Addis Ababa University

School of Graduate Studies

A Floristic Analysis and Ethnobotanical Study of the Semi-wetland of Cheffa Area, South Welo, Ethiopia

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A Floristic Analysis and Ethnobotanical Study of the Semi-wetland of Cheffa Area, South Welo

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Abstract

A floristic and ethnoboatnical study was carried out in Cheffa plain, South Welo, between 20 November 1999 and 30 February 2000. A total of 74 quadrat were established in semi-wetland and relict forest Islands. Cover-abundance values were taken for 115 plant species. From each quadrat one after the other, soil samples were taken at 0-20 cm depth and analyzed for pH, organic carbon and cation exchange capacity. Soil analysis result was computed in one way ANOVA to compare communities in relation with their environment. A significant difference on organic carbon and moisture content was obtained. Vegetation data was classified using computer program named Syn -Tax, multivariate data analysis, Version 5.02 Podani (1994) .Hierarchical clustering, average linkage classificatory technique and the following plant communities were obtained: *Bothriochloa insculpta - Heteropogon contortus* Type, *Cynodon dactylon-Xanthium strumarium* Type, *Echinochloa colona-Panicum coloratum* Type, *Panicum coloratum-Ludwigia stolonifera* Type, *Trifolium rueppellianum-Isolepis costata* Type, *Cyperus alopecuroides-Echinochloa pyramidalis* Type, *Typha domingensis-Schoenoplectus maritimus* Type, *Isolepis costata-Schoenoplectus maritimus* Type, *Cyperus digitatus* Type, *Lantana camara-Cordia africana* Type.

Ethnobotanical information of very important wild plants was 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, tooth brush, fumigation, fragrance and other miscellaneous uses have been recorded.

Edible plant parts, eaten fresh, raw, cooked or in combinations, include leaf (4 species), fruit (36), seed (6), flower (2), nectar (1), twig (1), stem (3), bark (2), resin (2), sap (1), above ground part (2), rhizo- me (1) and tuber (1). Depending on food scarcity, non-cultivated food plants were recognized and categorized as snack, seasonal, emergency and famine foods.

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 routes of administrations are oral (53.60%) and dermal (20.72%). Medicinal plants are used to treat more than 48 human and 20 livestock ailments.

Forage and other miscellaneous uses of plants were documented. The wetland is mainly used as a dry season grazing area. Relict forest islands are ritual, belief, religious and traditional-community based *in situ* conservation sites.

These traditional conservation activities and indigenous knowledge of the people should be strengthened. Traditional community based *in situ* conservation should be complemented with *ex situ* conservation activities.

1. Introduction

1.1 Background and Justification

The Ethiopian vegetation was rich in its composition and diversity. Large areas of the highlands of Ethiopia were covered by natural forests (Sebsebe Demissew, 1980). The excessive exploitation of the forest resources has left only small remnant inaccessible and holly places (Tamrat Bekele, 1994; Kebrom Tekele *et al.*, 1997; Kebrom Tekele, 1998). The loss of vegetation cover resulted in severe land degradation, environmental deterioration and shortage of plant resources.

Currently most of the remnant forests of the country exist in patches and are in a secondary state of development (Tamrat Bekele, 1994). Due to ever-increasing human and livestock population, the different vegetation types of the country are drastically dwindling both in physical and species composition.

The International Union for the Conservation of Nature and Natural resources (IUCN) in the Convention on Wetlands of International Importance as Waterfowl Habitat, the Ramsar Convention in 1971, defined wetlands as follows: "wetlands are areas of marsh, fens, peatland or water whether natural or artificial, permanent or temporary, with water that is static or

flowing, fresh, brakish, or salt including areas of marine water, the depth of which at low tide does not exceed 6 meters" (Mitsch and Gosselink, 1993).

In Ethiopia, wetland vegetation is mainly found as narrow strips around and along rivers (FAO, 1984). In East Africa there are large tracts of areas which in the rainy season, are often flooded by rivers but which dry out completely in the dry season and provide grazing areas (Lind and Morrison, 1974, Harper and Mavuti, 1996). Floodplains usually provide good grazing and shelter during the dry months and are used by both wild and domestic animals (Howard-Williams and Thompson, 1985; Harper and Mavuti, 1996). As stated by 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 (Denny, 1985;Howard, 1992; Muthuri, 1992; Harper and Mavuti, 1996) may change from seasonally flooded area to very drylands for most of the year. In drylands, these wetlands are very crucial to people, livestock and wildlife as refuges in times of drought (Howard, 1992). They are valuable as water source, storage and discharge, high productivity for human food, for breeding habitat, refuge and a feeding area during dry season. Their value as bird refuges, and habitats, especially for migratory species, is well known (Howard-Williams and Thompson, 1985).

Semi-wetlands are either seasonally or semi -permanentely inundated and wet areas. Seasonally or permanently flooded plains within the drylands of Ethiopia play a decisive role in the economy and ecological balance of the

surrounding environments. Traditionally, wetlands and semi-wetlands were considered as wastelands that should be drained and changed to other form so as to control diseases and for agricultural development activities (Maltby, 1986; Lean *et al.*, 1990; Mitsch and Gosselink, 1993; Beazley, 1993). Destruction of these habitats was an accepted and encouraged act. However, through time, these habitats are now recognized to be one of the most productive life supporting ecosystems (Williams and Gaudet, 1985; Maltby, 1986; Ellenbroek, 1987; Lean *et al.*, (1990); Ole Nkako, 1992; Mitsch and Gosselink, 1993; Montangue and Odum, 1997).

In Ethiopia, due to several reasons, wetlands are still considered as wastelands. Despite their enormous importance to humans little is known about the vegetation and ecology of wetlands and semi-wetlands of Ethiopia. In the study area, most of the natural vegetation is destroyed as a result of cultivation, overgrazing, drainage, diversion of river courses, adoption of flood protection, making cut off channels, fuel wood collection and charcoal making. In the area human impacts on wetlands and dry lands is highly pronounced. Hence, to sudy the vegetation of these habitats is important if the floodplain environments and biodiversity are to be scientifically understood, and sustainable management strategies are to be taken.

The Cheffa plain is one of the serveral seasonally flooded places in Ethiopia. It is one of the most productive plains with few remaining wetland vegetation.

During the dry season and severe prolonged drought years, the plain is used as a dry season communal grazing area by the Oromo, Afar and Amhara people (MOA, UNDP and FAO, 1987). As Mungai (1992) reported about wetlands of Kenya, in arid and semi arid areas, wetlands are very crucial to sustain the arid and semi-arid livestock economy and the surrounding environments. The Cheffa plain is a very critical area for the surrounding resident people, pastoralists and animals as a source of water, food, shelter and refuge. Destruction of semi-wetlands and wetlands within drylands will eventually aggravate destruction and over-exploitation of the fragile dryland environments.

Many pastoral people and livestock herds flock and pass over the dry season in Cheffa plain (personal observation). However, as a result of population increase in Cheffa area, the natural vegetation has been replaced by croplands, except for a few relic patches of island vegetation areas. Among these are the *hujubs* (in Oromigna), which are relic and isolated forest island patches.

In addition, due to commercial farming, investment projects and shortage of farm plots, the area is being threatened. As a result of ecological changes and human and livestock pressure occurring in the area, the loss of these habitats seems inevitable. In East Africa, drainage for agricultural fields, flood control dykes, diversions of the river course and cut-off channels have

been reported by Harper and Mavuti (1996) as the main causes of wetland destruction.

A careful analysis of vegetation is a means of revealing important information about other components of the ecosystem (Goldsmith *et al.*, 1986). Vegetation study could also help and promote to select and employ the appropriate conservation and management plan for sustainable use of ecosystems (Kershaw, 1973). Floristic data are relevant for establishing the present situation for environmental impact assessment and for monitoring changes in ecosystem quality in terms of changing species composition.(Groem *et al.*, 1994).

The ever- increasing threat and destruction of plant resources and ecosystems in an alarming rate calls for proper management and conservation activities so as to ensure the continued productivity and stability of the area. Understanding and taking conservation activities, however, should be based on floristic and ethnobotanical study of the area. According to Martin (1995), ethnobotanical information is basic for conservation and community development activities. Ethnobotanical information is useful to broaden our plant use knowledge (Abbink, 1995). As in other parts of Ethiopia, plant resources and the associated indigenous knowledge are vital for the survival of Cheffa society.

Many studies (e.g Hill, 1952; Cherry, 1985; Amare Getahun, 1974; Aregbeyen, 1996; Mathias, 1996; King, 1997; Azene Bekele, *et al.*, 1993; Fichtl and Admasu Adi, 1994; Zemede Asfaw, 1997) show plants are used in a vast diverse number of ways. Plants play a decisive role in almost every human activity. For example, estimates indicate that over 75% of the world's rural population (Andrews, 1982), and some 80% of the world's population (King, 1997) relies entirely on traditional herbal medicines for their health care. In Ethiopia the figure reported by Dawit Abebe and Ahadu Ayehu (1993) is 80 %. Dr. Tewolde Brehan Gebre Egziabher and Gelahun Abate started studying and documenting medicinal plants of Ethiopia scientifically in 1973 (Mesfin Tadesse and Sebesebe Demissew, 1992). Gradually the scope of the studies has got the required attention, though insufficient, as compared with the cultural diversity and the size of the country. Nevertheless, many studies have been conducted on medicinal plants, by several workers (e.g Mesfin Tadesse, 1986;Gelahun Abate (1989), Mesfin Tadesse and Sebsebe Demissew, 1992; Dawit Abebe and Ahadu Ayehu, 1993; Abbink, 1995; Mirutse Giday, 1999). More extensive and in depth studies are yet required to be undertaken throughout the country, including all the cultural diversity and ecological zones. Hence documenting and conserving ethnobotanical information of the area would be crucial and a timely endeavour. As Tesfaye Awass (1997) pointed out concerning the ethnobotanical study of Gambella Region, ethnobotanical information of the Cheffa area should be documented and conserved in *ex situ*, and *in situ* or in both conservation strategies.

During food scarcity and famine, people rely heavily on non-cultivated (wild) food plants (Cotton, 1996; Zemede 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 (Tuxill, 1999). Non-cultivated food plants and wild relatives of cultivated plants play significant role in the improvement of crops. Without genes from wild relatives tomatos and sugar cane would have hardly grown on a commercial scale today. Cocoa, maize, wheat, cassava have also been improved with the help of genes from the wild (Hanneberg, 1992). Furthermore, the same author indicated that the plant kingdom includes some 75,000 edible species out of which 20 or so of these account for 90 percent of the world's food base. Non-cultivated food plants also serve as a source of subsistence income from local marketing (Zemede Asfaw, 1997). These socio-economic benefits, for example, genes, food values, income source obtained from a very wide range of useful non-cultivated food plants have brought significant due attention for the conservation of their habitat and associated indigenous knowledge.

In arid regions (Khoshoo and Subrahmanyam, 1985), and wetland areas (Mitsch and Gosselink, 1993), plants and plant based products are vital for the large majority of the rural people to meet their daily household needs, basic requirements of their existence, and a major source of employment as well.

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 Rao and Jamir (1988), Morgan (1981), Erdelen *et al.* (1999) and in Ethiopia Abbink (1995), Zemede Asfaw (1989 and 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. Hence, so as to conserve both plants and information about the plants, pressure exerted by humans on plant species should be well assessed. As Cunningham (1996) pointed out that both saving plant species and documenting and preserving indigenous knowledge are fundamental urgent issues to be accomplished. Studying the relationship between people and plants, and the significance of plant use towards the well being of the community is extremely important (Martin, 1995; Alexiades, 1996; Cotton, 1996).

According to Grenier (1998), indigenous people have had developed unique, traditional and local knowledge around specific conditions. This knowledge is a cumulative result of many generations of experiences, careful observations and trial and error experiments. Furthermore, the same author noted that indigenous knowledge is expressed in stories, songs, folklore, proverbs,

dances, myths, beliefs, and rituals, local language. A vast pool of indigenous knowledge could be obtained within the languages beliefs, rituals, song, sayings, poems (Zemede Asfaw, 1989; Martin, 1995; Grenier, 1998).

Nevertheless, as the local people and communities encounter cultural changes, unless documented and conserved, the knowledge of the people could vanish forever. This vital information is diminishing at an alarming rate. Hence collecting and documenting it before it is lost forever is a fundamental urgent task (Maundu, 1995). Thus, In Cheffa area, the remaining plant resources and the associated indigenous knowledge should be documented.

There are various techniques of collecting and analysing of ethnobotanical information. The multidisciplinary nature of ethnobotany allows the use of a wide range of methodologies and applications (Alexiades, 1996; Cotton, 1996). Several qualitative and quantitative methods for analysing ethnobotanical information are provided by Martin (1995), Cotton (1996), Phillips (1996), and Alexiades (1996).

Ethnobotanical study is highly dependent on the effective use of anthropological, botanical, ecological, and linguistic methods. According to Martin (1995) and Cotton (1996), antropological techniques participant observation and structured surveys are very important for the collection of both qualitative and quantitative data. For accurate ethnobotanical study,

botanical methods are crucial. Both qualitative and quantitative methods are vital to collect accurate and complete data (Martin, 1995). These methods employ the four basic interview techniques: open-ended, semistructured, structured and questionnaires. The former two are used for qualitative and the later two for quantitative data. There are also several types of analytical tools, which are used in the quantification and data verification (Martin, 1995; Cotton, 1996; Alexiades, 1996; Phillips, 1996). Some of these quantification and verification tools are: free listing, preference ranking, direct matrix ranking, utilization surveys, relative use value, paired and triadic comparisons. Detailed accounts of these tools are provided by Martin (1995), Cotton (1996), Alexiades (1996) and Phillips (1996).

Depending on the aims and objectives of the study, there are various techniques of inquiry tools (Martin, 1995, and Alexiades, 1996). These inquiry techniques are: participant observation, simulations, field interviews, plant interview, group interview, artifact interview, checklist interview and market survey. Similarly, Maundu (1995) advocated interviews, observations and guided field works as the major ethnobotanical data collection methods. Grenier (1998) gives more diversified methods of ethnobotanical data collection. Ethnobotanically useful information could also be obtained from collection and analysis of beliefs, rituals, songs, sayings, poems, local names, dances (Zemede Asfaw, 1989; Martin, 1995; Grenier, 1998).

Informants should be selected using appropriate sampling techniques (Martin, 1995; Cotton, 1996; Alexiades, 1996). The sociological variables of the society should also be taken into consideration (Martin, 1995). Nevertheless, Barker and Cross (1992) and van Geusan *et al.* (1992); both cited in Cotton (1996) suggested that specialist informants may be chosen in consultation with community leaders and community members.

Standard taxonomic techniques for collecting and preparing ethnobotanically important species are summarized by Martin (1995), Cotton (1996), Balick and Cox (1996), and Alexiades (1996). Ethnobotanical information, without properly vouchered specimens, has little scientific value, since vernacular names vary widely among individuals, communities, ethnic groups, and geographical areas (Alexiades, 1996). Therefore ethnobotanically important plant species should be collected and described scientifically.

The main goal of the floristic analysis and ethnobotanical study of Cheffa vegetation is to identify the major plant associations and their relationships to their environments; document vegetation and plant resource use of the area. The result of this study will contribute to the understanding of vegetation composition and plant use knowledge of the Cheffa people.

1.2. Objectives of the study

1.2.1. General objectives

- To study the floristic composition of Ceffa plain
- To compile and document ethnobotanical information about plant species of the study area

1.2.1.2. Specific Objectives

- To collect floristic data on the Ceffa plain
- To record, and document indigenous knowledge of people on plant species of the study area
- To compile a check-list of ethnobotanically most important plants of the study area
- To suggest ways of conserving these habitats and plant species of the area.

1.3. Description of the study area

1.3.1. General features

The Cheffa plain is located along the Borkena and Jara River Basins, in South Welo. The study area lies between 10^0 32' and 10^0 58' N latitudes and between 39^0 46' and 39^0 56' E longitudes. The southern boundary of Cheffa plain extends to Chire village and the northern boundary reaches south of Fontenina village. The escarpment of highlands in the west of Cheffa plain and the Eastern hills in east are east-west boundaries. According to MOA, UNDP and FAO (1987) the plain has a width of 10 km in the North, 16 km in the center (South of Kemissie town) and 12 km in the south. It stretches along a length of some 55 km from north to south. The plain is situated with an altitudinal difference of 1445 and 1520 m. It has physical features of piedmont slopes, seasonally and permanently flooded plains and isolated hills and covers an area of 82,000 ha (MOA, UNDP and FAO, 1987). The central part of the Borkena plain is a seasonally flooded plain while the lower part is permanently flooded where high swamp and marshes are flooded for more than half of a year.

The study area consists of seven main seasonally and permanently flooded areas in which six of them are adjacent and connected to each other by

Borkena River. Cerecha swamp, which is separated from the Borkena River Basin by Ruggdi hill, is located in Jara River Basin. These major semi-wetland and /or swampy areas of Cheffa plain are:

1.Cherecha Semi-wetland/swamp

2. Bishe Semi-wetland/swamp

3. Borkena Semi-wetland/Swamp

4. Kotem Semi-wetland / swamp

5. Borkena Semi-wetland/swamp

6. Mutlu Semi-wetland/swamp

7. Other small and patchy semi wetland/swampy areas:

Hora-Shegla village, Hora-Derka village and Hora- Selama village areas. There are also small pockets of marshy and seasonally inundated grassland areas.

There are hot springs at two different sites, namely Borkena bottomland and Hora-Shegla village areas. These sites currently are used by the people of the area, to treat skin diseases, sores, gonorrhea etc. Though the disturbance of habitats of these areas seems less, high disturbance may encounter as a result of future investment trends.

1.3.2. Geology

The geology of the Cheffa area, according to Gregnanin *et al.* (1973) is Alaji rhyolites of Oligocene age overlain by Termaber basalts of upper Miocene age. The same rock units out cropping in the study area are dated by Justin-Visentin *et al.* (1974) as lower Miocene and Middle upper Miocene (all are Tertiary) times.

According to these workers and others, the Borkena graben, the western margin of the Afar Rift which is termed as a marginal graben formed due to the major tectonic phenomenon that occurs during the Afro-Arabian swell and the formation of the famous East African Rift Valley. The Western mountains are Tertiary volcanic rocks of mainly basaltic composition. The Borkena plain is a graben formed by tectonic movement during the Tertiary. The Eastern Mountains form a horst of the same system, covered by basaltic rocks at the top and rhyolites at the bottom. Ketema Tadesse (1980) has mapped the geology of the study area into the following geological formations.

1. "Alaji" rhyolites: which are the oldest rock units in the study area. It consists of alkaline rhyolites, which are acidic.
2. Termaber basalts:- these rocks are found overlying the "Alaji" rhyolites and are tuffs, scoraceous lava flows with interbeded red palaeosoils.

In the depression of the northern part of the study area these rocks underlie the sediments.

3. Recent alluvial sediments: these sediments cover almost all of the depressed wetlands of Cheffa which are more fine grained materials such as silt and clay than the north western or northern parts of the graben.

1.3.3. Soils

The physical and chemical compositions of soils are very important in determining the occurrence, growth, diversity and distribution of plant species of the area. According to the report MOA, UNDP and FAO (1987), the Borkena valley is a graben filled with fluvitaile, colluvial and Lacustrine sediments and the eastern hills are a horst structure of basaltic rocks. The major soil classifications of the study area are cambisols, phaezoms, lithosols, vertisols and fluvisols (MOA, UNDP and FAO, 1987; Kebrom Tekele, 1998). Soils of the Cheffa plain are gleysols, fluvisols, vertisols, luvisols and phaeozems.

1.3.4. Climate

Climatic factors, rainfall and temperature are the major environmental factors that play significant role in the growth, and distribution of plants. Rainfall and

temperature are highly influenced by altitudinal variation (Daniel Gemechu, 1977). The amount of annual rainfall in the study area is heavy during the main rainy season July to September and small rainy months February to May.

The highest mean maximum temperature is in June (33.3^0 C) and the lowest (26.4^0 C) in December while the highest mean minimum temperature was (16.2°c) and the lowest was (9.5^0 C) (Table 1 and Figure 2). The highest mean monthly total rainfall is in August (270.1 mm) and the lowest is in December (15.2 mm)(Table 1 and Figure 1).

Table 1. Climatic Data on: A / Monthly mean maximum temp (^{0}C), B/ Monthly mean minimum Temperature (^{0}C), C/ Mean monthly temperature (^{0}C) of Cheffa Wolde and D/ Mean monthly Total Rainfall (mm) of Kemissie town, Y/ years of observation

Climatic Factors	Months												
	Jan	Fe b	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Y
A (^{0} c)	27.0	27.7	29.5	30.1	31.3	33.3	30.4	29.0	29.2	28.6	27.3	26.4	1962-1988
B (^{0} c)	11.0	12.2	13.2	14.7	15.4	16.2	15.9	15.6	14.6	12.4	10.5	9.5	1962-1988
C (°c)	19.0	19.95	21.35	22.40	23.35	24.75	23.15	22.30	21.90	20.50	18.90	17.95	
D (mm)	30.4	40.6	70.2	90.2	61.9	27.6	239.8	270.1	119.6	42.6	20.3	15.2	1962-1998

Source: Data obtained from National Meteorological Services Agency (1999)

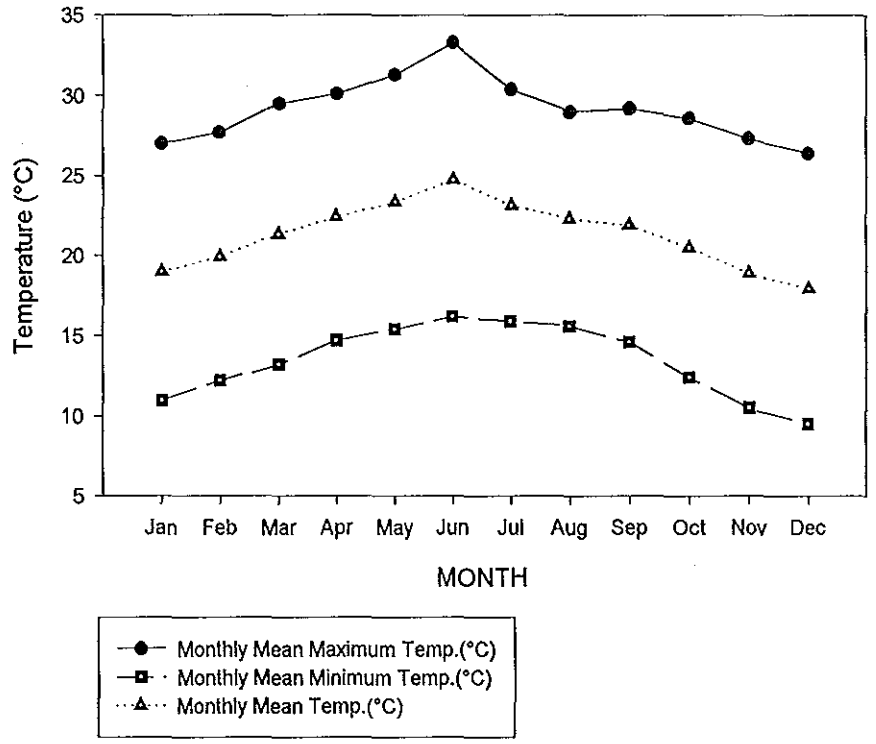

Fig.1. Graph showing monthly mean maximum, monthly mean minimum and monthly mean temperature(°C).

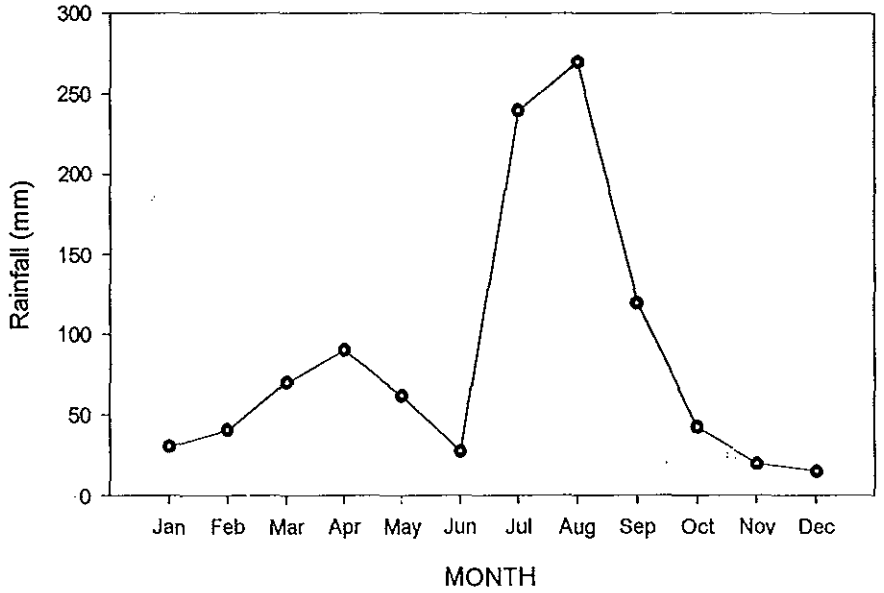

Fig.2. Graph showing mean monthly rainfall (mm)

1.3.5. Vegetation

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). Due to high population density combined with highly extensive cropping activity and grazing pressure, very little and patchy climax vegetation remains in the study area. These remaining but deteriorating forest island patches are somehow indicators of the original natural vegetation of the area. The relic forest islands are ecological islands that are surrounded by croplands and protected by the communities for ritual, ceremonial, religious purposes and burial (grave) places. They still host considerable amount of plant species. These very few forest islands, *hujubs*, are being protected because of rituals and beliefs, they are disturbed and are at risk from farming activities, grazing and fire. Topographic map of the area is presented in Fig.3.

The main plant spcies 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 spcies are represented mainly by *Cyperus digitatus* Roxb., *Typha domingensis* Pers., and *Echinochloa pyramidalis* (Lam.) Hitch. and Chase.

A vegetation survey conducted by MOA, UNDP and FAO (1985) documented the main structural vegetation types of Borkena as forest, woodland, bushland, shrubland and grassland. According to Kebrom Tekele (1998) the riverine vegetation, woodlands and shrublands of the area have decreased significantly.

1.3.6. Population and Land use

People:-People belonging to the Oromo nationality make the majority of the people living in the Cheffa plain. The area is densely populated (MOA, UNDP and FAO, 1985 and 1987). In addition to the residents, in Cheffa, there is a seasonal and continous populatin and livestock movenments into and out of the area. During the dry season, the Afar, Oromo and Amhara herders come with their herds to the Cheffa area. The Amhara are living in the Western escarpment and the high lands of Borkena.

Land use:- Crop production and livestock rearing are the main activities of the population of the area. The production is for household consumption and local markets. Agricultural production is based on rain fed cultivation and minor irrigation systems. The main crops grown in the area are given in Table 2. In the upper Cheffa plain, there is one large privately owned mechanized farm. This farm is currently involved mainly in maize, teff and sorghum

production and cattle fattening. Small scale commercial farming activities are also performed by few investors.

Table 2. Major food Crops Grown in the Study Area

Cropcategory	Scientific Name	English Name	Local Name
Cereals	*Sorghum bicolor* L.	Sorghum	Mashilla (Am.)
	Zea mays L.	Maize	Bekollo (Or.& Am.)
	Eragrostis tef (Zucc.) Troteer	Tef	Taffi (Or.)
	Eleusine coracana (L.) Gaertn	Finger millet	Daguja(Or.)
Pulses	*Pisum sativum* L.	Field peas	Ateri (Or.)
	Phaseolus vulgaris L.	Haricot beans	Adenguare
	Vicia faba L.	Horse beans	Bakela
	Cicer arietinum L.	Chick peas	Shinbura(Or.)
Oil crops	*Helianthus annuus* L.	Sunflower	Jabar suf
	Carthamus tinctorius L.	Safflower	Suf
Cash crops	*Coffea arabica* L.	Coffee	Buna(Or.)
	Nicotiana tabacum L.	Tobacco	Timbo(Or.)
	Saccharum officinarum L.	Sugar cane	Shenkorageda
	Catha edulis (Vahl) Forssk.ex Endle	Khat	Chati(Or.)
Vegetables	*Capsicum frutescens* L.	Pepper	Berberre(Or.)
	Allium cepa L.	Shallot	Shinkurti(Or.)
	Lycopersicon esculentum Mill.	Tomoto	Tematimi(Or.)
	Cucurbita pepo L.	Pumpkin	Duba Or.& Am.)
Fruits	*Citrus sinensis* (L.) Osb	Citrus	Birtukani(Or.)
	Citrus limon (L.) Burm.f	Lemon	Lomi(Or.)
	Musa paradisiaca L.	Banana	MUZ Or.& Am.)
	Psidium guajava L.	Guava	Zeituna Or.& Am.)
	Carica papaya L.	Papaya	Papaya Or.& Am.)
Root crops	*Ipomoea batatas* (L.) Lam.	Sweet potato	Squardinich Or.& Am.)

* Or.,Oromifa and A m.,Amaregna

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.

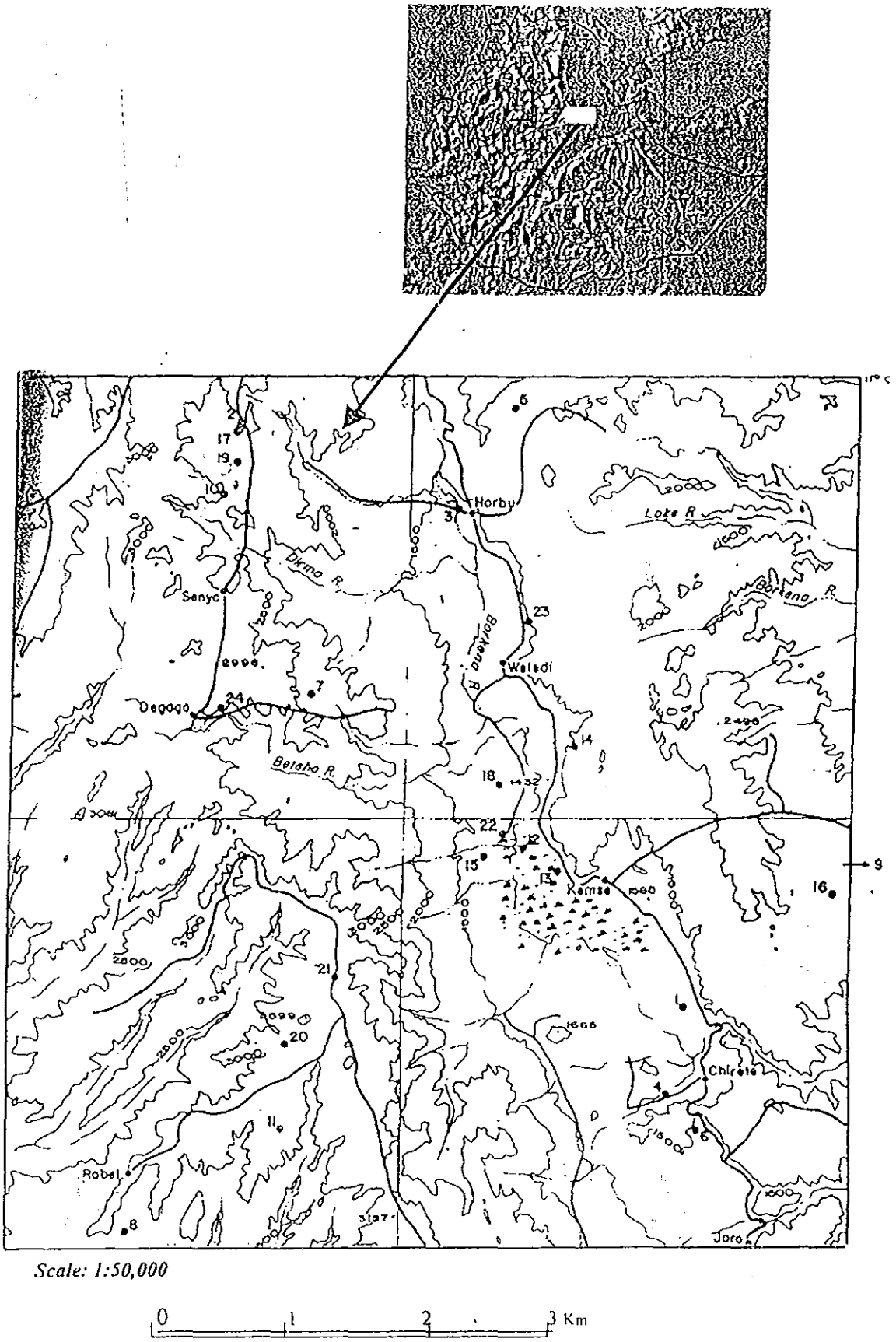

Figure 3 Topographic Map of Cheffa Area

2. Materials and Methods

2.1. Vegetation Sampling

A reconnaissance survey of Cheffa semi-wetlands and relict forest islands was made from 20-25 November 1999. Floristic data was collected from a total of 74 quadrarts (2 × 2 m) for herbs and (20 × 20 m) for shrubs and trees as described by Muller-Dombis and Ellenberg (1974). Systematic sampling was employed following Muller-Dombois and Ellenberg (1974) and Peters (1996). A total of seventeen transects were laid and samples were taken at approximately two kilometer interval of each sem-wetland. From every transect starting point two by two meters (2 m x 2 m) were delimited, one at every five meters intervals. For six island forest patches, at the center of each of them a homogenous square stand of twenty by twenty meters (20 m x 20 m) was delimited. Trees and shrubs were enumerated. Lists of species and environmental factors were recorded from each quadrat. The cover abundance values of all herbs, sedges, shrubs and trees were estimated using a 1-9 modified Braun Blanaquet (1932) scale as modified by van der Maarel (1979).

Forest island plant species that were found within each quadrat were recorded as present. Voucher specimens were collected, pressed, dried and

coded for identification at the National Herbrium, Addis Ababa University. Plant specimens were identified by comparing with the previously identified specimens in the National Herbarium and with reference to the published volumes of Flora of Ethiopia and Eritrea (Vol. 2, 3, 6 and 7) and other relevant literature.

2.2. Environmental Data

Altitude was recorded at every sample quadrat using an Everest altimeter. Soil samples were taken from a depth of 0-20 cm, at five points in each quadrat. Four samples were taken from each corner and one from the center in each quadrat. Composite sample weighing 1 kg was then taken for laboratory analysis. Soil moisture content was recorded by weighing using a portable Triple Beam Balance made in USA, in the site during the time of soil sample collection. Samples were air-dried and weighed to estimate moisture content difference between air-dried and at time of sample collection

2.3. Soil Analysis.

The soil samples were analyzed at the National Soil Research Laboratory of Ethiopia. The soil tests were carried out following the methods described by Jackson (1958) and Juo (1978). The standard soil analysis procedures followed were as follows.

The soil samples were air-dried at room temperature by spreading on plastic trays. On drying they were grounded in a grinding machine and sieved

through a 2 mm sieve for pH, Electrical Conductivity and Cation Exchange Capacity and through 0.5 mm sieve for Organic Carbon determination.

pH: pH water was determined in 1:2.5 soil/water ratio soil suspension.

Electrical Conductivity (EC): was determined in 1:2.5 soil water ratio soil suspensions.

Cation Exchange Capacity (CEC) and Exchangeable Bases were determined by the ammonium acetate method.

Organic Carbon (OC). Percentage Organic carbon was determined by Walkely and Black Method. Soil sample passing through 0.5 mm sieve is oxidized by an addition of 10 ml 1N Potassium Dichromate and 20 ml of concentrated Sulphuric acid. The excess Potassium Dichromate is determined by titration with Ferrous Ammonium Sulphate using Diphenylamine indicator.

2.4. Ethnobotanical Information

Basic information on the use of plant species including their local names, use, parts used and preparation were collected. Information was collected from key informants, observations and semi-structured interviews. Informants were selected with the assistance of local farmers' association leaders. 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 filed. 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 as described by Martin (1995) and Cotton (1996). In paired comparisons of the five most important plants pairing and ordering of the plant species names were done using random numbers table and/or flipping coins (Table 4). Moreover, 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 information. Non-cultivated food plants, medicinal, forage, construction, and other most useful plants of the area were recorded.

2.5. Data Analysis

Analysis of vegetation data was done using a Computer program called Syn Tax, multivariate data analysis, Version 5.02 Podani (1994). The classificatory technique followed was hierarchical clustering, average linkage. In this multivariate classificatory analysis, quadrats of similar floristic structurewere grouped together into clusters using dissimilarity ratio. Then a dendrogram

was constructed that gives a picture of the clusterig of vegetationally similar quadrats into groups, and the degree of similarity between groups was obtained. Vegetaion or communities were classified and described according to similarity of sample quadrats. Environmental factors or soil properties and communities relationships wer analysed. Environmental variables were tested using One Way ANOVA. Analysis of Variance, by employing a ststistical programme, SPSS. To summerise ethnobotanical data of plant species and their associated knowledge, descriptive statistics were used.

3. Results

3.1. Vegetation Classification

Analysis of vegetation data, based on Cover-abundance values of 115 plant species recorded in 74 quadrats resulted in ten plant communities (Fig. 4). These community types are designated as A, B, C, D, E, F, G, H, I, and J. Each plant community is named by one or a combination of dominant species that occur in each group. Description of the ten plants communities is given below.

A. Bothriochloa insculpta – Heteropogon contortus Type. *Bothriochloa insculpta* (Hochst. ex A. Rich.) A. Camus and *Heteropogon contortus* (L.) Roem. and Schult. are the dominant species of this community. Other important species include *Cynodon dactylon* (L.) Pers., *Eragrostis botryodes* W.D. Clayton, *Sporobolus pyramidalis* P.Beauv., *Cyperus amauropus* Steud.,

This community occur in the outer fringes of seasonally inundated flood plains. The people use it as a grazing area.

***B. Cynodon dactylon – Xanthium Strumarium* Type.** *Cynodon dactylon* and *Xanthium strumarium* L. are the dominant species of this community type. Other important species include *Amaranthus spinosus* L., *Hyparrhenia hirta* (L.) Stapf, *Hyparrhenia rufa* (Nees) Stapf, *Hyparrhenia collina* (Pilg.) Stapf, *Digitaria abyssinica* (Hochst. ex A.Rich.) Stapf and this community type is found in seasonally inundated flood plains.

***C. Echinochloa colona – Panicum coloratum* Type**. The dominant species of this community type are *Echinochloa colona* (L.) Link and *Panicum coloratum* L. Other species include *Paspalum vaginatum* SW., *Panicum repens* L., *Ipomoea aquatica* Forssk. This community type is found in wet grassland and semi-permantely flooded plain areas.

D. *Panicum coloratum – Ludwigia stolonifera* Type. *Panicum coloratum* and *Ludwigia stolonifera* (Gill. and Perr.) Raven are the dominant species of this community type. In addition, *Persicaria senegalensis* (Meisn) Sojan, *Ipomoea aquatica*, *Cyperus distans* L.f., were found in this community type. This community is the littoral part of the swamp.

***E. Trifolium rueppellianum- Isolepis costata* Type**. *Trifolium rueppellianum* Fressen. and *Isolepis costata* A.Rich. are the dominant species of this community type. Other species include: *Panicum repens* and *Panicum*

coloratum. This community type is found at the outskirt of *Typha domingensis* stand.

F. *Cyperus alopecuroides* - *Echinochloa pyramidalis* Type. *Cyperus alopecuriodes* Rottb. and *Echinochloa pyramidalis* (Lam.) Hitch. and Chase are the dominant species of this type of community. Other species include: *Cyperus distans, Persicaria senegalensis, Ludwigia stolonifera*, and *Panicum repens*. This community type occurs at the outer fringes of the *Typha domingensis* Pers. stand.

***G. Typha domingensis – Schoenoplectus maritimus* Type**. *Typha domingensis* and *Schoenoplectus maritimus* (L.) Lye are the dominant species of this community type. Other important species include: *Echinochola stagnina* (Retz.) P. Beauv., *Panicum maximum* Jacq., *Phragmites australis* (Cav.) Steud., *Vigna luteola* (Jacq.) Benth. As the depth of the swamp increases, next to the outer fringe of the high swamp, *Typha domingensis* become the dominant and pure stand species. The interior of the high swamp, which is dominated by *Typha domingensis*, is poor in species diversity as compared to the outer swamp fringe area. This community occurs in permanent swamp or at least flooded areas for most of the year.

***H. Isolepis costata – Schoenoplectus maritimus* Type**. This type of community is found at the outer fringe of *Typha domingensis* stand, which the

area, is characterized by its sponginess or marshiness and waterlogged for most of the year.

***I. Cyperus digitatus* Type**. This type of community occurs at the outer fringes of *Typha domingensis* stand. Other important species include: *Commelina diffusa* Burm. f., *Persicaria senegalensis, Panicum repens and Cyperus alopecuroides. It is found at less swampy areas.*

***J. Lantana camara – Cordia africana* Type**: *Lantana camara* L. and *Cordia afrciana* Lam. are the dominant species of this community. Other important speces of this type include *Celtis africana* Burm.f., *Acacia albida* Del., *Ficus sur* Forssk., *Ficus vasta* Forssk., *Ficus sycomorus* L., *Diospyros abyssinica* (Hiern.) White. This community type is found in raised grounds, in the form of relict forest islands.

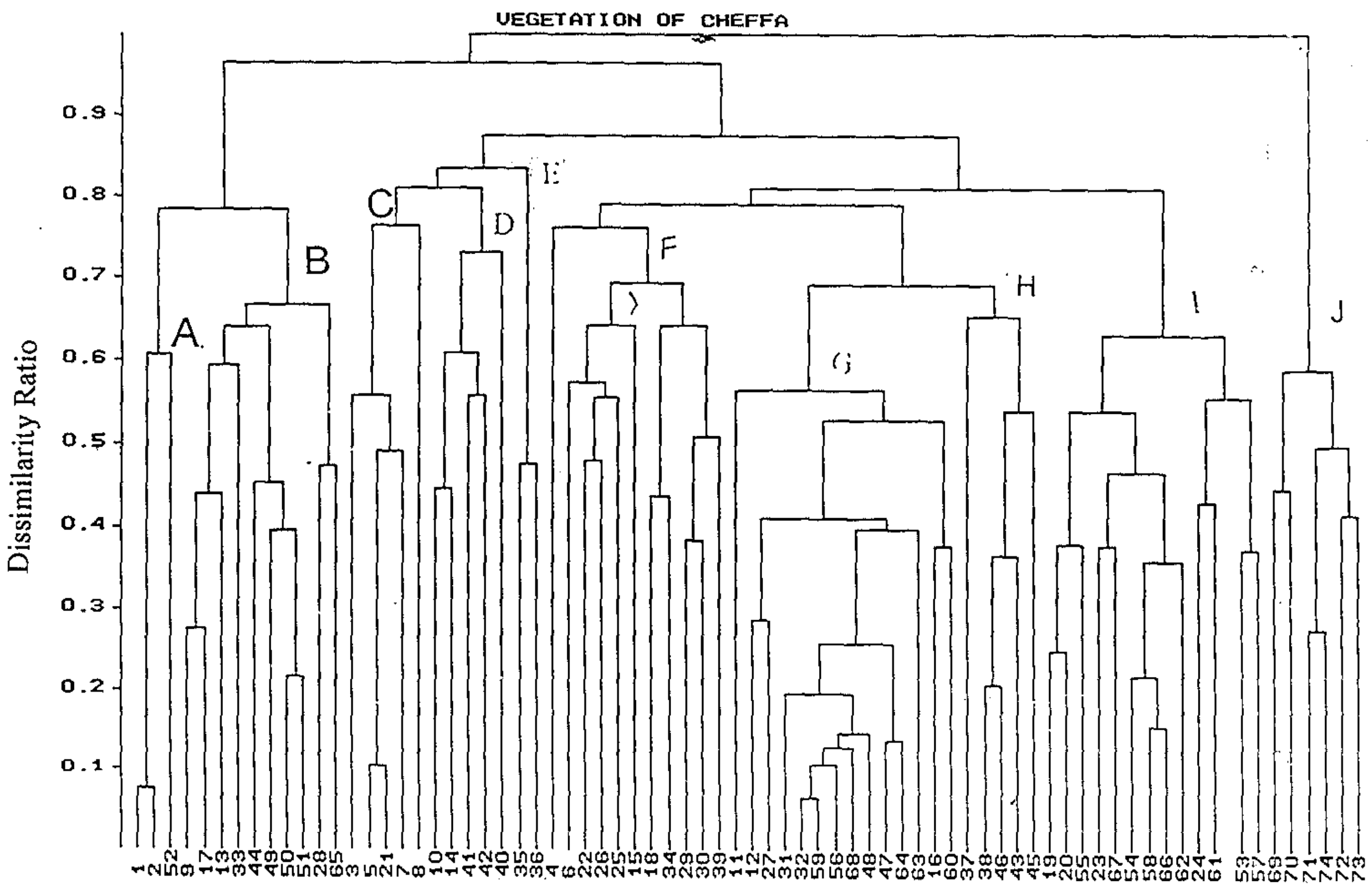

Fig 4. Dendrogram showing the vegetation of Cheffa

3.2. Soil Properties and Plant Communities

Soil pH: values, averaged for all quadrats in each community shows slightly alkaline pH values (6.92 – 8.93) in all plant communities (Appendix 9). The highest pH value was obtained in community H where *Isolepis costata* performs well. Alkalinity favors *T. domingensis*, which is more salt tolerant and indicator of prolonged waterlogging (Thompson, 1985). High pH values might be caused as a result of the topographic feature, waterlogging, water table temperature and evaporation. The result of one way ANOVA computation revealed no statistical significant difference at 0.05 level of significance on the pH values of communities (Appendix 10).

Electrical Conductivity: result of electrical conductivity gives the highest value in community F and the lowest in community B. While in community G, D, C, H, A, I, E, and J show their electrical conductivity gradient in decreasing order. This could be attributed to the duration of waterlogging and evaporation rate. Salinity, influence and control wetland vegetation types (Denny, 1985). Moreover, electrical conductivity gradient increases with increase waterlogging. However, as presented in the ANOVA Table (Appendix 10), we find that there is no statistical significant difference at 0.05 level of significance on their electrical conductivity between communities.

Cation Exchange Capacities: The mean values of cation exchange capacity of the communities E, J, F, G, I, D, A, C, and B are in decreasing order (Appendix 9). There is no significant difference between communities with respect to cation exchange capacity (Appendix 10).

Organic Carbon: The highest organic carbon content was obtained in community J, and followed by I, F, G, E, B, A, H, C, and D are in decreasing order (Appendix 9). There are significant differences in the organic carbon content of communities. This variation might have influence on the distribution and composition of vegetation of the area. The high amount of organic carbon in community J might be due to high humus accumulation of plant materials.

Soil Moisture: Percent soil moisture values of communities gives a range of values between 8.07 – 40.32% (Appendix 9) ANOVA results show a significant difference at 0.05 level in the soil moisture content of communities. The soil moisture content of the plain is obviously much higher that of the raised grounds. Moisture content might have strong effect on the distribution of communities, although there is overlap of species.

3.3. Basic Information on Some Ethnobotanically Important Plant Species

Based on the objective of the study, which was a floristic analysis and obtaining, recording and documenting ethnobotanical information about plant species of Cheffa area, some 206 plant species were collected and identified. These plant species are main sources of subsistence for the Cheffa society. 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. Ethnobotanically useful plants of the study area which are non-cultivated (wild) or semi-cultivated will be presented below under some major headings, namely non-cultivated food plants, medicinal, forage, and other miscellaneous uses. Plant descriptions and the information gathered are arranged alphabetically by species. Then followed by family name, local names, habit, habitat distribution, plant part used, preparation, mode of consumption, and general remarks. The information collected from the field study was augmented by related literature review whenever available and notes on the species are provided based on data collected from specimens housed at the National Herbarium (ETH).

3.3.1. Non-cultivated Food Plants

With regard to wild edible plants, non-cultivated food plants of the study area were collected and enumerated. 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 3). The plant parts used as food are 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 3).

Table 3: Parts used and Habit of Non-cultivated food plants of Cheffa

Parts Used	Habit					
	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	

Table 4: 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]

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

Following is a brief description of some the most important useful non-cultivated food plants of Cheffa area, as percived by the informants.

Amaranthus caudatus L.; Amaranthaceae; Alma (Or., Am.); Annual erect herb up to 1.5m high. Commonly occurs in cropland, gardens, roadside, shrub land, riverbanks, and floodplains at altitude between 500-2500. In Ethiopia, it is widely distributed. Leaves are eaten as vegetables and seeds are processed to be baked as bread. Seed flour is used as admixes to be baked on the time of severe food scarcity. It is a well-recognized famine food. In the study area during the 1986 great famine, it was used as lifesaver and staple food. Leaves and seeds are eaten (Zemede Asfaw, 1997). Elsewhere in Asia, it is cultivated as a main source of high protein quality and leafy vegetables (Wilson and Witecombe, 1985). In India different species of Amaranthus are

(Wilson and Witecombe, 1985). In India different species of Amaranthus are cultivated as both subsidiary and staple food sources (Khoshoo and Subrahmanyam, 1985).

Amaranthus spinosus L.; Amaranthaceae; Alma (Or. & Am.); Annual erect herb up to 1.5m high, common in disturbed areas, roadsides and ditches; growing at altitudes between 400 – 2400m. Distributed in Tigray, Welo, Gonder, Shewa, Gojam, Welega, Bale, Gamo Gofa and elsewhere in tropics and subtropics. In the study area, Leaves and seeds are edible. Leaves are cooked and eaten as vegetables. Seeds are used to make bread and/or injera admixed with other crop flour. It is a commonly well-known famine food of the study area. In Ethiopia it is a famine food (Zemede Asfaw, 1997), used by Shankila people as source of food, making local beer and to prepare porridge

Berchemia discolor (Klotzsch) Hemsl; Rhamnaceae; Jejeba (Or. & Am.). Tree to 8m high. Occurring in riverine forest, *Acacia-Commiphara-Balanites* woodland, wooded grassland, at altitudes between 800 – 1900m. Distributed in Welo, Shewa, Gamo Gofa, Bale, and Harerge. In Cheffa area ripe fruits are eaten raw. The species has been reported to be rare from time to time. Elsewhere from East Africa to South Africa and Namibia, Madagascar and Arabia (Vollesen, 1989a). The ripe fruit is edible (Vollesen, 1989a; Peters *et al.*, 1992; Azene Bekele *et al.*, 1993; Zemede Asfaw, 1997).

Balanites aegyptiaca (L.) Del.**var *aegyptiaca***; Balanitaceae; Baddanno (Or.). A spiny small tree up to 8m tall. Growing at altitude between 700-1800 m. In Ethiopia it is widely distributed in Tigray, Welo, Shewa, Arsi, Harerge, Illubabor, Gamo Gofa, and Sidamo (Sands, 1989). In Cheffa ripe fruits are eaten. Elsewhere in Africa and in Ethiopia fruits are edible (Hadidi, 1985; Sands, 1989; Peters *et al.*, 1992, Azene Bekele *et al.*, 1993; Fichtl and Admasu Adi, 1994; Zemede Asfaw, 1997).

Cordia africana Lam.; Boraginaceae; Wedessa (Or.), Wanza (Am.). Tree growing up to 25 m high. In Ethiopia widely distributed between 1600-2200 m (Azene Bekele *etal.,* 1993). In Cheffa it is common in relict forest islands and croplands as forest remnant of the area. Fruits are eaten raw. During the 1986 great famine, according to the informants, it was said to be as one of the lifesaver as that of *Ficus* species. Elsewhere in Ethiopia fruts are edible (Azene Bekele *et al,* 1993; Fichtl and Admasu Adi, 1994; Zemede Asfaw, 1997; Tesfaye Awass, 1997.)

Erucastrum abyssinicum A. Rich; Brassicaceae; Gugubli (Or.), Ye wof Gomen (Am.). Annual herb growing to 80 cm high. In Cheffa area it is widely distributed along the riverbanks and outer fringes of high swamps. Leaves and young twigs are collected and eaten cooked as vegetables. Growing in disturbed area, roadsides at altitudes between 1000 – 2600 m. Leaves used

as a vegetable (Fichtl and Admasu Adi, 1994; Zemede Asfaw, 1997) and seeds are source of oil (Fichtl and Admasu Adi, 1994).

Euclea schimperi (A.DC.) Dandy; Ebenaceae; Miesa (Or.), Dedeho (Am.). Shrub up to 4 m high; distributed in dry woodland, bushland, riverine forest at altitudes between 1500-2300 m (Azene Bekele *et al.*, 1993). As documented elsewhere in Ethiopia by Azene Bekele *et al.* (1993) and Zemede Asfaw (1997), in Cheffa area ripe fruits are edible. It is distributed in degraded hillsides, cropland hedges, and riverbank sides.

Ficus sycomorus L.; Moraceae; Oda (Or.) Shalla (Am.). A large tree to 30 m high. Commonly distributed along riverbanks, lake margins, woodlands, evergreen and bushlands; at altitudes between 500-2000 m. Found in Tigry, Welo, Gonder, Gojam, Shewa, Harerge, Illubabor, Kefa, Gamo Gofa, and Sidamo. Elsewhere in tropical Africa, west to Sengal and to South Africa (Friis, 1989). In the study area it is common in relic forest islands and very rare along riverbanks. As Zemede Asfaw (1997), has documented there are also other *Ficus* species in which their fruits are edible. These are *Ficus palmata* Forsk., *Ficus sur* Forssk., *Ficus thonningii* Blume and *Ficus vasta* Forssk. These species are becoming very rare and are found in forest relics called *hujubs.* Elsewher ripe fruits are eaten (Arnold *et al.*, 1985; El Hadidi, 1985; Friis, 1989; Peters *et al.*, 1992; Azene Bekele *et al.*, 1993; Zemede Asfaw, 1997).

Grewia ferruginea Hochst. ex A. Rich ; Tiliaceae; Ogomdi (Or.), Lenquata (Am.). Shrub or small tree up to 6 m high. Common in woodland and riverbanks at altitudes between 1350 – 2700 m. Distributed in Tigray, Gonder, Gojam, Welo, Shewa, Arsi, Welega, Illubabor, Kefa, Sidamo, Bale, Harerge; elsewhere in Red Sea hills and Sudan (Vollesen and Sebsebe Demissew, 1995). In Cheffa area fresh fruits are eaten raw. In the study area there are other *Grewia* species in which their fruits are eaten. These are *G. tembensis* Fresen, *G. velutina* (Forssk.) Vahl, *G. trichocarpa* Hochst. ex. A. Rich. It is an emergency and famine food of the area. Elsewhere in Ethiopia and Africa, fruits of *Grewia* are edible (Peters *et al.*, 1992, Azene Bekele *et al.*, 1993, Vollesen and Sebsebe Demissew, 1995; Zemede Asfaw, 1997).

Gardenia ternifolia Schumach. and Thonn. ***Subsp. jovis-tonantis*** (Welw.) Verdc.; Rubiaceae; Kubelo (Or.). Small tree to 8 m high. In the study area, very rarely found in the croplands left with other species of *Cordia*, *Croton* and *Acacia*. Fresh fruits are eaten.

Mimusops kummel Bruce ex DC.; Sapotaceae; Koladi (Or.), Shiye (Am.); A tree up to 35 m high. Common along riverbanks, at altitudes between 1600-2000 m (Azene Bekele *et al.*, 1993). Elsewhere in Ethiopia fruits are eaten (Azene Bekele *et al.*, 1993; Zemede Asfaw, 1997) and in Subsharan Africa (Peters *et al.*, 1992). Though its occurrence is very rare, in the study area, fresh fruits are eaten raw.

Nymphaea coerulea Savigny; Nympheaceae; Buran Buri (Or.) Aquatic herb, commonly distributed in wetland area, lakes slow flowing rivers and ponds at altitudes between 500 - 2100 m (Fichtl and Admasu Adi, 1994). In Cheffa area, flowers and seeds are eaten. Fresh flowers are eaten raw. Seeds are processed to be eaten baked admixed with flour. It is recognized as one of the famine food source of the area. In Ethiopia, the roots and seeds are edible (Fichtl and Admasu Adi, 1994). Elsewhere in Australia, for people living along riverine wetlands, *Nymphaea spp* are used as a major source of carbohydrate. Stalks, seeds and rhizomes are eaten (Cotton, 1996). In Egypt, rhizomes of *Nymphaea coerulea* are well known for their high nutritive value (Hadidi, 1985).

Opuntia ficus-indica (L.) Miller; Cactaceae. Are-Muss (Or.) Kulkual (Am.). Succulent spiny shrub or small tree up to 5 m high; widely distributed in arid, semi-arid and humid areas, growing at altitudes up to 2400 m (Fichtl and Admasu Adi, 1994). In Cheffa area fruits are eaten raw and are sold in local markets. Wide spread in arid and semi-arid parts of the world, fruits are eaten (Nablan and Felger, 1985; Houerou, 1985; Fichtl and Admasu Adi, 1994; Zemede Asfaw, 1997).

Portulaca quadrifida L.;.Portualacaceae; Antare (Or), Sis Antare, Ye emdir kitign, Akelete (Am.). Succulent herb commonly growing on sandy soil along riverbanks and croplands. In the Cheffa area, above ground parts are

eaten cooked as vegetables and baked in to bread either admixed with flour or alone. During the 1986 famine it was eaten both as vegetables and baked as bread. It is one of the outstanding famine food sources of the area. Another type of the same species is *Portulaca olercea* L., Wofram Antare (Am.). Leaves and above ground parts are edible either cooked or processed as that of *P. quadrifida.* In Ethiopia it is eaten cooked as vegetables (Zemede Asfaw, 1997).

Rhus natalensis Krauss; Anacardiaceae; Debobossha (Or.), Chakma (Am.). A shrub. Up to 5 m high, growing in well drained slopes, at altitudes between 700 – 2200 m. It is found in Gonder, Welo, Shewa, Arsi, Illubabor, Sidamo, Bale and Harerge (Gilbert, 1989). In Cheffa area fruits are eaten raw, roasted or drunk after steepend in water. While roasting salt may be added for flavouring. Other species namely, *Rhus glutinosa* A. Rich., *Rhus vulgaris* Meikle and *Rhus retinorrhoea* Oliv. friuts are eaten raw or processed as that of *R.natalensis. Elsewhere in Ethiopia* Fruits are edible (Gilbert, 1989; Peters *et al.*, 1992; Zemede Asfaw, 1997).

Sterculia africana (Lour.) Fiori.; Sterculiaceae., Kereri (Or.). Tree 10-15m high, occuring in *Acacia, Acacia – Comiphora and Acacia – Terminalia* woodland,at altitudes up to 1775 m. It is found in Welo, Shewa, Illubabor, Gamo Gofa, Bale, Harerge, and Afar. Elsewhere in Sudan, Somalia, Tanzania, Mozambique, Malawi, Zambia, Botswona, Namibia (Vollesen, 1995). In the study area it is found around rocky hillsides with Acacia

woodland. During severe food scarcity and famine of 1986, fruits, seeds, bark and stem were eaten. The stem was chopped, ground and mixed with grain flour to be baked and eaten. It was reported as one of famine foods of the area. In Africa fruits, seeds and barks are eaten (Peters *et al.,* 1992}

Tamarindus indica L.; Fabaceae; Roka (Or. & Am.).Tree 3 to 24 m high. Growing in grassland, woodland and *Combretum* bushland, and riparian forest, at altitudes between 0– 1500 m. It is distributed in Tigray, Gonder, Welo, Gojam, Shewa, Harege, Illubabor, Kefa, Gamo Gofa and Sidamo. Elsewhere distributed in tropical Africa (Thulin, 1989). In the study area, fruits are eaten and are grown in some home gardens. In Ethiopia and Africa fruits are edible and some times cultivated (Ben Salem and Palmberg, 1985; Lawton, 1985; Thulin, 1989; Peters *et al.*, 1992; Azene Bekele *et al.,* 1993; Fichtl and Adamasu Adi, 1994; Zemede Asfaw, 1997).

Typha domingensis Pers.; Typhaceae; Gura (Or.). Perennial herb, common around lake margins, river valleys, floodplains and wetland areas, at altitudes between 500 – 2200 m. In Ethiopia, the species is found in Tigray, Gonder, Welo, Shewa, Gamo Gofa, and Harerge. In Cheffa area fresh rhizomes and male part of the flower (upper part) are edible. The long leaves up to 4.50 m are used for production of mats (DIBORUA) either to be sold or household uses; female flowers are used for making mates, mattresses and pillows; leaves as thatch; to make shelter or house, leaves are also used for dinning and spread over floor as mats in the time of ceremonies; stems to

make drum sticks. Elsewhere it is widespread throughout tropical and subtropical regions (Lye, 1989, Peters *et al.,* 1992) and male part of the flower are edible (Lye, 1989). As documented elsewhere in Africa and other parts of the world, for example, by Curtis (1959), Mitchell (1974), Nechayeva (1985), Lye (1989), Peters *et al.* (1992).

Ximenia americana L.; Olacaceae; Huda (Or.), Enkoye (Am.). Spiny shrub or tree 7 to 10 m. Growing in *Acacia* woodland, *Acacia – Balanites* woodland, *Combretum- Terminalia* woodland, grassland at altitudes between 500 – 2450 m. Found in Tigray, Gonder, Welo, Shewa, Arsi, Gojam, Welega, Illubabor, Kefa, Gamo Gofa, Sidamo, Bale and Harerge, elsewhere distributed throughout tropical regions (Vollesen, 1989a). In the study area, fruits are eaten and seeds were used as candlelight. It was reported that, the species is getting rare from time to time. In Ethiopia and Tropical regions, fruits are edible (Arnold *et al.,* 1985; Vollesen, 1989a; Peters *et al.,* 1992; Azene Bekele *et al.,* 1993; Fichtl and Admasu Adi 1994; Zemede Asfaw, 1997).

Ziziphus mauritiana Lam.; Rhamnaceae; Kurkura (Or. and Am.). Spiny tree or shrub 8 – 15 m, occurring in *Acacia – Terminalia, Acacia – Balanites,* woodland and bushland, riverine forest and thicket at altitudes between 100-2100 m. It is common in Gonder, Gojam, Welo, Shewa, Arsi, Illubabor, Gamo Gofa, Bale, Sidamo, and Harerge, widely distributed in arid parts of tropical and South Africa, Madagascar, and Arabia (Vollesen, 1989b). The Cheffa people use it as a source of food and income. Fruits are sold in the local

markets. In the study area there is another edible species, *Ziziphus mucronata* Willd. This species is less favoured due to its sour taste as compared to *Z. mauritiana*. Elsewhere in Ethiopia and other places ripe fruit are edible (Cherry, 1985; Ben Salem and Palmberg, 1985; Khoshoo and Subrahmanyam, 1985; Vollesen, 1989b; Azene Bekele *et al.,* 1993; Zemede Asfaw, 1997). According to Khoshoo and Subrahmanyam (1985), *Ziziphus mauritiana* is a poor man's fruit.

Result

3.3.2. Medicinal Plants

In this study a total of 83 medicinal plant species were documented from Cheffa area. Some of the major medicinal plants will be briefly described below. Those species described above will not be described again, only their scientific names, family names, local names, uses, methods of preparation and mode of consumption will be given

3.3.2.1 Mdicinal plants for humans

Concerning medicinal plants for human use, many plants are directly used from the wild. In Ethiopia several authors have described and enumerated numberous plants that are useful in ethnomedicine. For example, Mesfin

Tadesse (1986), Gelahun Abate (1989), Mesfin Tadesse and Sebsebe Demissew (1992), Dawit Abebe and Ahadu Ayehu (1993) and Mirutse Giday (1999).

In this study information was gathered from key informants. 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 3).

The ethnomedicinal information 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%), 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. Medicinal use or treatment of several diseases and the corresponding numbers of species used by the people either single or mixed is presented in Appendix 4.

The utility of several species for the treatment of a particular ailment could indicate its prevalence in the area (Dawit Abebe and Ahadu Ayehu, 1993). As reported elsewhere in Indonesia by Erdelen *et al.* (1999), different plant species may be 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.

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.

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 6).

After herbal medicines are prepared, different routes of administration are utilized. The two main modes of administration are internaland 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 7).

Table 5: Plant parts used by Cheffa People and Habit of Medicinal plants.

Parts used	Habit					
	Herb	Climber	Shrub	Tree	Total	%
Leaf	20	11	58	18	107	50.71
Fruit	1	3	5	6	15	7.10
Branches	8		2	1	11	5.21
Whole	8	2	1		11	5.21
Stem	2	1	5	2	10	4.73
Latex	6		3		9	4.26
Seed			5		5	2.36
Bark			3	3	6	2.84
Twigs			5		5	2.35
Root	8	1	12	2	23	2.36
Above ground part	6				6	2.84
Sap				1	1	0.47
Oil				1	1	0.47
Flower	1				1	0.47
Total	65	18	94	34	211	100
%	30.80	8.53	44.54	16.11	100	

Table 6. Preparation Methods of Traditional Medicines Used by the Cheffa people..

Methods of Preparation	Total	%
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 7. Route of Administration of Traditional Medicines

Internal	Total	%	External	Total	%
Oral	119	86.23	Dermal	46	54.76
Nasal	12	8.69	Poultice	11	13.09
Anal	6	4.34	Chewing 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

A brief description of some of the most important medicinal plants, as perceived by the informants, recorded from the study area are given below.

Achyranthes aspera L.; Amaranthaceae; Dergu (Or.), Deme adreke (Am.). Perennial herb up to 2 m high. A widespread weed growing in Acacia woodland, gardens bushland, riverine forests and along roadside at altitudes of 700 – 3500 m (Fichtl and Admasu Adi, 1994). In Ethiopia it is widely distributed as undergrowth in forests, cropland hedges, and in gardens. Crushed leaves are applied to stop bleeding from injury; leaves and stems are pounded and drunk with water for gastrointestinal disorder and DINGETEGA. Leaves are pounded and squeezed to allow droplets of juice on tropical ulcer (YEKOLA KUSIL). Its medicinal value, elsewhere in Ethiopia, is known. Roots and flowers are used to treat conjunctivitis and gout (Mesfin Tadesse and Sebsebe Demissew, 1992), leaves to combat tonsillitis (Dawit Abebe and Estifanos Hagose, 1991), leaves against tropical ulcer (Mirutse Giday, 1999), elsewhere in Africa roots are used to stop wound bleeding and several other diseases (Iwu, 1993).

Acokanthera schimperi (A.DC.) Schweinf.; Apocynaceae; Qraro (Or.), Merez (Am.); It is a tree up to 10 m high, growing in woodlands and grasslands at altitudes between 1400 – 2300 m (Azene Bekele *et al.,* 1993). In the study area it is in a rare condition and found in degraded hillsides, relic forest islands; Leaves are pounded and drunk to treat malaria; twigs are held in between loosened teeth so as to strengthened and make be fixed at their

proper positions; branches are cut and hung on the door gate to prevent TILA. Smoke bath of a house and pen is used as mosquitoes repellant. The plant is considered as poisonous. Elsewhere in Ethiopia, leaves are used to treat leprosy (Mesfin Tadesse, 1986), haemorrhoides (Mesfin Tadesse and Sebsebe Demissew, 1992), young leaves are used as a remedy of tonsillitis (Mirutse Giday, 1999). Elsewhere it is found in Africa and used as arrow poisons (Iwu, 1993).

Anethum foeniculum L.; Apiaceae; Kamuni (Or.) Kemun (Am.). An erect perennial herb up to 2 m high at altitudes between 1500 – 2000 m. has medicinal value against gonorrhea and gastrointestinal disorder. Roots are used to remove umbilical cord of newborn babies (Fichtl and Admasu Adi, 1994) and for circumcision wound of babies. Leaves are pounded and drunk or chewed and swallowed to treat gastrointestinal disorder, gonorrhea, kidney disease and urine retention (SHINT MAT). Leaves are also chewed as admixes of *Catha edulis* (Vahl) Forssk. ex. Endle to prevent gastrointestinal disorder.

Cadia purpurea (Picc.) Ait.; Fabaceae; Hinjero (Or.). Shrub up to 4 m high. It grows on hillside escarpment, at altitudes between 1300 – 2700 m. Found in Tigray, Welo, Shewa, Harerge, Bale and elsewhere in Yemen and Oman, North Somalia and Kenya (Thulin, 1989). In the study area it is found on hillside escarpments. Medicinally seeds are powdered and drunk with water

for the treatment of malaria. Elsewhere in Ethiopia its root is applied to cure tropical ulcer (Mesfin Tadesse and Sebsebe Demissew, 1992).

Calpurnia aurea (Lam.) Benth.; Fabaceae; Cheketa (Or.), Dgtta (Am.) .A shrub up to 3 m high. Occurs at altitudes between 1650 – 2550 m and found in Tigray, Gonder, Welo, Gojam, Wolega, Shewa, Arsi, Bale, Harerge, Kefa, Gamo Gofa, and Sidamo. Elsewhere widespread to Central African Republic and to South Africa and India (Thulin, 1989). In the study area it is common in relict forest islands, hillside bush land areas, cropland hedges. The leaves and seeds are used to treat gastrointestinal disorder, diarrhea, and headache. Pounded leaves and powdered seeds are drunk against these diseases and pounded leaves are used as a poultice on NEKERSA, KUSIL. Elsewhere in Ethiopia fruits and roots are used to treat headache and stomach disorder (Mesfin Tadesse and Sebsebe, Demissew, 1992). Seeds are used for fish poisoning and against dysentery (Thulin, 1989; Fichtl and Admasu Adi, 1993).

Capparis tomentosa Lam.; Capparidiaceae; Harengema (Or.), Gumero (Am.). Shruby climber grows in woodlands and hillside bush lands and forest edges at altitudes between 1200 – 2300 m. (Azene Bekele *et al.,* 1993). In the study area it is common on hillside bush and woodlands, relict forest islands. The roots of this plant are held in between the tooth to alleviate headache and toothache. Fruits are said to be poisonous. And there is a saying, "*if you want to die, eat the fruit of 'Gumero"* (*Capparis tomentosa*). Elsewhere in Ethiopia roots, leaves and barks are used medicinally (Azene Bekele *et al.,* 1993),

roots are used to treat headache (Mesfin Tadesse and Sebsebe Demissew, 1992).

Carissa edulis (Forssk.) Vahl.; Apocynaceae; Agamsa (Or.), Agam (Am.).Spreading and spiny shrub up to 5 m high, growing in *Acacia* woodland and shrubland, riverbanks at altitudes between 1500 – 2500 m (Azene Bekele *et al.,* 1993; Fichtl and Admasu Adi, 1994). In the study area, it is commonly found in rocky hillside woodlands and shrub lands, riverbanks and relict forest islands. The leaves of this plant are pounded and drunk to treat headache, diarrhea, and gastrointestinal disorder; roots are pounded and drunk against kidney diseases, headache and Hepatitis. Juice of crushed leaves is applied to cure infected wound and tropical ulcer. Stems are burned and heated to combat KURTIMAN and smoke bath is used for GIN. Elsewhere in Ethiopia, the roots are used against headache (Mesfin Tadesse and Sebsebe Demissew, 1992), to treat snakebites, toothache and stomachache (Fichtl, and Admasu Adi, 1994), medicinal value of roots are also documented by Azene Bekele *et al.* (1993). Abbink (1995) has reported that the Suri people of Southwest Ethiopia used the crushed root to make ease or shorten the delivery of pregnant women.

Celosia trigyna L.; Amaranthaceae; Lemlemucha (Or.). Herb up to 60 cm high. Commonly grown in croplands, fallow fields, gardens, at altitudes between 500-2750m. Widely distributed in Gonder, Gojam, Shewa, Welega,

Keffa, Illubabor, Gamogofa, and Sidamo. In the study area, the whole plant parts are pounded and drunk to treat taeniasis and hepatitis.

Commicarpus plumbagineus (Cav.) Standley; Nyctaginaceae; Kontom (Or. and Am.). A climber herb up to 2 m long. Growing on forest edges, cropland hedges, at altitudes between 730-1800 m. Found in Tigray, Shewa, Gamo Gofa, Sidamo, Arsi, Harerge. In the area herbal baths of branches of this plant is used against skin rushes (DRIHA BESHITA) and KUAKUCHA.

Cordia africana Lam.; Boraginaceae; Wedesa (Or.), Wanza (Am.). In the study area bark, root and fruits are pounded and drunk to cure ascariasis. Elsewhere in Ethiopia the fruit and root are used against Ascariasis (Mesfin Tadesse and Sebsebe Demissew, 1992; Fichtl and Admasu Adi, 1994), concoction of fried leaves and butter is used against wounds and concoction of wood ash and butter is used for skin diseases (Fichtl and Admasu Adi, 1994). *Cordia ovalis* is also a medicinal plant in the area. Leaves of this plant are pounded and drunk, rubbed the body to combat MICH.

Croton macrostachyus Del.; Euphorbiaceae; Bekenisa (Or.), Bisana (Am.). Tree 20 m high, growing in relict forest edges and croplands. In Ethiopia occurring at altitudes between 1050 – 2350 m, found in Tigray, Gonder, Gojam, Welo, Shewa, Arsi, Welega, Illubabor, Kefa, Sidamo, Bale and Harerge (Gilbert, 1995). In the study area, barks are pounded and drunk to treat gonorrhea. Crushed leaves are rubbed and creamed on eyelashes

and eyelids. Pounded leaves are drunk to combat gastrointestinal disorder. The same plant part is also drunk and rubbed the body for MICH and DINGETEGNA, SAL and Fever. Stem bath is also applied for the same purpose. Sap from twigs and petioles are used for ringworm treatment. Roots and bark are pounded and drunk for abortifacient. Concoction of roots and barks with that of *Phytolacca dodecandra* is also used for the same purpose (abortifacient). Elsewhere in Ethiopia the sap, leaves, roots and bark of this plant are used as medicines (Azene Bekele *et al.,* 1993), fruits and roots to treat sexually transmitted diseases, concoction of the bark of this plant with flowers of *Hagenia abyssinica* as purgative and sap from leaves used against fungal skin diseases (Fichtl and Admasu Adi, 1994). Elsewhere in Africa *Croton macrostachyus* is used as tapeworms expellant (Iwu, 1993).

Cucumis ficifolius A.Rich.; Cucurbitaceae; Ye emdir embuaye (Am.). Trailing herb up to 1 m. tall, grows in grassland, cropland, at altitude between 1300 – 2400 m. Found in Tigray, Gojam, Shewa, Welega, Gamo Gofa, Harerge, and elsewhere in Africa in Uganda, Kenya, Rwanda and Tanzania (Jeffrey, 1995). In the study area the whole plant part is pounded and drunk for diarrhea and gastrointestinal disorder treatment and poisoning protection of wounds. Fruits are loosened and poultice (tied on) infected wounds so as to cure and protect poisoning. Elsewhere in Ethiopia roots are used against gonorrhea and SIRAY (Mesfin Tadesse and Sebsebe Demissew, 1992).

Datura stramonium L.; Solanaceae; Buldge (Or.), Atefaris (Am.). Annual herb to 1.50 m high, growing in wooded grassland, cropland roadsides, and gardens. Grow at altitudes between 900 – 2350 m and found in Gojam, Shewa, Sidamo, Kefa, Gamo Gofa, and Bale. In the study area pounded leaves are used to treat KUAKUCHA, roots are pounded and cream to combat infected wound and ALIFIGNA. Elsewhere in Ethiopia roots are used for otitis media, rectal prolapses and wet eczema (Mesfin Tadesse and Sebsebe Demissew, 1992), leaves are used against headache and boiled seeds to treat toothaches (Fichtl and Admasu Adi, 1994). The root is chewed to combat toothache (Abbink, 1995). Elsewhere in Africa, leaves are used for cough and chest complaints; leaves or seeds concocted with palm oil for insect bites and stings, leaves against asthma (Iwu, 1993).

Entada abyssinica Steud. ex A.Rich.; Fabaceae; Kentefa (Am.). Tree 3 – 10 m high, grows in woodland, hillside bushland and riverbanks, at altitudes between 1300 – 2050 m. In Ethiopia, found in Tigray, Gojam, Welega, Shewa, Harerge, Illubabor, Kefa, Gamo Gofa, and Sidamo. Elsewhere widespread in tropical Africa (Gilbert, 1989). In the study area twig of this plant is held in between teeth to treat toothache complaints. Leaves are pounded and creamed against eye diseases and the same plant part is pounded and drunk for retained placenta. Elsewhere in Africa it is used to treat bronchitis, coughs, eye complaints (Iwu, 1992).

Euphorbia tirucalli L.; Euphorbiaceae; Aneno (Or.), Qinchb (Am.). Succulent shrub 6 m high, grows on rocky hillsides, cropland hedges, live fence. Common at altitudes between 1300 – 2000 m. Found in Tigray, Welo, Shewa, Illubabor, Gamo Gofa, Sidamo, Bale, Harerge, (Gilbert, 1995). In the study area, latex of this plant is rubbed for the treatment of wound, haemorrhoids and KINTAROT. Azene Bekele *et al.* (1993) has reported its medicinal values. Elsewhere in Africa and other parts of the world, it is a major source of latex (Hall, 1985).

Solanum incanum L.; Solanaceae; Hidelae (Or.), Embuaye (Am.). A woody herb armed with prickles up to 2.5 m tall. Common in roadsides. It grows at altitudes between 450 – 2000 m (Fichtl and Admasu Adi, 1994). Found in Tigray, Welo, Gojam, Shewa, Harerge, Sidamo, Gamu Gofa, and Kefa. In the study area, it is a well-known medicinal plant employed for the treatment of several diseases. Leaves are pounded and drunk to alleviate headache, gastrointestinal disorder, and DINGETEGNA; pound leaves are sniffed to stop NESSER and crushed leaves are held on injured part of the body as a hemostatic agent so as to stop from wound bleeding; fruits are used for wound and ALEFIGN treatments. Elsewhere in Ethiopia fruits are used for the treatment of tonsillo-pharyngitis (Mesfin Tadesse and Sebsebe Demissew, 1992); wound dressing (Fichtl and Admasu Adi, 1994), roots are applied for the treatment of stomach problem, snakebite, chest pain, and bark against chest pain, flowers and fruits for tonsillitis (Mirutse Giday, 1999). Elsewhere in

Africa this plant is used for the treatment of skin diseases and venereal infections, abdominal pain, stomachache, placenta retention, snakebite (Iwu, 1993). The plant is also considered as poisonous. For example, unripe fruits are poisonous and eating ripe fruits cause severe tooth decay (Fichtl and Admasu Adi, 1994), roots and unripe fruits are used as admixes to prepare arrow poisons (Iwu, 1993).

Tamarindus indica L.; Fabaceae; Roka (Or. and Am.). In the study area fruits are used for the treatment of gastrointestinal disorder, diarrhea and taeniasis. Elsewhere in Ethiopia, bark, leaves, roots and fruits have been documented for their use as medicines (Azene Bekele *et al.,* 1993), fruits are used for the treatment of fever, intestinal diseases, diarrhea, malaria, wounds and hemorrhoids, and powdered seeds against dysentery (Fichtl and Admasu Adi, 1994). Elsewhere in Africa used for leprosy and cardiac diseases treatments (Iwu, 1993). Jansen (1981) has documented many medicinal uses of this plant.

Withania somnifera (L.) Dunal.; Solanaceae; Hide Buda (Or.). Erect shrub up to 2 m tall. It grows at edges of forests, roadsides, and gardens. At altitudes between 950 – 2660 m. It is distributed in Tigray, Gonder, Welo, Gojam, Shewa. Kefa, Sidamo, Harerge and elsewhere in Africa, in Egypt, Eritrea, Kenya, Somalia. In the study area leaves and roots are pounded and drunk against gastrointestinal disorder; pounded roots are drunk to combat evil eyes. Elsewhere in Ethiopia roots are used against headache (Mesfin

Tadesse and Sebsebe Demissew, 1992), for chest pain, typhoid and evil eye; leaves to treat MICH (Mirutse Giday, 1999).

3.2.2.2. Medicinal Plants – For Livestock

Medicinal plants of veterinary use were also documented. As that of ethnomedicines for humans, information 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 (Appendix 5). As indicated from Table 8, 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 9). 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 10 and 11). The prevalent livestock diseases of the Cheffa area are presented in Appendix 6.

Table 8. Habits of Medicinal Plants of Livestock Used by the Cheffa People

Habit	Total	%
Shrub	13	41.93
Herb	7	22.58
Tree	6	19.35
Climber	5	16.12
Total	31	100

Table 9. Plant Parts Used and Habit of Medicinal Plants of Livestock Used by the Cheffa People

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 10. Preparation Methods of Traditional Medicines of Livestock Used by the Cheffa People

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

Table 11. Route of Administration of Traditional Medicines For Livestock

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

Achyranthes aspera L., Amaranthaceae Dergu (Or.) Deme Adreke (Am.). Above ground parts of this plant are pounded and allowed to drink for the testament of black leg and MICH. A Concoction of the same plant and *Comicarpus plumbagineus* is allowed to drink against DINGETEGNA.

Calpurnia aurea (Lam.) Benth; Fabaceae; Cheketa (Or.), Dgtta (Am). In the study are pounded leaves are creamed for the treatment of actinobacillosis and actinomycosis. Pounded leaves are also used against dermatophillosis and to alleviate problems of external parasites such as lice, tick and mange. Elsewhere in Ethiopia leaves and roots are used against diarrhea (Jansen, 1981).

Ehretia Cymosa Thon.; Boraginaceae; Olaga (Or.). Game (Am.) Leaves are pounded and allowed to drink for the treatment of pasteurellosis, MICH and gastrointestinal disorder.

Entada abyssinica Steud. ex A. Rich.; Fabaceae; Amezaze (Or.), Geram kentefa (Am.). Pounded leaves are used to alleviate dermatophillosis and external parasites, lice, tick and mange.

Withania somnifera (L.) Dunal; Solanaceae; Hide Buda (Or. and Am.). In the study area leaves of this plant are pounded and allowed to drink for newly born calf; used to combat AINENAS; and drunk for cattles to be slaughtered so as to make meat healthy to be edible. Roots are also used against anthrax and are added into milk containers or pots so as to make curdle fast in a good condition. Elsewhere in Ethiopia roots are applied to treat anthrax (Mirutse Giday, 1999).

Ziziphus mauritiana Lam., Rhamnaceae; Kurkura (Or. and Am.). Leaves are pounded and allowed to drink to aid in the expulsion of retained placenta. In the study area, for the same purpose leaves of *Dodonaea angustifolia*; bark of *Acacia seyal* and leaves of *Acacia brevispica* are pounded and allowed to drink.

Zehneria scabra (L.f.) Sond; Cucurbitaceae; Chekugn (Or. and Am.). A well known veterinary medicinal plant of the area. The whole part of this plant

is pounded and allowed to drink for the treatment of pasteurellosis, MICH and DINGETE GNA.

3.3. 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. Information was collected from informants about the most important forage plant species of the area (Appendix 6).

4. 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. A total of 206 plant species, distributed in 148 genera and 66 families were collected (115 in quadrats and 91 out of quadrats). Of which 54 are non-cultivated food plants, 83 medicinal, 38 forage, and 39 are cleansing, fumigation and fragrance plants.

4.1. Non-cultivated Food Plants.

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 (Zemede 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. They said, "in the previous times once we go out to the field we were not returned for lunch, because we would have had good snacks from the wild". These days nothing is available in the nearby. When compared with earlier times there is a dramatic vegetation change. "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 Zemede 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. The later is a source of income in normal conditions too.

4.2. Medicinal Plants

With regard to medicinal plants, 83 species were recorded and classified according to their parts, preparation and uses ascribed to them by the informants. Under this category 79 species serve as medicinal for humans and 31 for ethnoveterinary use. It indicates that, although the area is deforested, there are many medicinal plants and hence broad indigenous

knowledge. As a result of several prevailing factors like deforestation, agricultural expansion, and acculturation, plant species with their associated indigenous knowledge are declining from time to time. Furthermore, transferring knowledge to the younger generation by elders is very low. As a result, when elderly knowledgeable local member die, invaluable knowledge also diminish. 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.

4.2.1. Plant Parts used and Habit of Medicinal Plants

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).

4.2.2. Disease/Treatment

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 dermatophillosis and for each of the following diseases 4

species (12.90) are used to treat pasteurellosis, black-leg, ectoparasites and repulsion of retained placenta.

4.2.3. Preparation and Route of Administration

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 Ayehyu, 1993; Mirutse Giday, 1999) support to the present findings.

4.2.4. Habitat Distribution

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 and riverbanks. 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*

There is a seasonal variation in the availability of medicinal plants. Some of the annual herbs became scarce during the dry season, and their spatial distribution is at times marked with pegs for any identification.

According to informants, some fifty years ago, the society was totally dependent on medicinal plants, to medicate themselves and their livestock. Plants were collected from the nearby surroundings. Recently, because of deforestation as a result of agricultural expansion, fuel wood collection and charcoal making by the local people, medicinal plants couldn't be easily accessible. They are found far away from villages. An informant has

expressed his views on the extent of habitat change and loss of medicinal plants from the area as: " In earlier times the surrounding area was covered by dense forest. We were using it as a source of food, medicines and other materials. Now the area is cleared, no food, no medicinal and other materials derived from forest. These days when cattle and people are sick, if we can afford money to buy medicines, clinics are more accessible than those medicinal plants, which are found far away in forests and woodlands. In this condition, it is wasting our time to go upland and find medicinal plants in the last remaining relic woodlands. For severe diseases every body goes to clinics and no body waits for medicinal plants. This is a result of deforestation and modernization."

Due to population increase, agricultural intensification 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.

Both Muslims and Christians of the surrounding area carry out ritual and beliefs performances. Those Christians who have cropland in the vicinity are involved in these ceremonies. There are strong beliefs within the people. Some of the beliefs are: if ritual activities are not undertaken at least once in a year, before harvesting season, there will not be good yield, good health,

livestock will be eaten by wild animals, there will be drought and famine, no rain. Thus, by their leader called *Abagar/ulama* ritual and ceremonial performances called *Dua, Zeyera,* which needs further detailed study, will be done once in a year.

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 the time of ceremonies, ritual or religious performances the leader could collect and cut for the same purpose. As Cotton (1996) has documented about the roles of, magical and religious beliefs and environmental perception on the use and management of plant species, spiritual and religions beliefs about *hujubs* have developed strong effect on its use and management. There are powerful beliefs, rituals and spirits and taboos for each *hujubs.*

These rituals and beliefs highly play great role to preserve the remaining remnant forest and associated indigenous knowledge. As Tamrat (1994), Kebrom *et al.* (1997) and Kebrom (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.

The relict forest islands are rich sources of plant species that vary in habitat and use. A total of 50 species distributed in 27 families was recorded from the *hujubs*. Of these recorded plant species, 22 (44.00%) served as non-cultivated food plants and 31 (62.00%) as medicinal plants. Three of the species are both non-cultivated foods and medicnials.

The beliefs about *hujubs* and associated rituals might have developed a significant influence on the preservation of these holly places together with plants and animals. The prevailing beliefs about *hujubs* is, if some body cuts a plant part, he / she will be faced with misery and die. As a result of these beliefs, nobody cuts plants for any other purposes except for medicinal use; even these are only leaves or fruits. The beliefs have helped *hujubs* to be protected safely from human interferences. At the beginning of the research work on *hujubs*, I was not allowed to take voucher specimens. It was only possible after a long discussion with elders

However, a farmer has complained about wild animals in the *hujubs*. For example warthogs and monkeys were reported for their destruction of the crops. This indicates that *hujubs* are not home only to plant species but also animals. These are the only places, which still contain, possibly the former natural vegetation. They are very important hiding, breeding, feeding, refuges, seasoning sites for several wild animals during the wet and dry seasons. For example, columbus and ververt 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. Some permanently dwell in the *hujubs.* As every park is a biological island for some species (Botkin and Keller, 1987), *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, beeforage, wild animal habitats and rituals and associated beliefs.

They are not only significant sources of medicinal plants, but are also reservoirs of diverse animals. 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.*

4.3. Forage Plants

As documented by MOA, UNDP and FAO (1987), for Cheffa and by Alemayehu Mengistu (1997, 1998), Kebrom Tekele (1998), elsewhere in Ethiopia and Kristjanson and Zerbini (1999), for India 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 (Alemayehu Mengistu, 1998).

To increase livestock productivity, adequate quantity and quality of livestock feeds are indispensable. Their productivity is highly dependent on the

quantity and the quality of feed. However, it has been noticed in Cheffa that forage plants have significantly decreased, as a result of agricultural expansion and habitat destruction. The Cheffa plain serve as a standing hay pasture bank for the dry season. It has significant value with respect to cattle rearing. According to the Cheffa Dawa district ministry of agriculture office there are 130726 cattle, 20758 sheep, 31556 goats, 4221 equines and 1610 camels. In addition, in Artuma jilie district, there are 113,504 cattle, 6950 sheep, 16053 goats, 1575 camels, 12354 equines are found. Livestock numbers are high. These figures might increase during the dry season when the pastorlists and the highlanders come with their herds.

In this study the most important livestock feeds were documented in which trees were 12 species, shrubs 11, grasses 15 and sedges 2 (Appendix 7). 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. 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. vaginatu, 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.* As Cotton (1996) has documented on nomadic pastoralists of Africa, the Cheffa people also have detailed indigenous knowledge on the quality, disease causing, parasite harboring, toxicity and distribution of their livestock feed. 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 others are all included in the list of shrubs and trees of high value as animal feeds documented by Kidest Shenkoru, *et al.* (1991). According to Alemayhu Mengistu (1997,1998), the main problem of sustainable livestock production in Ethiopia is lack of sufficient nutrition. The grassland area, 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. As a result of deforestation, fuel wood collection, charcoal making and crop field expansion important shrubs, trees and grasses coverage of the area has significantly decreased.

In addition to grasses, sedges, shrubs and trees, the Cheffa people also rely on crop residues for livestock feed. Crop residues play vital role in the feed requirements of cattle. Some crop residues have multipurpose uses as fuel wood, construction of houses and other materials.

4.4. 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 anguisetifolia, Euphorbia* candelabrum, *Grewia ferruginea, G. tembensis, G. trichocarpa, G. villosa, Rhus natalenisis, 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 australsis, 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. forskaoliana., 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 marketes* (Appendix 8).

5.Conclusion and Recommendation

The analysis of floristic data on cover-abundance value of the vegetation of Cheffa resulted in ten major plant Communities. A total of 54 species of non-cultivated food plants of Cheffa were collected. 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, accounting for 83 species. The people utilize medicinal plants for both his and veterinary medicineal 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 developed and managed by peoples' culture though the fundamental purposes are for rituals, beliefs and religious performances. 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.

The relict forests and wetlands provide habitat for many wild animals and birds. These remaining forest patches and wetlands could serve as a basic hot site to conserve and preserve biodiversity and indigenous knowledge of plant resource use. These 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 peoples 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. It should be community driven and stemmed at the grass root level not from the top - down – approach.

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Appendix 1. List of Plant Species Recorded in Cheffa Area:

Collection Numbe,Species and Family Name

116. Acacia asak (Forssk.) Willd. – Fabaceae

117. A. nilotica (L.) Willd. ex. Del. *subsp indica* (Benth.) Brena --Fabaceae

118. A. polyacantha Willd. – Fabaceae

119. A. senegal (L.) Willd. – Fabaceae

66. A. albida Del. – Fabaceae

111.A. brevispica Harms. – Fabaceae

120. A. seyal Del. – Fabaceae

121. Acalypha fruitcosa Forssk. – Euphorbiaceae

104. Achyranthes aspera L. – Amaranthaceae

95. Acokanthera schimperi (DC) Benth - Apocynaceae

122. Actiniopteris semiflabellata Pichi-Sermolli – Actinopetridaceae (Fern)

123. Aerva lanata (L.) Schult. --- Amaranthaceae

124. Agave sisalana Perr. ex Eng. --Agavaceae

26. Ageratum conyzoides L. – Asteraceae

35. Alisma plantago-aquatica L. – Alismataceae

125. Aloe camperi Schweinf. - Aloaceae

38. Amaranthus caudatus L. – Amaranthaceae

116. A. spinosus L. – Amaranthaceae

126. Anethum foeniculum L. – Apiaceae

52. Argemone mexicana L. – Papaveraceae

127. Arundo donax L. - Poaceae

128. Asparagus africanus Lam. – Asparagaceae

129. Azadirachta indica A. Juss – Meliaceae

130. Balanites aegyptiaca (L.) Del. - Balanitaceae –

131. Berchemia discolor (Klotzsch) Hemsl – Rhamnaceae – Poaceae

Appendix 1. (Continued).

1. Bothriochloa insculpta (Hochst. ex. A. Rich.) A. Camus

132. Cadia purpurea (Picc.) Ait. – Fabaceae

133. Calo1tropis procera (Ait.) Ait. f. – Asclepiadaceae

87. Calpurnia aurea (Lam.) Benth. – Fabaceae

72. Capparis tomentosa Lam. – Capparidiaceae

134. Caralluma speciosa (N.E.Br.) N.E.Br. – Asclepiadaceae

80. Carissa edulis (Forssk.) Vahl. – Apocynaceae

135. Celosia trigyna L. – Amaranthaceae

65. Celtis africana Burm. f. – Ulmaceae

136. Cissus quadrangularis L. – Vitaceae

137. C. rotundifolia (Forssk.) Vahl. – Vitaceae

96. Citrus aurantifolia (Christm.) Swingle – Rutaceae

138. Cladostigma dioicum Radlk.-- Convolvulaceae

139. Clematis hirsuta Perr. and Gill. – Ranunculaceae

97. Coffea arabica L. – Rubiaceae

140. Combretum adenogonium Steud. ex A. Rich. –.Combretaceae

141. Combretum collinum Fresen. – Combretaceae

142. Combretum mollie G.Don. – Combretaceae

36. Commelina diffusa Burm.f. – Commelinaceae

43. Commicarpus plumbagineus (Cav.) Standley. – Nyctaginaceae

143. Commiphora schimperi (Berg.) Engl. – Burseraceae

64. Cordia africana Lam. – Boraginaceae

83. C. ovalis R.Br. ex DC. – Boragenaceae

67. Croton macrostachyus Del. – Euphorbiaceae

Appendix 1. (Continued).

144. Cucumis ficifolius A.Rich. – Cucurbitaceae

145. Cucurbita pepo L.--Cucurbitaceae

146. Cyclantheropsis parviflora (Cogn.) Harms. – Cucurbitaceae

147. Cymbopogon citratus (DC.) Stapf. –Poaceae

56. Cynodon aethopicus Clayton and Harlan – Poaceae

8. C. dactylon (L.) Pers. – Poaceae

18. Cyperus alopecuroides Rottb. – Cyperaceae

5. C. amauropus Steud. – Cyperaceae

48. C. assimilis Steud. -- Cyperaceae

45. C. digitatus Roxb. – Cyperaceae

9. C. distans L.f. – Cyperaceae

13. C. rigidifolius Steud. – Cyperaceae

148. Datura stramonium L. – Solanaceae

58. Desmodium dichotomum (Klein. ex Willd.) DC. Fabaceae

149. Dicrostachys cinerea (L.) Winght and Arn. – Fabaceae

150. Digitaria abyssinica (Hochst. ex A. Rich.) Stapf. – Poaceae

77. Diospyros abyssinica (Hiern.) White. – Ebenaceae

151. Dodonaea angustifolia L.f. - Sapindaceae

99. Dombeya aethopica Gilli. – Sterculiaceae

76. Dracaena steudneri Engler. – Dracaenaceae

53. Dyschoriste nagchana (Nees) Bennt. – Achanthaceae

109. Echinochloa colona (L.) Link – Poaceae

112. E. haploclada (Stapf.) Stapf. – Poaceae

20. E. pyramidalis (Lam.) Hitch. And Chase – Poaceae

Appendix 1. (Continued).

110. E. stagnina (Retz.) P. Beauv.– Poaceae

70. Eh*etia cymosa* Thon. – Boraginaceae

6. *Eleusine indica* (L.) Garten – Poaceae

152. Englerina woodforioides (Schweinf.) M.Gilbert – Loranthaceae

79. Entada abyssinica Steud. ex A.Rich. – Fabaceae

153. Entropogon macrostachys (Hochst. ex. A.Rich.) Benth. – Poaceae

14. Eragrostis botryodes W.D. Clayton – Poaceae

19. *Eriochloa procera* (Retz.) C.E. Hubb. - - Poaceae

41. Erucastrum abyssinicum A.Rich. – Brassicaceae

154. Eucalyptus camaldulensis Dehnh. – Myrataceae

155. E. citriodora Hook. – Myrtaceae

156. E. globulus Lambill. – Myrtaceae

94. Euclea schimperi (A.DC.) Dandy – Ebenaceae

89. Euphorbia candelabrum Kotschy – Euphorbiaceae

157. E. indica Lam. – Euphorbiaceae

158. E. tirucalli L. – Euphorbiaceae

106. Ficus palmata Forssk. – Moraceae

68. *F. sur* Forssk. – Moraceae

86. *F. sycomorus* L. – Moraceae

90. F. thonningii Blume – Moraceae

71. F. vasta Forssk. – Moraceae

27. Flaveria trinervia (Spreng.) Mohr. – Asteraceae

159. Fuerstia africana Th. Fries – Labiatae

160 Gardenia ternifolia Schumach. and Thonn. *subsp. jovis-tonantis* (Welw.) Verdc

Appendix 1. Continued).

88. Grewia ferruginea Hochst ex. A.Rich. – Tiliaceae

161.. *G. tembensis* Fresen. – Tiliaceae

162. G. trichocarpa Hochst. ex. A.Rich. - Tiliaceae

163. G. velutina (Forssk.) Vahl. – Tiliaceae

73. G. villosa Willd. – Tilliaceae

164. Heliotropium cinerascens DC. – Boraginaceae

11. Heteropogon contortus (L.) Roem. and Schult. – Poaceae

57. Hibiscus macranthus Hochst. ex A.Rich. – Malvaceae

74. Hippocratea africana (Willd.) Loes. - Celastraceae

165. Hosulundia opposita Vahl – Labiatae

166. Huernia concinna N.E.Br. – Asclepiadaceae

46. Hygrophylia auriculata (Schum.) Heine – Acanthaceae

115. Hyparrhenia anthistirioides (Hochst. ex A.Rich.) tapf – Poaceae

114. H. collina (Pilg.) Stapf – Poaceae

54. H. hirta (L.) Stapf -- Poaceae

55. H. rufa (Nees) Stapf – Poaceae

105. Dicliptera maculata Nees-- Acanthaceae

168. Indigofera vohemarensis Baill - Fabaceae

167. I. articulata Grovan – Fabaceae

42. I. hochstetteri Bark. – Fabaceae

16. Ipomoea aquatica Forssk. – Convolvulaceae

40. I. tenuirostris Choisy – Convolvulaceae

7. Isolepis costata A.Rich. – Cyperaceae

91. Jasminium abyssinicum Hochst. ex. DC. --Oleaceae

102. Justicia schimperiana (Hochst. ex. A.Nees) T.Anders. - Acanthaceae

Appendix 1. (Continued).

103. Monathecium glandulosum Hochst. – Acanthaceae

169. Lactuca inermis Forssk. – Asteraceae

170. Lagenaria ciceraria (Molina) Standl. - Curcurbitaceae

59. Laggeria alata (D.Don.) Schult. – Bip. ex Oliv. - Asteraceae

69. Lantana camara L. --Verbenaceae

171. Lawsonia inermis L. – Lythraceae

172. Lippia adoensis Hochst. ex. Walp. – Verbenaceae

15. Ludwigia stolonifera (Guill and Perr.) Raven. – Onagraceae

81. Maytenus arbutifolia (A.Rich.) Wilezek – Celastraceae

50. Medicago polymorpha L.-- Fabaceae

173. Millettia ferruginea (Hochst.) Bark. – Fabaceae

78. Mimusops kummel Bruce ex. DC. -- Sapotaceae

174. Myrtus communis L. – Myrtaceae

175. Nicotiana rustica L. – Solanaceae

176. Nicotiana tabacum L. --Solanaceae

177. Nuxia oppositifolia (Hochst.) Benth. – Longaniaceae

21. Nymphea coerulea Savigny – Nympheaceae

178. Ocimum basilium L. *var thyrsiflorum* (L.) Benth. – Labiate

29. O. cenum L. – Labiatae

101. O. graticimum L. – Labiatae

32. O. lamiifolium Hochst. – Labiate

179. O. spicatum Delfers. – Labiatae

180. Olea europaea subsp. cuspidata (Wall. ex. DC.) Cifferri – Oleaceae

181. Oncoba spinosa Forssk. – Flacourtiaceae

182. Opuntia ficus – indica (L.) Miller – Cactaceae

Appendix 1. (Continued).

108. Oplismens compositus (L.) P. Beauv. – Poaceae

183. Osyris quadripartita Decn. – Santalaceae

2. Panicum coloratum L. – Poaceae

4. Panicum maximum Jack. –Poaceae

3. Panicum repens L – Poaceae

113. Panicum repentellum Napper – Poaceae

47. Paspalum vaginatum SW. – Poaceae

100. Periploca linearifolia Del ex. A. Rich. – Asclepiadaceae

22. Persicaria senegalensis (Meisn.) Sojan – Polygonaceae

107. Phaulopsis imbricata (Forssk.) Sweet – Acanthaceae

84. Phoneix reclinata Jacq - Palmae

60. Phragmites australis (Cav.) Steud. – Poaceae

92. Phytolacca dodecandra L' Herit – Phytolacaceae

17. Pistia stratiotes L. - Araceae

51. Portulaca oleracea L. - Portulacaceae

34. P. quadrifida L. - Portulacaceae

184. Premna schimperi Engl. – Verbenaceae

185. Punicum granatum L. – Lythraceae

186. Rhoicissus tridentata (L.f.) Willd. and Drummond - Vitaceae

187. Rhus glutinosa A.Rich. – Anacardiaceae

85. R. natalensis Krauss – Anacardiaceae

188. R. retinorroea Olive – Anacardiaceae

189. R. vulgaris Meikle – Anacardiaceae

82. Ricinus communis L. – Euphorbiaceae

191. Rumex nervosus Vahl – Polygonaceae

Appendix 1. (Continued).

190. Rubus steundneri Schweinf. – Rosaceae

192. Ruta chalepensis L. Rutaceae

193. Salvadora persica L. – Salvadoraceae

194. *Sansevieria ehrenbergii* Schweinf. ex.Baker – Dracaenaceae

195. *S. forskaoliana* (Schult.f.) Hepper and Wood – Dracaenaceae

12. *Schoenoplectus maritiums* (L.) Lye – Cyperaceae

44. *S. subulatus* (Vahl) Lye – Cyperaceae

28. *Senna didymobotrya* (Fresen.) Irwin and Barneby – Fabaccee

30. *S. occidentalis* (L.) Link – Fabaceae

196. *S. septemtrionalis* (Viv.) Irwine and Barneby – Fabaceae

197. *Setearia incrassata* (Hochst.) Hack - Poaceae

31. *Sida schimperiana Hochst. A.Rich.* – Malvaceae

33. *Solanum incanum* L. – Solanaceae

23. *Sphaeranthus suaveolens* (Forssk.) DC. *var abyssinicus* (Steetz.) Ross Craig - Asteraceae

10. Sporobolus pyramidalis P.Beauv. – Poaceae

198. *Sterculia africana* (Lour.) Fiori. - Sterculiaceae

61. *Tagetes minuta* L. – Asteraceae

199. Tamarindus indica L. – Fabaceae

75. *Teclea nobilis* Del. – Rutaceae

98. T. simplicifolia (Engl.) Verddorn – Rutaceae

200. Terminalia brownii Fresen. – Combretaceae

201. Trichodesma zeylanicum (Burm.f.) R.Br – Boraginaceae

49. Trifolium rueppellianum Fresen. – Fabaceae

24. Typha domengensis Pers. – Typhaceae

Appendix 1. (Continued).

202. Verbena oficinalis L. – Verbenaceae

63. Veronica anagallis-aquatica L. – Scrophulariaceae

37. *Vigna luteola* (Jacq.) Benth. – Fabaceae

39. Vigna schimperi Bark. – Fabaceae

03. *Withania Somnifera* (L.) Dunal. – Solanaceae

25. *Xanthium strumarium* L.- Asteraceae

204. *Ximenia americana* L. - Olacaceae

205. Zehneria scabra (L.f.) Sond. – Cucurbitaceae

93. *Ziziphus mauritiana* Lam. – Rhamnaceae

115. *Ziziphus mucronata* Willd. – Rhamnaceae

Appendex 2.List of Non- Cultivated Food Plants: Scientific, Family and Local Name : Habit, Plant Part Used Mode of Consumption. Key: Ha, habit;(H, herb; C, climber; S, shrub; T, tree). Pp, plant part used (L, leaf; F, fruit; S, seed; Re, resin; Ag, above ground; Rh, rhizome; Ro, root; St, stem; Tw, twig; Fl, flower; B, bark; N, nectar). MC, mode of consumption.

Scientific Name	Family Name	Local Name	Ha	P.P	M.C.
Acacia asak (Forssk.) Willd.	Fabaceae	Alekebesa	S	F	Raw
Acacia seyal Del.	Fabaceae	Wacho	T	B Re	Raw Chewing
Amaranthus caudatus L.	Amaranthaceae	Alma	H	L S	Raw Cooked
Amaranthus spinosus L.	Amaranthaceae	Alma	H	S	Cooked
Anethum foeniculum L.	Apiaceae	Kamuni	H	L	Raw
Argemone mexicana L.	Papaveraceae	Koshele	S	S	Cooked
Balanites aggyptiaca (L.) Del.	Balanitaceae	Baddano	T	F	Raw
Berchmia discolor (Klotzsch) Hemsl	Rhamnaceae	Jejeba	T	F	Raw
Carissa edulis (Forssk.) Vahl	Apocynaceae	Agamsa	S	F	Raw
Citrus aurientifolia (Christm.) Swingle	Rutaceae	Lomi	S	F	Raw
Commelina diffusa Brum f.	Commelinaceae	Wofe anqur	H	Ro L	Raw Cooked
Cordia africana Lam.	Boraginaceae	Wedesa wanzax	T	F	Raw
Corida ovalis R.Br. ex DC.	Boraginanceae	Mender (Or) Kebwanza (Am)	T	F	Raw
Cyclantheropsis parviflora (Cogn.) Harms	Cucurbitaceae	Embuteteye	C	F	Raw
Cyperus alopecuroides Rottb.	Cyperaceae	Rogrogal	Se	S	Raw
Echinochloa pyramiddlis (Lam.) Hitchc. & Chase	Poaceae	Gebis	H	S	Raw
Erucasterum abyssinicum A.Rich.	Bracicassceae	Guguble	H	L	Cooked
Euclea schimperi (A.DC.) Dandy	Ebenanceae	Miesa Dedeho	S	F	Raw
Ficus palmata Forssk.	Moraceae	Beles	S	F	Raw
Fiscus sur Forssk.	Moraceae	Harbu Sholla	T	F	Raw
Ficus sycomorus L.	Moraceae	Oda Sholla	T	F	Raw
Ficus thonningii Blume	Moraceae	Dembi Zemat	T	F	Raw
Ficus vasta Forssk.	Moraceae	Oda, kiltu warka	T	F Re	Raw Chewing

Appendix 2. (Continued).

Scientific Name	Family Name	Local Name	Ha	P.P	M.C.
Gardenia ternifolia K.Schum. subsp. *Javis tonatis* (Welw.) Vesok	Rubiaceae	Kubelu	T	F	Raw
Grewia ferruginea Hochst. ex A.Rich.	Tiliaceae	Ogomdi Lenguata	S	F	Raw
Grewia villosa Willd.	Tiliaceae	Ogomdi Lenquata	S	F	Raw
Grewia tembensis Fresen.	Tiliaceae	Nech Deka	S	F	Raw
Grewia velutina (Forssk.) Vahl	Tiliaceae	Nech Deka	S	F	Raw
Grewia tricocarpa Hochst. ex A.Rich.	Tiliaceae	Wondie Deka	S	F	Raw
Hosulunidia opposita Vahl	Labiate	Yeregan Kolo	S	F	Raw
Ipomoea aquatica Forssk.	Convolvulaceae	Keshewae	C	L Ro	Raw Raw
Justicia schimperiana (Hochst. ex Nees) T.Anders	Acanthaceae	Dumuga Sensel	S	N	Fresh
Lantana camara L.	Verbenaceae	Yeregna kolo	S	F	Raw Roasted
Mimusops Kummel Bruce ex DC.	Sapotaceae	Koladi shiyemito	T	F	Raw
Nymphea Coerulea Saviginy	Nympheaceae	Buranburi	H	Fl S	Raw Cooked
Ocimum spicatum Delfers	Labiatae	Satu Durba	S	S	Raw
Oncoba spinosa Forssk.	Flacortiaceae	Akoko	S	F	Raw Rosted
Opuntia ficus indica (L.) Miller	Cactaceae	Are-Muss	S	F	Raw
Portulaca oleracea L.	Portulacaeae	SisAntaria	H	Ag	Cooked
Portulaca quadrifida L.	Portulacaceae	Antaria	H	Ag	Cooked
Punicum granatum L.	Lythraceae	Rumani	S	F	Raw
Rhus natalensis Krauss	Anacardiaceae	Debobosh Chakma	S	F	Raw Roasted Steeped
Rhus glutinosa A-Rich.	Anacardiaceae	Tatessa Embus	S	F	Raw Roasted Steeped
Rhus retinorrhoea Oliv	Anacardiaceae	Tadessa Talo	S	F	Raw Roasted Steeped
Rhus vulgaris Meikle	Anacardiaceae	Ashkamo yeregnKolo	S	F	Raw Roasted Steeped
Rumex nervosus Vahl	Polygonaceae	Dangago Embwacho	S	Tw	Raw
Rubs steundneri Schwenif.	Rosaceae	Enjori	C	F	Raw
Senna occidentalis (L.) Link.	Fabaceae	Asene Meka	S	S	Cooked

Appendix 2. (Continued).

Sterculia africana (Lour.) Fiori.	Sterculiaceae	Kereri	T	Ba S	Raw Cooked
Tamarindus indica L.	Fabaceae	Roka	T	F	Raw
Typha domengensis Pers.	Typhaceae	Gura	Se	Fl Rh	Raw Raw
Ximenia americana L.	Olacaceae	Huda Inkoye	S	F	Raw
Ziziphus mauritiana Lam.	Rhamnaceae	Kurkura	T	F	Raw
Ziziphus mucronata Willd.	Rhamnaceae	Hado Kurkura	T	F	Raw

Appendix 3. Lists of Medicinal Plants for Humans Scientific Family and Local names, Habit, Disease/Treatment, Plant Part Used, Preparation Method and Route of administration.

Key: Ha, habit;(H, herb; C, climber; S, shrub; T, tree). PP, plant part used (L, leaf; F, fruit; S, seed; La, latex; Ro, root; St, stem; Fl, flower; Ba, bark; B, branch; W, whole; Ag, above ground ;Tw, twig; Sp, sap; Oi, oil; Ch, charcoal), PM, preparation method (Pd, pounded & drunk; Pc, pounded & cream; Ps, pounded& sniffed; Pt, poultice; Pr, pounded &rubbed; H, Held on; Sb, smoke bath; Bh, burn & heat; R, rubbed; Cs, chewed and spitting; Csw, chewed& swallow; D, drunk; E, eating; Pw, pounded & washed; P, powder; Co, concoction; De, decoction; Stb, stem bath; C, cream; Hu, hung on door). R.A, route of administration (O, oral; E, external; N, nasal, A, anal), Local names (Or. Oromifa; Am., Amarigna)

Scientific Name	Family Name	Local Name	Ha	Disease Treatment	P P	P.M.	R.A
Achyranthes aspera L.	Amaranthaceae	Dergu (Or.) Deme Adrek (Am.)	H	Stomachache Bleeding Wound DINGETEGNA	B L L B	P.d P.t P.c P.d	O E E O
Acokanthera schimperi (DC.) Benth.	Apocynaceae	Kararo (Or.) Mereze (Am.)	S	Loosened tooth Malaria TILA Repel Mosquitoes poisonous	T L B L S	H P.d H.u S.b	E O E E
Actiniopteris semiflabellata Pichi-Sermolli	Actinopetrtidaceae (Fern)	Yezenjero Ariti (Am.)	H	AIN BESHETA (unable to open eyes)	A g	C.s	E
Anethum foeniculum L.	Apiaceae	Kamuni (Or.) Kemun (Am.)	H	Stomachache Stomach disorder Gonorroea Kidney disease SHINTMAT	L L L L L	P.d P.d C.sw C.sw C.sw	O O O O O

Appendix 3. (Continued).

Scientific Name	Family Name	Local Name	H	Disease Treatment	P P	P.M.	R.A
Arundo donax L.	Graminae	Shembeko (Am.)	H	Abortifacient Contraceptive (cause sterility)	R R	P.d P.d	O O
Aloe Campari Schweinf.	Aloaceae	Sebri (Or.) Ertet (Am.)	H	Malaria Hepatites TUTE MASTAYA	La La La	D D C	O O E
Asparagus africanus Lam.	Asparagaceae	Seriti (Or.) yeset kest (Am.)	S	SHINTMAT Circumcission wound	L L	De Co	O E
Azadirachta indica A.Juss	Meliaceae	Neem (Or.& Am.)	T	Skin rushes Insecticide	L L	P.r	E.
Cadia purpurea (Picc.) Ati.	Fabaceae	Hinjero (Or.)	S	Malaria	S e	P.d	O
Calortopis procera (Ait.) Ait.f.	Aclepiadaceae	Gura Harae (Or.)	S	Sores Poisonous wound	La	R	E.
Calpurnia aurea (Lam.) Benth.	Fabaceae	Cheketa (Or.) Digita (Am.)	S	Stomachache Diarrhoea Headeache NEKERSA	L L L L	P.d P.d P.d P.t	O O O E
Capparis tomentosa Lam.	Capparidiaceae	Gumero (Or. & Am.) Harengema (Or.)	C	Headache Toothache Poisonous	R R F	H H	E E
Caralluma speciosa (N.E.Br.) N.E.Br.	Asclepiadeaceae	Hada (Or.)	H	NEKERSA Poisonous	R S La La	P.c	E
Carissa edulis (Forssk.) Vahl.	Apocynaceae	Agamsa (Or.) Agam (Am.)	S	Headeache Diarrhea Kidney disease Wound Hepatites Stomach disorder KURTIMAN GIN	L L R L R L S S	P.d P.d P.d P.r P.d P.d B.h S.b	O O O E O O E E
Celosia trigyna L.	Amaranthaceae	Lemlemucha (Dr.)	H	Taeniasis Hepatites	W W	P.d P.d	O O
Cissus quadrangularis L.	Vitaceae	Chobi Hada (Or.) Chobi Hareg (Am.)	C	Uvular infec-tion (tonsilitis) IBACH	R R	P.d P.t	O E

Appendix 3. (Continued).

Scientific Name	Family Name	Local Name	H	Disease Treatment	P P	P.M.	R.A
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Lomi (Or.&Am.)	S	Malaria Nausea DEMBIZAT	F F F	Co P.d P.d P.d	O O O
Clematis hirsuta Perr. & Gill	Ranunculaceae	Azo Hada (Or.) Azo Hareg (Am.)	C	KINTAROT NEKERSA Haemorroids	L L L	P.c P.d	E O
Commicarpus plumbagineus (Cav.) Standley	Nyctaginaceae	Kontom (Or.& Am.)	C	Skin reashes KUAKUCHA	B B	P.w P.w	E E
Cordia africana Lam.	Boraginaceae	Wedesa (Or.) Wanza (Am.)	T	Ascariasis	Ba F R	P.d P.d P.d	O O O
Cordia ovalis R.Br. ex Del.	Boraginaceae	Mendero (Or.) Keb wanza (Am.)	T	MICH	L	P.d P.r	O E.
Croton macrastochyus Del.	Euphorbiaceae	Bisana (Am.)	T	Gonorrhea Eye disease stomachach e ring worm abortifacient Fever MICH DINGETEG NA	Ba L L L Sa R Ba L L	P.d P.c P.d R P.d P.d P.d R	O E O E O O O E
Cucumis ficifolius A.Rich.	Cucurbitaceae	Yeemdir Embuaye	C	Infected sores Diarrhoea Stomach disorder poisioning protection	F W W	P.t P.r P.d	E O O
Cyclantheropsis parviflora (Cogn.) Harms	Cucurbitaceae	Embutetey (Or.)	C	Stomach disorder	L	P.d	O
Datura stramonium L.	Solanaceae	Buldge (Or.) Astefaris (Am.)	H	Infected sores KUAKUCHA ALIFIGN	R L R	P.c P.w P.c	E E E
Dodonaea anguistifolia L.f.	Sapindaceae	Itecha (Or Kittkita (Am.)	S	KINTAROT	L R	P.c P.c	E E
Dichrostachys cinerea (L.) Winght and Arn.	Fabaceae	Worsa mesa (Or.) Ader (Am.)	T	Infected wound ALIFIGN	L L	C.s C.s	E E

Appendix 3. (Continued).

Scientific Name	Family Name	Local Name	H	Disease Treatment	P P	P.M.	R.A
Englerina woodforioides (Schweinf.) M.Gilbert	Loranthaceae	Irto Bekenisa (Or.) Yebesana Tegedera (Am.)	S	Fever	W	P.d	O
Entada abyssinica Steud. ex A.Rich.	Fabaceae	Amezaze (Or.) Kentefa (Am.)	S	Toothache Eye disease retained placenta	Tw L L	H P.c P.d	E E O
Eucalyptus globulus Lambill	Myrtaceae	Nech Bahir zaf (Am.)	T	Common cold MICH	L L	S.b S.b	O N E O N E
Euclea schimperi (A. DC.) Dandy	Ebenaceae	Mieasa (Or.) Dedeho (Am.)	S	Stomach disorder	R	P.d	O
Eupahorbia indica L.	Euphorbiacea e	Antefra (Am.)	H	Leishmanias is KINTAROT Haemorroids	La La La	R R	E E
Euphorbia tirucalli L.	Euphorbiacea e	Aneo (Or.) Kinchibt (Am.)	T	KUSIL KINTAROT Haemorroids	La La La	R R	E E
Ficus sycomorus L.	Moraceae	Oda (Or.) Sholla (Am.)	T	LIB DIKAM	F	E	O
Grewia ferruginea Hochst. ex.A.Rich.	Tiliaceae	Ogomdi (Or.) Lenquata (Am.)	S	Taeniasis	Ba	P.d	O
Grewia tembensis Fresen.	Tiliaceae	Eka (Or.) Deka (Or.)	S	Elephantiasi s MICH	L L	P.t P.r	D E
Grewia villosa Willd.	Tiliaceae	Ogomdi (Or.) Lenquata (Am.)	S	Conjunctiviti s Hepatites	R Ba	P.c P.d	E O
Heliotropium cinerascens DC.	Boraginaceae	Amerarita (Or.) Chegogot (Am)	H	Stomach disorder Insecticide	L B	P.d	O
Hippocratea africana (Willd.) Loes.	Celastraceae	Tero Hada (Or.) Tero Hareg (Am.)	C	KINTAROT	L	P.c	E

Appendix 3. (Continued).

Scientific Name	Family Name	Local Name	H	Disease Treatment	P P	P.M.	R.A
Huernia concinna N.E.Br.	Asclepiadeaceae	Yelam Tut (Am.)	H	Infected wound	W	P.c	E
Indigofera articulata Grouan	Fabaceae	Ye Ebabe Merze Medehanit (Am.)	S	Snakebite	L B	P.d	O
Jasminium abyssinicum Hochst.	Oleaceae	Tembellel (Am.)	C	Taeniasis Infected wound YELEG TILA Poisoning protection poisonous	L L L L F	P.d P.c P.c P.c P.c	O E E E E
Justicia schimperiana (Hochst. ex.A.Nees) T.Anders	Acanthaceae	Dumuga (Or.) Sen Sensl (Am.)	S	Toothache MICH EBACH Repel Mosquitoes	Tw L L L	H S.b P.t S.b	E I E. E E
Lawsonia inermis L.	Lythraceae	Hina (Or.& Am.)	S	Stomach disorder Headache Retained placenta bleeding skin disease	L L L L L	P.d P.d P.d P.t P.d C	O O O E O
Maytenus arbutifolia (A.Rich.) Wilezek	Celastraceae	Kombolcha (Or.) Atat (Am.)	S	NEFAS BESHETA IGER MASSASER	S S	B.h	E E
Millettia ferruginea (Hochst.) Bark	Fabaceae	Dedatu (Or.)	T	Skin rushes CHEFIE Ascariasis Swelling Fish poison	L L L L	P.r P.r P.d P.t	E E O E
Mimusops kummel Bruce ex. DC.	Sapotaceae	Koladi (Or.) Shiye (Am.)	T	Stomach disorder	F	E	O
Myrtus communis L.	Myrytaceae	Adess (Or. & Am.)	S	Stomach disorder	L	P.r	O
Ocimum graticimum L.	Labiatae	Dama Kassie (Or. & Am.)	S	Headache Nausea MICH	L L L	P.d P.d P.d P.r	O O O E
Ocimum lamiifolium Hochst.	Labiatae	Dama Kassie (Or. & Am.)	S	Headeache Nausea MICH	L L L	P.d P.d P.d P.r	O O O E

Appendix 3. (Continued).

Scientific Name	Family Name	Local Name	Ha	Disease Treatment	PP	P.M.	R.A
Olea europaea subsp. cuspidata (Wall ex DC.) Cifferri.	Oleaceae	Ejersa (Or.) Weyra (Am.)	T	Circumcision wound Skin disease Fumugation	C h O S B	C.o C.r S.b	E E E
Opuntia ficus-indica (L.) Miller	Cactaceae	Are-Muss (Or.) yebe har kulkual(Am.)	S	Stomachache	F	E	O
Osyris quadripartita Decn.	Santalaceae	Wato (Or.) Keret (Am.)	S	Stomach disorder Evil eye LEKISAT	L L L	P.d P.d P.d	O O O
Periploca linearifolia Del. ex A.Rich.	Asclepiadeaceae	Wezer Hada (Or.) Wezere hareg (Am.)	C	Yekolakusil (Tropical ulcer)	L	Co	E
Persicaria senegalensis (Meisn.) Sojan.	Polygonaceae	Kererita (Or.) Yekebero Ageda (Am.)	H	Swollen body	L	P.w	E.
Phytolacca dodecandra L'.Herit	Phytolacaceae	Indodi (Or.) Indod (Am.)	C	Gonorrhea Abortifacient Sores	R R L	P.d P.d P.r	O O E
Punicum grantum L.	Lythraceae	Rumani (Or.)	S	Vomitting	F	E	O
Rhus natalensis Krauss	Anacardiaceae	Debobosha (Or.) Chakma(Am)	S	Tootache Stomacheache Diarrhea	T w L L	H P.d P.d	E O O
Ricinus communis L.	Euphorbiaceae	Obo (Or.) Gulo (Am.)	S	Retained placenta KINTAROT Haemorroids	L L La	P.d P.c	O E
Rumex nervosus Vahl	Polygonaceae	Dangago(Or.) Embwacho (Am.)	S	Diarrhea Vermifuge MICH	L L L	P.d P.d P.d	O O O
Salvadora persica L.	Salvadoraceae	Ade (Or.)	T	Diarrhea Stomachache Headache Toothache Retained placenta tonsillitis throat disease MICH IBACH	L L L T w L L L L L	P.d P.d P.d H P.d P.d P.d P.d P.d P.r	O O O E O O O O E

Appendix 3. (Continued).

Scientific Name	Family Name	Local Name	Ha	Disease Treatment	P P	P.M.	R.A
Verbena Officinalis L.	Verbenaceae	Atefti (Or.& A m.)	H	Stomach Disorder Kidney disease	R Ag	P.d P.d	O O
Withania somnifera (L.) Dunal.	Solanaceae	Hide Buda (Or.)	S	Stomach disorder evil eye	L R R	P.d P.d P.d	O O O
Ximenia american L.	Olacaceae	Huda (Or.) Inkoye (Am.)	S	Uvular infection Retained placenta Liver disease skin sores lizard poisoning DEMBIZAT	L L R L L Ba	P.d P.d P.d C.s C.s P.d	O O O E E O
Xanthium Strumarium L.	Asteraceae	Deha Nikel (Am.)	S	Barili	L	P.r	E
Ziziphus mauritiana Lam.	Rhamnaceae	Kurkura (Am. & Or.)	T	Retained placenta Forofor	L L	P.d P.r	O E
Zehneria scabra (L.) Sond.	Cucurbitaceae	Chikuegn (Or.)	C	Malaria MICH Astham Cchest pain AGIL	Ag Ag Ag Ag Ag Ag	P.d P.d P.s P.s P.d	O O N N O
Sansevieria ehrenbergii Schwinf. ex Baker	Dracaenaceae	Algae(Or.) Dibulbul Kacha (Am.)	H	Ear disease	S	Pd	I

Appendix 4. Disease/Treatment and Number of Species Used in Human Medicine

Disease/Treatment	Total Number of species	%
Gastrointestinal disorder	20	25.31
Infected wound and Tropical ulcer	13	16.45
Febrile illness (MICH)	11	13.92
Diharreal diseases	9	11.39
Intestinal parasitosis (Ascaris and Taeniasis)	8	10.12
Headache	8	10.12
Toothache	6	7.59
Placental retention	6	7.59
Haemorrhoids	6	7.59
Wart (KINTAROT)	6	7.59
Malaria	5	6.32
FOROFOR	5	6.32
Eye Complaints	4	5.06
Hepatitis	4	5.06
Nausea, vomiting	4	5.06
Lympadenitis &Tuberculous	4	5.06
Coughs, Common Colds	3	3.79
Gonorrhea	3	3.79
Lyphadenopaty	3	3.79
Snakebites	3	3.79

Appendix 4.Continued)

Kidney disease	3	3.79
Abortifacient	3	3.79
Skin rushes	3	3.79
Tonsillitis and throat diseases	3	3.79
LE LIFIGN	3	3.79
DINGETEGNA	3	3.79
Urine retention (SHINT MAT)	2	2.53
Chest pain	2	2.53
Skin disease	2	2.53
Evil eye	2	2.53
DEM BIZAT	2	2.53
Swollen body	2	2.53
Ear Complaints	1	1.26
Althragia	1	1.26
Elephantasis	1	1.26
Leishmaniasis	1	1.26
Asthma	1	1.26
Mental illness (AJIL)	1	1.26
Wet eczema (CHIFEE)	1	1.26
LIB DIKAM	1	1.26

Appendix 4.Continued)

MEFAS BESHITA	1	1.26
LE KISAT	1	1.26
YELEG TILA	1	1.26
TILA	1	1.26
GIN	1	1.26
Mosquito repellant, Insectcide	5	6.32
Poisonous	4	5.06
	183	100

'Appendix5. List of Medicinal Plants for Livestock: Scientific Family and Local names, Habit, Disease/Treatment, Plant part used, Preparation Method and Route of administration.

Scientific Name	Family Name	Local Name	Ha	Disease/ Treatment	P.P.	P.M	R.A
Acacia brevispica Harms	Fabaceae	Amezaee (Or.) Kentefa (Am.)	S	Retained placenta	L	P.d	O
Achyranthes aspera L.	Amaranthaceae	Dergu (Or.) Deme Adrek (Am.)	H	Black leg MICH	Ag Ag	P.d P.d	O O
Acacia seyal Del.	Fabaceae	Wacho (Or.) Nech Girar (Am.)	T	Retained placenta	Ba	P.d	O
Actinopetris semiflabellata Pichi Sermoli	Actinopetridaceae (Fern)	Yezenjero Ariti (am.)	H	Black leg	W	P.d	O
Anethum foeniculum L.	Apiaceae	Kamuni (Or.) Kamun (Am.)	H	SHINTMAT	L	P.d	O
Calpurnia aurea (Lam.) Benth.	Fabaceae	Cheketa (Or.) Digeta (Am.)	S	Actino bacillosis Actinomycosis Dermatophillosis External parasites Lice, tick, mange	L L L L	P.c P.c P.w P.w	E E E E
Capparis tomentosa Lam.	Capparidaceae	Gumero (Am.,Or.) Harengema (Or.)	C	Dermatophillosis IGER MASASER	L R	P.w Co	E O
Carissa edulis (Forssk) Vahl	Apocynaceae	Agamsa (Or.) Agam (Am.)	S	Anthrax	L R	Co Co	O O
Cissus quadrangularis L.	Vitaceae	Chobi Hada (Or.)	C	Black leg Dermatophillosis	S S	P.d P.w	O E
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Lomi(Or. & Am.)	S	Foot and Mouth	F	Co	O
Comicarpus plumbagineus (Cav.) Standl.	Nyctaginaceae	Contom (Or.)	C	DINGETEGNA	Ag	P.d	O
Croton macrostachyus Del.	Euphorbiaceae	Bekenisa (Or.) Besana (Am.)	T	MICH	L	P.d	O

Appendix 5. (Continued)

Scientific Name	Family Name	Local Name	Ha	Disease/ Treatment	P.P	P.M	R.A
Dodonaea anguistifolia L.f.	Sapindaceae	Itecha (Or.) Kitkita (Am.)	S	Dermatophillosis external parasites (mange, lice, tick) retained placenta	L L L	P.w P.w P.d	E E O
Ehretia cymosa Thon	Boraginaceae	Oolaga (Or.) Game (Am.)	T	Pasteurellosis IGER MASASER MICH HODE MENFAT	L R L L	P.d Co P.d P.d	O O O O
Englerina woodfordioides (Schweinf.) M.Gilbert	Loranthaceae	Irto Bekenesa (Or.)Ybesana aTegedera (Am.)	S	Fasciola GUNFAN	W W	P.d P.d	O O
Entada abyssinica Steud. ex A.Rich.	Fabaceae	Kentefa (Am.) Amezaze (Or.)	S	Dermatophillosis External parasites (mange, lice, tick)	L L	P.w P.w	E E
Grewia ferruginea Hochst. ex.A.Rich.	Tiliaceae	Ogomdi (Or.) Lenquata (Am.)	S	Pasteurellosis	L	P.d	O
Grewia villosa Willd.	Tiliaceae	Ogomi (Or.) Lenquata (Am.)	S	Pasteurellosis	L	P.d	O
Heliotropicum cinerascens Dc.	Boraginaceae	Amerarita (Or.) Chegogot (Am.)	H	Anthrax	L	P.d	O
Lactuca inermis Forssk.	Asteraceae	Kirinbulti (Or.)	H	Black leg	Ag	P.d	O
Millettia ferruginea (Hochst.) Bark	Fabaceae	Dedatu (Or.) Bir Bira (Am.)	T	External parasites (manges, lice, ticks)	L	P.w	E
Nicotiana tabacum L.	Solanaceae	Timbo (Or.) Timbaho (Am.)	H	Actinomycosis Actinobacillosis Leech	L L L	P.c P.c P.d	E E N
Osyris quadripartita Decn.	Santalacaceae	Wato (Or.) Keret (Am.)	S	Protect from Hayena	L	P.d	O
Ricinus communis L.	Euphorbiaceae	Obo (Or.) Gulo (Am.)	S	Stomach disorder	L S	P.d P.d	O O
Solanum incanum L.	Solanaceae	Hidelae (Or.) Embuay(Am.)	S	Leech JIRATKERKER	F R	P.d P.c	N E

Appendix5.(Continued)

Scientific Name	Family Name	Local Name	Ha	Disease/ Treatment	P.P	P.M	R.A
Salvadora persica L.	Salvadoraceae	Ade (Or.)	T	Diarrhea Stomachache MICH	L L L	P.d P.d P.d	O O O
Sida schimperiana Hochst. A. Rich.	Malvaceae	Geberesede (Or.)	S	Wound sore (of yoking)	B	C.s	E
Withania somnifera (L.) Dunal	Solanaceae	Hide Buda (Or.) Chefreg(Am.)	S	AINENAS allow to drink fornewly born calf allowed to drink for cattles to be slaughteled to make meat healthy	L R L L	P.d P.d P.d	O O O
Ziziphus mauritian Lam.	Rhamnaceae	Kurkura (Or, & Am.)	T	Retained placenta	L	P.d	O
Zehneria scabra (Linnf.f.) Sond.	Cucurbitaceae	Chekugn (Or.)	C	Pasteurellosis DINGETEGNA MICH	W W W	P.d P.d P.d	O O
Cyclantheropsis parviflora (Cogn.) Harms	Cucurbitaceae	Embuteteye (Or.)	C	MICH	Ag	P.d	O

Appendix 6. Major Livestock Disease Types and Ethnoveterinary Plant Species Used by the Cheffa People.

Disease/Treatment	Total Number of Species	%
Febrile illness (MICH)	6	19.35
Dermatophillosis	5	16.12
Pasteurellosis	4	12.90
Black – Leg	4	12.90
Ectoparasistes (Mange, Lice, Tick)	4	12.90
Retained Placenta	4	12.90
Stomachache	3	9.67
DINGETEGNA	3	9.67
Foot-and –Mouth disease	3	9.67
Anthrax	2	6.45
Actinomycosis	2	6.45
Actinobacilliosis	2	6.45
Diarrhea	2	6.45
Wound, Sores	2	6.45
Fasciola	1	3.22
CBPP (Contagious Bovine Pleuro Pneamonea)	1	3.22
Evil eye	1	3.22
Leech	1	3.22
SHINT MAT	1	3.22
Total	51	100

*The total number of plant species used for livestock treatment documented was 31. The total numbers of plant species given in this table are 51. This is because of the fact that for one type of complaints different species are used.

Appendix 7. List of the most important forage plants of Cheffa: Scientific, family and local names, habit, plant parts used, degree of preference and palatability

Scientific Name	FamilyName	Local Name	Ha	P.P.	Degree of preference And Palatability				
					1	2	3	4	5
Acacia brevispica Harms	Fabaceae	Amezaze Kentefa	T	L P F	X				
Acacia albida Del.	Fabaceae	Garbi	T	L P F		X			
Celtis africana Brum.f.	Ulmaceae	Fetokoma kawot	T	L		X			
Cordia africana Lam.	Boraginacea e	Wedesa wanza	T	L		X			
Cordia ovalis R.Br. ex Dc.	Boraginacea e	Mendero kebe wanze	T	L			X		
Croton macrostachyus Del.	Euphorbiace ae	Bikenesa Besana	T	L				X	
Combretum mollie G. Don.	Combretace ae	Rukessa	T	L		X			
Combretum collinum Fresen.	Combretace ae	Sete Rukessa	T	L		X			
Dicrostachys cinerea (L.) Winght and Arn.	Fabaceae	Ader	T	L P		X			
Ehretia cymosa Thon.	Boraginacea e	Olaga Game	T	L		X			
Eucelea sehimperi (A. DC.) Dandy	Ebenaceae	Miesa Dedeho	S	L			X		
Grewea ferruginea Hochst. ex A.Rich.	Tiliaceae	Ogomdi Lenquata	S	L	X				
Grewia tembensis Fresen.	Tiliaceae	Nech Deka	S	L	X				

Appendix7.(Continued)

Scientific Name	FamilyName	Local Name	Ha	P.P.	Degree of preference And Palatability				
					1	2	3	4	5
Grewia Velutina (Forssk.) Vahl	Tiliaceae	Nech Deka	S	L	X				
Grewia villosa Willd.	Tiliaceae	Ogomdi lenquata	S	L	X				
Justicia schimperiana (Hochst.ex Nees) T.Anders	Acanthaceae	Dumuga Sensel	S	L				X	
Maytenus arbutifolia (A.Rich.) Wilczek	Celastraceae	Kombolcha Atat	S	L		X			
Rhus natalensis Krauss	Anacardiaceae	Debobosha Chakma	S	L			X		
Ziziphus mauritiana Lam.	Rhamnaceae	Kurkura	T	L		X			
Ziziphus mucronate Willd.	Rhamnaceae	Hado kurkura	S	L		X			
Cladostigma dioicum Radlk	Convolvulaceae	Kertatume	S	B	X				
Acalypha fruitcosa Forssk.	Euphorbiaceae	Nech/Sete kertatume	S	B	X				
Acacia asak (Forsk.) Willd.	Fabaceae	Alekebesa	T	L P F	X				
Heteropogon contortus (L.) Roem. and Schult.	Poacae	Sekokae Shekokae	G		X				
Digitavia abyssinica (Hochst.ex A.Rich.) Stapf	Poacae	Urra	G		X				
Entropogon macrostachyus (Hochst. ex A.Rich.) Benth.	Poacae	Daremo	G		X				
Cynodon dactylon (L.) Pers.	Poacae	Serdo	G		X				

Appendix 8.Miscellanious uses of Plants of Ceffa. (1, body wash; 2,cloth wash; 3,utensil wash; 4,toothbrush; 5,fumigation; 6,fragrance).

Scientific Name	Family Name	Local Name	Ha	P.P.	1	2	3	4	5	6
Acokanthera sehimperi (DC.) Benth.	Apocynaceae	Keraro(Or.). Mereze (Am.)	S	S					X	
Aloe camperi Schweinf.	Aloaceae	Sebri (Or.) Erete (Am.)	H	L	X				X	
Azadirachta indica A. Juss	Meliaceae	Neem	T	L					X	
Balanites aegyptiaca (L.) Del.	Balanitaceae	Bedeno (Or.)	T	S					X	
Combretum adenogonium Steud. ex. A. Rich.	Combretaceae	Abalo (Or.&Am.)	S	S					X	
Combretum collinum Fresen.	Combretaceae	Sete Rukesa	S	S B					X	
Combretum mollie G. Don	Combretaceae	Rukesa (or)	S	S B					X	
Commiphora Schimperi (Berg.) Engl.	Burseraceae	Adrus (Or.&Am.)	S	S					X	
Croton macrostachyus Del.	Euphorbiaceae	Bekenesa (Or.) Besana (Am.)	T	L			X			
Cymbopogon Citratus (DC.) Stapf.	Graminae	Tej sar (Am.)	H	L						X
Cucumis ficifolius A.Rich.	Cucurbitaceae	Yemder embuaye	C	L			X			
Cyperus rigidifolius Stued.	Cyperaceae	Gicha(Am.)	S	Bu						X
Dicrostachys cinerea (L.) Winght and Arn.	Fabaceae	Worsamesa (Or) Ader(Am)	T	S					X	
Eucalyptus citriodara Hook.	Myrtaceae	Bahirzaf Urga (Or.) Shito Bahirzaf (Am.)	T	L						X
Eucalyptus globulus Lambill	Myrtaceae	Bahir zaf Ade (Or.) Nech Bahir Zaf(Am.)	T	Sc						X
Fuerstia africana Th. Fries	Labiatae	Eje Akela	H	B						X
Grewia ferruginea Hochst. ex A. Rich.	Tiliaceae	Ogomdi (Or.) Lenguata(Am.)	S	Ba L	X		X			
Indigofera vohemarensis Baill	Fabaceae	Kechinae	H	B						X

Appendix 8.(Continued)

Scientific Name	Family Name	Local Name	Ha	P.P.	1	2	3	4	5	6
Justicia schimperiana (Hochst. ex Nees) T.Anders	Acanthaceae	Dumuga (Or) Sensel (Am.)	S	L			X			
Lawsonia inermis L.	Verbenaceae	Hina(Or.&Am.)	S	B			X			
Lippia adoensis Hochst.ex Walp.	Lythraceae	Kessie (Am.)	S	Tw L				X		X
Mimusops Kummel Bruce ex. DC.	Sapotaceae	Koladi (Or.) Shiye (Am.)	T	S					X	
Myrtus communis L.	Myrtaceae	Adess (Am.)	S	L						X
Nuxia oppositifolia (Hochst.) Benth.	Longaniaceae	Chocho (Or.)	S	S					X	
Ocimum basilium L. var thyrsiflorum (L.) Benth.	Labiatae	Ajuban	H	L Fl						X
Ocimum graticimum L.	Labiatae	Dama Kassie	S	L						X
Ocimum lamiifolium Hochst.	Labiatae	Dama Kassie	S	L						X
Olea europaea subsp. Cuspidata(Wall. ex. Dc.) Cifferri	Oleaceae	Aejersa Weyra (Am.)	T	Tw B S			X	X	X X	
Premna schimperi Engl.	Verbenaceae	Chocho	S	S L					X	X
Phytolacca dodecandra L' Herit	Phytolacaceae	Indodi (Or.) Indod (Am.)	C	L F S		X X X				
Rhus natalensis Krauss	Anacardiaceae	Debobasha (Or.) Chakma (Am.)	S	Tw B			X	X		
Salvdora persica L.	Salvadoraceae	Ade (Or.)	T	Tw				X		
Sida schimperiana Hochst A. Rich.	Malvaceae	Gebere sede chefereg (Am.)	S	S W			X	X		
Sphaeranthus suaveolens. (Forssk) DC. Vara byssinicus (Steetz.) Ross-Craig.	Asteraceae	Hollagabis (Or)	H	L F S						X
Solanum incanum L.	Solanaceae	Hidelae (Or.) Embuaye (Am.)	S	L F			X			
Terminalia brawnii Fresen	Combretaceae	Berensa (Or.) Weyba (Am.)	S	S B			X		X	
Withania somnifera (L.) Dunal	Solanaceae	Hide Buda	S	L			X			

Appendix 9. Comparison of plant communities by mean values of soil properties. pH: H_2O (1:2.5); Electrical Conductivity, EC (ds/m); Cation Exchange Capacity , CEC (Meq/100 gm soil); Sodium, Na (Meq/100 gm soil); Potassium, K (Meq/100 gm soil); Calcium, Ca (Meq/100 gm soil); Magnesium, Mg (Meq/100 gm soil); Base saturation, Base Sa. (%); Organic Carbon, OC (%); Moisture, M (Kg).

	Soil Properties									
Com.	pH.	EC.	Na.	K	Ca	Mg.	CEC	B.S.	OC.	M.
A	7.52	0.33	4.72	3.30	9.73	2.80	25.50	80.00	1.29	20.92
B	6.92	0.04	1.28	1.27	9.54	1.67	13.76	66.00	1.85	12.45
C	7.66	0.44	2.48	2.73	7.78	2.50	21.00	74.00	0.74	23.28
D	8.10	0.49	13.44	2.44	9.64	1.75	33.60	81.00	0.46	15.64
E	8.43	0.21	5.60	3.20	22.31	6.42	77.60	54.00	1.94	24.38
F	7.34	0.83	9.57	3.39	12.91	7.83	44.13	75.00	3.08	30.04
G	7.69	0.56	12.83	3.27	16.77	7.05	42.93	78.33	2.46	37.31
H	8.93	0.43	11.20	3.02	13.15	7.01	45.00	76.00	1.22	40.32
I	7.34	0.26	11.84	7.98	8.83	9.08	37.73	46.00	3.361	28.21
J	7.63	0.16	2.38	7.95	17.27	5.02	45.55	72.00	4.95	0.07

Appendix 10. One way ANOVA Summary Table for Soil Analysis

Variable	Source	Sum of squares	df.	Mean square	F.	Sig.
PH	Between groups	9.958	9	1.106	1.738	0.125
	Within Groups	18.458	29	0. 636		
	Total	28.416	38			
EC	Between Groups	2.003	9	0.223	0.606	0.782
	Within Groups	10.653	29	0.367		
	Total	12.656	38			
Na	Between Groups	392.242	9	43.582	2.322	0.113
	Within Groups	168.890	9	18.766		
	Total	561.132	18			
K	Between Groups	90.296	9	10.033	2.289	0.144
	Within Groups	30.687	7	4.384		
	Total	120.983	16			
Ca	Between Groups	278.703	9	30.967	1.273	0.384
	Within Groups	170.297	7	24.328		
	Total	449.00	16			
Mg	Between Groups	91.208	9	10.134	0.632	0.746
	With in Groups	128.325	8	16.041		
	Total	219.533	17			
CEC	Between Groups	3160.254	9	351.139	3.237	0.056
	Within Groups	867.783	8	108.473		
	Total	4028.037	17			
Base Sat.	Between Groups	3121.611	9	346.846	1.799	0.210
	Within Groups	1542.667	8	192.833		
	Total	4664.278	17			
OC	Between Groups	6399.145	9	711.016	96.750	0.000
	Within Groups	169.028	23	7.349		
	Total	6568.173	32			
M	Between Groups	6829.923	9	758.880	7.024	0.000
	Within Groups	3133.343	29	108.046		
	Total	9963.266	38			

At 0.05 Level of significance

Appendix 11. Key Points Used in the Discussion of this Ethnobotanical Study.

1. Name of Non-cultivated food plants, habit distribution plant part used, preparation, mode of consumption and food categories in the time of food scarcity.
2. Medicinal plants, local name, habit, distribution, type of disease, plant part used, preparation, and mode of consumption.
3. Name of very important forage plants of the area, habit, habitat distribution, and their use value.
4. Other uses and useful plants for laundry and cleansing tooth brush, fumigation, fragrance, aromatic and perfume.
5. Main causes of habitat destruction of the area.
6. Informant name, age, sex and occupation.

Appendix 12. List of key Informants Participated in this Study

Name	Sex	Age	Locality
Ahemed Ebrahim	M	30	Cheffa Robit
Ahemed Abdruhaman	M	50	Cheffa Robit
Adem Mohammed	M	61	Kelo
Abdu Assen	M	56	Kelo
Aliye Kassa	M	72	Gerbi
Aliye Muhae	M	68	Cheffa Robit
Eshetu Endris	M	37	Kelo
Fatuma Ahemed	F	60	Kelo
Hassen Aba Mohammed	M	66	Cheffa Robit
Hassen Seid	M	50	Gerbi
Kemal Mohammed	M	43	Gerbi
Lubaba Liben	F	50	Gerbi
Merima Ahemed	F	55	Cheffa Robit
Mohammed Abagar	M	50	Cheffa Robit
Mohammed Meneshu	M	30	Cheffa Robit
Mohammed Hassen	M	60	Cheffa Robit
Mohammed Muftuha	M	70	Cheffa Robit
Mohammed Assen	M	60	Kelo
Mohammed Yesaf	M	30	Kelo
Mohammed Omer	M	31	Gerbi

Appendix 12. **Continued)**

Mohammed Endris	M	45	Gerbi
Muhae Daud	M	71	Gerbi
Seid Abegaz	M	70	Cheffa Robit
Seid Ibrahim	M	30	Kelo
Yesuf Abedela	M	80	Kelo
Yesuf Mohammed Gelglae	M	45	Gerbi
Yesuf Adem	M	65	Gerbi
Yesuf Amede	M	31	Gerbi
Yimam Assen	M	60	Kelo