

An Ethnobotanical study of the Semi-wetland Vegetation of Cheffa

Bayafers Tamene¹, Tamrat Bekele², Ensermu Kelbessa²

ABSTRACT: An ethnobotanical study was carried out in Cheffa plain, Ethiopia, between 20 November 1999 to 30 February 2000. Ethnobotanical data of wild plants were obtained from local key informants, mainly based on semi-structured interviews. A total of 206 plant species distributed in 148 genera and 66 families were documented. Of these 54 species are non-cultivated food plants, 83 medicinal, 38 forage, 39 cleansing, laundry, toothbrush, fumigation and fragrance. The Cheffa people utilize 79 and 31 medicinal plants for his and ethnoveterinary use respectively. Habit of medicinal plants includes shrubs (38 species), herbs (21), trees (13) and climbers (11). The most frequently used plant parts are leaves (33 species). Remedies are usually prepared by pounding, crushing and squeezing juice (79.69%). The two major route of administrations are oral (53.60%) and dermal (20.72%). Relict forest islands are traditional- community based *in sit* conservation sites. Traditional community based *in situ* conservation should be complemented with *ex situ* conservation activities.

Key words: Ethiopia, ethnobotany, ethnoveterinary, informant, medicinal plants, relict forest islands

INTRODUCTION

Plant resources contain and provide materials for survival, that is, economic, medicinal, forage values, but also possess and preserve cultural heritages, biological information and indigenous knowledge on their utility. As documented elsewhere by Morgan (1981), Andrews (1982), Rao and Jamir (1988), Mathias (1996), Erdelen *et al.* (1999), and in Ethiopia Abbink (1995), Zemedede Asfaw (1997), Tesfay Awass (1997), Mirutse Giday (1999) there is a wealth of indigenous knowledge of the use, management of plant resources among the local people of an area.

However, unwise use and over exploitation can slowly eliminate a plant species from the environment (Peter, 1996). As a plant species is lost from a locality, the information contained in it will also be slowly blurred and finally become lost forever. As Cunningham (1996) pointed out that both saving plant species and documenting and preserving indigenous knowledge are fundamental urgent issues

In the study area, the ever- increasing threat and destruction of plant resources and ecosystems in an alarming rate calls for proper management and conservation activities. Understanding and taking conservation activities, however, should be based on ethnobotanical study of the area. According to Martin (1995), ethnobotanical data is basic for conservation and community development activities. Ethnobotanical data is useful to broaden our plant use knowledge (Mesfin Tadesse, 1986; Gelahun Abate 1989; Mesfin Tadesse and Sebsebe Demissew, 1992; Ensermu Kelbessa *et al.*, 1992; Dawit Abebe and Ahadu Ayehu, 1993; Abbink, 1995; Tesfaye Awass 1997; Mirutse Giday, 1999). As in other parts of Ethiopia, plant resources and the associated indigenous knowledge are vital for the survival of Cheffa society. Hence documenting and conserving ethnobotanical information of the Cheffa area would be crucial and a timely endeavour.

The study area was selected because most of the natural vegetation of the area has been losing its physical and species composition. In the area human impacts on semi-wetlands and dry lands was highly pronounced. The Cheffa plain is a very critical area for the surrounding resident people, pastoralists and animals as a source of medicine, water, food, shelter and refuge.

¹ Dessie College of Teachers Education, PO Box 93, Dessie, Ethiopia, E-mail: bayaferstamene@yahoo.com

² National Herbarium, Department of Biology, Addis Ababa University. P.O. Box 3434, Addis Ababa, Ethiopia

*Author to whom all correspondences should be addressed.

The local people of Cheffa heavily rely on plant resources. Destruction of semi-wetlands and wetlands within drylands will eventually aggravate destruction and over-exploitation of the fragile dryland

environments. According to Denny (1985), Muthuri (1992) and Harper and Mavuti (1996), in drylands, these wetlands are very crucial to people, livestock and wildlife as refuges in times of drought. Nevertheless, as the local people and communities encounter cultural changes, unless documented and conserved, the knowledge of the people on plant resource use could vanish forever.

In Cheffa area, this vital information has been diminishing at an alarming rate. No ethnobotanical data documentation on plant resource use and indigenous knowledge of the local people was found. Therefore, collecting and documenting ethnobotanical knowledge before it is lost forever was a fundamental urgent task. Hence, this study was emerged. to gather, record and document indigenous knowledge of Cheffa people on plant species, to compile a checklist of ethnobotanically most important plants and to suggest ways of conserving these habitats and plant species of the area.

MATERIALS AND METHODS

The study was conducted in Cheffa semi-wetland located 300 km north of Addis Ababa, Ethiopia at 10° 32' and 10° 58' N latitudes and 39° 46' and 39° 56' E longitudes. The Cheffa plain semi-wetland is found along the Borkena and Jara River Basins. Its total area is estimated 82,000 ha (MOA, UNDP and FAO, 1987). The altitude extends from about 1445 to 1520 m.

Gregnanin *et al.* (1973), Justin- Visentin *et al.* (1974) and Ketema Tadesse (1980) described the geology of the Cheffa area. Soils of the Cheffa plain are gleysols, fluvisols, vertisols, luvisols and phaeozems(MOA, UNDP and FAO, 1987, Kebrom Tekele, 1998).The area has the mean annual temperature that ranges between 33.3° C and 9.5° C. and a mean annual rainfall of about 270.1 m (National Meteorological Services Agency, 1999).

Most of the vegetation cover of south Welo has disappeared (MOA, UNDP and FAO, 1985 and 1987, Kebrom Tekele *et al.*, 1997; Kebrom Tekele, 1998). The vegetation can be categorized as wetland and dry affromontane evergreen forest. The main plant species that predominate the relic forest islands are *Celtis africana* Burm. f., *Diospyros abyssinica* (Hiern) White, *Mimusops kummel* Bruce ex.DC., *Acacia albida* Del., *Cordia africana* Lam., *Ficus sur* Forssk., *Ficus vasta* Forssk., *Ficus sycomorus* L. The wetland vegetation species are represented mainly by *Cyperus digitatus* Roxb., *Typha domingensis* Pers., and *Echinochloa pyramidalis* (Lam.) Hitch. and Chase.

People belonging to the Oromo nationality make the majority of the people living in the Cheffa plain. During the dry season, the Afar, Oromo and Amhara herders come with their herds to the Cheffa area. Crop production and livestock rearing are the main activities of the population of the area.

Ethnobotanical data on the use of plant species including their local names, use, parts used and preparation were collected between 20 November 1999 and 30 February 2000 using Key informants, observations, focus group discussion, guided field walks, transect walks and semi-structured interviews as described by Martin (1995), Maundu (1995), Cotton (1996), Balick and Cox (1996), Alexiads (1996) and Grenier (1998). A total of 30 knowledgeable key informants were chosen and involved during the course of study. In order to minimize the risk of confusing identity of plant species, most of the interviews were done in the field. Some of the interviews and the study site environmental setups were photographed and recorded with video camera so as to document information as voucher specimens. In addition to these, using an informant, lists of local names of ethnobotanically important plants were recorded with tape recorder.

After identification of the five most important plants, based on their high use values as perceived by the informants, of non-cultivated food plants paired comparisons were employed. Local plant names and their uses were asked for and recorded at different sites at different periods, with the same and different informants so as to confirm the validity and reliability of the recorded data. Voucher specimens for non-cultivated food plants, medicinal, forage and other plants of the area were collected, identified and

deposited at the National Herbarium of Addis Ababa University. Descriptive statistics was used to summarize ethnobotanical data.

RESULTS

Ethnobotanical Data

A total of 206 plant species were collected and identified. Of 206 plant species, 54 species as non-cultivated food, 79 species as medicinal species for humans and 31 for veterinary use, 38 forage 39 miscellaneous uses (cleansing, fumigation and fragrance plants).

Non-cultivated Food Plants

Non-cultivated food plants of the study area were collected and enumerated (Appendix 1). Fiftyfour species of non-cultivated flowering plants belonging to 38 genera and 34 families have been reported to be eaten raw or cooked and alone or mixed with other food plants (Table 1). Results showed that the plant parts used as food were fruit 57.14 %, seed 9.52 %, leaf 6.34, stem 4.76 %, flower 3.17 %, bark 3.17 %, resin 3.17 %, sap 1.58 %, twig 1.58%; flower nectar 1.58 %, root 1.58 %, rhizomes 1.58 % and tubers 1.58 % (Table 1). Paired comparison of five very important non-cultivated fruits based on their taste qualities and perceptions showed that *Opuntia ficus-indica* was the most preferred and has the best taste qualities and followed by *Ziziphus mauritana*, *Ximenia americana*, *Ficus sycomorus*, *Cordia africana* (Table 2).

Medicinal Plants for Humans

A total of 83 medicinal plant species, which are distributed among 74 genera and 44 families, were documented from Cheffa area, which are considered very important by the local people (Appendix 2). The ethnomedicinal data for human use obtained included local names, habit, plant parts used, medicinal use (disease and /or treatment), method of preparation and mode of administration. The habits of these medicinal plants include shrubs (46.83%), herbs (24.05%), trees (15.18%) and climbers (13.92%) (Table 5).

For human use, plant parts used for preparation of medicines include leaf (50.71%), above ground part (10.90%), fruit (7.10%), branches (5.21%), whole (5.21%), stem (4.73%), latex (4.26%), bark (2.84%), seed (2.36%), twigs (2.36%), flower (0.47%), sap (0.47%), and oil (0.47%) (Table 5). As can be seen from these figures the most commonly utilized plant part was leaf accounting for (50.71%) and followed by above ground part comprising (10.90%), and fruit (7.10%).

In Cheffa, people use specific type of plant species for a particular type of disease. A single plant species are employed for several types of diseases. For the same type of ailment different plant parts are concocted and used. Again, different plant species are used for the same disease.

Several plants may be concocted and applied for the treatment of a particular disease type. In the community, some of the species may be commonly known and recognized as effective remedies. In Cheffa, *Ocimum spp.*, *Solanum incanum*, *Withnania somnifera*, *Zehneria scabra*, *Croton macrostachyus* and *Ehretia cymosa* are popular and widely known for their medicinal values.

Table 1 Parts used and Habit of Non-cultivated food plants of Cheffa, Ethiopia, from 20 November 1999 to 30 February 2000.

Habit

Parts Used	Herb	Climber	Shrub	Tree	Total	%
Fruit		2	20	14	36	57.14
Seed	5		1		6	9.52
Leaf	4				4	6.34
Stem	2			1	3	3.17
Flower	2				2	3.17
Above ground	2				2	3.17
Bark				2	2	3.17
Resin				2	2	3.17
Nectar			1		1	1.58
Sap			1		1	1.58
Twig			1		1	1.58
Root	1				1	1.58
Tuber	1				1	1.58
Rhizome	1				1	1.58
Total	18	2	24	19	63	100
%	28.57	3.17	38.09	30.15	100	100

With regard to preparation methods of traditional medicines used by the Cheffa people, medicines are prepared by employing several methods. These are: pounding, crushing and squeezing juice (79.69%), powder (3.04%), smoke bath (2.53%), concoction (2.03%), steam bath (2.03%), cold infusion (1.52%), decoction (0.50%), poultice, rubbed and cream (0.5%), solidified/dried sap (0.5%) and others (7.61%) (Table 3).

After herbal medicines are prepared, different routes of administration are utilized. The two main modes of administration are internal and external. Internal route accounts for (61.11%) and external for (38.88%). The most commonly employed, of the several internal route of administrations, oral accounts for (90.15%) and that of external is dermal or topical (54.76%) (Table 4).

Table 2 Paired Comparison of Five very Important Non-cultivated Fruits Based on their Taste Qualities [5=best, 4 = very good, 3 = good, 2 = fair, 1 = least], Cheffa people, Ethiopia, from 20 November 1999 to 30 February 2000.

Fruits	Respondents										Total	Rank
	1	2	3	4	5	6	7	8	9	10		
<i>Ximenia americana</i>	2	2	3	3	3	3	2	2	2	2	20	3
<i>Ziziphus mauritana</i>	3	3	3	2	1	2	2	4	4	3	31	2
<i>Ficus sycomorus</i>	1	1	1	1	1	1	1	1	1	1	10	4
<i>Cordia africana</i>	1	1	1	1	2	1	1	1	1	1	11	5
<i>Opuntia ficus- indica</i>	4	4	4	4	4	4	4	3	3	4	38	1

Table 3 Preparation Methods of Traditional Medicines Used by the Cheffa people, Ethiopia, from 20 November 1999 to 30 February 2000.

<i>Methods of Preparation</i>	<i>Total</i>	<i>%</i>
Pounded, crushed and squeezed	157	79.69
Powder	6	3.04
Smoke bath	5	2.53
Concoction	4	2.03
Steam bath	4	2.03
Cold infusion (Steeped in water)	3	1.52
Decoction	1	0.50
Rubbed, cream, ointment, salve	1	0.50
Solidified /dried sap,	1	0.50
Other	15	8.12
Total	197	100

Table 4 Route of Administration of Traditional Medicines, Cheffa people, Ethiopia, from 20 November 1999 to 30 February 2000.

<i>Internal</i>	<i>Total</i>	<i>%</i>	<i>External</i>	<i>Total</i>	<i>%</i>
Oral	119	86.23	Dermal	46	54.76

Nasal	12	8.69	Poultice	11	13.09
Anal	6	4.34	Chewin and spitting	5	5.95
Dermal (Surgical)	1	0.72	Steam baths	4	4.76
Total	138	100	Smoke baths	3	3.57
			Herbal baths	3	3.57
			Other	12	14.28
			Total	84	100

Medicinal Plants – For Livestock

Medicinal plants of veterinary use were also documented. As that of ethnomedicines for humans, data about 21 families, 29 genera, and 31 species of ethnoveterinary use were recorded along with their habit, parts used, disease, preparation and route of administration. As indicated from Table 5, the most utilized habit of medicinal plants for livestock used by the Cheffa people is shrubs (41.93%) followed by herbs (22.58%) and the highest plant parts used is leaf (56.89%) (Table 5). Similarly, the most commonly utilized mode of preparation and route of administration is pounding, crushing and squeezing (88.88%) and internal mode of administration (72.41%), respectively (Tables 6 and 7).

Table 5 Plant Parts Used and Habit of Medicinal Plants of Livestock Used by the Cheffa People, Ethiopia, from 20 November 1999 and 30 February 2000.

Plant Parts Used	Habit				Total	%
	Herb	Climber	Shrub	Tree		
Leaf	5	1	18	9	33	56.89
Above ground	4	2	-	-	6	10.34
Whole	1	3	2	-	6	10.34

Root	1	1	2	1	5	8.62
Fruit	1	-	1	-	2	3.44
Branches	-	-	2	-	2	3.44
Stem	2	-	-	-	2	3.44
Bark	-	-	-	1	1	1.72
Seed	-	-	1	-	1	1.72

Table 6 Preparation Methods of Traditional Medicines of Livestock Used by the Cheffa People, Ethiopia from 20 November 1999 to 30 February 2000.

Methods of Preparation	Total	%
Pounding, Crushing and Squeezing	48	88.88
Concoction	6	11.11
Total	54	100

Forage Plants

The Cheffa plain is a grazing area for the surrounding people and pastoralists. These people use a variety of habitats and plant species for their livestock feed. They utilize the area in a shift grazing mechanism. Data was collected from informants about the most important forage plant species of the area. The most important livestock feeds were documented in which trees were 12 species, shrubs 11, grasses 15 and sedges 2. Depending on the type of season, for example as reported by informants, sedges are believed to have low quality or useless feed value with respect to livestock productivity. These and other wetland grasses are also known to harbor disease causing parasites or harbor worms during wet season but they are valuable feed in the dry season. After the wetland is intensively grazed, they burn it so as to remove the unpalatable tusks of *Cyperus* and *Typha* species thereby stimulating new growth of palatable forage.

According to informants, *Paspalum vaginatum*, *Typha domingensis*, and *Echinochloa pyramidalis*, *E. stagnina*, *E. haploclada*, *E. colona* harbor disease. In wet condition, cattle do not graze (hate) *P. vaginatum*, *T. domingensis* and *Cyperus digitatus*, *C. distans*, *C. alopecuroides*, *C. amauropus* and they are not considered useful and are eaten only for survival. Though they harbor diseases *Echinochloa pyramidalis*, *E. stagnina* are of high quality feed. Based on the pastoralists and informants perception, the best pasture of the area has been reported as *Cynodon dactylon*, *Hyparrhenia hirta*, *H. rufa*, *H. collina*, *H. anthistirioides*, *Heteropogon contortus*, *Digetaria abyssinica* and *Echinochloa pyramidalis*, *E. stagnina*, *E. haploclada*, *E. colona*.

Table 7 Route of Administration of Traditional medicines for Livestock in Cheffa, Ethiopia, from 20 November 1999 to 30 February 2000.

Route of Administration	Total	%
Internal	42	72.41
Oral	40	95.23
Nasal	2	4.76
External	16	27.58
Wash	10	62.50
Cream	5	31.25
Chewing and Spitting	1	6.25
Total	58	100

Other Plants/Miscellaneous Uses

Different types of many species have multiple use values. For instance, fuel, construction, craft, laundry, fragrance, food, and medicine. The Cheffa people highly depend on plant materials for the construction of their houses. While building their houses, sidewalls are made from *Eucalyptus camaldulensis*, *Acacia nilotica*, *Cadia purpurea*, *Dodonaea anguistifolia*, *Euphorbia candelabrum*, *Grewia ferruginea*, *G. tembensis*, *G. trichocarpa*, *G. villosa*, *Rhus natalensis*, *Combretum mollie*, *C. collinum*, *C. adenogonium*, *Agave sisalana*, *Arundo donax* and *Justicia schimperiana*. Roofs are thached with *Cyperus digitatus*, *Typha domingensis* and with a variety of *Hyparrhenia hirta*, *H. rufa*, *H. collina*, *H. anthistirioides*. The roof parts are held together by cordage made from *Cordia africana*; which is very important to carve mortar and pestle, cordage. Milking and milk containers (AKOLAE, ANGUA) are made either carved from a tree called DIDO (in Oromifa) or woven from *Agave sisalana* and *Cyperus digitatus*, *C. distans*, *C. alopecuroides*. Gourd utensils used for milk container (WOSHO) and milk curdling gourd are made from *Lagenaria siceraria*.

Mattresses and pillows are made from stem of *Isolepis costata* and *Schoenoplectus maritimus* and ripen flowers of *T. domingensis* and *Aerva lanata*. Stem of several *Cyperus* species are gathered to weave into baskets and mats. In honeymoon houses, both the sidewalls and the roofs are constructed and decorated by *T. domingensis*, *C. digitatus*, *Phragmites australis*, and *Echinochloa pyramidalis*.

Fibers are obtained from *C. digitatus*, *C. distans*, *C. alopecuroides*, *Grewia ferruginea*, *G. tembensis*, *G. trichocarpa*, *G. villosa*, *Dombea aethiopica*, *Agave sisalana*, *Sanseveria ehrenbergii*, *S. forskaliiana*, *Acacia spp.*, and *Hibiscus macranthus*, *Periploca linearifolia* is very important to weave and make bee hives and to hold roof parts together. *Cissus quadrangularis* and *C. rotundifolia* are very important to construct houses.

As in many other major parts of the country firewood is a severe problem. The main fire wood genera, used by the people of Cheffa, are *Eucalyptus*, *Acacia*, *Cadia*, *Combretum*, *Calpurnea*, *Senna*, *Rhus*, *Lantana*, *Xanthium*, *Enthada*, and crop residues like *Sorghum*.

Plants, which are used as laundry and cleansing, fumigation, fragrance and aromatic characters of the area, were documented. For example, bulbs of *Cyperus rigidifolius* is collected from underground and pounded to prepare *kuni* and mixed with butter to make a local perfume to salve their hairs. Lids of fruit capsules of *Eucalyptus globulus* are collected and powdered to be mixed with butter and *kuni*. Pounded branches of *Indigofera vohemarensis* are mixed with *Myrtus communis*, *kuni* and AFERKOCHER (purchased from local market) to prepare traditional perfume. *Fuerstia africana* and *Lawsonia inermis* are

used as a body and hair paint during ceremonies. These fragrant plants are sold in local markets. Fumigative plants and toothbrushes made of *Salvadora persica* were also sold in local markets

DISCUSSION

The Cheffa people though exposed to high cultural and habitat change, have maintained several plant use knowledge. Plant use knowledge accumulated through generations allowed them to use many varieties of wild plants as food, medicine, and other uses. Wild plants used by Cheffa people are diverse.

Although the quantity and quality of non-cultivated food plants that contribute to the people is unknown, a total of 54 non-cultivated food plants were documented. Non-cultivated food plants are very important and eaten mainly at times of food scarcity and famine (Amare Getahun, 1974; Zemedu Asfaw, 1997; Tesfaye Awass, 1997).

As reported by informants, during the 1986 great famine, non-cultivated food plants have played significant role in saving lives of the local people. Wild foods could be categorized as famine, emergency, seasonal and snack. In normal conditions, when there is no food scarcity, non-cultivated foods are used as snack for herders. But due to habitat loss in the area non-cultivated food plants are becoming rare. According to informants, there were many edible wild plants, which are not easily accessible nowadays. "Those plant species which become rare are *Ficus*, *Cordia*, *Mimusops*, *Ximenia*, *Rhus*, *Berchemia* and *Ziziphus* species. Though natural forests have disappeared; due to deforestation, charcoal making, and agricultural expansion, a wide range of non-cultivated food plants are found. As Zemedu Asfaw and Ayele Nigatu (1995) have reported elsewhere, in the study area, some edible wild plants are used as live fence, left in crop field and open spaces. During food scarcity, some of the non-cultivated foods are sold in local markets and generate income. For example, *Opuntia ficus-indica* collected from hillsides and *Ziziphus mauritiana* are sold in local markets.

During food scarcity and famine, people rely heavily on non-cultivated (wild) food plants (Cotton, 1996; Zemedu Asfaw, 1997; Tesfaye Awass, 1997; Tuxill, 1999). Wild food plants are not only used as a source of food energy but also are very important sources of vitamins, trace minerals and other nutrients. Non-cultivated food plants and wild relatives of cultivated plants play significant role in the improvement of crops. Non-cultivated food plants also serve as a source of subsistence income from local marketing (Zemedu Asfaw, 1997).

The recorded medicinal plants of Cheffa area were crosschecked with the findings of previous authors. Of 83 species recorded in Cheffa area, 19 were already documented by Mesfin Tadesse (1986), 36 by Mesfin Tadesse and Sebsebe Demissew (1992), 26 by Azene Bekele *et al.*, (1993), 29 by Fichtl and Admasu Adi (1994), 6 by Abbink (1995) and 13 by Mirutse Giday (1999).

As can be noted from these and other available literature, of 83 recorded medicinal plants of Cheffa 65 species (78.31%) are used elsewhere in Ethiopia. In Africa 36 (43.37%) are used in which their medicinal values were documented; 14 species by Boulos (1983), 12 by Anokbonggo (1992) and 27 by Iwu (1993). Most of the medicinal plants used by Cheffa people are used elsewhere in Ethiopia and in Africa, which could be related with their efficacy.

The habit of the most utilized medicinal plants of Cheffa is shrubs (46.83%) and followed by herbs (24.05%). The analysis of the data from informants showed that the majority of wild medicinal plants of the area are shrubs. It seems that the Cheffa medicinal plants originate from forest-based habitats and season of specimen collection may also contributes to the differences. That is herbs are obtained abundantly during the wet season.

According to Dawit Abebe and Estifanos Hagose (1991), from 54 species, plant parts used were leaves (35 species), roots (26), seed (13), bark (8), fruit (4) and whole plant (3). Similarly in this study, the highest plant part used for the preparation of remedies is leaf with 50.71% for humans and 56.89% for

livestock. The utility of plant parts, in the preparation of remedies, may or may not affect the survival of the plant. Those medicinal plants, which are harvested for their roots, rhizomes, bulbs, bark, stem, or whole part, have severe effect on their survival (Dawit Abebe and Ahadu Ayehu, 1993).

Medicinal plants of Cheffa are used for the treatment of more than 48 human ailments and 20 livestock diseases. The most frequently encountered and the highest percentage 20 species (25.3%) of medicinal plants are used for the treatment of gastrointestinal disorders followed by infected wound and tropical ulcer, accounting for 13 species (16.45%). For Febrile illness 11 species (13.92%) and for diarrhea 9 species (11.39%) are used. Similarly in veterinary use 6 species (19.35%) are used to treat febrile illness (MICH), 5 species (16.12%) for dermatophilosis and for each of the following diseases 4 species (12.90 %) are used to treat pasteurellosis, black-leg, ectoparasites and repulsion of retained placenta.

In the preparation of remedies used by the Cheffa people, remedies are mainly prepared by pounding, crushing and squeezing juice, which accounts for 79.69% of plant parts. The result of this study indicated that most of human remedies are prepared from a single plant (97.96%) and concoction or mixture of plant species is very rare, accounting for 2.07% only. It holds true for ethnoveterinary purposes. Single plant preparation accounts for (88.88%) and mixtures of plant species (11.11%). The finding of this study is in line with that of Mirutse Giday (1999), but inconsistent with that of Dawit Abebe (1986), who claimed that using mixture of plant species as a commonly used preparation method for the treatment of a particular disease. Prepared remedies are taken either internally (62.16%) or externally (37.83%). The majority of remedies are applied internally rather than externally. The most commonly utilized routes of administration are oral and dermal accounting for 53.60% and 20.72%, respectively. Other works carried out elsewhere in Ethiopia (Dawit Abebe and Ahadu Ayehu, 1993; Mirutse Giday, 1999) support to the present findings.

As reported elsewhere in Indonesia by Erdelen *et al.* (1999), in Cheffa different plant species are used for the treatment of the same disease or a specific ailment might be treated by a particular plant species. Similarly a single plant species could be used against different diseases. Similarly, (Dawit Abebe and Ahadu Ayehu, 1993) reported that the utility of several species for the treatment of a particular ailment could indicate its prevalence in the area.

Medicinal plants utilized by the Cheffa people are collected from wild and they are distributed in relict forests (*hujubs*), crop fields, fallows, roadsides, hedges, live fences, gardens, hillside woodlands riverbanks and wetlands. The habitat of these plants is increasingly becoming threatened due to agricultural intensification. Heavy pressure and continued over exploitation of these habitats pose a high risk to their continued utility. Destruction of habitats has resulted in the rarity of most medicinal plants consequently decreased in indigenous knowledge of plants of the area. For example, medicinal plants are mainly found in the *hujubs*.

Due to population increase, agricultural intensification, overgrazing, urbanization, acculturation, low transfer of knowledge to the younger generation by elders and the alien species encroachment most of the area has changed into croplands. Forest islands are preserved by the community's socio-cultural factors as rituals, beliefs, grave and religious places. The islands are of three types. *hujubs* used for: 1/ rituals, beliefs, and religious purposes; 2/ rituals, beliefs, religious and grave places; and 3/ family line grave places of the clan leader.

The present study indicates that there are beliefs, which have played great role for the preservation of these forest islands. To cut a plant part is not allowed, even a dried part of a branch. In agreement with the present study, Cotton (1996) have had similar conclusions about the roles of, magical and religious beliefs and environmental perception on the use and management of plant species. Hence, spiritual and religious beliefs about *hujubs* have developed strong effect on its use and management. There are powerful beliefs, rituals and spirits and taboos for each *hujubs* (relict forest islands of Cheffa).

These rituals and beliefs highly play great role to preserve the remaining remnant forest and associated indigenous knowledge. As Tamrat Bekele (1994), Kebrom *et al.* (1997) and Kebrom Tekele(1998) have reported elsewhere in Ethiopia, in the study area, holly places have preserved remnant forests. Like the Ethiopian Orthodox Church does in other places, in the study area Muslim religion plays a significant role in the conservation of remnant forest island vegetation. These areas not only preserve and conserve the

plant and animal diversity of the area, but also preserve a wide range of indigenous and botanical information and cultural diversity.

Hujubs are very important hiding, breeding, feeding, refuges, seasoning sites for several wild animals during the wet and dry seasons. For example, columbus and vervet monkey, civet, warthog, antelopes are found in *hujubs*. Some of the birds that are observed in the wetlands are crane, flamingos, ibises, plovers, egrets, queela, and ducks. As every park is a biological island for some species, *hujubs* are ecological relict forest islands created by traditional communities and surrounded by agricultural fields. These habitats have significant values as sources of medicinal and food plants, beforage, wild animal habitats and rituals and associated beliefs. They are *In situ* conservation sites of both plant and animal species. These sites have got ritual and religious protection. But there is a high risk from fire that could arise from agricultural practices and roasting sorghum fruit heads by farmers on the outskirts of *hujubs*.

As documented by MOA, UNDP and FAO (1987), for Cheffa and by Alemayehu Mengistu (1997), Kebrom Tekele (1998), elsewhere in Ethiopia, livestock play a fundamental role in food production, as live account for food shortage and famine, provide milk, meat, hide, draught and draft power, manure croplands and are source of prestige. In Ethiopia, livestock production is high, accounting for 80% of farmers' income. However, it has been noticed in Cheffa that forage plants have significantly decreased. The Cheffa plain serve as a standing hay pasture bank for the dry season. It has significant value with respect to cattle rearing.

In the present study the people of Cheffa have detailed indigenous knowledge on the quality, disease causing, parasitic harboring, toxicity, ethnoveterinary medicine and distribution of their livestock feed. Traditional activities and the significant value of peoples' culture, rituals, beliefs, and religions on the preservation, conservation and sustainable utilization of biodiversity were noted. The results agree with the report of Cotton (1996)

Based on their observation and perception on their livestock preference and palatability of feed *Grewia*, *Cladostigma*, *Acacia*, *Ehretia*, *Cordia* and *Celtis* species are considered and valued as the best browse shrubs and trees of the area. However, their scale of preference depends on their availability and season, dry or wet. Except for *Cladostigma*, the results agree with the reports of Kidest Shenkoru, *et al.* (1991) who showed that the list of shrubs and trees of high value as animal feeds, The grassland area of Cheffa, which was once covered by high quality feed, has changed into croplands. Notorious and unpalatable invaders occupy the remaining small patches of seasonal waterlogged grasslands. These invasive unpalatable weeds which posed critical problem in the productivity of pasture and hence livestock are: *Xanthium strumarium*, *Hygrophila auriculata*, *Ageratum conyzoides*, *Argemone mexicana* and *Lantana camara*. Weeds have tremendously decreased the quality and quantity of livestock production.

Depending on the scarcity of food, non-cultivated plant foods could be categorized into snack, seasonal, emergency and famine foods.

Medicinal plants of Cheffa are diverse. The people utilize medicinal plants for both his and veterinary medicinal needs. In the preparation and application of remedies a single plant could be used to treat a particular or several diseases. Similarly, two or more plant species could be concocted for the treatment of a single disease or several species may be used for a single type of ailment.

The major treats for the loss of food, medicinal and other useful plants are deforestation, habitat change, environmental degradation, and acculturation. As a result of these factors both useful plants and their associated plant use knowledge are being diminished. The Cheffa wetland is slowly changing into croplands. The remaining floodplains are highly threatened by agricultural development pressures, which can in turn affect the surrounding dryland areas, livestock economy and indigenous knowledge of the society.

The relict forest islands could be considered as a traditional community based *In situ* conservation areas. Cultural practices of the Cheffa people have played vital role in the conservation of these plant resources. Unless cultural heritages are preserved, if changed, the cultural management activities will be lost forever.

It is recommended that the relict forests and semi-wetlands are special habitats, which require special attention for the conservation of medicinal plants, indigenous knowledge, and biodiversity. Thus,

traditional plant resource use management should be strengthened by developing people's values and positive attitudes towards biodiversity. Traditional use of plants should be integrated into both formal and non-formal education systems. Integrating into school curricula could help in developing positive attitudes towards conservation of natural resources and indigenous knowledge.

The nutritional values of non-cultivated food plants, forage plants, the pharmacological and therapeutic activities of medicinal plants and properties of other useful plants should be tested and developed.

Developmental activities should be based on and integrate with the needs and interest of the local people and their knowledge

ACKNOWLEDGEMENTS

We are indebted to the people of Cheffa Informants who kindly shared us their invaluable plant use indigenous knowledge. We thank Prof. Sebsebe Demissew for his assistance in species identification. We are grateful to the Biology Department of AAU and RPSUD (Research Programme for Sustainable Use of Dryland Biodiversity) for its financial support.

REFERENCES

- Abbink, J. (1995). Medicinal and ritual plants of Ethiopia southwest: An Account of Recent Research. *Indigenous Knowledge and Development Monitor*. **3 (2)**: 6 – 8.
- Alemayehu Mengistu (1997). *Conservation Based Forage Development for Ethiopia*. Self Help Development International Institute for Sustainable Development, Addis Ababa, Ethiopia. B.S.P.E. Pp. 170.
- Alexiades, M. (1996). *Collecting Ethnobotanical Data. An Introduction to Basic Concepts and Techniques*. In: Alexiades, M.N. and Sheldon, J.W. (eds.), *Selected Guidelines for Ethnobotanical Research: A Field Manual*. The New York Botanical Garden, Bronx, New York, U.S.A. Pp. 53 – 94.
- Amare Getahun (1974). The role of wild plants in the native diet of Ethiopians. *Agroecosystems* 1: 45-56.
- Andrews, T. (1982). *A Bibliography on Herbs, Herbal Medicine, Natural Foods and Unconventional Medical Treatment*. Libraries Unlimited, Inc. Littleton, Colorado, USA.
- Anokbonggo, W. (1992). *The Role of African Traditional Medicine in Health – Care Delivery Alongside Modern Medicine*. In: Edwards, S. and Zemedu Asfaw (eds.), *Plants used in African traditional Medicine as practiced in Ethiopia and Uganda*. Botany 2000: East and Central Africa. NAPRECA Monograph Series No. 5. Published by NAPRECA, Addis Ababa University, Addis Ababa. Pp. 25 – 35.
- Azene Bekele – Tesemma, Birnie, A., Tengnas, B. (1993). *Useful Trees and Shrubs for Ethiopia: Identification, Propagation and Management for Agricultural and Pastoral Communities*. Regional Soil Conservation Unit SIDA, RSCU, Nairobi, Kenya. Pp. 474.

- Balick, M.J. and Cox, P.A. (1996). *Plants, Pople and Culture: Science of Ethnobotany*. Scientific American Library, New York, USA.
- Boulos, L. (1983) *Medicinal Plants of North Africa*. Reference Publication, Inc; Algonac, Michigan, U.S.A. Pp. 286.
- Cotton, C.M. (1996). *Ethnobotany: Principles and Applications*. John Wiley and Sons Ltd. Chichester, England.
- Cunningham, A.B.(1996). *Professional Ethics and Ethnobotanical Research*. In: Alexiades, M.N. and Sheldon, J.W.(eds.), *Selected Guidelines for Ethnobotanical Research : A Field Manual*. The New York Botanical Garden, Bronx, New York. U.S.A. Pp. 19 – 51.
- Dawit Abebe (1986). Traditional Medicine in Ethiopia: The Attempts being made to promote it for effective and better Utilization. **SINET: Ethiop. J. sci.**, **9 (Supp.)**: 61 – 69
- Dawit Abebe and Ahadu Ayehu (1993). *Medicinal Plants and Enigmatic Health Practices of Northern Ethiopia*. B.S.P.E., Addis Ababa, Ethiopia. Pp. 511.
- Dawit Abebe and Estifanos Hagos (1991). *Plant as Primary Source of Drugs in the Traditional Health Practices of Ethiopia*. In: Engles J.M., Hawkes, J.G., and Melaku Worede (eds.), *Plant Genetic Resources of Ethiopia*. Cambridge Universit Press, Cambridge. Pp. 101 –113.
- Denny, P. (1985). *Wetland Vegetation and Associated Plant Life forms*. In: Denny, P. (ed.), *The Ecology and Management of African Wetland Vegetation: Geobotany 6*. Dr.W.Junk Publishers, Dordrecht. The Netherlands. Pp. 1 –18.
- Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Edwards,S. (1992). Some threatened endemic plants of Ethiopia. In: *The status of some plant resources in parts of Tropical Africa, Botany 2000*. (Zemedede Assfaw and Edwards. S., eds.). NAPRECA, Monograph No. 2: 35 - 55. Addis Ababa.
- Erdelen, W.R., Adimihardja, K., Moesdarsono, H., Sidik. (1999). Biodiversity, Traditional Medicine and the Sustainable Use of Indigenous Medicinal Plants of Indonesia. *Indigenous Knowledge and Development Monitor*, **7(3)**: 3-6.
- FAO (Food and Agriculture Organization of the United Nations)(1984). *Vegetation and Natural Regions and their Significance for Land use Planning*. Ethiopia, FAO, Rome.
- Fichtl, R. and Admasu Addi (1994). *Honeybee Flora of Ethiopia*. Margraf Verlag, Weikersheim, Germany. Pp. 510.
- Gelahun Abate (1989). Etse Debdabe (Ethiopian Traditional Medicine). Sebsebe Demissew (ed.), Research and Publications Office, Addis Ababa University. (In amharic)
- Grenier, L. (1998). *Working with Indigenous Knowledge: A Guide for Researchers*. International Development Research Centre, Ottawa, Canada.
- Harper, D. and Mavuti, K. (1996). *Fresh Water Wetlands and Marshes*. In: McClanahan, T.R. and Young, T.P. (eds.), *East African Ecosystems and Their Conservation*. Oxford University Press, Oxford, New York. Pp. 217 – 239.
- Iwu, M.M. (1993). *Handbook of African Medicinal Plants* CRC Press, Inc. Boca Raton. Ann Arbor. London. Tokyo. Pp. 43.
- Kebrom Tekle (1998). *Ecological Rehabilitation of Digraded Hill Slopes in Southern Welo, Ethiopia*. Ph.D. Dissertation. Uppsala University, Sweden.
- Kebrom Tekle, Backeus, I., Skoglund, I. and Zerihun Woldu (1997). Vegetation on hill Slopes in Sothern Wello, Ethiopia: Degradation and Regeneration. *Nord.J.Bot.* **17 (5)**: 483-493.
- Kidest Shenkoru, Hanson, J. and Metz, T. (1991). *ILCA Forage Germplasm Catalogue 1991. Vol.2. Tropical Lowland Forages*. ILCA (International Livestok Center for Africa), Addis Ababa, Ethiopia. Pp. 167.

- Martin, G.J.(1995). *Ethnobotany. A Method Manual*. World Wide Fund for Nature (International), Chapman and Hall Ltd., London,UK. Pp. 268.
- Mathias, E.(1996). How Can Ethnoveterinary Medicine be used in Field Projects.*The Indigenous Knowledge and Development Monitor*, **4 (2)**: 6 - 7
- Maundu, P. (1995). *Methodology for Collecting and Sharing Indigenous Knowledge: A Case Study*. *Indigenous Knowledge and Development Monitor*, **3 (2)**: 3 –5.
- Mesfin Tadesse. (1986). *Some Medicinal Plants of Central Shewa and Southwestern Ethiopia*. **SINET: Ethiop. J.Sci.**, **9 (supp.)**: 143-168.
- Mesfin Tadesse and Sebsebe Demissew. (1992). *Medicinal Ethiopian Plants: Inventory, Identification and Classification*. In: Edwards, S. and Zemedede Asfaw (eds.), *Plants Used in Africa Traditional Medicine as Practiced in Ethiopia and Uganda*. Botany 2000: East and Central Africa. NAPRECA Monograph Series. No. 5. Published by NAPRECA, Addis Ababa University, Addis Ababa. Pp. 1-19.
- Mirutse Giday (1999). An Ethnobotanical Study of Medicinal Plants Used by the ZAY People in Ethiopia. M.Sc. Thesis. Uppsala, Sweden.
- MOA, UNDP and FAO (1985). *Assistance to Land use Planing, Ethiopia: Vegetation and Land Use Survey of the Borkena Area (Welo)*. Addis Ababa, Ethiopia. Pp. 153
- MOA, UNDP and FAO (1987). *Land Evaluation and Recommendations for Land Use Planning in the Borkena Study Area (Welo/Shewa)*. Addis Ababa, Ethiopia. Pp. 258.
- Morgan, W.T. (1981). Ethnobotany of the Turkana: Use of Plants by a Pastoral People and their Livestock in Kenya. *Journal of Economic Botany*, **35 (1)**: 96 – 130.
- Muthuri, F.(1992). *Classification and Vegetation of Freshwater Wetlands*. In: Crafter, A., Njugura, G. and Howard, W.(eds.), *Wetlands of Kenya*. Proceedings of the KWWG Seminar on Wetlands of Kenya, National Museums of Kenya, Nairobi, Kenya, 3-5 July 1991. IUCN. Pp. 79 – 84.
- National Meteorological Services Agency (1999).Report of Meteorological data of Cheffa area.
- Peters, C..M. (1996). *Beyond Nomenclature and Use: A Review of Ecological Methods for Ethnobotanists*. In: Alexiades, M.N. and Sheldon, J.W. (eds.), *Selected Guidelines for Ethnobotanical Research: A Field Manual*. The New York Botanical Garden, Bronx, New York, U.S.A. Pp. 241 – 273.
- Rao, R.R. and Jamir, N.S. (1988). *Ethnobotanical Studies in Nagaland. I. Medicinal Plants*. *Journal of Economic Botany*, **36 (2)**: 176 – 181.
- Tamarat Bekele (1994). *Studies on Remnant Afromontane Forests on the Central Plateau of Shewa, Ethiopia*. Ph. D. Dissertation, Acta Universitatis Upsaliensis, Uppsala, Sweden.
- Tesfaye Awass (1997). A Study on the Ecology and Ethnobotany of Non-cultivated Food Plants and Wild Relatives of Cultivated Crops in Gambela Region, South Western Ethiopia. M.Sc.Thesis Submitted to Addis Ababa University, Addis Ababa, Ethiopia.
- Tuxill, J. (1999). *Nature's Cornucopia: Our Stake in Plant Diversity*. Worldwatch Paper 148. Worldwatch Institute. Washington, DC. U.S.A. Pp. 85.
- Zemedede Asfaw (1997). *Indigenous African Food Crops and Useful Plants: Survey of Indigenous Food Crops, Their Preparations and Home Gardens*. The United Nations University Institute for Natural Resources in Africa. ICIPE Science Press, Nairobi, Kenya. Pp. 65
- and Ayele Nigatu (1995). Home Gardens in Ethiopia: Characteristics and Plant Diversity. **SINET: Ethiop. J. Sci.**, **18 (2)**: 235 – 266