tephrosia | | | | | | | |
| 145 | *Thymus schimperi* **+** Ronniger | Lamiaceae | Thymus | Thymus | | | | | | | |
| 146 | *Tragia cinerea* + (pax) Gilbert and Radd.-Smith | Euphorbiaceae | Tragia | Tragia | | | | | | |
### Appendix 1. Contd.

| No. | Species | Family | Genus | Species | Common Name | Mode of Administration | Dosage | Lat. | Long. |
|-----|---------|--------|-------|---------|-------------|------------------------|--------|------|-------|
| 147 | *Trigonella foenum-graecum* L. | Fabaceae | ABISH | H | W | C | Se | D | Melasma, Gastritis | Dermal Oral | 2906 | 10° 17' 52.7 N 039° 34' 5 E | SW062 |
| 148 | *Urtica simensis* Steudel | Urticaceae | SAMA | H | HG | C | L | F | Gastritis and Heart failure | Oral | 3006 | 10° 29' 03.4 N 039° 46' 56.5 E | SW003 |
| 149 | *Verbascum sinaticum* + Benth. | Scrophulariaceae | YE'AHIYA JORO | H | W | C | R | F | Allergic dermatitis, Retained placenta | Dermal | 2924 | 10° 17' 52.4 N 039° 34' 53 E | SW037 |
| 150 | *Verbena officinalis* L. | Verbenaceae | ATUCH | H | HG | Ra | L | F | Uvulitis, Young disease | Oral | 2888 | 10° 21' 45.9 N 039° 33' 16 E | SW023 |
| 151 | *Vernonia amygdalina* Del. | Asteraceae | GIRAWA | S | W | Ra | L | F | Acute sickness and Abdominal pain | Oral | 2744 | 10° 31' 11.5 N 039° 47' 07.8 E | SW097 |
| 152 | *Vernonia biporntini* + Vatke | Asteraceae | MUZIGN | H | W | C | L | F | Nasal bleeding Diarrhoea | Nasal Oral | 2895 | 10° 21' 47 N 039° 33' 16 E | SW149 |
| 153 | *Viscum tuberculosis* + A.Rich. | Viscaceae | YEMRENZ TEKETSLA | S | W | Ra | L | D | Evil eye “Eyewog” | Oral and Nasal | 2299 | 10°12'42.1 N 039° 32'05.6 E | SW113 |
| 154 | *Withania somniferas* + (L.) Dunal in DC. | Solanaceae | GIZIEWA | S | W | Ra | R | D | Impotency “Eyewog” | Oral | 2315 | 10° 13' 23.2 N 039° 31' 49 E | SW054 |
| 155 | *Zehneria scabra* (Linn. f.) Sond. | Cucurbitaceae | BUHAREG | Cl | HG | C | L | F | Eye disease, Wart | Oral Dermal | 2928 | 10° 17' 53.5 N 039° 34' 53 E | SW073 |

Cultivated medicinal -*. Endemic medicinal plant-**. Both cultivated and endemic medicinal plant-***. Climber-CI, Herb-H, Shrub-S, Tree-T. Wild- W, Home garden- HG, Medium-M, Common-C, Rare- Ra, Abundance –Ab, Condition of Preparation –CP, Plant Parts used for Aliment treatment-PU, Friut-Fr, Root-R, Stem-St, Leaf-L, Flower-Fi, Seed-Se, Bark-Br, Bulb-Bu, Latex-Lt, Fresh-F, Dried-D, For Both human & livestock +++, for Animals only-+. 