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A STUDY ON THE ECOLOGY AND ETHNOBOTANY OF NON-CULTIVATED FOOD PLANTS AND WILD RELATIVES OF CULTIVATED CROPS IN GAMBELLA REGION, SOUTHWESTERN ETHIOPIA

BY

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DEDICATED TO THE INDIGENOUS PEOPLE OF GAMBELLA

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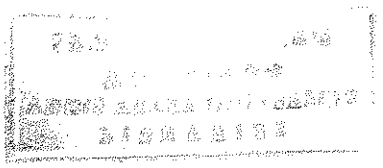

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ABSTRACT

Five field trips were made between October 14, 1995 and October 10, 1996 to Gambella Region, southwestern Ethiopia to study the vegetation, the non-cultivated food plants and wild relatives of cultivated crops. Undisturbed vegetation types were studied to describe the plant communities in which non-cultivated food plants and wild relatives of cultivated crops occur. The cover/abundance data of 220 plant species were recorded from 58 relevès. For each sample stand, environmental data on topographic factors (altitude and slope), and soil from a depth of 10 cm (top soil) and 50 cm (sub soil) were collected. The soil was analyzed for pH, texture, Cation Exehange Capacity, Organic Carbon, total Nitrogen, available Phosphorus, exchangeable Potassium and Sodium. The relevès were classified using a FORTRAN computer program TWINSPAN and the following seven major plant communities were described: 1, *Commelina-Hygrophila*; 2, *Sorghum purpureo-sericeum-Pennisetum thunbergii*; 3, *Loudetia arundinacea-Hyparrhenia pilgeriana*; 4, *Combretum adenogonium-Anogeissus leiocarpa*; 5, *Tamarindus indica-Anogeissus leiocarpa*; 6, *Baphia abyssinica-Tapura fischeri*; 7, *Manilkara butugi-Cordia africana*. Each community was compared with all others in their environmental factors using ANOVA. Plant community-environment interrelationships were investigated to see whether there are statistically significant variations between plant communities in environmental factors.

Indigenous people were involved as guides, laborers and informants in the study of non-cultivated food plants and wild relatives of cultivated crops. Inquiries regarding the local name of plants, uses and mode of uses were made and recorded on the spot with other botanical field notes. The information obtained from local informants was further enriched through literature review and from notes on herbarium specimens found at the National Herbarium (ETH). A total of 469 plant specimens, which comprise 311 wild and 4 cultivated species, were collected in duplicate or triplicate, identified and deposited at ETH and Biodiversity Institute/Ethiopia. Of these, 84 plant species in 39 families and 71 genera have been recorded as non-cultivated food plants. The edible plants fall into 11 categories: fruits (36 species), leaves (30), plant ash as a source of edible salt (8), tubers (3), oil seed (3), seeds as a cereal (2), spices (2), bark for beverage (1), leaves and beans for hot drink (1), stem as a source of water (1) and flower as a source of sweet nectar (1).

A total of 13 species in 9 families and 10 genera were recognized as wild relatives of cultivated crops. These plants belong to cereals (3 species), fibers/leafy vegetables (3), oil seeds (2), stimulant (1), spices (2) and tubers (2).

These important plant species are distributed in the seven major plant communities. Both *ex-situ* and *in-situ* conservation activities are recommended to protect the individual species and the plant communities.

1. INTRODUCTION

1.1. Scope of the problem

Mankind depends mainly on plants and to a lesser extent on animals for the basic requirements of his existence. One of the most direct values of plants is its use as a source of foodstuffs. Of the many plant species in the world, about 75,000 to 80,000 species are believed to be edible (WCMC, 1992; and Bukenya-Ziraba, 1996). Through the process of domestication, from a total of about 2,000 to 3,000 wild edible plants 150 to 200 plants have progressed from wild to a domesticated crop phase (Borlaug, 1981; Johannessen, 1982; WCMC, 1992; and Bukenya-Ziraba, 1996). It is also known that only about 20 to 30 crops are providing the world's nutritional needs and most of the plants with significant nutritional values exist in the wild or in under utilized state.

In early human civilization, plants were collected and consumed from the wild and this culture of gathering of wild edible plants has still continued in many parts of the world (Doebley, 1984; WCMC, 1992). Wild (non-cultivated) food plants are here defined as traditionally edible plant species that are available from the wild, but not cultivated as a crop. Many studies (e.g. Keller *et al.*, 1969; Ichikawa, 1980; Kambuye, 1986; Goode, 1989; Edwards, 1991; Johns and Kokwaro, 1991; Peters *et al.*, 1992; and Zemede Asfaw, 1995), show that non-cultivated food plants are collected from a wide variety of habitats and are used mainly by indigenous people in rural areas. Wild plants are more resistant to disease or drought than crops and play an important role as buffer against drought and famine (Makombe, 1990).

With the ever increasing dependence of the world population on few crops with narrow genetic bases, there is a high risk of crop susceptibility to diseases, drought and other agronomic characters (Hoyt, 1988). One way of establishing resistance to diseases by crop plants is cross breeding (classical or modern techniques) with resistant strains which are available from wild relatives (Harlan, 1984; Ingram and Williams, 1984; Merker, 1992; and Skoric, 1993; Esquivel *et al.*, 1994). Wild relatives of cultivated crops are defined by Hoyt (1988), as "wild species from which crop plants were selected and which continued to survive in the wild with their closely related wild plants". When the wild relatives and crops are in the primary gene pool genetic exchange is an easy natural process (Harlan and de Wet, 1971), and the gene pool formed by the two groups help to keep our crops diverse and healthy (Harlan, 1984; and Hoyt, 1988).

Advancement in biotechnology made wild relatives of crops attractive sources of desired traits and economically very important group of plants (Merker, 1992). So far, genes from wild relatives have brought benefits to the most important crops such as tomatoes, sugar cane, tobacco, wheat and rice (Hoyt, 1988). Such developments and the existence of significant proportion of edible plants in the wild leads to increasing awareness throughout the world about the need to conserve wild relatives of crops, non-cultivated food plants and associated indigenous knowledge. Ethnobotanic study of wild plants is the key in providing clues about important wild plants and indigenous knowledge about their use. Ethnobotany tries to find out how people have traditionally used plants, for whatever purposes, and how they are still doing so (den Eynden *et al.*, 1992).

Ethnobotanic information contributes to our knowledge of diverse plant uses, promotes further studies on useful plants and clearly shows the dependence of indigenous people on plants (Abbink, 1995). However, with increasing dependence of indigenous people upon western clothing, food and medicine, indigenous knowledge on traditional use of plants decline (Whistler, 1988). These practices have threatened the lifestyles, indigenous knowledge and cultures of the people (Agrawal, 1995), and also affected the natural ecosystems.

Like biodiversity, ethnobotanical information could be conserved in *ex-situ* and *in-situ* conditions. Agrawal (1995), gives two strategies for preservation of such information. The first is through documentation and storage of information in international, regional and national archives. The second, which is considered as the most important by the present author, is through orientation of the state policies to allow members of threatened populations to determine their own future and decide on the ways of biological resource conservation and associated indigenous knowledge preservation.

Basically, there are three general methods of collecting ethnobotanical information: interviews, observations and guided field works (Maundu, 1995). Martin (1995), gives more detailed methods which help in ethnobotanic data collection. Useful information could also be extracted, among others, from lines in traditional songs, common sayings, descriptive popular nomenclature or vernacular names and poems (Martin, 1995; and Zemede Asfaw, 1995). Zemede Asfaw (1989 & 1995), provides examples in Ethiopian cases.

Identification of areas (for germplasm collecting missions and establishment of the reserve areas) are very important for *ex-situ* and *in-situ* conservation of plants (Burrill, 1991). The process in turn depends heavily on the ecological and geographical information. Investigation of a wide range of ecogeographical regions will help in systematic collection of a wide variety of genetic resources for *ex-situ* conservation. The exercise may also help to identify habitats for *in-situ* conservation. Vegetation analysis is an ecological approach to sort out species-species and species-environment interactions and interrelationships in the ecosystem (Causton, 1988).

Although various methods of vegetation analysis have been put forward, the leading is the Braun-Blanquet approach, developed in Zurich (Switzerland) and Montpellier (France) during 1900's and 1910's (Økland, 1990). This approach is also called "the Zurich-Montpellier School or the Middle European-Mediterranean School" and has great support. Two kinds of data are normally required in this method: floristic data on cover/abundance, collected for plants in homogenous vegetation stands and environmental factors such as soil and topographic features measured in the stands (Braun-Blanquet, 1965; and Muller-Dombois and Ellenberg, 1974).

The primary goal of the vegetation analysis in this study is to identify the basic ecological groups and plant associations in the Gambella Region. Once these associations are identified and their environmental relationships established, non-cultivated food plants and wild relatives of cultivated crops are, then, discussed in

relation to these ecological and environmental perspectives. Information on their ecosystem will be documented for later use in conservation activities.

Prior to this study plant collection expeditions have been carried out in the Gambella Region with accompanying publications which have described the flora of the region (Chaffey, 1979; Friis *et al.*, 1982; Ensermu Kelbessa *et al.*, 1992; Friis, 1992; and Mesfin Tadesse, 1992). In addition, the ethnobotany and the economic role of 23 selected plants species in Gambella was also given by Mengistu Woube (1995). However, the work is limited to small number of plants and some of them were not even identified to the species level.

So far no thorough study was made on non-cultivated food plants and wild relatives of cultivated crops in Gambella Region. Peters *et al.* (1992), indicated that the Guineo-Congolian flora (which also includes the vegetation in the eastern lowlands of Gambella) has very few studies of the wild food plants compared to other parts of the Sub-Saharan Africa.

The present study has, therefore, the following objectives:

-To document the indigenous knowledge on non-cultivated food plants and wild relatives of cultivated crops.

-To compile a checklist of non-cultivated food plants and wild relatives of crops.

-To make botanical description of these plants and identify the parts of the plant used.

-To identify the plant communities in which non-cultivated food plants and wild

relatives of crops are occurring and to give an ecological description.

-To give recommendations that would contribute to the development of a strategy for the conservation of non-cultivated food plants and wild relatives of cultivated crops.

1.2. Description of the study site

1.2.1. Geographical location

The study was carried out in Gambella People's National Regional State, in southwestern Ethiopia, between latitudes 6° 30' and 8° 30' N and longitudes 33 °00' and 35 °45' E, with an area of about 26,000 km^2 (Fig. 1). The northern and the eastern part of the region is mountainous, hilly steep escarpments reading an elevation of about 2,000 meters above sea level (m.a.s.l.). The altitude range of the central part of the region is between 500 and 600 m. Towards the western part the elevation decreases gradually to an altitude of 300 m.

Gambella Region is bordered by Oromia Regional State in the north, Southern Nation, Nationalities and People's Regional State in the east and Republic of Sudan in the south and west. The present Gambella Region includes Akobo, Jikawo, Itang, Gambella, Abobo, Gog & Jor and Godere Weredas. Godere Wereda was part of Kefa Administrative Region prior to 1991. Gambella was the part of Ilubabor Region prior to 1989. Gambella, the main administrative town of the region, is situated on the river bank at the junction of the Baro and Jejebae rivers.

Fig. 1. Map of Gambella Region: modified from 1:1,000,000 scale map (EMA, 1994) using computer digitizing techniques. Ethinic distribution from Kurimoto (1992).

1.2.2. Geology

The pre-cambrian rocks that underlain all the other rocks in Ethiopia is covered by extensive Late Tertiary and Quaternary deposits in the lowlands of Gambella (Mohr, 1971; Davidson *et al.*, 1976). Old crystalline rocks overlay the pre-cambrian rocks in the adjacent relief (Mesfin Wolde Mariam, 1969), and valleys are largely composed of Phyllite with uncommon Chlorite Schist (Mohr, 1971).

1.2.3. Soil

The physical and chemical composition of soil have a considerable influence on the occurrence and distribution of plants, and many plants are strictly confined to certain kinds of soil. The soils in the Gambella plain are mainly Chromic and Pellic Vertisols, with Eutric Glysols and Eutric Histosols in areas that experience extreme seasonal flooding (FAO, 1984; Ethiopian Mapping Agency (EMA), 1988). There is also Eutric Fluvisols on the alluvial plains of Baro river and its tributaries (FAO, 1984). The soils in the forest of eastern Gambella are reddish or brown Ferrisols derived from volcanic material (Friis *et al.*, 1982). The well drained sandy soils of different origin support various plant communities in Gambella.

1.2.4. Climate

The climate is the major factor affecting the plant distribution and plays a key role in the development of climax communities and ecological balance. National Meteorological Services Agency, NMSA (1996), divided Ethiopia into 11 climatic zones, which come

under dry climate, tropical rainy climate and temperate rainy climate. Among these zones two tropical rainy climates occur in the Gambella Region: "Tropical Climate-II", upto an elevation of about 800 m, and "Tropical Climate-III", at an elevation between 800-2000 m.

Topography and the direction of air currents that carry moisture are the two main factors determining rainfall in Ethiopia (Daniel Gamachu, 1977; NMSA, 1996). Thus, the escarpments in the eastern Gambella face the humid air currents coming from the Atlantic ocean and receive high rainfall compared to the lowlands in the western Gambella. The rainfall in this region is characterized by a single maximum rainfall that runs from February/March to October/November (Table 1).

Temperature (Table I) is another climatic factor that determines plant growth and distribution. Recent account of the temperature in Ethiopia was given by NMSA (1996). This account showed that the second highest mean maximum temperature for the country was recorded in the lowlands of Gambella (35-40 °C) next to the Afar Depression (40 °C). The highest mean minimum temperature (i.e. 20-30 °C), however, have been shown to be comparable in the lowlands of Gambella and the Afar Depression. The escarpments in eastern Gambella on the other hand, have a mean maximum temperature between 20-28 °C.

Table 1. Climatic parameters: 1, monthly mean maximum temperature (°C); 2, monthly mean minimum temperature (°C) and 3, mean monthly total rainfall (mm) of three selected sites in Gambella Region and Tepi town (the nearest meteorological station to Godere wereda in eastern Gambella). Years of observation: a, 1981-1996; b, 1974-1993; c, 1905-1993; d, 1973-1989; e=1973-1990.

SOURCE: National Meteorological Services Agency, received on January, 1997.

Locality		TEPI				ABOBO				GAMBELLA				ITANG		
Altitude (M)		1540				610				600				570		
Climatic parameters		1	2	3		1	2	3		1	2	3		1	2	3
Month																
January		31.5	13.4	45.1		37.6	17.0	12.1		37.5	16.9	5.4		36.9	18.4	0.6
February	32.4	14,6	31.1		39.3	17.9	9.2		38.3	18.3	9.3		38.2	19.6	4.7	
March		31.9	15.2	94.0		39.5	20.5	43.1		39.4	19.9	31.4		38.5	20.6	13.4
April		30.1	16.1	155.5		38.7	21.4	101.3		38.8	20.7	68.6		38.3	20.7	43.4
May		28.9	15.8	209.8		35.5	20.2	215.5		35.4	19.6	150.7		34.9	18.0	32.0
June		28.3	15,5	179.8		34.1	18.7	154.7		31.1	18.5	163.0		33.4	17.2	102.6
July		27.5	14.7	202.1		32.4	18.9	204.5		32.5	22.0	221.8		30.4	17.3	180.1
August		27.8	15.6	218.5		31.2	18.5	179.7		32.6	18.1	237.8		32.7	17.4	131.8
September		28.6	15.4	191.8		30.5	17.9	115.0		33.2	18.9	170.6		33.5	17.9	106.6
October		29.7	14.8	122.0		33.6	17.6	144.8		34.8	36.5	105.1		34.6	19.6	96.5
November		30.0	14.0	85.0		35.8	18.8	52.3		35.4	18.3	43.4		35.1	17.5	50.8
December		30.7	13.8	51.9		36.0	18.3	21.1		34.5	17.6	12.6		35.6	18.5	0.7
Years of observation		a	a	a		a	a	a		b	b	c		d	d	e

1.2.5. Vegetation

Woodland and grassland: The vegetation of western Gambella have Sudanian floristic character which extends to west Africa (Tewolde Berhan Gebre Egiziabher, 1991). The predominant natural vegetation consists of tall perennial grasses, upto four meters high, with fire-resistant, deciduous broad-leaved trees. The major grasses include: *Hyparrhenia pilgeriana* C. E. Hubb., *H. filipendula* (Hochst.) Stapf., *Loudetia arundinacea* (Hochst. ex A. Rich.) Steud., *Andropogon schirensis* Hochst. ex A. Rich., *Sorghum purpureo-sericeum* (Hochst. ex A. Rich.) Aschers. Schweinf., *Panicum maximum* Jacq. and *Pennisetum thunbergii* Kunth. Some of the deciduous broad leaved trees include: *Combretum collinum* Fresen., *Pterocarpus lucens* Guill. & Perr., *Anogeissus leiocarpa* (A. DC.) Guill. & Perr., *Terminalia laxiflora* Engl. Diels, *Lonchocarpus laxiflorus* Guill. & Perr. and *Sterculia africana*. (Lour.) Friori. In addition, lianas like *Cissus populina* Guill. & Perr. and *Opilia amentacea* Roxb., shrubs like *Flueggea virosa* (Willd.) Vigot. and *Grewia mollis* A. Juss. and small herbs like *Hygrophila auriculata* (Schumach.) Heine. and *Chlorophytum gallabatense* Schweinf. ex Bak. are common in woodlands and grasslands. In the dry season, this vegetation is susceptible to fire. In addition to natural fire people also burn the grassland every year so as to ease collecting honey, wild edible plants, fuel wood and hunting. The effect of fire is the major important factor for the maintenance of the grassland in the region.

Riverine forests: Riverine forests are found along the major rivers (Baro, Alwaero, Gilo and Akobo) and their tributaries. Some species in the riverine forest along the Baro river include: canopy trees such as *Ficus glumosa* Del., *Tamarindus indica* L. and *Turraea nilotica* Kotschy. & Peyr., shrubs and small trees like *Maerua triphylla* A. Rich. and *Strychnos innocua* Del. and lianas like *Cissus populina* and *Combretum capituliflorum* Schweinf.(Friis *et al.*, 1982). In addition to these, trees like *Anogeissus leiocarpa* and *Celtis toka* (Forssk.) Hepper & Wood., shrubs such as *Acalypha ornata* A. Rich., *Erythroxylum fischeri* Engl. and *Capparis erythrocarpus* Isert. and lianas like *Saba florida* (Benth.) Bullock. are also common in the riverine forests.

Dry peripheral semi-deciduous Guineo-Congolian forests and transitional rain forests: Eastern and southeastern part of the Gambella Region are covered by transitional rain forests and dry peripheral semi-deciduous Guineo-Congolian forests (Ensermu Kelbessa *et al.*, 1992; and Friis, 1992). Early floristic studies were made on these forests by L. Senni (Senni, 1940, cited in Mesfin Tadesse, 1992). Chaffey (1979), surveyed these forests in his reconnaissance inventory of forests in southeast Ethiopia. Friis *et al.* (1982), also included these forests in their studies in the flora of southwest Ethiopia. Recent information on these forests is given by Friis (1992) and Mesfin Tadesse (1992).

The dry peripheral semi-deciduous Guineo-Congolian forests are at an altitudes between 500 and 800 m and are restricted to the lowlands of the eastern part of Gambella (Friis, 1992). These forests are dominated by continuous canopy of *Baphia abyssinica*

Brummitt., emergent trees like *Alstonia boonei* De Wild., *Antiaris toxicaria* Lesch. and *Milicia excelsa* (Welw.) C. C. Derg and other trees like *Zanthoxylum lepreurii* Guill. & Perr., *Malacantha alnifolia* (Bak.) Pierre. and *Tapura fischeri* Engl.

Transitional rain forests are found between an altitudes 800-2000 m (Daniel Gamachu, 1977) and characterized by the following tree species: *Aningeria altissima* (A. Chev.) Aubrev. & Pellgr., *Elaeodendron buchananii* (Loes.) Loes., *Celtis zenkeri* Engl., *Ficus mucuso* Ficalho., *F. ovata* Vhal., *Manilkara butugi* Chiov., *Morus mesozygia* Stapf., *Trichilia dregeana* Sond. and *Trilepisium madagascariense* DC. These forests extends into Welega, Ilubabor and Kefa Regions (Friis, 1992).

1.2.6. Population and land use

People: The major indigenous nationalities in Gambella are of Nilotic origin and include: Majangir, Anywaa, Nuer and minority populations of Komo and Opuo (Fig. 1). They are characteristically jet black with a proud majestic bearing. The 1994 population census indicates that the population of Gambella Region was 181,862 of which 75,121 were Nuer, 50,012 Anywaa and 11,393 were Majangir (Central Statistical Authority (CSA), 1995).

The Majangir nationality inhabit the escarpments in the eastern Gambella. They live in deep forests on shifting cultivation, gathering and hunting. Honey gathered from forest is the main source of income for Majangir.

The Anywaa live mainly in the central part of Gambella and extend their influence into the interior of southern Sudan. Their settlements are concentrated along four major rivers: Baro, Alwaero, Gilo and Akobo. They are sedentary agriculturists farming mainly along rivers and also engaged in fishing, hunting and gathering. Detailed information about Anywaa nationality could be obtained in TAMS-Agricultural Development Group (1976), and Kurimoto (1992).

The Nuer nationality dwell in the western part of Gambella and mainly in the southern Sudan where their population is higher than in Ethiopia. They are semi-nomadic pastorals. They are also engaged in farming to some extent and supplement their protein requirements by fishing. (See TAMS-Agricultural Development Group (1976), for more information.)

The Komo and Opuo nationalities have very small populations. They live in the northern extreme of the Gambella Region on the border between Ethiopia and Sudan.

Land use: Agricultural activities are carried out by small scale farmers and production is just for consumption and small scale local markets. Farmers use hand tools and fire to clear the land. Then they make holes by wooden sticks and plant the seeds into the holes. With such primitive way of production the land under cultivation is too small and agricultural production is minimal. As a result, indigenous people are malnourished between cropping seasons every year. But they get their supplement from the wild plants which enable people to survive.

The major subsistence crops of the region are given in Table 2. In addition to these subsistence crops, cotton is the main commercial crop grown by Abobo State Farm in Gambella plain (altitude 600 m), while coffee is grown by Tepi Coffee State Farm in Godere (Altitude 1350-1600 m). Farmers in Godere also produce coffee, though it is in small scale.

Table 2. Major Subsistence Crops in Gambella Region. Common Names: A, Anywaa; E, English; M, Majangir; N, Nuer.

Category	Scientific Name	Common Names
Cereals	*Zea mays* L.	Maize (E), Abich (A)
	Sorghum bicolor L.	Sorghum (E), Daello (A)
Beans	*Phaseolus vulgaris* L.	Kidney beans (E), Unguno (A)
	Arachis hypogea L.	Ground nut (E), Akalomi/Akuli (A)
Oil seed	*Sesamum indicum* L.	Sesame (E), Gnimo (A)
Vegetables	*Cucurbita sp.*	Pumpkin (E), Ukullo (A)
	Abelmoschus esculentus (L.) Moench.	Okra (E), Amula (A)
Tubers	*Colocasia esculenta* (L.) Schott.	Taro (E), Baka (M)
	Manihot esculenta Crantz.	Cassava (E), Bafura (A)
	Dioscorea bulbifera L.	Aerial Yam (E), Hoak (A), Wekoy (M)
Fruits	*Mangifera indica* L.	Mango (E), Manga (A & N)
	Carica papaya L.	Papaya/Pawpaw (E), Ulelo (A)
	Musa sp.	Banana (E), Balla (A & N)

Conservation status: According to information from the Gambella National Park Head Quarter, the park occupies an area of about 5061 km^2 in the Gambella plain. However, the park area is not demarcated. In the region, strictly speaking, there is no practically protected area to minimize large scale human interference. As a result, logging is a serious problem

in Godere forest where *Cordia africana* Lam., for instance, is selectively logged for timber. Unless measures are taken soon, logging, expansion for coffee plantation and shifting cultivation will spread and result in severe soil erosion and climatic changes, at least in southwestern Ethiopia. Loss of biological diversity is also inevitable.

Flooding occurs annually in Gambella plain during the late wet season. Most villages, towns and farmlands are located along the main rivers. River bank farming and removal of riverine forest further increases flooding. As a result, flooding causes severe crop loses. For example, during the 1996 crop losses between 52-100% were encounterd in many areas of Gambella (EWD, 1996). The people in this region are usually the last to receive food aid during occurrence of such disasters and they depend on the wild food.

Vegetation of the Gambella plain has been degraded (Ensermu Kelbessa *et al.*, 1992), due to resettlement programs and concentration of refugee from southern Sudan. Establishment of Abobo State Farm also removed significant proportion of the natural vegetation. The new Alwaero Dam is now ready for use and more than 10 thousand hectare of natural vegetation will be cleared and converted into agricultural field in the near future.

Conservation activities are urgently required to solve the above problems and to save not only the flora and fauna of the region, but also the indigenous knowledge of the local people. The result of this study will fill gaps in our knowledge of the indigenous knowledge on the non-cultivated food plants and wild relatives of cultivated crops.

2. MATERIALS AND METHODS

2.1. Vegetation sampling

A reconnaissance survey was made in October, 1995 to identify vegetation types in undisturbed areas of Gambella Region. Five subsequent study trips, October 14 to November 6, 1995; November 20 to December 13, 1995; April 1-19, 1996; May 22 to June 1, 1996; and September 21 to October 10, 1996 were conducted. The sampling sites were selected along the following roads radiating from Gambella town: Gambella-Itang-Larae, Gambella-Mugi, Gambella-Bure, Gambella-Abobo-Phugnudo-Gog in the lowland. On the estern escarpment, Tepi-Meti-Dushi road was selected (Fig. 2).

Floristic data was collected from 58 relevè (sample plots) following the Braun-Blanquet approach (Braun-Blanquet, 1965; Muller-Dombois and Ellenberg, 1974). A systematic sampling method was used to locate homogenous vegetation stands. Each relevè was sampled using a square plot of 20 m by 20 m. The cover/abundance values of all plants in each plot was estimated according to a 1-9 modified Braun-Blanquet scale (van der Maarel, 1979). (See Table 3.)

2.2. Plant specimen collection

A total of 469 specimens, comprising 312 species, were collected either in duplicate or triplicate, numbered, pressed, dried for identification and mounting. Most of the

Fig. 2. Relative position of sample plots.

specimens were identified at the National Herbarium (ETH) following Hedberg and Edwards (1989 and 1995) and Edwards *et al.* (1995), and unpublished manuscripts. Few were identified at the Royal Botanic Gardens, Kew (K). (Abbreviations of herbaria names are according to Holmgren *et al.* (1981).) Identified specimens were deposited at ETH and Biodiversity Institute/Ethiopia.

Fully Numerical 1-9 Scale	Cover/Abundance
1	Rare
2	Occasional
3	Abundant
4	Very abundant
5	Cover 5-12.5%
6	Cover 12.5-25%
7	Cover 25-50%
8	Cover 50-75%
9	Cover > 75%

Table 3. Modified Braun-Blanquet Scale for Cover/Abundance (van der Maarel, 1979).

2.3. Environmental data

Environmental data on topographic and soil factors were gathered for each relevè. Everest Altimeter and Clinometer were used to measure altitude and slope, respectively. Soil auger was used to collect soil samples to depths of 10 cm (top soil) and at 50 cm (sub soil). Soil was sampled from five spots (four from the corners and one from the center) within the quadrat and mixed to obtain a composite sample. Only top soil was collected from areas with rocky substrates and grasslands.

2.4. Ethnobotanic information

Indigenous people were involved in each trip as guides, laborers and informants. Inquiries were made regarding the local name of plants, uses and the way they are used and recorded on the spot with other botanical field notes. The specimens were also photographed before being collected. Local name of the plants were studied and inquiries were repeatedly made at different times either from the same person or different persons in order to confirm the accuracy of the information. The information obtained from local informants was further enriched through literature review and by field notes on plant specimens deposited at ETH. Photographs and slide films were deposited at ETH and Institute Biodiversity.

2.5. Soil analysis

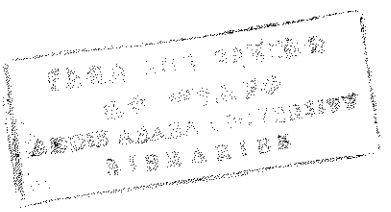
Soil samples were analyzed in the soil laboratory at Biology Department, Addis Ababa University, by following Jue (1978), and Chopra and Kanwar (1982). Soil samples were air dried, passed through 2 mm sieve for pH, texture, Potassium, Cation Exchange Capacity and Phosphorous and through 0.5 mm sieve for Nitrogen and Organic Carbon determination.

The pH was measured using pH-Meter in suspension at 1:1, distilled water to soil ratio. Texture was determined by Hydrometer Method using Sodium Hexametaphosphate as dispersing agent. Percentage of Organic Carbon and total Nitrogen were determined by Walklay-Black's Titration Method and Kjeldahl Method, respectively. Available

Phosphorus was determined Spectrophotometrically at 660 nm and Exchangeable Potassium and Sodium by Flame Photometer.

2.6. Data analysis

Vegetation data was analyzed and classified with a FORTRAN Computer Program TWINSPAN, TWo-way INdicator SPecies Analysis, version 1.0 (Hill, 1979). TWINSPAN is a divisive polythetic method of vegetation classification which is far more suitable than other methods (e.g. agglomerative methods) for classifying vegetation data objectively (Hill *et al.*, 1975). The resulting groups were recognized as community types. Community-environment relationships were tested using ANOVA (analysis of variance). The statistical analysis were performed using the computer program STATISTICA. Descriptive statistical methods were employed to summarize ethnobotanical data.



3. RESULT AND DISCUSSION

3.1. Vegetation classification

Vegetation of Gambella Region was classified into seven major clusters or plant communities using a FORTRAN Computer Program TWINSPAN (Hill, 1979). The community types are designated as 1,2,3,4,5,6 and 7 (Table 4). The classification was based on the cover/abundance values of 220 plant species (see appendix) recorded in 58 sample stands. The result in the table shows the indicator species distribution between relevès, species names at the left and relevè numbers along the top. The plant communities were named by the character species which have the highest cover/abundance values. The seven major plant communities are described as follows:

1: *Commelina-Hygrophila* community: *Commelina zambesica* C. B. Clanke. and *Hygrophila auriculata* were the character species in this community. The herbs were found to be dominant over grasses such as *Echinochloa rotundiflora* Clayton. because the sample was taken at the beginning of the rainy season, in May. In addition to herbs and grasses, the occurrence of scattered trees of *Balanites aegyptiaca* (L.) Del. and shrubs of *Combretum* collinum and *Maerua triphylla* was noted in the community. This community occurs in the western plain of Gambella at an average altitude of about 535 m.

Relevès

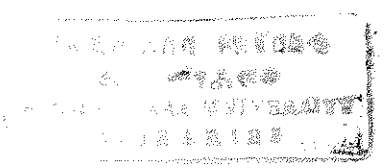
	Species	44 67	1 890	11111111222244555555 23567123456782345892345	1222255 49017867	2552 16019	3333333 1534067	344443344 223458910	
52	*Chlorophytum gallabatense*	21	---	----------	--------	-----	-------	---------	0011
73	*Commelina zambesica*	32	---	----------	--------	-----	-------	---------	0011
95	*Echinochloa rotundiflora*	3-	---	----------	--------	-----	-------	---------	0011
117	*Hygrophilia auriculata*	23	---	----------	--------	-----	-------	---------	0011
162	*Panicum porphyrrhios*	-3	---	----------2----------	---2----	-----	-------	---------	0011
164	*Pennisetum thunbergii*	--	233	----------	--------	-----	-------	---------	0011
187	*Sorghum purpureo-sericeum*	--	444	----------	--------	-----	-------	---------	0011
16	*Ampelocissus schimperiana*	--	---	----------2-2-	--------	-----	-------	---------	0000
17	*Andropogon schirensis*	--	-3-	442222-4-33----------2-	--------	-----	-------	---------	0000
70	*Combretum collinum*	--	---	--122-1-1----121222-----	--------	-----	-------	---------	0000
97	*Entada africana*	--	---	----------1-12--2	--------	-----	-------	---------	0000
118	*Hyparrhenia filipendula*	--	---	---2-3---3--2--32-------	--------	-----	-------	---------	0000
119	*Hyparrhenia pilgeriana*	--	---	--33123-3-32-31333333323	-333-33-	-----	-------	---------	0000
145	*Loudetia arundinacea*	--	---	333--32-3324311232-23233	-----2--	-----	-------	---------	0000
189	*Sterculia africana*	--	---	----------2112-2-	--------	-----	-------	---------	0000
198	*Terminalia macroptera*	--	---	----------223--------	--------	-----	-------	---------	0000
69	*Combretum adenogonium*	--	---	----------	-31-31--	-----	-------	---------	0001
78	*Crossopteryx febrifuga*	--	---	--1----------1-------	-----2--	-----	-------	---------	0001
93	*Echinochloa crus-pavonis*	--	---	----------1----	-------2	-----	-------	---------	0001
107	*Flueggea virosa*	--	---	----------	--22-2--	-----	-------	---------	0001
109	*Grewia mollis*	--	---	------12------2--------1	1-21-1--	-----	-------	---------	0001
133	*Justicia ladanoides*	--	---	----------	------22	-----	-------	---------	0001
144	*Lonchocarpus laxiflorus*	--	---	--111--11----1111---1---	2-33---1	-----	-------	---------	0001
161	*Panicum maximum*	--	---	----3--2----------	3------3	-----	-------	---------	0001
174	*Ptercarpus lucens*	--	---	231---1----------2221222	--2-3233	---2-	-------	---------	0001
179	*Rottboellia cochinchinensis*	--	---	--------2---------2--3--	2-----2-	-----	-------	---------	0001
197	*Terminalia laxiflora*	--	---	----------	21--21--	-----	-------	---------	0001
206	*Tylosema fassoglensis*	--	---	----------22---	-----2--	-----	-------	---------	0001
218	*Ziziphus abysisinica*	--	---	----------	---221--	-----	-------	---------	0001
8	*Acalyph ornata*	--	---	----------	--------	-22--	-------	---------	0010
10	*Achyranthus aspera*	--	---	----------	--------	-2-1-	-------	---------	0010
22	*Annona senegalensis*	--	---	----------2---------	--------	2----	-------	---------	0010
23	*Anogeissus leiocarpa*	--	---	----------2--2----1--	-2222322	33332	-------	---------	0010
31	*Asystasia gangaetica*	--	---	----------	----2---	3-2--	-------	---------	0010
48	*Celtis toka*	--	---	----------	--------	---23	-------	---------	0010
104	*Ficus sycomorus*	--	---	----------	3-------	----3	-------	---------	0010
111	*Hibiscus calyphyllus*	-1	---	-----1----------	--------	--22-	-------	---------	0010
131	*Justicia diclipteroides*	--	---	----------	----2---	-2---	-------	---------	0010
194	*Tamarindus indica*	--	---	----------3----2--	--------	2233-	-------	---------	0010
219	*Ziziphus pubescens*	--	---	----------2-------	--------	23--2	-------	---------	0010
99	*Erythroxylum fischeri*	--	---	----------	--------	2-113	--31---	---------	01
44	*Capparis erythrocarpus*	--	---	----------	--------	--2-3	22-----	---------	10
139	*Lepidotrichilia volkensii*	--	---	----------	--------	-112-	--222-1	---------	10
209	*Vepris dainellii*	--	---	----------	--------	----2	--21---	--------2	10
34	*Baphia abyssinica*	--	---	----------	--------	-----	1333333	-------3-	1100
147	*Malacantha alnifolia*	--	---	----------	--------	-----	3--1---	---------	1100
150	*Milicia excelsa*	--	---	----------	--------	-----	22-----	---------	1100
195	*Tapura fischeri*	--	---	----------	--------	-----	13-2-11	--------2	1100
217	*Zanthoxylum lepreurii*	--	---	----------	--------	-----	1---2-1	---------	1100
86	*Diospyros abyssinica*	--	---	----------	--------	-----	--21-2-	-22------	1101
7	*Acalypha acrogyna*	--	---	----------	--------	-----	2-12---	22------2	1110
49	*Celtis zenkeri*	--	---	----------	--------	-----	2---113	3--12232-	1110
213	*Whitfieldia elongata*	--	---	----------	--------	-----	-2-2-23	2-3331---	1110
11	*Achyrospermum schimperi*	--	---	----------	--------	-----	-------	--------3	1111
12	*Adathoda schimperiana*	--	---	----------	--------	-----	-------	-3232----	1111
14	*Alchornea laxiflora*	--	---	----------	--------	-----	-------	------2-2	1111
21	*Aningeria altissima*	--	---	----------	--------	-----	-------	-----1323	1111
26	*Argomuellera macrophylla*	--	---	----------	--------	-----	---122-	332222332	1111
46	*Celtis africana*	--	---	----------	--------	-----	-------	--3------	1111
76	*Cordia africana*	--	---	----------	--------	-----	----2--	-21233323	1111
80	*Croton macrostachyus*	--	---	----------	--------	-----	-------	--------3	1111
92	*Dracaena fragrans*	--	---	----------	--------	-----	-------	-22-234-2	1111
148	*Manilkara butugi*	--	---	----------	--------	-----	-------	-4444--2-	1111
152	*Mimusops kummel*	--	---	----------	--------	-----	-------	---12-23-	1111
		00	000	00000000000000000000000	00000000	00000	1111111	111111111	
		00	000	11111111111111111111111	11111111	11111	0000000	111111111	
		00	111	00000000000000000000000	00000000	11111	0011111	000000001	
				00000000000000000000000	11111111	00001	00111	00000111	
Cluster codes or Communities		1	2	3	4	5	6	7	

Table 4. Plant communities in Gambella Region: -classified using TWINSPAN. Community: 1, *Commelina zambesica-Hygrophilia auriculata*;2, *Sorghum purpureo-sericeum-Pennisetum thunbergii*; 3, *Loudetia arundinacea-Hyparrhenia pilgeriana*; 4, *Combretum adenogonium-Anogeissus leiocarpa*; 5, *Tamarindus indica-Anogeissus leiocarpa*; 6, *Baphia abyssinica-Tapura fischeri*; 7, *Manilkara butugi-Cordia africana.*

2: *Sorghum purpureo-sericeum-Pennisetum thunbergii* community: *Sorghum purpureo-sericeum* and *Pennisetum thunbergii* were the character species in this community. The occurrence of scattered trees of *Balanites aegyptiaca* and shrubs of *Acacia polyacantha* Willd. and *A. seyal* Del. was noted in the community. This community is confined around Itang town at an altitude of about 580 m.

3: *Loudetia arundinacea-Hyparrhenia pilgeriana* community: *Loudetia arundinacea* and *Hyparrhenia pilgeriana* are the most important character species of this community. Other important grasses include: *H. filipendula, Andropogon schirensis, Rottboellia cochinchinensis* (Lour.) Clayton. and *Panicum maximum*. The community is also characterized by the presence of deciduous fire resistant woodland trees such as *Combretum collinum, Pterocarpus lucens* and *Lonchocarpus laxiflorus*. In this community, *Sterculia africana* and *Entada africana* Guill. & Perr. are noted as important characteristic species on hilly areas and on the escarpments and ridges leading to lowland in western Gambella (Fig. 3). The community was found to occur along the road from Abobo to Phugnudo, Gambella to Itang and Baro-Bonga to Bure at an average altitude of about 635 m.

4: *Combretum adenogonium-Anogeissus leiocarpa* community: *Combretum adenogonium* Steud. ex A. Rich. and *Anogeissus leiocarpa* are the character species in this community. The community is dominated and characterized by deciduous woodland trees. Other important trees include: *Pterocarpus lucens, Lonchocarpus laxiflorus,*



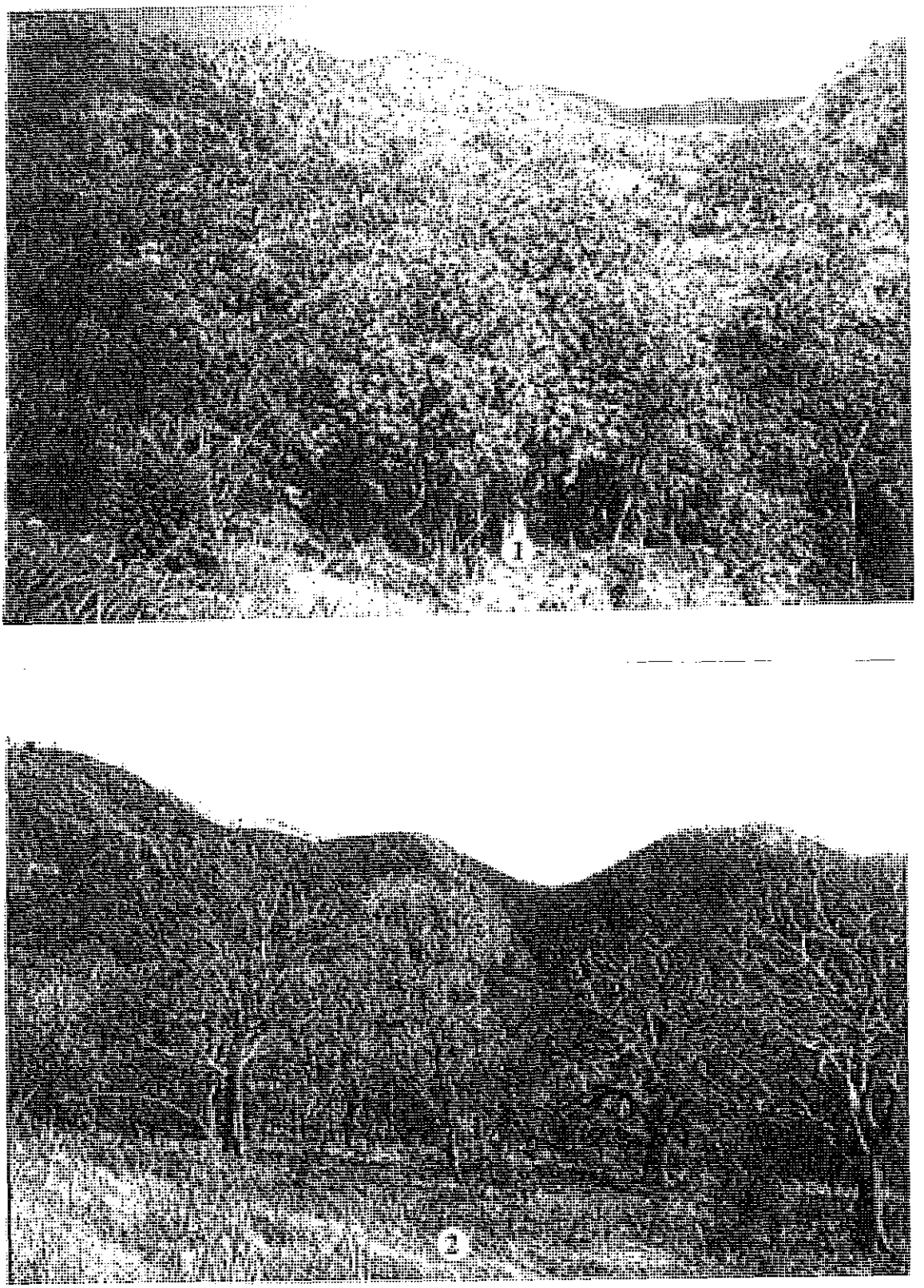


Fig. 3. *Loudetia arundinacea-Hyparrhenia pilgeriana* community: -49 km northeast of Gambella to Bure, where *Sterculia africana* and *Entada africana* are noted as characteristic species. At the beginning of rainy season (1) and after fire in dry season (2).

Terminalia laxiflora and *Ziziphus abyssinica* Hochst. ex A. Rich. Shrubs like *Flueggea virosa* and *Grewia mollis*, and lianas like *Cissus populina* and *Opilia amentacea* are also found in this community. Dominance of trees suppress grasses and allow growth of herbs such as *Justicia ladanoides* Lam. and *Asystasia gangetica* (L.) T. Anderss. under the canopy. Tall grasses such as *Hyparrhenia pilgeriana*, *Rottboellia cochinchinensis* and *Panicum maximum* occur in open area. This community is confined along the road from Gambella to Abobo (Air port area) and extends about 10 km along the road from Gambella to Baro-Bonga. Only very small patch (sample stand 4) was observed along Gambella-Itang road. The average altitude at which the community occur was about 686 m.

5: *Tamarindus indica-Anogeissus leiocarpa* community: This community occurs along river banks and represent riverine forest (Fig. 4). It is characterized by *Tamarindus indica* and *Anogeissus leiocarpa*. Trees like *Celtis toka* and *Ziziphus pubescens* Oliv., shrubs like *Acalypha ornata*, *Erythroxylum fischeri* and *Lepidotrichilia volkensii* (Gurke.) Leroy., herbs like *Asystasia gangetica* and *Hibiscus calyphyllus* Cavan. are also common. The average altitude at which the community occur was about 617 m.

6: *Baphia abyssinica-Tapura fischeri* community: This community belongs to the forest described by Friis (1992), as dry peripheral semi-deciduous Guineo-Congolian forest at altitudes between 500 and 800 m and are restricted to the lowlands of the eastern part of Gambella (Fig. 5). *Baphia abyssinica* and *Tapura fischeri* are the characteristic

Fig. 4. *Tamarindus indica-Anogeissus leiocarpa* community: -along Baro river, 45 km northeast of Gambella to Bure.

Fig. 5. *Baphia abyssinica-Tapura fischeri* community:-Dubeng forest, about 16 km northeast of Abobo.

species in this community. *Malacantha alnifolia, Zanthoxylum lepreurii, Vepris dainellii* (Pichi-Serm.) Kokwaro., *Diospyros abyssinica* (Hiern.) F. White., *Milicia excelsa* and *Celtis zenkeri* are also important trees. *Whitfieldia elongata* (P. Beauv.) C. B. Cl., *Argomuellera macrophylla* Pax. and *Acalypha acrogyna* Pax. are common understorey shrubs. Epiphytes are absent and lianas like *Hippocratea africana* (Willd.) Loes. ex Engl. and *H. pallens* Oliv. are rarely found.

7: *Manilkara butugi-Cordia africana* community: This community is part of the transitional rain forests which occur at an altitudes between 800-2000 m (Daniel Gamachu, 1977) and extends into Ilubabor and Kefa (Friis, 1992). The community is characterized by *Manilkara butugi* and *Cordia africana* (Fig. 6). Other important trees include: *Mimusops kummel* Bruce. ex A. DC., *Aningeria altissima, Alchornea laxiflora* (Benth.) Pax. & K. Hoffm., *Celtis zenkeri, C. africana* Burm.f. and *Croton macrostachyus* Del. *Celtis philippensis* Blanco., *Hippocratea africana* and *H. pallens* are characteristic lianas. *Adathoda shimperiana* Nees., *Dracaena fragrans* (L.) Kor-Grawal., *Whitfieldia elongata, Argomuellera macrophylla* and *Acalypha acrogyna* are common understorey shrubs. Epiphytic mosses and ferns like *Selaginella abyssinica* Spring., *Leptogramma pozoi* (Lagasca.) Heywood. and *Drynaria volkensii* Hieron. are also common.

Fig. 6. *Manilkara butugi-Cordia africana* community: -Godere forest, Dushi area.

3.2. Environment-plant communities interrelationships

Soil properties and topographic factors have been the most important abiotic factors that cause variation in plant species distribution (Oliveira-Filho *et al.*, 1994). The averaged values of soil properties and topographic variables and tests of significance for the seven major plant communities are given in Table 5. Importance of each parameter in explaining variation in the plant communities are discussed below.

Table 5. Comparison of the soil physical and chemical properties and topographic features between seven plant communities. CEC, Cation Exchange Capacity; OC, Organic Carbon; TS, Top Soil; SS, Sub Soil. Values are means with standard error (in parentheses). Values within the same column followed by different letters are significantly different (ANOVA, $P < 0.05$).

Community	pH		Sand (%)		Silt(%)		Clay (%)		CEC (meq/100g soil)	
	TS	SS	TS	SS	TS	SS	TS	SS	TS	SS
1: *Commelina-Hygrophila*	6.02cd	---	40.10bc	---	31.60ab	---	28.30b	---	26.09bc	---
(N=2)	(0.01)	---	(5.00)	---	(4.00)	---	(1.00)	---	(9.57)	---
2: *Sorghum purpureo-sericeum-Pennisetum thunbergii*	6.10c	---	36.83c	---	11.60b	---	51.57a	---	79.13ab	---
(N=3)	(0.07)	---	(3.14)	---	(1.89)	---	(2.91)	---	(12.43)	---
3: *Loudetia arundinacea-Hyparrhenia pilgeriana*	6.79bd	6.19bc	53.94bc	55.26b	27.32a	19.90bc	17.28bc	24.50bc	25.85c	27.63b
(TS, N=24; SS, N=18)	(0.11)	(0.15)	(4.49)	(5.59)	(3.07)	(2.88)	(2.82)	(4.78)	(5.81)	(12.13)
4: *Combretum adenogonium-Anogeissus leiocarpa*	6.94ab	5.69c	75.55a	64.76b	16.30b	19.98bc	8.78d	16.23bc	5.90c	13.02b
(N=8)	(0.11)	(0.15)	(4.44)	(6.33)	(2.83)	(4.84)	(1.87)	(4.55)	(3.63)	(7.60)
5: *Tamarindus indica-Anogeissus leiocarpa*	7.26ab	6.78ab	73.16a	67.06b	16.26ab	12.44c	10.58cd	24.10ac	74.78b	27.36b
(N=5)	(0.10)	(0.46)	(2.65)	(7.22)	(1.28)	(1.94)	(1.97)	(8.47)	(23.09)	(10.88)
6: *Baphia abyssinica-Tapura fischeri*	6.79bc	6.73ab	62.16ab	34.33a	26.43ab	25.17bc	11.41cd	40.50a	51.55b	18.02b
(N=7)	(0.30)	(0.35)	(2.38)	(5.24)	(3.60)	(4.31)	(1.51)	(5.23)	(6.65)	(7.56)
7: *Manilkara butugi-Cordia africana*	6.95ab	6.95a	70.00a	48.46b	21.57ab	28.18ab	8.44d	23.39ac	117.49a	83.38a
(N=9)	(0.19)	(0.16)	(4.77)	(5.14)	(3.18)	(3.40)	(1.89)	(4.29)	(12.64)	(8.49)

Table 5. Contd...

Community	OC (%)		N (%)		P (ppm)		K (ppm)		Na (ppm)		Average elevation (m)	Slope (°)
	TS	SS	TS	SS	TS	SS	TS	SS	TS	SS		
1: *Commelina-Hygrophila*	0.90b	---	0.19b	---	1.07cd	---	14.75ab	---	7.00a	---	535.00b	0c
(N=2)	(0.09)	---	(0.04)	---	(0.47)	---	(1.75)	---	(1.50)	---	(5.00)	(0)
2: *Sorghum purpureo-sericeum-Pennisetum thunbergii*	0.41b	---	0.15b	---	0.01cd	---	11.83b	---	12.83a	---	580.00b	0c
(N=3)	(0.17)	---	(0.05)	---	(0)	---	(1.69)	---	(1.17)	---	(0)	(0)
3: *Loudetia arundinacea-Hyparrhenia pilgeriana*	2.09b	1.10b	0.31b	0.15b	2.10d	0.74b	14.88b	6.89b	2.50b	2.85b	635.00b	11.00ab
(TS, N=24; SS, N=18)	(0.85)	(0.15)	(0.03)	(0.02)	(0.52)	(0.30)	(1.91)	(1.14)	(0.49)	(0.42)	(9.63)	(2.46)
4: *Combretum adenogonium-Anogeissus leiocarpa*	1.28b	0.56b	0.25b	0.13b	2.38bc	0.92b	12.00b	6.88b	2.69bc	3.13b	686.25b	2.88b
(N=8)	(0.30)	(0.17)	(0.04)	(0.02)	(1.01)	(0.43)	(2.60)	(0.68)	(0.19)	(0.52)	(20.44)	(0.93)
5: *Tamarindus indica-Anogeissus leiocarpa*	2.68b	1.06ab	0.60b	0.16b	3.92bcd	4.00ab	13.30b	13.20ab	2.90bc	2.71ab	617.12b	3.8b
(N=5)	(0.44)	(0.42)	(0.18)	(0.05)	(2.07)	(3.28)	(2.75)	(2.50)	(0.64)	(0.73)	(24.17)	(1.71)
6: *Baphia abyssinica-Tapura fischeri*	2.39b	0.53b	0.51b	0.14b	4.17bc	3.51ab	16.93b	8.57b	1.07bc	1.07a	714.29b	5.14b
(N=7)	(0.36)	(0.15)	(0.06)	(0.03)	(0.77)	(1.44)	(4.59)	(1.00)	(0.37)	(0.37)	(11.92)	(1.30)
7: *Manilkara butugi-Cordia africana*	9.41a	1.79a	2.01a	0.58a	5.97ab	5.56a	28.00a	35.83a	1.06c	1.78ab	1303.33a	14.67a
(N=9)	(1.39)	(0.29)	(0.37)	(0.11)	(0.74)	(1.12)	(4.40)	(15.83)	(0.29)	(0.32)	(102.75)	(1.91)

Soil pH: The averaged top soil pH values of the plant communities (Table 5) gave a sequence (from lowest to highest) 1,2,3 and 6,4,7 and 5. Community 1 and 2 occur in slightly acidic soil. Community 3,4,6 and 7 occur on neutral soil while community 5 occurs on slightly basic top soil. Based on increasing order of the averaged pH values of the sub soil, a sequence 4,3,6,5 and 7 was obtained. In community 4 the sub soil was found to be medium acidic, in 3 slightly acidic and 6,5 and 7 are neutral.

Soil texture: Based on the textural designations of Mechanical analysis or American Scale (Townsend, 1973), the average values of top soil gave community 1 as clay loam soil, Community 2 as clay soil, community 3 as loam soil and communities 4-7 as sandy loam soil. The average values of sub soil gave communities 3-5 as sandy loam soil, community 6 as clay soil and community 7 as loam soil.

The result of textural analysis show that community 1 and 2 occur on poorly drained soil while community 3-7 occur on well drained soil. Friis (1992), had also indicated the occurrence of the forests of Gambella (represented by community 6 and 7) on well-drained soil. Dewan *et al.* (1985a and 1985b), also indicated the occurrence of poorly drained soil in Itang area (area represented by community 1 and 2) and well drained soils in Abobo and Phugnudo area (area represented by community 3 and 4).

Organic Carbon, Cation Exchange Capacity, Total Nitrogen, Available Phosphorus and Exchangeable Potassium: These soil variables show similar variation both in the top and

sub soil. The values were found to be significantly higher in community 7. This community occur in transitional rain forests (Tepi area), where climatic condition (Table 1) was different from other communities. The higher precipitation and the lower temperature reduce mineralization of humus (Foth and Turk, 1972), and the resulting accumulation of soil organic matter increased Cation Exchange Capacity and reduced leaching of nutrients, particularly Nitrogen, Phosphorus and Potassium (Menassie Gashaw and Masresha Fetene, 1996). Low organic matter, Nitrogen, Phosphorus and Potassium were also recorded in Gambella plain by Dewan *et al.* (1985a and 1985b).

Exchangeable Sodium: The averaged values of top soil exchangeable Sodium resulted a sequence (from lowest to highest) 7,6,3,4,5,1 and 2. Community 2 was significantly highest and followed by community 1, while community 7 was significantly lowest than all. Based on averaged values of sub soil Sodium, community 6 was found to be significantly lower than all other communities. The higher Sodium concentration in community 1,2,3 and 4 could be explained in terms of grassland and woodland fire, which removes the humus and causes the accumulation of soluble salts like Sodium (Vickery, 1982).

Topographic factors: The tests of significance carried out with the topographic variables (Table 5) indicated that community 7 was found to occur at higher altitudes compared to other communities. The slope of community 7 was significantly highest and followed by community 3,6,5 and 4 (in a decreasing sequence). Community 1 and 2 were found to occur at 0°.

Variation in both the plant distribution (Table 4) and environmental factors (Table 5) show polarity and continuum from community 1 to 7. Similarly, most of non-cultivated food plants and wild relatives of cultivated crops were found to occur in more than one community, with only few restricted species in a particular community. Information on each species is given below and summarized in Table 6 and 7.

3.3. Information on non-cultivated food plants and wild relatives of cultivated crops

Detailed botanical description of 87 plant species which were recorded as non-cultivated food plants and/or wild relatives of cultivated crops are given below. The plants are arranged by family in alphabetic order and followed by scientific name, and local name(s), species description, edible part(s) and method(s) of consumption (highlighted), habitat and/or plant communities in which the species occur, geographical distribution and altitude range elsewhere. Information on altitude and geographical distribution and altitude range outside Gambella were obtained from cited literature or field notes on specimens at ETH. The description began with lower plants (Pteridophyta - ferns) and followed by higher plants (Angiosperm - Dicotyledons and Monocotyledons). Introduced and naturalized plant species have been included since they are collected from the wild. Important information on non-cultivated food plants and wild relatives of cultivated crops are summarized in Table 6 and 7, respectively.

Pteridophyta

AZOLLACEAE

1. Azolla nilotica *L.*, Ogoro/Ugoro (Anywaa).

Fern, floating herb 4 to 6 cm high or flat on the ground rooting at nodes. Leaves light-green or ashy-green. **Edible salt is extracted from ash.** Common in temporarily flooded area.

Based on the plant specimens deposited at ETH, found in Gojam, Ilubabor and Sidamo. Altitude 550-580 m.

Spermatophyta

Dicotyledons

ACANTHACEAE

2. Asystasia gangetica *(L.) T. Anderss.*, Mella (Anywaa).

An erect or strangling herb 50 cm to 1.5 m high. Stem four angled, sometimes rooting at nodes. Leaves grey green, ovate. Corolla white to pale yellow, with purple lower lip. **Leaves edible as cooked vegetable under famine condition.** Common under the shade of woodland trees in *Combretum adenogonium-Anogeissus leiocarpa* community, along rivers in *Tamarindus indica-Anogeissus leiocarpa* community and in Anywaa village

under the shade of *Mangifera indica, Psidium guajava* L. and *Pithecellobium dulce* (Roxb.) Benth.

Based on the plant specimens deposited at ETH, found in Gojam, Welega, Ilubabor, Kefa, Gamo Gofa and Sidamo. Altitude 580-1800 m.

3. Hygrophila auriculata *(Schumach.) Heine.*, Utiwaello (Anywaa) and Siyal/Till (Nuer).

Erect herb 50 cm to 1 m high. Leaves hairy, about 6 and arise circularly from the node. Spines also arise from the same point on the node. Flower violet, zygomorphic, clumped at nodes. **The dry plants are collected, burnt and edible salt is extracted from the ash.** Very common in *Commelina-Hygrophila* and *Sorghum purpureo-sericeum-Pennisetum thunbergii* communities, and rarely occur in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Based on the plant specimens deposited at ETH, found in Tigray, Gonder, Gojam, Wello, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo and Malawi. Altitude 500-2100 m.

4. Whitfieldia elongata *(P. Beauv.) C. B. Cl.*, Adibuch (Anywaa) and Eraekoy (Majangir). Shrubby herb 1 to 2.5 m high, growing in shade. Leaves dark green above, paler below, shiny. Corolla white. **Sweet nectar is sucked from the flower by children.** Very

common in *Baphia abyssinica-Tapura fischeri* and *Manilkara butugi-Cordia africana* communities.

Based on the plant specimens deposited at ETH, found in Welega, Ilubabor and Kefa. Altitude 600-1600 m.

AMARANTHACEAE

5. Amaranthus hybridus *L.*, Korbo/Mureduk (Majangir).

Annual erect herb to 50 cm high. Leaves light green, glabrous, lanceolate to ovate. Stem yellowish green, glabrous. Inflorescence reddish-grey, spiny to feel. **Leaves and young shoots edible as cooked vegetable.** Common in abandoned cultivations, in Majangir inhabited area grow in garden with tomato, maize and sorghum (Fig. 7).

Based on the plant specimens deposited at ETH, found in Tigray, Gonder, Wello, Shewa, Arsi, Kefa and Harerge. Altitude 1300-2400 m.

6. Amaranthus spinosus *L.*, Amugnaedor (Anywaa) and Duwong (Nuer).

Annual erect herb 50 cm to 1.5 m high. Leaves glabrous, ovate, each leaf axil bear a pair of spines. Inflorescence grey, with spines. Capsule ovoid. **Leaves edible as cooked vegetable** (Fig. 8). Common in abandoned cultivations, along roads and in Anywaa village under the shade of *Mangifera indica, Psidium guajava* and *Pithecellobium dulce*.

Fig. 7. Non-cultivated food plants tolerated in home garden: *Amaranthus hybridus* (1), *Bidens pilosa* (2) and *Cleome gynandra* (3).

Fig. 8. *Amaranthus spinosus*

Based on the plant specimens deposited at ETH, found in Tigray, Harerge and Malawi. Altitude 580-1525 m.

7. Celosia trigyna *L.*, Agnogn (Anywaa) and Bongi (Majangir).

Erect annual herb 50 cm to 1 m high. Leaves light green. Inflorescence white. Carpels 3 to 6 at a point. **Leaves and young shoots edible as cooked vegetable.** Common on marginal area of agricultural field, in abandoned cultivations and in Majangir village grow with tomato, maize and sorghum in garden.

Based on the plant specimens deposited at ETH, found in Gojam, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo and Malawi. Altitude 720-2150 m.

ANACARDIACEAE

8. Lannea welwitschii *(Hiern.) Engl.*, Arim (Anywaa) and Jomaeh (Majangir).

Tree to 30 m high. Bark smooth, pale grey. Leaves 5-7 foliolate, glabrous, leaflets lanceolate. Corolla creamy yellow. Drupe glabrous, brown to red when mature. **Fruit eaten fresh.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana, Combretum adenogonium-Anogeissus leiocarpa* and *Manilkara butugi-Cordia africana* communities.

In Ethiopia it is restricted to Ilubabor and Kefa; from Ethiopia west to Ivory Coast, south to Uganda, Zaire and Angola (Gilbert, 1989). Altitude 610-1250 m.

9. Sclerocarya birrea *(A. Rich) Hochst.*, Tibo (Anywaa), Paelen (Majangir) and Kamul (Nuer).

Tree 5 to 14 m high. Leaves imparipinnate, light green upper surface, whitish green beneath; leaflets obovate. Flower dark red with pale margins. Fruit dusty green, yellowish when mature. **Fruit pulp eaten fresh.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Found in Tigray, Shewa, Ilubabor, Gamo Gofa and Sidamo; west to Senegal, south to Uganda and Tanzania (Gilbert, 1989). Altitude 500-1700 m.

APOCYNACEAE

10. Saba florida *(Benth.) Bullock.*, Cohomo (Anywaa).

Woody climber 8 to 10 m long. Stem and leaves with milky latex when cut. Leaves oblong, dark green and shiny above, paler beneath. Corolla tubular, white. **Fruit eaten fresh.** Frequent liana in *Tamarindus indica-Anogeissus leiocarpa* community.

Based on the plant specimens deposited at ETH, found in Shewa, Welega and Gamo Gofa. Altitude 570-1180 m.

ASCLEPIADACEAE

11. Leptadenia hastata *(Pers.) Decne.*, Akochdial/Akoro (Anywaa).

Herbaceous evergreen creeper 2 to 12 m long. Leaves ovate, puberulous and sometimes

scarbid on both surfaces. Inflorescence several flowered, sub-axillary. Corolla pale orange to yellow with white dense hairs inside. When petals are removed 5-star like structures seen. **Leaves edible as cooked vegetable under famine condition and when people are away from home for some days especially for gathering honey or mining.** Common in disturbed area (e.g. for road construction) along roads and in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Based on the plant specimens deposited at ETH, found in Gojam, Shewa, Ilubabor, Gamo Gofa and Harerge. Altitude 640-1550 m.

ASTERACEAE/COMPOSITAE

12. Bidens pilosa *L.*, Kaella (Anywaa) and Jongae (Majangir).

Annual erect herb 1 to 1.2 m high. Stem four angled. Leaves 3-foliolate, leaflets ovate. Inflorescence headed, with white ligulate and yellow tubular florets. Seeds black, with four barbed bristles. **Leaves and young shoots edible as cooked vegetable.** Common in abandoned cultivations, in Majangir inhabited area grow in garden with tomato, maize and sorghum (Fig. 7). In Gambella lowland, grow in *Combretum adenogonium-Anogeissus leiocarpa* community.

Widespread in most tropical and sub tropical regions and also extending into some temperate areas (Mesfin Tadesse, 1984). Altitude 730-2400 m.

13. Crassocephalum montuosum *(S. Moore.) Milne-Redhead.*, Miningi (Majangir). Annual erect herb 1 to 1.5 m high. Leaves yellowish green, ovate to elliptic. Inflorescence yellow-orange, with no ray florets. **Leaves edible as cooked vegetable.** Common on the margin of *Manilkara butugi-Cordia africana* community, in abandoned cultivations and in Majangir inhabited area grow in garden with tomato, maize and sorghum.

Based on the plant specimens deposited at ETH, found in Ilubabor, Kefa, Bale and Tanzania. Altitude 1200-2270 m.

14. Ethulia gracilis *Del.*, Apuda (Anywaa).

Herb to 1 m high. Stem densely branched. Leaves pale green. Flower in head, purple. **Ash is used as a source of edible salt.** Common in abandoned cultivations, along roads and in Anywaa village under the shade of *Mangifera indica, Psidium guajava* and *Pithecellobium dulce.*

Based on the plant specimens deposited at ETH, found in Tigray, Gonder, Gojam, Shewa, Ilubabor and Sidamo. Altitude 580-1470 m.

15. Launaea taraxacifolia *(Willd.) Amin. ex C. Jeffrey.*, Ataebi (Anywaa).

Erect perennial herb 30 to 75 cm high. Stem and leaves with clear sap when cut. Flower

yellow. **Edible salt is extracted from ash.** Common in abandoned cultivations, agricultural field and marginal area.

Based on the plant specimens deposited at ETH, found in Gojam, Wello, Shewa and Harerge regions. Altitude 720-1500 m.

BALANITACEAE

16. Balanites aegyptiaca *(L.) Del.*, Tow (Anywaa), Toin (Majangir) and Sow (Nuer). Tree 4 to 8 m high. Branchlet spiny. Bark rough, cracked with age. Leaflets glabrous, elliptic. Flower yellowish or blue green. Fruit oblong, yellow when rip. Seeds covered with yellow pulp. **Fruit pulp eaten fresh. Fruits are also sold in local markets and generate income for household.** Common in *Commelina-Hygrophila* and *Sorghum purpureo-sericeum-Pennisetum thunbergii* communities.

Found in Tigray, Wello, Shewa, Arsi, Harerge, Ilubabor, Gamo Gofa and Sidamo; from Senegal to Somalia and from Egypt south in to Zimbabwe, also the Jordan valley and western Arabian peninsular (Sands, 1989). Altitude 0-1250 m.

BORAGINACEAE

17. Cordia africana *Lam.*, Urogu (Anywaa) and Dampaey (Majangir).

Tree 6 to 15 m high. Bark vertically striped, smooth, pale. Leaves ovate. Flower with pleasant scent, corolla white. Fruit drupe, green, yellow when ripe, gummy. **Ripe fruit**

eaten fresh. Very common in *Manilkara butugi-Cordia africana* community and rarely found in *Baphia abyssinica-Tapura fischeri* community.

Widespread species in Ethiopia and Sudan in the north and to the Republic of South Africa in the south; also occurs in Saudi Arabia and Yemen (Warfa, 1988). Altitude 720-1400 m.

18. Cordia myxa *L.*, Goy (Anywaa).

Tree 8 to 10 m high. Stem with white bark, due to bark peeling. **Fruit eaten fresh.** Found in *Baphia abyssinica-Tapura fischeri* community.

Collection foun in ETH was from Harerge only. Widespread and native to tropical Asia and naturalized in Ethiopia and Sudan, where it is cultivated (Warfa, 1988). Altitude 700-740 m.

BRASSICACEAE

19. Cardamine trichocarpa *Hochst. ex A. Rich.*, Okoy (Majangir).

Annual herb to 40 cm high. Leaves pinnately dissected, leaflets in 1-5 pairs, ovate. Corolla white. Fruit green. **Leaves and young shoots edible as cooked vegetable.** Common in coffee plantation and abandoned cultivations.

Found in Tigray, Gonder, Gojam, Shewa, Welega, Ilubabor, Kefa and Bale; mountain areas of tropical Africa and India (Jonsell, in preparation). Altitude 700-3100 m.

20. Cadaba farinosa *Forssk.*, Anaedo (Anywaa) Net (Nuer)

Shrub 1.5 to 2 m high. Young twigs farinaceous with small white scales or hairs. Leaves elliptic, sometimes obovate or ovate-oblong, ashy-grey green. Flower whitish to yellow. Stamens branched. Fruit capsular, seeds black, covered with red pulp. **Leaves edible as cooked vegetable under famine conditions.** Commonly found on the termite hills under the shade of *Tamarindus indica* in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Based on the plant specimens deposited at ETH, found in Afar, Tigray, Gojam, Wello, Shewa, Ilubabor, Kefa, Gamo Gofa, Sidamo, Harerge, Somalia and Kenya. Altitude 560-2000 m.

21. Capparis erythrocarpus *Isert.*, Omono (Anywaa).

Climbing or scrambling shrub 2 to 8 m high. Leaves elliptic to lanceolate. Flower white, stamens many. Fruit ellipsoid, red, pulp white. **Fruit pulp eaten fresh by children.** Found in *Tamarindus indica-Anogeissus leiocarpa* and *Baphia abyssinica-Tapura fischeri* communities.

Based on the plant specimens deposited at ETH, found in Welega, Ilubabor and Kefa. Altitude 500-1670 m.

22. Cleome gynandra *L.*, Akiya (Anywaa) and Kokomen (Majangir).

Annual herb to 1 m high. Leaflets obovate to elliptic. Corolla white. Fruit capsular. **Leaves and young shoots edible as cooked vegetable.** Common in abandoned cultivations, in Majangir inhabited area grow in garden with tomato, maize and sorghum (Fig. 7).

Based on the plant specimens deposited at ETH, found in Wello, Shewa, Ilubabor, Kefa, Gamo Gofa, Sidamo and Harerge. Altitude 450-1300 m.

23. Crateva adansonii *DC.*, Bado (Anywaa) and Kaech (Nuer).

Shrub 2 m to 3 m high. Leaves trifoliate. Flower white. Fruit ball shaped, hard, woody, glossy green, hanging. **Leaves edible as cooked vegetable under famine conditions.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities and on the margin of agricultural field.

Based on the plant specimens deposited at ETH, found in Welega, Ilubabor, Kefa and Gamo Gofa. Altitude 450-1700 m.

24. Maerua triphylla *A. Rich.*, Anaedo (Anywaa).

Shrub or small tree to 6 m high. Leaves simple or trifoliate. Inflorescence simple or branched. Corolla whitish or greenish. **Leaves edible as cooked vegetable under famine conditions.** Commonly found in *Commelina-Hygrophila*, *Loudetia*

arundinacea-Hyparrhenia pilgeriana and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Based on the plant specimens deposited at ETH, found in Shewa, Ilubabor, Gamo Gofa, Sidamo, Arsi, Bale, Harerge, Kenya, Tanzania and Malawi. Altitude 550-1900 m.

CELASTRACEAE

25. Elaeodendron buchananii *(Loes.) Loes.*, Beyen/Chogaey (Majangir).

Tree to 30 m high. Bark slash liver colored. Leaves lanceolate to ovate, leathery, yellowish green and dull above, paler beneath. Flowers white to yellow. Fruit drupe, pale yellow. **Fruit eaten fresh.** In *Baphia abyssinica-Tapura fischeri* and *Manilkara butugi-Cordia africana* communities.

In Ethiopia it is confined in Ilubabor and Kefa; from Sierra Leone to Cameroon and from Sudan to Malawi (Robson and Sebsebe Demissew, 1989). Altitude 660-2250 m.

CONVOLVULACEAE

26. Ipomoea aquatica *Forsk.*, Ajuwaella (Anywaa) and Tach (Nuer).

Creeping perennial herb to 2 m long. Stem rooting at nodes. Leaves variable, triangular to linear-oblong. Flowers axillary, solitary. Corolla purple with dark purple throats. **Leaves edible as cooked vegetable**. Along the river banks, in temporarily flooded area and in *Sorghum purpureo-sericeum-Pennisetum thunbergii* community.

Based on the plant specimens deposited at ETH, found in Afar, Gonder, Gojam, Shewa, Welega, Ilubabor, Gamo Gofa, Sidamo, Harerge and Malawi. Altitude 360-1870 m.

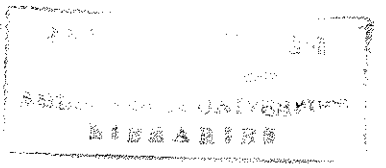
EBENACEAE

27. Diospyros mespiliformis *Hochst. ex A. DC.*, Adiu (Anywaa) and Monchol (Nuer). Tree 6 to 10 m high. Bark grey, slash pinkish, longitudinally fissured. Leaves oblong or elliptic, dark green upper surface and yellowish beneath. Flowers clustered. Fruit subglobose, yellow when mature. **Fruit pulp sweet and eaten fresh.** In *Combretum adenogonium-Anogeissus leiocarpa* and *Tamarindus indica-Anogeissus leiocarpa* communities.

Based on the plant specimens deposited at ETH, found in Tigray, Gojam, Shewa, Ilubabor, Kefa, Gamo Gofa and Sidamo. Altitude 550-1820 m.

EUPHORBIACEAE

28. Acalypha ornata *A. Rich.*, Atinotur/Atiyho/Atiyho Merpap (Anywaa). Shrub 1 to 3 m high. Stem and leaves glabrous. Male inflorescence axillary, 7 to 15 cm long, white. Female spike terminal, red. Stigma hairy. Fruit 3-lobed, covered with long and green bracts. Bracts covered with white hairs. **The plant is dried, burned and the ash is used as a source of edible salt after filtration and evaporation by Anywaa people.** Very common in *Tamarindus indica-Anogeissus leiocarpa* community and



rarely found in *Combretum adenogonium-Anogeissus leiocarpa* and *Baphia abyssinica-Tapura fischeri* communities.

Found in Tigray, Gojam, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa and Sidamo; west to Nigeria, South to Angola, Botswana and Mozambique (Gilbert, 1995). Altitude 610-700 m.

29. Flueggea virosa *(Willd.) Voigt.*, Akano (Anywaa) and Wak (Nuer).

Shrub to 2 m or small tree to 6 m high. Leaves glabrous, obovate. Flowers in dense clusters. Fruits white and fleshy when ripe. **Fruits eaten fresh and leaves as cooked vegetable.** Very common in *Commelina-Hygrophila, Sorghum purpureo-sericeum-Pennisetum thunbergii, Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Found in Tigray, Gonder, Gojam, Wello, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo, Bale and Harerge; throughout tropical Africa; Madagascar; Arabia and from India east to Japan and Indonesia (Gilbert, 1995). Altitude 400-2050 m.

30. Phyllanthus boehmii *Pax.*, Awik (Anywaa) and Butot (Nuer).

Annual herb 20 to 30 cm high. Stem and leaves glabrous. Leaflets oblong-elliptic to obovate. Male flowers in lower axil and female flowers in upper axil. **Leaves and young shoots edible as cooked vegetable.** Common in *Commelina-Hygrophila* community.

Found in Gonder, Gojam, Shewa, Welega, Ilubabor, Kefa and Bale; east Africa (Gilbert, 1995). Altitude 530-1900 m.

31. Ricinus communis *L.*, Boliyr (Majangir)

Shrub 2 to 3 m high. Leaves lobed. Corolla yellow. Fruits spiny, dehiscent. Grown in home garden, grows wild in patches of natural forest left in an area cleared for coffee plantations, in the edge of *Tamarindus indica-Anogeissus leiocarpa* community and on the marginal area of agricultural field.

Widespread as a home garden plant in Ethiopia; pantropical (Edwards, 1991; Gilbert, 1995). Seeds are used as a source of oil for oiling baking plate. It is cultivated commercially for the oil from the seeds which has medicinal and industrial uses (den Eynden *et al.*, 1992; Gilbert, 1995). The wild relative of cultivated *R. communis* is recognized by its dehiscent fruits (Edwards, 1991). Altitude 400-2500 m.

FABACEAE

32. Albizia grandibracteata *Taub.*, Bamu (Anywaa) and Sati (Majangir).

Tree 8 to 25 m high. Bark smooth. Leaves paripinnate, leaflets pink-red when young, obovate. Flower in white to pink heads. Anthers reddish, exposed well beyond the petals. Pods oblong. **Bark used for making local alcoholic drinks called `Ogolli'.** Common in *Manilkara butugi-Cordia africana* community and found rarely in *Baphia abyssinica-Tapura fischeri* community.

Found in Welega, Shewa, Ilubabor, Kefa and Sidamo; Sudan, Uganda, West Kenya, North Tanzania and Zaire (Asfaw Hunde and Thulin, 1989). Altitude 630-1700.

33. Pithecellobium dulce *(Roxb.) Benth.*, Aluwa (Anywaa).

Tree 14 to 16 m high. Leaves pinnate. Flower capitate, white. Pods, curved and twisted, pulp reddish. **Fruit pulp eaten fresh.** Naturalized around Anywaa village, planted as live fence and commonly grown with *Mangifera and Psidium.*

P. dulce is planted as an ornamental, for shade as hedge in Harerge and Ilubabor; native in South America (Asfaw Hunde and Thulin, 1989). Altitude 30-750 m.

34. Senna obtusifolia *(L.) Irwin & Barneby*, Ajada (Anywaa) and Riyer (Nuer).

Erect annual herb 1 to 2 m high. Bark grey. Leaves paripinnate, light green above, paler beneath, leaflets obovate. Corolla yellow. Pods grooved. **Leaves edible as cooked vegetable.** Common in dry river bed, in disturbed area and along roads.

Found in Tigray, Welega, Shewa, Harerge, Ilubabor and Gamo Gofa (where it is cultivated in small scales for its edible leaves); widespread throughout the tropics (Polhill and Thulin, 1989). Altitude from sea level up to 2000 m.

35. Tamarindus indica *L.*; Chuwa (Anywaa), Moti (Majangir), Qad (Nuer).

Evergreen tree 7 to 18 m high. Leaves paripinnat, leaflets oblong, glabrous. Flower

yellow, with reddish outside. Pods pale brown, pubescent, pulp brown, sticky. **Fruit pulp edible fresh or after roasting the pods in fire. Sold in local markets and generates income for household.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities and very common in *Tamarindus indica-Anogeissus leiocarpa* community.

Found in Tigray, Gonder, Gojam, Wello, Shewa, Harerge, Ilubabor, Gamo Gofa and Sidamo; native to tropical Africa and doubtfully also Asia, cultivated in tropical and subtropical regions for ornament and for the fruits (Polhill and Thulin, 1989). Altitude upto 1500 m.

36. Vigna membranacea *A. Rich.*; Bog Ajowom (Anywaa).

Herbaceous climber or twiner among grasses, 2 to 3.5 m long. Leaves trifoliolate, leaflets ovate. Corolla with blue standard and set of honey guides in center, wings pale, keel very pale pink. Pods pubescent, linear-cylindrical. **Leaves edible as cooked vegetable**. Common in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Found in Tigray, Wello, Gonder, Gojam, Shewa, Welega, Arsi, Harerge, Ilubabor, Kefa, Gamo Gofa and Sidamo; Sudan, Uganda, Kenya, Tanzania and Somalia (Thulin, 1989). Altitude 100-2400 m.

FLACOURTIACEAE

37. Oncoba spinosa *Forssk.*, Adiquala (Anywaa).

Shrub 1.5 to 2 m high. Stem dark brown. Bark slash light yellow, in oxidation changed to brown and no smelling. Leaves simple, dark green above with very pale midrib, paler beneath. Corolla white. Stamens yellow, many. Stigma brown, capitate. Ovary superior. Fruit green, brown when mature, very hard and woody. **Fruit eaten fresh.** In *Tamarindus indica-Anogeissus leiocarpa* and *Loudetia arundinacea-Hyparrhenia pilgeriana* communities.

Based on the plant specimens deposited at ETH, found in Tigray, Shewa, Arsi, Ilubabor, Kefa, Sidamo, Bale and Harerge. Altitude 690-2350 m.

ICACINACEAE

38. Pyrenacantha kaurabassana *Baill.*, Appel (Anywaa).

Herbaceous climber 1.5 to 2 m long. Stem annual. Tubers (Fig. 9) with fresh weight upto 12 Kg. Leaves pubescent, ovate to reniform, glandular. Flowers yellowish, in spikes on erect young shoots. Flowers appear before the leaves. Fruit ellipsoid, yellowish to orange. **The tubers are chopped, dried, burned, filtered and evaporated to obtain edible salt.** Commonly found on the termite hills under the shade of *Tamarindus indica* in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Found in Ilubabor and Sidamo; Somalia, Kenya, Tanzania, Mozambique, Malawi and Zimbabwe (Vollesen, 1989a). Altitude 600-1300 m.

Fig. 9. *Pyrenacantha kaurabassana*: -tuber.

Fig. 10. *Ocimum canum*: -inflorescence.

LAMIACEAE

39. Ocimum canum *Sims.*, Meno (Anywaa).

Annual or short lived perennial herb 10 to 70 cm high. Stem quadrangular, erect. Leaves narrowly ovate or elliptic. Inflorescence has aromatic smell (Fig. 10). Corolla white, funnel shaped. **Inflorescence is used as spice.** Common in abandoned cultivations, along roads, in *Loudetia arundinacea-Hyparrhenia pilgeriana* and in *Combretum adenogonium-Anogeissus leiocarpa* communities.

Widespread in Ethiopia and tropical Africa (Cufodontis, 1953-1972). Altitude 600-2400 m. *O. canum* grows both wild and cultivated (Edwards, 1991). It was collected from the wild and is recognized as a wild relative of cultivated species.

MALVACEAE

40. Hibiscus calyphyllus *Cavan.*, Gnilorbey (Anywaa and Majangir) and Tid (Nuer). Herb or shrubby herb or shrub to 2 m high. Leaves ovate. Flower in leaf axil, corolla yellow toward the edge, purple at the internal base, stamens fused. Capsule ovoid to ellipsoid. **Leaves edible as cooked vegetable.** Very common as understorey shrub in *Tamarindus indica-Anogeissus leiocarpa* community, as shrubby herb in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities, and as small erect herb in *Commelina-Hygrophila* and *Sorghum purpureo-sericeum-Pennisetum thunbergii* communities.

Found in Tigray, Gonder, Gojam, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo and Bale; widespread in tropical and south Africa, Madagascar and Yemen (Vollesen, 1995). Altitude 450-2100 m.

41. Hibiscus cannabinus *L.*, Gnilorbey (Anywaa) and Tid (Nuer).

Erect coarse annual herb to 1 m high. Leaves glabrous to puberulous, palmatly lobed. Flowers in leaf-axil or in well defined raceme, corolla yellow toward the edge, purple at the internal base, stamens fused. Capsule ovoid. **Leaves edible as cooked vegetable.** Common in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Tamarindus indica-Anogeissus leiocarpa* communities.

Found in Tigray, Gonder, Gojam, Shewa, Welega, Ilubabor, Kefa, Sidamo, Bale and Harerge; in tropical and subtropical regions (Vollesen, 1995). Altitude 400-2200 m.

H. cannabinus, Knaf, is one of the most important cultivated species that provide bark fibers similar to jute in India, Sudan and southern tropical Africa (Vollesen, 1995). Recently, its cultivation has spread to all parts of the world (Rehm and Espig, 1991). In Ethiopia, trials on this crop have been carried out in many experimental stations, but it is produced only for local supply by Beles State Farm (EMA, 1988). The species exists in the wild in Gambella and is recognized as a wild relative of Knaf.

42. Sida collina *Schlechtend.*, Adik (Anywaa).

Annual herb 20 to 1.5 m high. Stem pilose. Leaves subglabrous or with long simple appresed hairs, ovate to elliptic. Corolla yellow. Fruit 5-winged. **Leaves and young shoots edible as cooked vegetable.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Commelina-Hygrophila* communities.

Found in Ilubabor and Kefa; west Africa to Cameroon, Zaire, Burundi and also in Central America (Vollesen, 1995). Altitude 530-1250 m.

MELIACEAE

43. Lepidotrichilia volkensii *(Gurke.) Leroy.*, Kijang (Anywaa).

Shrub 2 to 3 m or tree usually less than 9 m high and sometimes flowering as shrub. Leaflets 3-4 pairs, oblanceolate to elliptic. Corolla white. Fruit drupe, encrusted with stellate lobes. **Fruit eaten fresh.** Common in *Tamarindus indica-Anogeissus leiocarpa* and *Baphia abyssinica-Tapura fischeri* communities.

Found in Gojam, Welega, Arsi, Shewa, Ilubabor, Kefa, Sidamo, Bale and Harerge; from Ethiopia to Malawi (Styles and White, 1989). Altitude 575-2800 m.

44. Trichilia dregeana *Sond.*, Yuya (Majangir).

Large evergreen tree 30 to 40 m high. Leaves paripinnate, pubescent. Flowers white. Capsules grey to dull yellow, when fall an ant colony colonizes the whole area under the

tree, feeding on the fruit pulp exposing red seeds with black dots. **Seeds are important sources of edible oil for the Majangir community. The oil and seeds are sold in the local market and generates income for household.** Common in *Manilkara butugi-Cordia africana* community.

Found in Welega, Ilubabor and Kefa; west Africa, Angola and from Ethiopia to South Africa, but absent from Zaire basin (Styles and White, 1989). Altitude 1150-1900 m.

MORACEAE

45. Ficus sycomorus *L.*, Olam (Anywaa) and Engop (Nuer).

Buttressed tree 4 to 30 m high. Bark greyish-brown. Leaves ovate. White latex oozes out when a leaf petiole is cut or bark is slashed. Fig grey, ovoid. **Figs eaten fresh**. Common in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Tamarindus indica-Anogeissus leiocarpa* communities. Altitude 500-2000 m.

Found in Tigray, Gonder, Gojam, Wello, Shewa, Ilubabor, Gamo Gofa, Sidamo and Harerge; widespread in tropical Africa, west to Senegal, and south to South African Republic (Friis, 1989).

46. Morus mesozygia *Stapf.*, Ochik (Anywaa) and Echik (Majangir).

Tree to 30 m high. Leaves ovate, elliptic to oblong. Fruit-syncarp subglobose, greenish, fleshy. **Fruit eaten fresh.** Found in *Baphia abyssinica-Tapura fischeri* and *Manilkara butugi-Cordia africana* communities.

Found in Welega, Ilubabor and Kefa; distributed along the northern fringe of the lowland forest zone of central Africa; west to Senegal, also Uganda, Kenya, Tanzania, Angola, Malawi, Mozambique and South African Republic (Friis, 1989). Altitude 500-1500 m.

47. Trilepisium madagascariense *DC.*, Goboy (Majangir).

Buttressed tree 15 to 25 m high. Leaves glabrous, ovate to lanceolate. Bark slash with milky latex. Flowers blue to purple. Fruiting receptacle ovoid. **Fruit eaten fresh.** Found in *Manilkara butugi-Cordia africana* community.

In Ethiopia this species is confined along the southwest fringe of the upland rain forest of Kefa and Welega; widespread in tropical Africa to Guinean Republic, south to Angola and Republic of South Africa; Madagascar and Seychelles (Friis, 1989). Altitude 1050-1600 m.

NYMPHAEACEAE

Nymphaea nouchalii *Burm.f.*, Kiyho (Anywaa) and Kaehe (Nuer).

Succulent aquatic herb 50 to 70 cm long. Leaves and flowers spread on water surface. Leaves shiny green above, dark-purple beneath. Corolla white, anthers yellow. Seeds numerous, white. **Tubers and seeds edible.** Common along river banks and flooded area.

Based on the plant specimens deposited at ETH, found in Afar, Gojam, Wello, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo and Harerge. Altitude 550-1800 m.

OLACACEAE

49. Ximenia americana *L.*, Ulaemo Menan Dago (Anywaa) and Wulaeng (Nuer).

Shrub 3 to 4 m high, much-branched. Stem bears straight spines. Bark grey, smooth to rough. Leaves oblong, glabrous. Flower grey to white, with pleasant secant. Fruit oval, yellow to orange (Fig. 11). Seeds subglobose. **Fruit eaten fresh. Edible oil is extracted from seeds. Fruits are sold in local market places and generates income for household.** Common in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

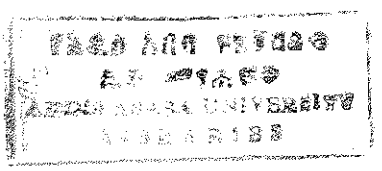
Found in Tigray, Gonder, Gojam, Wello, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo, Bale, Harerge and Arsi; Pantropical (Vollesen, 1989b). Altitude 500-2450 m.

PEDALIACEAE

50. Sesamum latifolium *Gillett.*, Gnim Jowok (Anywaa).

Herb 1.5 to 2 m high. Leaves glabrous, ovate. Flower tubular, 5-lobed, purple. Stamens 4. Ovary superior. Capsule split laterally. Found in *Sorghum purpureo-sericeum-Pennisetum thunbergii* and *Loudetia arundinacea-Hyparrhenia pilgeriana* communities.

Based on the plant specimens deposited at ETH, found in Ilubabor, Gamo Gofa and Kenya. Altitude 500-1400 m. Ihlenfeldt and Grabow-Seidensticker (1979), proposed *S. latifolium* as the probable ancestor of cultivated sesame.



PORTULACACEAE

51. Portulaca oleracea *L.*, Adilagae (Anywaa) and Wur (Nuer).

Spreading annual herb 20 to 30 cm high. Stem succulent. Leaves fleshy, flat, spatulate. Flowers yellow. Capsule circular. **Leaves and young shoots edible as cooked vegetable.** Common in *Commelina-Hygrophila* community.

Based on the plant specimens deposited at ETH, found in Gonder, Shewa, Ilubabor, Gamo Gofa, Sidamo, Bale and Harerge. Altitude 540-4550 m.

RHAMNACEAE

52. Ziziphus abyssinica *Hochst. ex A. Rich.*, Laang Dial (Anywaa).

Shrub to 3 m or small tree to 6 m high: Bark dark grey, fissured. Leaves glabrous, greyish, ovate. Flowers yellowish green, in many flowered cymes. Fruit globose drupe, brown when ripe, exocarp fleshy. **Fruit eaten raw, sold in local market and generates income for household.** Common in *Combretum adenogonium-Anogeissus leiocarpa* community.

Found in Tigray, Gonder, Gojam, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo and Bale; widespread in the drier parts of tropical Africa from Senegal to Ethiopia and south to Angola and Zimbabwe (Vollesen, 1989c). Altitude 450-2000 m.

53. Ziziphus spina-christi *(L.) Desf.*, Laang (Anywaa) and Bow (Nuer).

Shrub or small tree to 10 m high. Bark grey to brown, fissured. Leaves glabrous, ovate to elliptic. Flowers yellowish green in pubescent, many flowered cymes. Fruit globose drupe, yellow when ripe, exocarp fleshy. **Fruit eaten raw (Fig. 12) and sold in local market places and generates income for household.** Common in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Found in Afar, Tigray, Gonder, wello, Shewa, Gamo Gofa, Bale and Harerge; widespread in the Near East and Middle East and in dry parts of north Africa, introduced and naturalized in east Africa (Vollesen, 1989c). Altitude upto 2400 m.

RUBIACEAE

54. Coffea arabica *L.*, Buna (Anywaa) and Carry (Majangir).

Shrub or small tree to 6 m high. Leaves elliptic to ovate. Flowers in axillary clusters. Corolla tubular, white. Fruit red. **Fruit pulp eaten fresh. Leaves and seeds used to prepare hot drink `Chaemo'**(Majangir). Common in *Manilkara butugi-Cordia africana* community and rarely found in *Baphia abyssinica-Tapura fischeri* community.

C. arabica is the most important cash crop. It is indigenous to the forests in southwestern Ethiopia which was considered as the "center of origin" of the species (Siegenthaler, 1963; and Friis, 1979). It also occurs wild in southeast Sudan, northern Kenya and is widely cultivated throughout the tropics. Altitude 660-2000 m

Fig. 11. *Ximenia americana*: -fruits.

Fig. 12. *Ziziphus spina-christi*: -Anywaa children eating the fruits.

55. Gardenia ternifolia *Schum. & Thonn.*, Duwong (Anywaa).

Shrub or small tree to 6 m high. Leaves in whorls of 3, mostly on short branches, obovate, oblong or elliptic. Bark grey to pale. Corolla creamy-white to yellow with age. Fruit grey, woody, has size and shape of chickens egg. **Fruits eaten fresh by children.** Common in *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

It is very common and widespread in Ethiopia and tropical Africa (Puff, in preparation). Altitude 500-1500 m.

56. Sarcocephalus latifolius *(J. E. Smith) E. A. Bruce.*, Moyo (Anywaa).

Shrub or small tree to 4 m high. Bark grey to brown, slash yellow. Leaves shiny, deep green, broadly elliptic to round-ovate. Flowers in heads. Corolla white to yellow tube, narrowly funnel shaped. Fruit ovoid, brown; mesocarp, fleshy, reddish with numerous seeds. **Fruit eaten fresh.** In wet areas of *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Found in Gojam, Ilubabor and Kefa; west to Senegal, Uganda and Kenya (Puff, in preparation). Altitude 550-1500 m.

57. Vangueria apiculata *K. Schum.*, Aruwano (Anywaa).

Shrub 3 m to 4 m or small tree to 10 m high. Leaves elliptic or ovate. Fruit globose,

yellow, pulp brown. Corolla tubular, greenish-white. **Fruit pulp eaten fresh.** Found in *Combretum adenogonium-Anogeissus leiocarpa* and *Tamarindus indica-Anogeissus leiocarpa* communities.

Found in Gonder, Gojam, Welega, Ilubabor, Gamo Gofa, Sidamo, Bale and Harerge; Somalia, tropical east Africa and south to Zimbabwe (Puff, in preparation). Altitude 570-2100 m.

SAPINDACEAE

58. Allophylus macrobotrys *Gilg.*, Athow (Anywaa).

Shrub or small tree to 4(-6) m high. Leaflets elliptic. Inflorescence racemoid, 7-15 cm long, white. Fruit ellipsoid, red when mature. **Fruit sweet, eaten fresh.** Found in *Tamarindus indica-Anogeissus leiocarpa* community.

Found in Gojam, Shewa, Arsi, Welega, Ilubabor, Kefa, Sidamo and Bale; Sudan, Uganda, Kenya Tanzania, Burundi and Zaire (Vollesen, 1989d). Altitude 640-2500 m.

SAPOTACEAE

59. Aningeria altissima *(A. Chev.) Aubrev. & Pellgr.*, Gomu (Majangir).

Tree to 25 m high. Bark smooth, grey. Leaves pubescent, with brown hairs when young. Flowers greyish-white. **Fruit eaten fresh.** Common in *Manilkara butugi-Cordia*

africana community and as patch of natural forest left in area cleared for coffee plantations.

Based on the plant specimens deposited at ETH, found in Ilubabor and Kefa. Altitude 506-1500 m.

60. Butyrospermum paradoxum *(Gaertin.f.) Hepper*, Wado (Anywaa).

Tree 10 to 12 m high. Crown mach branched. Bark dark, rough, fissured, milky latex ooze out from white to red internal layer of the bark when slashed. Leaves crowded at the tip of branchlet, reddish and hairy when young, oval to oblong, dark green and glabrous when mature. Flower white to yellow. Fruit ovoid, grey. **Fruit pulp sweet, eaten fresh. Edible oil is extracted from seeds. The oil is sold in local market and generates income for household.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Based on the plant specimens deposited at ETH, found in Gambella only. Altitude 670-710 m.

61. Manilkara butugi *Chiov.*, Gojae (Majangir).

Tree 30 to 35 m high. Bark greyish black, finely fissured, slash with milky latex. Leaves glabrous, elliptic. Flower yellow. Fruit yellow. **Fruit pulp sweet, eaten fresh**. Common

in *Manilkara butugi-Cordia africana* community and as patch of natural forest left in area cleared for coffee plantations.

Based on the plant specimens deposited at ETH, found in Ilubabor, Kefa and Sidamo. Altitude 900-1500 m.

62. Mimusops kummel *Bruce. ex A.DC.*; Achak (Anywaa) and Woni (Majangir). Tree 10 to 20 m high. Bark slash reddish to white with milky latex. Leaves obovate to lanceolate, glabrous, dark green. Flowers dirty white. Fruit red. **Fruit eaten fresh.** Common in *Manilkara butugi-Cordia africana* community and rarely found in *Baphia abyssinica-Tapura fischeri* community.

Based on the plant specimens deposited at ETH, found in Tigray, Gonder, Gojam, Shewa, Kefa, Gamo Gofa, Sidamo and Bale. Altitude 610-1930 m.

SOLANACEAE

63. Capsicum annum *L.*, Adimaeti (Anywaa).

Perennial erect herb 1.5 m high. Leaves ovate. Corolla grey to white. Fruits upright, green when young and red when mature. **Fruit hot to taste, edible as spice.** Naturalized, found in abandoned cultivations and grow in the edge of *Tamarindus indica-Anogeissus leiocarpa* community.

C. annum is cultivated for its green and red fruits which is used as spices. The wild state of *C. annum* is not known and may have been derived from *C. minimum* Roxb. in Mexico (Tindall, 1983). *C. annum* is introduced into Ethiopia in early 16th or 17th century (Tewolde Berhan Gebre Egiziabher, 1984). Altitude 600-1590 m.

64. Physalis peruviana *L.*, Gongor (Majangir).

Herb 30 to 60 cm high. Leaves ovate. Corolla yellow with black to brown centers. Fruit berry, covered with persistent sepals. **Fruit eaten fresh.** Common in abandoned cultivations, road sides and in Majangir inhabited area grow in garden with tomato, maize and sorghum.

Based on the plant specimens deposited at ETH, found in Wello, Shewa, Welega, Ilubabor, Kefa, Bale and Harerge. Altitude 1300-2600 m.

65. Solanum nigrum *L.*, Achigoy (Anywaa).

Annual herb to 1.5 m high. Leaves ovate. Corolla white. Stamens yellow. Fruits berry, black. **Fruit eaten fresh.** Common in disturbed area at the edges of *Baphia abyssinica-Tapura fischeri* community.

Based on the plant specimens deposited at ETH, found in Tigray, Gojam, Wello, Shewa, Welega, Ilubabor, Kefa, Sidamo, Bale, Harerge and Kuwait. Altitude 740-2540 m.

66. Corchorus aestuans *L.*, Awachuwaey (Anywaa).

Erect annual herb to 1 m high. Stems pilose and with a denser band or crispped pubescence. Leaves ovate or elliptic. Corolla yellow. Capsule 3-valved, cylindric, straight, membranous wings on angles and terminated by 3 spreading horns. **Leaves edible as cooked vegetable.** Common in dry river-bed, growing on sand with *Corchorus capsularies* L., *Senna obtusifolia* and *Triumfetta rhomboidea* Jacq.

In Ethiopia recorded from Gambella only; Pantropic (Vollesen and Sebsebe Demissew, 1995). Altitude 500-600 m.

67. Corchorus capsularies *L.*, Awachuwaey (Anywaa), NEW RECORD TO ETHIOPIA.

Annual herb to 1 m high. Leaves simple, glabrous, lanceolate, crenate, the lower 2-teeth elongate into auricles 3 to 8 mm long, leaf-blade 8 mm to 3 cm wide, 2.5 to 12 cm long. Petiole 4 to 14 mm long. Flower yellow, leaf-opposed, 1-3 at a point. Fruit circular capsule, flattened at the top, surrounded by longitudinal ridges. Seeds brown to black. **Leaves edible as cooked vegetable.** Common in dry river-bed growing on sand with C. aestuans, *S. obtusifolia* and *T. rhomboidea*. Altitude 570-650 m.

Purseglove (1968) and Cobley and Steele (1976), indicated that *C. capsularies* occurs wild only in China. It was recorded as a cultivated plant in the Republic of South Africa

and Tanzania (Edmonds, 1990). However, it was found to occur wild in Gambella. The specimen was identified using the description given in Edmonds (1990) and by comparison with specimens deposited at K.

Jute, *C. capsularies*, is the main source of bast fiber in Asia, followed in importance by *C. olitorius* L. grown in Africa (Rehm and Espig, 1991). The specimen was collected from wild and recognized as a wild relative of cultivated jute.

68. Corchorus fascicularis *Lam.*, Awachuwaey (Anywaa).

Erect to semi-prostrate annual herb 50 cm to 1 m high. Stem smooth, glabrous. Leaves ovate to elliptic. Inflorescence in 3 flowered fascicles. Corolla yellow. Capsule 3-valved, cylindric, straight, no wing. **Leaves edible as cooked vegetable.** Found in *Loudetia arundinacea-Hyparrhenia pilgeriana* community.

Found in Tigray, Gonder, Gojam, Shewa and Gamo Gofa; widespread in tropical Africa, India and Australia (Vollesen and Sebsebe Demissew, 1995). Altitude 400-1800 m.

69. Corchorus olitorius *L.*, Awachuwaey (Anywaa) and Maero (Nuer).

Erect annual herb 10 cm to 2.5 m high. Leaves alternate, serrate, 2-lower teeth elongate into auricles. Corolla yellow. Capsule, cylindric, straight, 5-valved and split into 5. **Leaves and young shoots edible as cooked vegetable. It is sold in local markets and**

generates income for household. Common in *Commelina-Hygrophila, Sorghum purpureo-sericeum-Pennisetum thunbergii, Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Found in Afar, Gojam, Shewa, Ilubabor, Kefa, Gamo Gofa, Sidamo and Harerge; widespread in tropics (Vollesen and Sebsebe Demissew, 1995). Altitude 250-1750 m.

In addition to its fiber, *C. olitorius* is cultivated as a vegetable crop in many tropical areas, including Egypt, Sudan, tropical Asia, tropical Africa particularly west Africa, south America and the Caribbean (Tindall, 1983). Here it is recognized as a wild relative of both fiber and vegetable crops.

70. Corchorus tridens *L.*, Awachuwaey (Anywaa) and Maero (Nuer).

Erect annual herb to 1 m high. Stem glabrous to sparsely pilose. Leaves ovate to elliptic, glabrous. Corolla yellow. Capsule, cylindric, 3-valved and split into 3, each valve terminated by 2 horns. **Leaves edible as cooked vegetable.** Found in *Combretum adenogonium-Anogeissus leiocarpa* community.

Found in Afar, Tigray, Gonder, Gojam, Shewa, Kefa, Gamo Gofa, Sidamo and Harerge; widespread in tropical Africa and Asia (Vollesen and Sebsebe Demissew, 1995). Altitude 400-1700 m.

71. Triumfetta rhomboidea *Jacq.*, Wiyo/Adik (Anywaa).

Annual herb 1 to 2 m high. Stem and leaves pubescent. Leaves ovate. Corolla yellow. Fruit covered with bristles. **Leaves edible as cooked vegetable.** On marginal area of agricultural field and in dry river-bed growing on sand with *C. aestuans, C. capsularies* and *S. obtusifolia.*

Found in Tigray, Gonder, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Bale and Harerge; widespread in tropics (Vollesen and Sebsebe Demissew, 1995). Altitude 400-2750 m.

ULMACEAE

72. Celtis africana *Burm.f.*, Upi (Majangir).

Tree to 35 m high. Bark smooth, grey. Slash cream to yellow. Young shoots and leaves covered with brown hairs. Leaves 3-veined, oval, pubescent. Flower grey. Fruit yellow to orange, ellipsoid-globose, hairy. **Fruit eaten fresh.** Found in *Manilkara butugi-Cordia africana* community.

Found in Tigray, Gonder, Gojam, Wello, Shewa, Arsi, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo, Harerge and Bale; east to Yemen, west to Ghana and south to Angola and South Africa Republic (Polhill, 1989). Altitude 1200-2300 m.

73. Celtis toka *(Forssk.) Hepper & Wood.*, Laero (Anywaa).

Strongly buttressed tree 12 to 25 m high. Bark grey-brown, scaly. Slash cream turning brownish. Leaves 3-veined, ovate. Fruit subglobose, yellow to orange, turn brown when dry. **Fruit eaten fresh.** Found in *Tamarindus indica-Anogeissus leiocarpa* community.

Found in Wello, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa and Sidamo; Sudano-Sahelian zone from Senegal to Yemen (Polhill, 1989). Altitude 375-1000 m.

74. Celtis zenkeri *Engl.*, Kobaey (Anywaa) and Kobae (Majangir).

Tree 20 to 30(-50) m high. Buttressed, bark smooth, grey-brown, slash cream turning brown. Leaves ovate to oblong-elliptic or slightly obovate, 3-veined. Fruit subglobose or ovoid, red, pubescent to subglobose. **Fruit eaten fresh.** Found in *Baphia abyssinica-Tapura fischeri* and *Manilkara butugi-Cordia africana* communities.

In Ethiopia found in Ilubabor only; west to Guinea, south to Zaire and Angola (Polhill, 1989). Altitude 500-1800 m.

VERBENACEAE

75. Vitex doniana *Sweet.*, Juwaello (Anywaa).

Tree 5 to 7 m high. Bark scaly, grey. Leaves 5-foliate (finger-like) leaflets obovate. Corolla blue to purple, bell-shaped. Fruit drupe oval, black when mature. **Fruit eaten**

fresh. In Anywaa village, *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Based on the plant specimens deposited at ETH, found in Gojam, Welega, Ilubabor, Kefa and Gamo Gofa. Altitude 506-1450 m.

VITACEAE

76. Cissus populina *Guill. & Perr.*, Gniallo/Ajaegno (Anywaa).

Woody climber to 15 m long. Leaves ovate. Corolla yellowish green. Fruit blue and soft. **The stem is used as water source by Anywaa when they go into woodland. They cut once the stem from two ends and drink water that flow out from the vascular bundle** (Fig. 13). Found in *Loudetia arundinacea-Hyparrhenia pilgeriana, Combretum adenogonium-Anogeissus leiocarpa* and *Tamarindus indica-Anogeissus leiocarpa* communities.

Found in Gonder and Ilubabor; from Guinea to Sudan, Uganda and Tanzania (Vollesen, 1989e). Altitude 650-850 m.

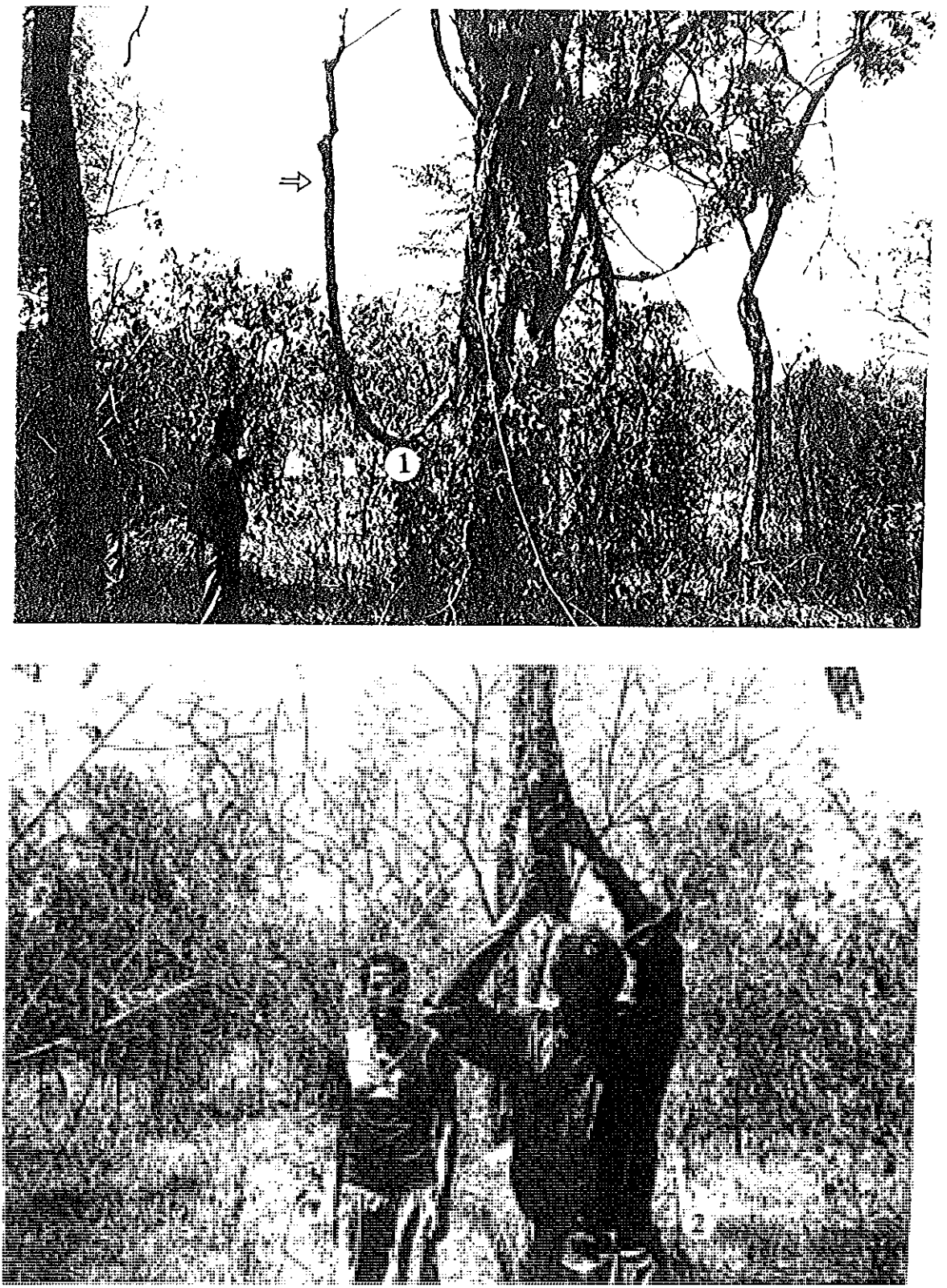


Fig. 13. *Cissus populina*: -softwood climber (1) and young Anywaa drinking water from vascular bundle (2).

Monocotyledons

ALISMATACEAE

77. Limnophyton obtusifolium *(L.) Miq.*, Tuytuy (Anywaa).

Perennial herb to 1 m high. All leaves produced at the base, peduncle inflated, milky sap seen when cut. Inflorescence whorled. Corolla white. Fruits light green with long petioles clasping at the base. **Ash is used as a source of edible salt.** Common in temporarily flooded area and along rivers with *Ipomoea aquatica* and *Azolla nilotica.*

Found in Afar, Ilubabor and Harerge; throughout tropical Africa, Madagascar, India and Malaysia (Lye, in preparation). Altitude sea-level to 700 m.

COMMELINACEAE

78. Aneilema beniniense *(P. Beauv.) Kunth.*, Ametegaella/Aretekodo (Anywaa), Chol'en (Majangir).

Herb to 1.2 m high. Leaves dull, dark green above, pale green beneath. Flower terminal, dense. Corolla white to purple. Anthers yellow. **Leaves edible as cooked vegetable.** Common in abandoned cultivation, in *Manilkara butugi-Cordia africana* community (in deep shade) and *Combretum adenogonium-Anogeissus leiocarpa* community.

Based on the plant specimens deposited at ETH, found in Ilubabor, Kefa and Welega. Altitude 700-1600 m.

79. Commelina diffusa *Burm.f.*, Chol'en (Majangir).

Erect to creeping herb to 50 cm high. Rooting at lower nodes. Root fibrous. Leaf lamina clasp the stem at its base. Flowers in open spathe. Corolla bright blue. Filaments blue, anthers yellow. **Leaves edible as cooked vegetable.** Found in deep shade of *Tamarindus indica-Anogeissus leiocarpa, Baphia abyssinica-Tapura fischeri* and *Manilkara butugi-Cordia africana* communities.

Based on the plant specimens deposited at ETH, found in Tigray, Wello, Shewa, Welega, Ilubabor, Kefa, Gamo Gofa, Sidamo, Bale and Harerge. Altitude 500-2400 m.

80. Commelina imberbis *Ehrenb. ex Hassk.*, Ametegaella/Aretekodo (Anywaa), Gnok (Nuer).

Herb 50 to 80 cm high. Stem succulent, with fibrous roots, rooting at lower nodes. Leaf lamina clasp the stem at its base. Flower spathe closed. Corolla blue. **Leaves edible as cooked vegetable.** Very common in *Sorghum purpureo-sericeum-Pennisetum thunbergii, Loudetia arundinacea-Hyparrhenia pilgeriana, Combretum adenogonium-Anogeissus leiocarpa* and *Tamarindus indica-Anogeissus leiocarpa* communities.

Based on the plant specimens deposited at ETH, found in Tigray, Wello, Shewa, Welega, Ilubabor, Kefa, Sidamo, Bale and Harerge. Altitude 500-1950 m.

81. Commelina zambesica *C. B. Clarke.*, Ametegaella/Aretekodo (Anywaa), Gnok (Nuer). Herb to 50 cm high. Stem rooting at lower nodes. Leaf lamina clasp the stem at its base. Corolla light blue. **Leaves edible as cooked vegetable.** Found in *Commelina-Hygrophila, Sorghum purpureo-sericeum-Pennisetum thunbergii* and *Combretum adenogonium-Anogeissus leiocarpa* communities.

Based on the plant specimens deposited at ETH, found in Welega. Altitude 580-1480 m.

DIOSCOREACEAE

82. Dioscorea bulbifera *L.*, Muwana Ajowom/Done (Anywaa).

Herbaceous climber 3 to 12 m long. Stem climbs clock-wise. Leaves ovate, up to 22.5 X 28 cm. Aerial tubers brown (resemble liver in structure and color), yellow with brown ridges when dissected. Fruit 3-winged, elongate, narrow (Fig. 14). **Aerial tubers edible after boiling and discarding water two times to remove its bitter taste.** Common in *Tamarindus indica-Anogeissus leiocarpa* community.

Found in Tigray, Gonder, Gojam, Ilubabor, Kefa, Gamo Gofa and Sidamo (Miege and Sebsebe Demissew, in preparation). Altitude 570-1500 m.

D. bulbifera, potato yam, is cultivated in south-east Asia, Pacific Islands, China, west Africa, south and central America (Rehm and Espig, 1991). Both cultivated and wild forms exist in Gambella, the wild being distinguished by its bitter taste.

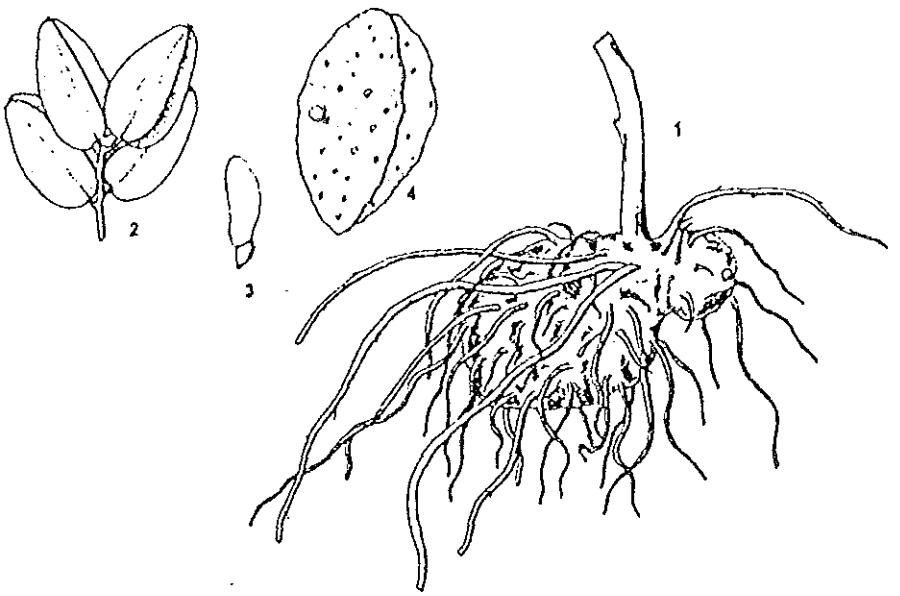


Fig. 14. *Dioscorea bulbifera*: -1 -tuber with many adventitious roots x3/4; 2 -group of fruits x3/4; 3 -seed x3/4; 4 -aerial tuber x3/4. All from *Tesfaye A.* 223. Drawn by Damtew Teferra. From Miege and Sebsebe Demissew (in preparation) and used with kind permission of the authors.

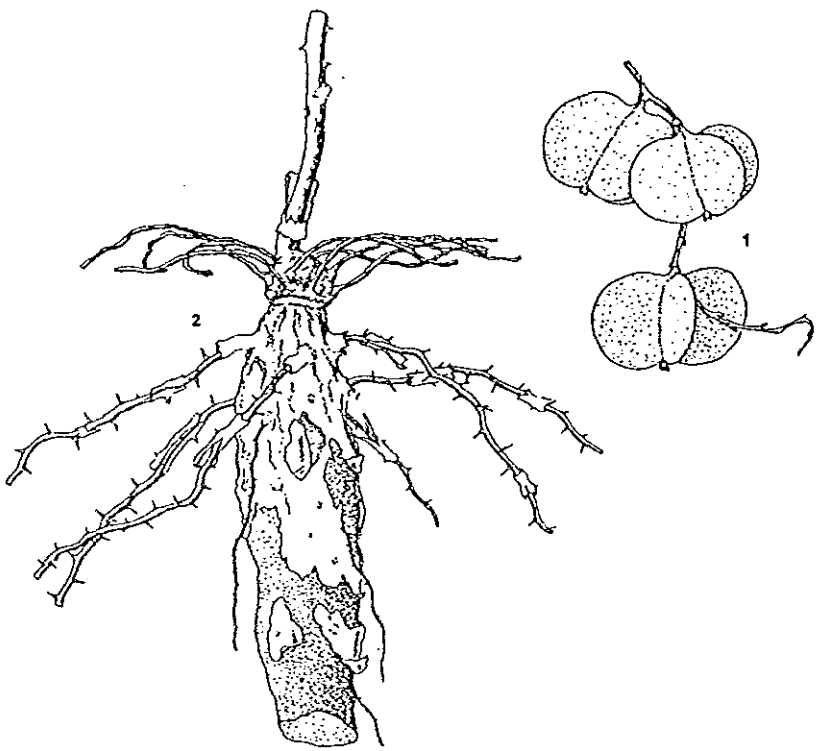


Fig. 15. *Dioscorea praehensilis*: -1 -group of fruits x1/2; 2 -tuber showing thorny adventitious roots and flaking surface (epidermis) of the main tuber x1/2. All from *Tesfaye A.* 126. Drawn by Damtew Teferra. From Miege and Sebsebe Demissew (in preparation) and used with kind permission of the authors.

83. Dioscorea praehensilis *Benth.*, Modo (Anywaa), Kawon (Majangir). (See Fig. 4)

Herbaceous climber 3 m to 8 m long. Stem with pickles, climbs in anti clock direction. Leaves opposite. Fruit 3-winged. Seeds winged. **Underground tuber edible as cooked and roasted vegetable. Important wild edible plant consumed between cropping seasons. It is also important food for hunters, honey gatherers and travelers. People replant the lower end of the stem so that its growth will continue.** Very common *Loudetia arundinacea-Hyparrhenia pilgeriana* and *Combretum adenogonium-Anogeissus leiocarpa* communities and rarely found in *Manilkara butugi-Cordia africana* community.

D. praehensilis, wild yam, is the wild relative of cultivated yams - *D. cayenensis-rotundata* complex (Hamon and Toure, 1991). In Ethiopia, found in Ilubabor only; wide spread to Sierra Leone in the west, and Malawi, Mozambique, Zambia and Angola in the south (Miege and Sebsebe Demissew, in preparation). Altitude 550-1600 m.

POACEAE

84. Oryza barthii *A. Chev.*, Alumo (Anywaa).

Annual grass 1 to 1.5 m high. Spikelets oblong, awns rough to touch. *O. barthii* can be distinguished from *O. longistaminata* A. Chev. & Roehr. by its much shorter ligule (Phillips, 1995). **Seeds edible under famine condition.** Found in temporally flooded area and along rivers with *Ipomoea aquatica, Limnophyton obtusifolium* and *Azolla nilotica.*

In Ethiopia found in Gambella only; westward to Mauritania; also in Tanzania and Zambia (Phillips, 1995). *O. barthii* is the closest wild relative of *O. glaberrima* Steud. which is cultivated in West Africa (Abbiw, 1990). Altitude 600 m.

85. Oryza longistaminata *A. Chev. & Roehr.*, Alumo (Anywaa).

Grass 2 to 2.5 m high. Panicle 17-30 cm long. Spikelets narrowly oblong, grey. **Seeds edible under famine condition.** Found in temporarily flooded area and along rivers.

O. longistaminata is the wild relative of rice (Edwards, 1991). Found in Gonder, Gojam and Ilubabor, in Ethiopia and throughout tropical Africa, south Africa and Madagascar (Phillips, 1995). Altitude 570-1800 m.

86. Sorghum arundinaceum *(Desv.) Stapf.*, Abaro (Anywaa), Waet (Nuer).

Grass to 4.3 m high. Inflorescence yellow when young and brown after maturity. Spickelet two and one reduced. Found in *Sorghum purpureo-sericeum-Pennisetum thunbergii* community, along the roads and as weed in agricultural field.

Widespread in Ethiopia; throughout tropical and south Africa and india (Phillips, 1995). Altitude 580-2400 m. *S. arundinaceum* is the wild relative of *S.bicolor* L. with which it is interfertile and forms hybrids (Edwards, 1991; and Phillips, 1995). According to International Board Plant Genetic Resources (1984), *S. arundinaceum* is in the primary genepool of sorghum.

PONTEDERIACEAE

87. Eichornia crassipes *(Mart.) Solms-Laub.*, Tuytuy (Anywaa)

Floating herb 10 to 20 cm high. Leaf petiole with air sack. **Ash is used as a source of edible salt.** Common in open water of river, temporally flooded area and along rivers with *Ipomoea aquatica, Limnophyton obtusifolium* and *Azolla nilotica.*

Based on the plant specimens deposited at ETH, found in Afar and Gambella. Altitude 575-580 m.

3.4. Categories of non-cultivated food plants

Of the total 311 plant species collected from wild (see appendix), 84 plants in 39 families and 71 genera (Table 6) were found to be non-cultivated food plants in the Gambella Region. Dicotyledonous plants had the highest proportion, 34 families, 64 genera and 74 species. The family Tiliaceae contains the highest number of species (6), followed by the families Capparidaceae and Fabaceae (5 species each), Asteraceae, Euphorbiaceae, Rubiaceae and Sapotaceae (4 species each). Five families, 6 genera and 10 species of Monocotyledonous plants were recorded as edible. Among monocots the family Commelinaceae contains the highest number of edible species (4), followed by the families Dioscoreaceae and Poaceae (2 species each). Only one species belonging to Pteridophyta was recorded as a source of edible salt.

Table 6. Non-cultivated food plants in Gambella Region. Category: A, fruit; B, leafy vegetables; C, plant ash salt; D, tubers; E, oil seeds; F, seeds as cereal; G, spices: H, beverage; I, hot drink; J, stem as water source; K, nectar. Habitat: DA, disturbed area; DR, dry river bed; FA, flooded area; HG, home garden. Community: 1, *Commelina-Hygrophila*; 2, *Sorghum purpureo-sericeum-Pennisetum thunbergii*; 3, *Loudetia arundinacea-Hyparrhenia pilgeriana*; 4, *Combretum adenogonium-Anogeissus leiocarpa*; 5, *Tamarindus indica-Anogeissus leiocarpa*; 6, *Baphia abyssinica-Tapura fischeri*; 7, *Manilkara butugi-Cordia africana*.

Botanical Name	Family	Category	Habit	Habitat/ Community
Acalypha ornata	Euphorbiaceae	C	Shrub	4,5,6
Albizia grandibracteata	Fabaceae	H	Tree	6,7
Allophylus macorobotrys	Sapindaceae	A	Shrub	5
Amaranthus hybridus	Amaranthaceae	B	Herb	DA,HG
Amaranthus spinosus	Amaranthaceae	B	Herb	DA,HG
Aneilema beniniense	Commelinaceae	B	Herb	DA,7
Aningeria altissima	Sapotaceae	A	Tree	7
Asystasia ganaetica	Acanthaceae	B	Herb	HG,4,5
Azolla nilotica	Azollaceae	C	Herb	FA
Balanites aegyptiaca	Balanitaceae	A	Tree	1,2
Bidens pilosa	Asteraceae	B	Herb	DA,HG,4
Butyrospermum paradoxum	Sapotaceae	A,E	Tree	3
Cadaba farinosa	Capparidaceae	B	Shrub	3,4
Capparis erythrocarpus	Capparidaceae	A	Shrub	5,6
Capsicum annum	Solanaceae	G	Herb	DA,5
Cardamine trichocarpa	Brassicaceae	B	Herb	DA
Celosia trigyna	Amaranthaceae	B	Herb	DA,HG
Celtis africana	Ulmaceae	A	Tree	7
Celtis toka	Ulmaceae	A	Tree	5
Celtis zenkeri	Ulmaceae	A	Tree	6,7
Cissus populina	Vitaceae	J	Climber	3,4,5
Cleome gynandra	Capparidaceae	B	Herb	DA,HG
Coffea arabica	Rubiaceae	A,I	Shrub	6,7
Commelina diffusa	Commelinaceae	B	Herb	3,6,7
Commelina imberbis	Commelinaceae	B	Herb	2,3,4
Commelina zambesica	Commelinaceae	B	Herb	1,2,4
Corchorus aestuans	Tiliaceae	B	Herb	DR
Corchorus capsularies	Tiliaceae	B	Herb	DR
Corchorus fascicularis	Tiliaceae	B	Herb	3
Corchorus olitorius	Tiliaceae	B	Herb	1,2,3,4
Corchorus tridens	Tiliaceae	B	Herb	4
Cordia africana	Boraginaceae	A	Tree	6,7
Cordia myxa	Boraginaceae	A	Tree	6
Crassocephalum montuosum	Asteraceae	B	Herb	DA,HG,7
Crateva adansonii	Capparidaceae	B	Shrub	DA,3,4
Dioscorea bulbifera	Dioscoreaceae	D	Climber	5
Dioscorea praehensilis	Dioscoreaceae	D	Climber	3,4,7

Table 6. Contd...

Botanical Name	Family	Category	Habit	Habitat/ Community
Diospyros mespiliformis	Ebenaceae	A	Tree	4,5
Eichornia crassipes	Pontederiaceae	C	Herb	FA
Elaeodendron buchananii	Celastraceae	A	Tree	6,7
Ethulia gracilis	Asteraceae	C	Herb	DA,HG
Ficus sycomorus	Moraceae	A	Tree	3,5
Flueggea virosa	Euphorbiaceae	A,B	Shrub	1,2,3,4
Gardenia ternifolia	Rubiaceae	A	Shrub	3,4
Hibiscus calyphyllus	Malvaceae	B	Herb	1,2,3,4,5
Hibiscus cannabinus	Malvaceae	B	Herb	3,5
Hygrophila auriculata	Acanthaceae	C	Herb	1,2,3
Ipomoea aquatica	Convolvulaceae	B	Herb	DA,FA,2
Lannea welwitschii	Anacardiaceae	A	Tree	3,4,7
Launaea taraxacifolia	Asteraceae	C	Herb	DA
Lepidotrichilia volkensii	Meliaceae	A	Tree	5,7
Leptadenia hastata	Asclepidaceae	B	Herb	DA,3
Limnophyton obtusifolium	Alismataceae	C	Herb	FA
Maerua triphylla	Capparidaceae	B	Shrub	1,2,4
Manilkara butugi	Sapotaceae	A	Tree	7
Mimusops kummel	Sapotaceae	A	Tree	6,7
Morus mesozygia	Moraceae	A	Tree	6,7
Nymphaea nouchalii	Nymphaeaceae	D,F	Herb	FA
Ocimum canum	Lamiaceae	G	Herb	DA,3,4
Oncoba spinosa	Flacourtiaceae	A	Shrub	3,5
Oryza barthii	Poaceae	F	Herb	FA
Oryza longistaminata	Poaceae	F	Herb	FA
Phyllanthus boehmii	Euphorbiaceae	B	Herb	1
Physalis peruviana	Solanaceae	A	Herb	DA,HG
Pithecellobium dulce	Fabaceae	A	Tree	HG
Portulaca oleracea	Portulacaceae	B	Herb	1
Pyrenacantha kaurabassana	Icacinaceae	C	Climber	3
Saba florida	Apocynaceae	A	Climber	5
Sarcocephalus latifolius	Rubiaceae	A	Shrub	3,4
Sclerocarya birrea	Anacardiaceae	A	Tree	3
Senna obtusifolia	Fabaceae	B	Herb	DA
Sida collina	Malvaceae	B	Herb	1,3
Solanum nigrum	Solanaceae	A	Herb	DA
Tamarindus indica	Fabaceae	A	Tree	3,4,5
Trichilia dregeana	Meliaceace	E	Tree	7
Trilepisium madagascariense	Moraceae	A	Tree	7
Triumfetta rhomboidea	Tiliaceae	B	Herb	DA
Vangueria apiculata	Rubiaceae	A	Shrub	4,5
Vigna membranacea	Fabaceae	B	Climber	3,4
Vitex doniana	Verbenaceae	A	Tree	HG,3,4
Whitfieldia elongata	Acanthaceae	K	Herb	6,7
Ximenia americana	Olacaceae	A,E	Shrub	3,4
Ziziphus abyssinica	Rhamnaceae	A	Shrub	4
Ziziphus spina-christi	Rhamnaceae	A	Shrub	3

The analysis of the data show that 48% are herbs, 29% trees, 17% shrubs and 7% climbers. Most of these plants are distributed among the seven major plant communities.

Zemede Asfaw (1995), compiled 170 angiosperm as non-cultivated food plants consumed within Ethiopia. When the list in Table 6 was cross checked with his list, 21 species were already compiled. The remaining 62 Angiosperm and one Pteridophyte were additional records of non-cultivated food plants of Ethiopia. This increased the number of non-cultivated food plants of Ethiopia from 170 to 233.

In Ethiopia, wild plants are generally consumed as food during food shortage (Edwards, 1991). Indigenous people in Gambella commonly use non-cultivated food plants as supplements or main food, when there is food shortage due to crop loss as a result of sever flooding or drought. Wild plants are the main food sources when people are away from home for honey gathering, mining, hunting and fishing. The appearance of some wild herbs is seasonal, especially before crops are harvested and their consumption alternates with cultivated crops.

The edible parts of these plants include: fruit, leaves, plant ash, tubers, seeds and flowers, where 37% plant species were consumed as fresh fruit only, 36% as leafy vegetables only, 10% with plant ash as a source of edible salt and 18% with other uses and those species with more than one uses. Based on the ways of consumption, the plants are categorized in to 11 groups and each group is discussed below.

Fresh fruits: Wild fruits are important food when people are away from home for honey gathering, hunting, mining or fishing. They are also consumed during food shortage. A total of 36 wild species in 20 families have been found to produce edible fruits (Table 6). All are consumed fresh while *Tamarindus indica* may be consumed after roasting. Most edible fruits from the wild are collected from trees (20 species), followed by shrubs (12), herbs (3) and climber (1).

Leafy vegetables: Wild vegetables, especially leaves, play an important role in the nutritional systems of the local people (Keller *et al.*, 1969) . Most are consumed before they flower with porridge and fish. Some (e.g. *Corchorus spp.*) are sold in local market places and generates income for house hold. A total of 31 species in 13 families were recorded to be used as vegetables from the wild (Table 6). Most of the leafy vegetables are herbs (24 species), followed by shrubs (4) and climbers (3).

Plant ash as a source of edible salt: `Salts' of plant origin have been commonly used in tropical Africa and South and North America whenever the common salt is unavailable (Ohtsuka *et al.*, 1987). Indigenous people in Gambella use 8 plants as a source of edible salt (Table 6). After burning the plants, the ash is dissolved in water and followed by filtration and evaporation to obtain edible salt. The whole plant is burnt to obtain the ash except *Pyrenacantha kaurabassana* in which only the tuber is used.

Tubers: Two wild species in family Dioscoreaceae: *Dioscorea bulbifera* and *D. praehensilis* were recorded to produce edible tubers. *D. bulbifera* produce aerial tubers in the leaf axil. The aerial tubers collected from wild tastes bitter due to the poisonous alkaloid dioscorine (Rehm and Espig, 1991), but indigenous people in Gambella boil the tubers and discard the water two times to remove the bitter. The cultivated variety (Hoak -Anywaa and Wekoy - Majangir) is not bitter.

Dioscorea praehensilis produces a very big underground tuber. It is consumed after roasting or cooking. It is very important and reliable wild food when people are away from home for mining, hunting, gathering honey or traveling. It is also the major food whenever there is food shortage between cropping seasons. During gathering of this species people leave a portion of the tuber on the stem and replant it so that its growth will continue. This is an important indigenous sustainable use of wild plants that requires encouragement.

An aquatic herb *Nymphaea nouchalii* is another wild plant with edible tuber. In this case, the tuber is usually collected from flooded areas or river banks.

Oil seed: Seeds of *Butyrospermum paradoxum, Trichilia dregeana* and *Ximenia americana* are important sources of edible oil. The oil and the seeds are sold in local markets.

Seeds as cereal: The seeds of *N. nouchalii*, *Oryza barthii* and *O. longistaminata* are dried and ground for meal as a cereal. During collection of the latter two species, collectors cover their nose with a piece of cloth to prevent the barbed seeds from entering.

Spices: Some spices needed for preparation of the main dish of the day grow wild in Ethiopia (Goettsch, 1991). The inflorescence of *Ocimum canum* is collected from the wild and used as spices. The fruits of naturalized *Capsicum annum* are used as spices from the wild.

Beverage: The bark of *Albizia grandibracteata* is used in the preparation of local alcoholic drink known as "OGOLLI". Fine part of the bark is collected after removing external dead bark. Then, it is added into dissolved honey and kept in direct sunlight. Fermentation will immediately take place and alcoholic intoxication is also very fast.

Hot drink: The leaves and beans of *C. arabica* are collected from wild and used in hot drink preparation.

Stem as source of water: The climate of the Gambella plain is hot, and regular water intake is essential to replace the water lost from the body through sweating. It is very difficult to obtain water when people go into woodlands. Carrying water is useless since it becomes hot and difficult to drink. People use the stem of a climber with soft wood,

Cissus populina, as a source of water. They cut the stem once from two ends and drink pure and cold water that flows out from the vascular bundle.

Flower as a source of sweet nectar: The flowers of *Whitfieldia elongata* produce sweat nectar. Children pick the flower and suck the nectar.

3.5. Categories of wild relatives of cultivated crops

A total of 13 species in 9 families and 10 genera were recognized as a wild relatives of cultivated crops (Table 7). They are grouped into 6 categories as wild relatives of cereal crops (3 species), fibers/leafy vegetables (3), oil seeds (2), stimulant (1), spices (2), and tubers (2). These wild relatives are related to economically important crops. Above all *Coffea arabica* is very important for the Ethiopian economy. Hoyt (1988), indicated that it is among the threatened wild relatives of crop plants and requires special attention in conservation.

Table 7. Wild relatives of cultivated crops in Gambella Region. Habitat: DA, disturbed area; DR, dry river bed; FA, flooded area. Community: 1, *Commelina-Hygrophila*; 2, *Sorghum purpureo-sericeum-Pennisetum thunbergii*; 3, *Loudetia arundinacea-Hyparrhenia pilgeriana*; 4, *Combretum adenogonium-Anogeissus leiocarpa*; 5, *Tamarindus indica-Anogeissus leiocarpa*; 6, *Baphia abyssinica-Tapura fischeri*; 7, *Manilkara butugi-Cordia africana*.

Category	Cultivated crop	Wild relative	Family	Habit	Habitat/ Community
Cereals	*Oryza glaberrima*	*O. barthii*	Poaceae	Herb	FA
	O. sativa	*O. longistaminata*	Poaceae	Herb	FA
	Sorghum bicolor	*S. arundinaceum*	Poaceae	Herb	DA,2
Fibers/Leafy Vegetables	*Hibiscus cannabinus*	*H. cannabinus*	Malvaceae	Herb	3,5
	Corchorus capsularies	*C. capsularies*	Tiliaceae	Herb	DR
	C. olitorius	*C. olitorius*	Tiliaceae	Herb	1,2,3,4
Oil Seeds	*Ricinus communis*	*R. communis*	Euphorbiaceae	Shrub	DA,5
	Sesamum indicum	*S. latifolium*	Pedaliaceae	Herb	2,3
Stimulant	*Coffea arabica*	*C. arabica*	Rubiaceae	Shrub	6,7
Spices	*Ocimum canum*	*O. canum*	Lamiaceae	Herb	DA,3,4
	Capsicum annum	*C. annum*	Solanaceae	Herb	DA,5
Tubers	*Dioscorea bulbifera*	*D. bulbifera*	Dioscoreaceae	Climber	5
	cayenensis-rotundata	*D. praehensilis*	Dioscoreaceae	Climber	3,4,7

4. CONCLUSION AND RECOMMENDATION

Based on the present study, the analysis of floristic data on cover/abundance value revealed that the vegetation of Gambella Region can be classified into seven major plant communities. The communities are described as *Commelina-Hygrophila*, *Sorghum purpureo-sericeum- Pennisetum thunbergii*, *Loudetia arundinacea-Hyparrhenia pilgeriana*, *Combretum adenogonium-Anogeissus leiocarpa*, *Tamarindus indica-Anogeissus leiocarpa*, *Baphia abyssinica-Tapura fischeri* and *Manilkara butugi-Cordia africana*. This classification was further supported by the variation in environmental factors between the plant communities.

The non-cultivated food plants of Gambella region accounts about 27% of the total plants sampled from the wild. The plants are consumed in various ways and are grouped into 11 categories: fresh fruits, leafy vegetables, plant ash as a source of edible salt, tubers, oil seed, seeds as cereal, spices, beverage, hot drink, stem as a source of water and flower as a source of sweet nectar. Indigenous people use these plants as supplements or as a main food when there is food shortage or when people are away from home.

It is interesting to note that the indigenous people in Gambella have very unique ethnobotanical knowledge, being well versed in the native plant name and uses of wild plants. These ethnobotanical knowledge has traditionally being passed on from

generation to generation. In the rural area of Gambella even teenagers know local name of plants and their specific uses. They recognize plants on the basis of a combination of appearance, morphology, ecological requirements and usage.

The rapid disappearance of ethnobotanical knowledge occurs when new generations take advantage of opportunities not available to their elders, such as attending school and living in urban areas. One way of preserving such important knowledge is through integrating into school curricula or into extracurricular school activities.

The wild relatives of cultivated crops recorded from Gambella belong to economically important plant groups like *Coffea arabica*. These plants are promising sources of genes for possibly improving our crops in the future. Information given in this study might help in identification of these plants for further evaluation and utilization and/or may be utilized in any conservation activities.

For protection of non-cultivated food plants, wild relatives of cultivated crops and plant communities described in this study, both conservation in nature (*in-situ*) and off site (*ex-situ*) are recommended as follows.

In-situ conservation

i. Establishing well defined protected areas where indigenous people have the right to collect non-timber products like wild food plants, medicinal plants, honey, fuel wood

and local construction materials form the plant communities described in these study. Clearing land for state farm expansion, lumbering and burning natural vegetation in protected area should be strictly controlled. These might be achieved by setting rules and regulations.

ii. Rehabilitating and restoring degraded areas using multipurpose indigenous plants described in this study instead of exotic plants. These should involve participation of indigenous people and use of their ethnobotanical knowledge.

Ex-situ conservation

i. Collecting the germplasm of these plants and maintaining in Gene Banks or in Botanic gardens so that it might be used in future to improve our crops and/or broaden our food base.

ii. Encouraging indigenous people in maintaining these plants in home gardens as Majangir nationalities, for example, grow *Amaranthus hybridus, Bidens pilosa, Celosia trigyna* and *Cleome gynandra* in garden with tomato, maize and sorghum.

ii. Evaluation of these plants for potential use as future crop or for improving crops or for using in agroforestry systems.

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APPENDIX

Plants in Gambella Region

A. Scientific and family names versus local names (A, Anywaa; M, Majangir; N, Nuer). Highlighted are cultivated crops. For fern species family names are capitalized. Species collected outside sample stands are marked by ~*~. For species marked by ~**~ description was based on herbarium specimen.

Scientific name		Family	Local name(s)	Coll. No.
Abrus precatorius L.		Fabaceae	Walwagno (A)	119
Abrus schimperi Hochst. ex Bak.		Fabaceae	Adigera (A)	103
Abutilon mauritanum (Jacq.) Medc.	*	Malvaceae	Gnikognjiw (A)	226
Acacia hockii De Willd.		Fabaceae	Tip/Uchino (A)	414
Acacia pentagona (Schumach.) Hoof.f.		Fabaceae	Adicham (A), Sesesm (M)	251,369,385
Acacia polyacantha Willd.		Fabaceae	Tip/Uchino (A)	92,423
Acacia senegal (L.) Willd.		Fabaceae	Uchino (A)	421
Acacia seyal Del.		Fabaceae	Alalo/Alaro (A), Laeren (M)	89,187
Acacia sieberiana DC.	*	Fabaceae	Tip (A)	179
Acalypha acrogyna Pax.		Euphorbiaceae	Atiyhomerlul (A), Gidgid (M)	247,301,365
Acalypha ornata A. Rich.		Euphorbiaceae	Atinotur/Atiyho/Atiyhomerpap (A)	40,150,390,459
Achyranthes aspera L.		Amaranthaceae	Akadomerpap/Akaldaegn (A)	115,141,267
Achyrospermum schimperi (Hochst. ex Briq.) Perkins.		Lamiaceae	Ongok (M)	372
Acmella caulirhiza Del.	*	Asteraceae	Elaeru (A)	159
Adathoda shimperiana Nees.		Acanthaceae	Wachakem (M)	343
Albizia grandibracteata Taub.		Fabaceae	Bamu (A), Sati (M)	260,278,33
Alchornea laxiflora (Benth.) Pax. & K. Hoffm.		Euphorbiaceae	Dashu (M)	356,359
Allophylus macrobotrys Gilg.		Sapindaceae	Athow (A)	17,210,391
Alstonia boonei De Wild.	*	Apocynaceae	Joga (A & M)	319
Amaranthus hybridus L.	*	Amaranthaceae	Korbo/Mureduk (M)	327,328
Amaranthus spinosus L.	*	Amaranthaceae	Amugnaedor(A), Duwong (N)	456
Amorphophalus gallaensis (Engl.) N. E. Brown.	*	Araceae	Apinajowom (A)	386B
Ampelocissus schimperiana (Hochst. ex A. Rich.) Palanch.		Vitaceae	Omok (A)	38
Andropogon schirensis Hochst. ex A. Rich.		Poaceae	Pedo (A)	8,447
Aneilema beniniense (P. Beauv.) Kunth.		Commelinaceae	Chol'en (M), Ametegaela/Aretekodo (A)	292,325,352

Scientific name		Family	Local name(s)	Coll. No.
Aningeria adolfi-friderici (Engl.) Rob. & Gilb.		Sapotacae	Saoy (M)	384
Aningeria altissima (A. Chev.) Aubrev. & Pellgr.		Sapotaceae	Gomu (M)	339
Annona senegalensis Pers.		Annonaceae	Geyo/Ubollo (A)	83,128,290
Anogeissus leiocarpa (A. DC.) Guill. & Perr.		Combretaceae	Rid (A), Kokeden (M)	76,98
Antiaris toxicaria Lesch.		Moraceae	Tengo (A), Tengi (M)	276
Argomuellera macrophylla Pax.		Euphorbiaceae	Adibubongo (A), Babuch (M)	244
Asparagus flagellaris Baker.		Asparagaceae	Bot (N), Obodo (A)	23,283,314
Aspilia kotschyi (Sch. Bip.) Oliv.		Asteraceae	Ajela (A)	69A,454
Asystasia gangetica (L.) T. Anderss.		Acanthaceae	Mella (A)	450,454
Azolla nilotica L.	*	AZOLLACEAE	Ogoro/Ugoro (A)	451
Basilicum polystachion (L.) Moench.		Lamiaceae	Anono (A)	49,216
Balanites aegyptiaca (L.) Del.		Balanitaceae	Sow (N), Toin (M), Tow (A)	61
Baphia abyssinica Brummitt.		Fabaceae	Adidagoy (A), Duwae (M)	209,249,303
Barleria grandicalyx Lindau.	*	Acanthaceae	Mella (A)	160
Bidens pilosa L.		Asteraceae	Jongae (M), Kaella (A)	112,239
Blyttia fruticulosa (Decne.) D. V. Field.		Asclepidaceae	Dai (A)	27B
Bridelia scleroneura Muell. Arg.		Euphorbiaceae	Orwich (A)	21,171,233
Bulbostylis clarkeana Hutch. ex Bodard.		Cyperaceae	Oluwa (A)	91
Butyrospermum paradoxum (Gaertin.f.) Hepper	*	Sapotaceae	Wado (A)	191,298
Cadaba farinosa Forssk.		Capparidaceae	Anaedo (A),Net (N)	142,287
Cadaba longifolia DC.		Capparidaceae	Alak (A)	138,310
Calotropis procera (Ait.) Ait.f.	*	Asclipidaceae	Abuwo (A)	280
Capparis erythrocarpus Isert.		Capparidaceae	Omono (A)	85A,85B,304
Capparis sepiaria L.	*	Capparidaceae	Ungerow (A)	288
Capsicum annum L.	*	Solanaceae	Adimeeti (A)	43
Cardamine trichocarpa A. Rich.	*	Brassicaceae	Okoy (M)	330
Catunaregam nilotica (Stapf.) Tirvengadum.		Rubiaceae	Gnimorbichang (A)	153
Celosia argentea L.	*	Amaranthaceae	Abelagak (A)	445
Celosia trigyna L.	*	Amaranthaceae	Agnogn (A), Bongi (M)	198,351
Celtis africana Burm.f.		Ulmaceae	Upi (M)	366
Celtis philippensis Blanco.		Ulmaceae	Kokaey (M)	355
Celtis. toka (Forssk.) Hepper & Wood.		Ulmaceae	Laero (A)	166

Scientific name		Family	Local name(s)	Coll. No.
Celtis zenkeri Engl.		Ulmaceae	Kobaey (A), Kobae (M)	257
Chlorophytum blepharophyllum Bak.		Anthericaceae	Apitu (A)	53,113,441
Chlorophytum gallabatense Schweinf. ex Bak.		Anthericaceae	Apitu (A), Botoloto (N)	35,397
Cissus petaiolata Hook.f.		Vitaceae	Makatae (M)	362
Cissus populina Guill & Perr.		Vitaceae	Ajaegno/Gniallo (A)	100
Cissus ruspolii Gilg.		Vitaceae	Monotor (A)	28
Cleome gynandra L.	*	Capparidaceae	Akiya (A), Kokomen (M)	326,387
Clerodendrum captitatum (Willd.) Schumach. & Thonn.		Verbenaceae	Ajaegna (A)	114,208
Clerodendrum cordifolium (Hochst.) A. Rich.		Verbenaceae	Ajaegna (A)	101,125,22,320
Coffea arabica L.		Rubiaceae	Buna (A), Cary (M)	261,361
Combretum adenogonium Steud. ex A. Rich.		Combretaceae	Cora/Dot (A)	111,299
Combretum capituliflorum Fenzl ex Schweinf.	*	Combretaceae	Atiben (A)	224
Combretum collinum Fresen.		Combretaceae	Duno/Kegno (A)	20,130,146,212
Combretum molle A. Br. ex G. Don.	*	Combretaceae	Kegno (A)	297
Commelina diffusa Burm.f.		Commelinaceae	Chol'en (M)	324
Commelina imberbis Ehrenb. ex Hassk.		Commelinaceae	Ametegaella/Aretekodo(A),Gnok(N)	102,174
Commelina zambesica C. B. Clanke.		Commelinaceae	Ametegaella/Aretekodo(A),Gnok(N)	37
Corchorus aestuans L.	*	Tiliaceae	Awachuwaey (A)	162
Corchorus capsulariers L.	*	Tiliaceae	Awachuwaey (A)	163
Corchorus fascicularies Lam.	*	Tiliaceae	Awachuwaey (A)	192
Corchorus olitorius L.		Tiliaceae	Awachuwaey (A), Maero (N)	15,121A,395,424
Corchorus tridens L.		Tiliaceae	Awachuwaey (A)	121B
Cordia africana Lam.		Boraginaceae	Dampaey (M), Urogu (A)	200,402
Cordia gharaf (Forssk.) Aschers.	*	Boraginaceae	Odallo (A)	196
Cordia myxa L.		Boraginaceae	Goy (A)	307
Crassocephalum montuosum (S. Moore.) Milne-Redhead.	*	Asteraceae	Miningi (M)	383
Crateva adansonii DC.		Capparidaceae	Bado/Bodo (A), Kaech (N)	145,281,388
Crossoandria nilotica Oliv.	*	Acanthaceae	Laewani (M)	246
Crossopteryx febrifuga (Afzel. ex G. Don) Benth.		Rubiaceae	Akogegn (A)	4,235
Croton macrostachyus Del.		Euphorbiaceae	Chomo (M)	364
Croton sylvaticus Krauss.		Euphorbiaceae	Chata (A), Chomo (M)	262,264
Cucumis pustulatus Naud. ex Hook.f.		Cucurbitaceae	Gnibenekuru (A)	108
Cyperus alopecurides Rottb.		Cyperaceae	Utok (A)	105

Scientific name		Family	Local name(s)	Coll. No.
Cyperus reduncus Hochst. ex Bock.	*	Cyperaceae	Utok (A)	183
Cyphostemma adenocaule (Steud. ex A. Rich.) Wild. & Drummond.	*	Vitaceae	Monotor (A)	197
Desmodium dichotomum (Klein. ex Willd.) DC.		Fabaceae	Poni (A)	60,136
Desmodium gangeticum (L.) DC.	*	Fabaceae	Poni (A)	202
Dichrostachys cinerea (L.) Wight & Arn.		Fabaceae	Akiru (A)	129
Dioscorea bulbifera *L.*	*	Dioscoreaceae	Hoak (A), Wekoy (M)	277
Dioscorea bulbifera L.		Dioscoreaceae	Done/Muwana Ajowom (A)	19,168,221,223
Dioscorea praehensilis Benth.		Dioscoreaceae	Modo (A), Kawon (M)	34.126A,126B,231,348
Diospyros abyssinica (Hiern.) F. White.		Ebenaceae	Acheriy (A), Kuri (M)	254,345
Diospyros mespiliformis Hochst. ex A. DC.		Ebenaceae	Adiu (A), Monchol (N)	41,205
Dolichos sericeus E. Mey.		Fabaceae	Adiketi(A)	462
Dorstenia barnimiana Schwenif.		Moraceae	Kiyo (A)	36
Dracaena fragrans (L.) Kor-Grawal.		Dracaenaceae	Emuy (M), Tachi (A)	268
Drynaria volkensii Hieron.		POLYPODIACEAE	Ajech (M)	349
Echinochloa crus-pavonis (Kunth.) Schult.		Poaceae	Aponchuwaey (A)	127,419
Echinochloa rotundiflora Clayton.		Poaceae	Terro (A), Tot (N)	6
Echinops longisetus A. Rich.		Asteraceae	Gnallo (A)	47,96
Eichornia crassipes (Mart.) Solms-Laub.	*	Pontederiaceae	Tuytuy (A)	455
Elaeodendron buchananii (Loes.) Loes.		Celastraceae	Beyen/Chogaey (M)	266,338
Entada africana Guill & Perr.		Fabaceae	Chilwidy (A)	79
Eragrostis tremula Hochst. ex Steud.	*	Poaceae	Juwi Awaero (A)	170
Eriosema sp.		Fabaceae	Adiketi (A)	64
Erythroxylum fischeri Engl.		Erythroxylaceae	Gegem (M), Jemo (A)	84,151
Ethulia gracilis Del.	*	Asteraceae	Abuwa/Apuda (A)	189,458
Ficus capreaefolia Del.	*	Moraceae	Ageta (A)	439
Ficus dicranostyla Mildbr.		Moraceae	Udallu (A)	302
Ficus glumosa Del.	*	Moraceae	Obuya (A)	93
Ficus mucuso Ficalho.		Moraceae	Abae (M)	377
Ficus ovata Vhal.		Moraceae	Dokaey (M)	367
Ficus sur Forssk.		Moraceae	Chaemen/Shaemen (M)	350
Ficus sycomorus L.		Moraceae	Engop (N), Olam (A)	1
Ficus thonningii Blume.		Moraceae	Oredah (A), Shimetiy (M)	317,336
Ficus vasta Forssk.		Moracae	Pow (A)	393,448

Scientific name		Family	Local name(s)	Coll. No.
Flueggea virosa (Willd.) Vigot.		Euphorbiaceae	Akano (A), Wak (N)	86,184
Gardenia ternifolia Schum. & Thonn.		Rubiaceae	Duwong (A)	74
Grewia mollis A. Juss.		Tiliaceae	Pabo (A)	22
Grewia velutina (Forsk.) Vahl.	*	Tiliaceae	Mano (A)	94,227,230
Harrisonia abyssinica Oliv.		Simaroubaceae	Piado (A)	75,97
Heteropogon contortus (L.) Roem. & Schult.	*	Poaceae	Achillrodae (A)	433
Hibiscus calyphyllus Cavan.		Malvaceae	Gnilorbey (A), Tid (N)	16,185,427
Hibiscus cannabinus L.		Malvaceae	Gnilorbey (A), Tid (N)	239
Hilleria latifolia (Lam.) H. Walter.		Phytolacaceae	Mermet (M)	358
Hippocratea africana (Willd.) Loes. ex Engl.		Celastraceae	Keyo (A), Yakat (M)	255,318
Hipppocratea pallens Oliv.		Celastraceae	Alenki (A), Gelenchi (M)	248
Hygrophila auriculata (Schumach.) Heine.		Acanthaceae	Siyal/Till (N), Utiwaello (A)	12,313
Hyparrhenia filipendula (Hochst.) Stapf.		Poaceae	Till (A)	52
Hyparrhenia pilgeriana C. E. Hubb.		Poaceae	Gnibolla (A)	54,416
Hyparrhenia rufa (Nees.) Stapf.		Poaceae	Acheill (A)	7
Hyperthelia dissoluta (Steud.) Clayton.		Poaceae	Till (A)	415
Impatiens ethiopica Grey-Wilson		Balsaminaceae	Puley (M)	323
Imperata cylindrica (L.) Raeuschel.		Poaceae	Ubaeyow (A)	56
Indigofera arrecta Hochst. ex A. Rich.		Fabaceae	Ochuwa/Uchuwa (A)	412
Indigofera brevicalyx Bak.f.		Fabaceae	Adigera (A), Riyer (N)	57
Indigofera garckeana Vatake.		Fabaceae	Dijwaey (A)	29
Ipomoea aquatica Forsk.		Convolvulaceae	Ajuwaella (A), Tach (N)	62
Ipomoea dichora Hochst. ex Choisy.		Convolvulaceae	Omok (A)	438
Ipomoea eriocarpa R. Br.		Convolvulaceae	Dai (A)	107,134,413
Ipomoea sepiaria Roxb.	*	Convolvulaceae	Ajuwaella (A)	389
Ipomoea shupangensis Bak.	*	Convolvulaceae	Ajuwaella (A)	240,420
Justicia glabra Koening. ex Roxb.		Acanthaceae	Mella (A)	165,265,300
Justicia ladanoides Lam.		Acanthaceae	Mella (A)	99
Justicia nyassana Lindau.	*	Acanthaceae	Chingi (M), Mella (A)	272
Kaemfera aethiopica (Schweinf.) Solms-Laub.	*	Zingiberaceae	Apitu (A)	392
Keetia gueizii (Sond.) Bridson.		Rubiaceae	Ajella (A), Kachagin (M)	250,270
Kigelia aethiopum (Fenzl.) Dandy.	*	Bignoniaceae	Ja (A)	219
Laggera pterodonta (DC.) Oliv.	*	Asteraceae	Apuda (A)	48

Scientific name		Family	Local name(s)	Coll. No.
Lannea fruticosa (Hochst. ex A. Rich.) Engl.		Anacardiaceae	Qualidi (A)	39,173
Lannea welwitschii (Hiern.) Engl.		Anacardiaceae	Arim (A), Jomaeh (M)	88
Launaea taraxacifolia (Willd.) Amin. ex C. Jeffrey.	*	Asteraceae	Ataebi (A)	203
Lecaniodiscus fraxinifolius Bak.		Meliaceae	Kiyang (M)	368
Ledebouria Kirkii (Bak.) Stedje. & Thulin.		Hyacinathceae	Apitu (A), Botoloto (N)	400
Lepidotrichilia volkensii (Gurke.) Leroy.		Meliaceae	Kijang (A)	152
Leptadenia hastata (Pers.) Decne.	*	Asclepidaceae	Akochdial/Akuro (A)	65,182,432
Leptaspis zeylanica Nees ex Steud.		Poaceae	Dongaey (M)	353
Leptogramma pozoi (Lagasca.) Heywood.		THELYPTERIDACEAE	Lamon (M)	378
Limnophyton obtusifolium (L.) Miq.	*	Alismataceae	Tuytuy (A)	431
Linocira giordanii Choiv.		Oleaceae	Mermego (M)	354
Lonchocarpus laxiflorus Guill. & Perr.		Fabaceae	Olwaeto (A)	78,229,286
Loudetia arundinacea (Hochst. ex A. Rich.) Steud.		Poaceae	Akarach/Ubarro (A)	90,417,461
Maerua triphylla A. Rich.		Capparidaceae	Anaedo (A)	149
Malacantha alnifolia (Bak.) Pierre.		Sapotaceae	Chikochiy (M), Chiwachiy (A)	256
Manilkara butugi Chiov.		Sapotaceae	Gojae (M)	575
Maytenus grcilipes (Welw. ex Oliv.) Exell.	*	Celastraceae	Atatoy (M)	380
Maytenus senegalensis (Lam.) Exell.		Celastraceae	Ulaemo mananek tuwon(A)	44
Merremia hederacla (Burm.f.) Hallier.f.		Convolvulaceae	Achak (A)	436
Milicia excelsa (Welw.) C. C. Derg		Moraceae	Dego (A), Kanchi (M)	269,371
Millittia ferruginea (Hochst.) Bak.		Fabaceae	Yagoy (M)	337
Mimusops kummel Bruce. ex A. DC.		Sapotaceae	Achak (A), Woni (M)	271,279,363
Momordica foetida Schumach.		Cucurbitaceae	Okamo (A)	175,190
Morus mesozygia Stapf.		Moraceae	Echick (M), Ochik (A)	275
Mosses			Uchaey (M)	334
Nymphaea nouchalii Burm.f.		Nymphaeaceae	Kaehe (N),Kiyho (A)	177
Ochna leucophloeos Hochst. ex A. Rich.		Ochnaceae	Gnikango (A)	131,285,443
Ocimum canum Sims.	*	Lamiaceae	Meno (A)	156
Olyra latifolia L.		Poaceae	Opero (A)	245
Oncoba spinosa Forssk.	*	Flacourtiaceae	Adiquala (A)	164,289
Opilia amentacea Roxb.		Opiliaceae	Adimoti (A)	157,316
Oryza barthii A. Chev.	**	Poaceae	Alumo (A)	-
Oryza longistaminata A. Chev. & Roehr.	*	Poaceae	Alumo (A)	442

Scientific name		Family	Local name(s)	Coll. No.
Oryza sativa *L.*	*	Poaceae	Laeb (N)	429
Panicum comorense Mez.		Poaceae	Angeri Merpap (A)	18
Panicum maximum Jacq.		Poaceae	Agada (A), Magedae (M)	33,449
Panicum porphyrrhios Steud.		Poaceae	Jaewach (A)	68
Pennisetum petiolare (Nees.) Benth.	*	Poaceae	Akirro (A)	31
Pennisetum polystachion (L.) Schult.		Poaceae	Abuno (A)	14,117
Pennisetum thunbergii Kunth.		Poaceae	Ajjeb Gowok (A)	9
Periploca linerifolia Dill. ex A. Rich.		Asclepiadaceae	Aditeti (A)	154
Phyllanthus boehimii Pax.		Euphorbiaceae	Awik (A), Butot (N)	396
Phyllanthus leucanthus Pax.		Euphorbiaceae	Adigera (A)	122B
Phyllanthus pseudoniruri Muell. Arg.		Euphorbiaceae	Adigera (A)	122A
Physalis peruviana L.	*	Solanaceae	Gongor (M)	409
Piliostigma thonningii (Schum.) Milne-Redh.		Fabaceae	Egawach (N), Upet (A)	55
Pithecellobium dulce (Roxb.) Benth.	*	Fabaceae	Aluwa (A)	453
Polyscias fulva (Hiern.) Harms		Araliaceae	Karashoy (M)	370
Portulaca oleracea L.		Portulacaceae	Adilagae (A), Wur (N)	399
Pseuderanthemum tunicatum (Afz.) Milne-Redh.		Acanthaceae	Akadomerlul (A)	263
Pseudocedrela kotschyi (Schweinf.) Harms	*	Meliaceae	Put (A)	242
Psidium guajava *L.*	*	Myrtaceae	Ajuwata (A)	322
Pterocarpus lucens Guill. & Perr.		Fabaceae	Laro (A)	77,315
Pyrenacantha kaurabassana Baill.		Icacinaceae	Appel (A)	144,293,311
Rhynochosia nyasica Bak.		Fabaceae	Dai (A)	27A,176
Ricinus communis L.	*	Euphorbiaceae	Boliyr (M), Uliru (A)	381
Rinorea friisii M. Gilbert.		Violaceae	Gedeji (M)	340,405
Rottboellia cochinchinensis (Lour.) Clayton.		Poaceae	Akiwaega (A)	32
Saba florida (Benth.) Bullock.		Apocynaceae	Cohomo (A)	167,193
Sansevieria abyssinica N. E. Br.		Agavaceae	Tuworo (A)	426
Sarcocephalus latifolius (J. E. Smith) E. A. Bruce.		Rubiaceae	Moyo (A)	45
Sclerocarya birrea (A. Rich.) Hochst.		Anacardiaceae	Tibo (A)	80,321
Selaginella abyssinica Spring.		SELAGINELLACEAE	Uchaey (M)	381
Senna obtusifolia (L.) Irwin. & Barneby	*	Fabaceae	Ajada (A)	161
Sesamum angustifolium (Oliv.) Engl.	*	Pedaliaceae	Gnim Jowok (A)	312
Sesamum indicum *L.*	*	Pedaliaceae	Gnimini (A)	428

Scientific name		Family	Local name(s)	Coll. No.
Sesamum latifolium Gillett.	*	Pedaliaceae	Gnim Jowok (A)	10
Sida collina Schlechlend.		Malvaceae	Adik (A)	398,425
Solanum benderianum Schimp. ex Engl.	*	Solanaceae	Tigle (M)	374
Solanum incanum L.		Solanaceae	Uchock (A)	46
Solanum nigrum L.	*	Solanaceae	Achigoy (A)	206
Solanum terminale Forssk.	*	Solanaceae	Pijo (M)	408
Sorghum arundinaceum (Desv.) Stapf.	*	Poaceae	Abaro (A), Waet (N)	13
Sorghum purpureo-sericeum (Hochst. ex A. Rich.) Aschers. & Schweinf.		Poaceae	Alumo Manachol (A)	5
Spermacoce sphaerostigma (A. Rich.) Vatake.		Rubiaceae	Adigaella (A)	69B,435,440
Sterculia africana (Lour.) Friori.		Sterculiacae	Orimo (A)	422
Stereospermum kunthianum Cham.		Bignoniaceae	Chipolo (A)	25,180,228
Streptogyna crinita P. Beauv.		Poaceae	Baentae (M), Obentaey (A)	258
Strychnos innocua Del.		Loganiaceae	Adiquala Leach (A)	72,284
Tacca leontopetaloides (L.) Kuntze.		Taccaceae	Apina Ajowom (A)	24
Tamarindus indica L.		Fabaceae	Chuwa (A), Moti (M), Qad (N)	42,296
Tapura fischeri Engl.		Dichapetalaceae	Chamchir (A & M)	259
Tephrosia bracteolata Guill. & Perr.		Fabaceae	Ochuwa/Adigera (A)	59,95
Terminalia laxiflora Engl. & Diels		Combretaceae	Pok (A)	73,238
Terminalia macroptera Gull. & Perr.		Combretaceae	Pok (A)	220
Thelopogon elegans Roem. & Schult.		Poaceae	Angeri (A)	58
Trichilia dregeana Sond.		Meliaceace	Yuya (M)	335,411
Trichilia prieuriana A. Juss.		Meliaceae	Gileh/Koti (M)	252,273,357
Trilepisium madagascariense DC.		Moraceae	Goboy (M)	331,410
Triumfetta pentandra A. Rich.		Tiliaceae	Wiyo (A)	110
Triumfetta rhomboidea Jacq.	*	Tiliaceae	Adik/Wiyo (A)	199
Turraea nilotica Kotschy. & Peyr.		Meliaceae	Ubello (A)	194
Tylosema fassoglensis (Kotschy. ex Schwenif.) Torre. & Hillc.		Fabaceae	Adiphaga(A)	158
Vangueria apiculata K. Schum.		Rubiaceae	Aruwano (A)	118
Ventilago diffusa (G. Don.) Exell.		Rhamnaceae	Bitekot (M)	342
Vepris dainellii (Pichi-Serm.) Kokwaro.		Rutaceae	Geltegni/Welaelaey (M), Olan (A)	207,347,379
Vigna membranacea A. Rich.	*	Fabaceae	Bogajowom (A)	155,446
Vitex doniana Sweet.	*	Verbenaceae	Juwaello (A)	434
Whitfieldia elongata (P. Beauv.) C. B. Cl.		Acanthaceae	Adibuch (A), Erekoy (M)	204,344

Scientific name	Family	Local name(s)	Coll. No.
Wissadula rostrata (Schumach. & Thonn.) Hook.f.	Malvaceae	Gnikognjiw (A)	104
Ximenia americana L.	Olacaceae	Ulaemo menan dago(A), Wulaeng (N)	81,169,282
Xylopia parviflora (A. Rich.) Benth.	Annonaceae	Orwaey (A)	274
Zanthoxylum lepreurii Guill. & Perr.	Rutaceae	Angich (A)	253
Ziziphus abyssinica Hocht. ex A. Rich.	Rhamnaceae	Laang Dial (A)	2
Ziziphus pubescens Oliv.	Rhamnaceae	Arumo (A)	82,211,295
Ziziphus spina-christi (L.) Deof.	Rhamnaceae	Bow (N), Lanng (A)	3

B. Scientific and family names (plants without local names). Species collected outside sample stands are marked by *.

Scientific name		Family	Coll.No.
Abutilon figarianum Webb.	*	Malvaceae	181
Acacia drepanolobium Harms ex Sjostedt.	*	Fabaceae	186
Acalypha villicaulis A. Rich.		Euphorbiaceae	109
Aframomum alboviolaceum (Ridl.) K. Schum.	*	Zingiberaceae	243
Albizia malacophylla (Steud. ex A.Rich) Walp.	*	Fabaceae	232
Ammania auriculata Willd.	*	Lytraceae	217
Aspila africana (Pers.) Adams.	*	Asteraceae	460
Astragalus fatnensis Hochst. ex Baker.		Fabaceae	140
Astripomoea malvacea (Klotzsh.) Meuse.		Convolvulaceae	26,172
Barleria ventricosa Nees.	*	Acanthaceae	120
Biophytum umberaculum Welw.		Oxalidaceae	123
Blepharis maderaspatensis (L.) Heyne. ex Roth.		Acanthaceae	143,195
Chazaliella abrupta (Hiern.) Petit. & Verdc.		Rubiaceae	305
Clerodendrum alatum Gurke.		Verbenaceae	71,394
Clematis hirsuta Perr. & Guill.		Ranunculaceae	87A,87B
Coccinia grandis (L.) Voigt.		Cucurbitaceae	306
Crotalaria impressa Nees. ex Walp.		Fabaceae	133,139
Cynglossum lanceolatum Forsk.	*	Boraginaceae	11
Diplocyclos palmatus (L.) C. Jeffrey.	*	Cucurbitaceae	201
Grewia tenax (Forssk.) Flori.	*	Tiliaceae	309
Hoslundia opposita Vahl.		Lamiaceae	51,294
Hyptis spicigera Lam.	*	Laminaceae	188
Jusminum emini Gilg.		Oleaceae	116,430
Justicia diclipteroides Lindau.		Acanthaceae	147
Leonotis nepetifolia (L.) R. Br.	*	Lamiaceae	444
Lippia grandifolia Hochst. ex A. Rich.		Verbenaceae	70
Mimosa invisa Mart. ex Colla.	*	Fabaceae	457
Monechuma ciliatum (Jacq.) Milne-Redh.		Acanthaceae	63
Neorautanenia mitis (A. Rich.) Verdc.		Fabaceae	137
Nicandra physalodes (L.) Gaertn.	*	Solanaceae	332
Ottelia ulvfolia (Planch.) Walp.	*	Hydrocharitaceae	178
Polygala arenaria Willd.		Polygalaceae	124,236
Polyscias farinosa (Del.) Harms	*	Aralaceae	241
Ruellia prostrata Poir.	*	Acanthaceae	291
Sesbania sesban (L.) Merr.	*	Fabaceae	218
Sida alba L.		Malvaceae	66
Sopubia ramosa (Hochst.) Hochst.		Scrophulariaceae	237
Thunbergia ruspolii Lindau.		Acanthaceae	106
Vernonia purpurea Sch. Bip. ex Walp.		Asteraceae	132
Vernonia rothii Oliv. ex Hiern.		Asteraceae	418
Vigna ambaceensis Bak.		Fabaceae	30,135
Walthera indica L.		Sterculiaceae	225

C. Unidentified plants. Plants collected outside sample stands are marked by *.

Coll. No.	Local name(s)	
50	Omok (A)	
67	Mella (A)	
148	-	
234	-	
308	Amucoy (A)	
341 & 407	Gontae (M)	
346 & 406	Wengaey	
360	Chonkaey (M)	*
373	Chingi (M)	
376	Dufarae (M)	*
386A	Achirema (A), Kuchitae (M)	*
404	-	

D. Local name(s) (A, Anywaa; M, Majangir; N, Nuer) versus scientific and family names.

Local name	Scientific name/Family
Abae (M)	*Ficus mucuso* Ficalho. (Moraceae)
Abaro (A)	*Sorghum arundinaceum* (Desv.) Stapf. (Poaceae)
Abelagak (A)	*Celosia argentea* L. (Amaranthaceae)
Abuno (A)	*Pennisetum polystachion* (L.) Schult. (Poaceae)
Abuwa (A)	*Ethulia gracilis* Del. (Asteraceae)
Abuwo (A)	*Calotropis procera* (Ait.) Ait.f. (Asclipidaceae)
Achak (A)	*Merremia hederacla* (Burm.f.) Hallier.f. (Convolvulaceae)
Achak (A)	*Mimusops kummel* Bruce. ex A. DC. (Sapotaceae)
Acheill (A)	*Hyparrhenia rufa* (Nees.) Stapf. (Poaceae)
Acheriy (A)	*Diospyros abyssinica* (Hiern.) White. (Ebenaceae)
Achigoy (A)	*Solanum nigrum* L. (Solanaceae)
Achillrodae (A)	*Heteropogon contorus* (L.) Roem. & Schult. (Poaceae)
Adibubongo (A)	*Argomuellera macrophylla* Pax. (Euphorbiaceae)
Adibuch (A)	*Whitfieldia elongata* (P. Beauv.) C. B. Cl. (Acanthaceae)
Adicham (A)	*Acacia pentagona* (Schumach.) Hook.f. (Fabaceae)
Adidagoy (A)	*Baphia abyssinica* Brummitt. (Fabaceae)
Adigaella (A)	*Spermacoce sphaerostigma* (A. Rich.) Vatake. (Rubiaceae)
Adigera (A)	*Abrus schimperi* Hochst. ex Bak. (Fabaceae)
	Indigofera brevicalyx Bak.f. (Fabaceae)
	Phyllanthus leucanthus Pax. (Euphorbiaceae)
	Phyllanthus pseudoniruri Muell. Arg. (Euphorbiaceae)
	Tephrosia bracteolata Guill. & Perr. (Fabaceae)
Adik (A)	*Sida collina* Schlechtend. (Malvaceae)
	Triumfetta rhomboidea Jacq. (Tiliaceae)
Adiketi (A)	*Eriosema sp.* (Fabaceae)
	Dolichos sericeus E. Mey. (Fabaceae)
Adilagae (A)	*Portulaca oleracea* L. (Portulacaceae)
Adimeeti (A)	*Capsicum annum* L. (Solanaceae)
Adimoti (A)	*Opilia amentacea* Roxb. (Opiliaceae)
Adiphaga (A)	*Tylosema fassoglensis* (Kotschy. ex Schwenif.) Torr. (Fabaceae)
Adiquala (A)	*Oncoba spinosa* Forssk. (Flacourtiaceae)
Adiquala Leach (A)	*Strychnos innocua* Del. (Loganiaceae)

Local name	Scientific name/Family
Aditeti (A)	*Periploca linerifolia* Dill. ex A. Rich. (Asclepiadaceae)
Adiu (A)	*Diospyros mespiliformis* Hochst. ex A. DC. (Ebenaceae)
Ageda (A)	*Panicum maximum* Jacq. (Poaceae)
Ageta (A)	*Ficus capreaefolia* Del. (Moraceae)
Agnogn (A)	*Celosia trigyna* L. (Amaranthaceae)
Aidagoy (A)	*Baphia abyssinica* Brummitt. (Fabaceae)
Ajada (A)	*Senna obtusifolia* (L.) Irwin. & Barneby (Fabaceae)
Ajaegna (A)	*Clerodendrum captitatum* (Willd.) Schumach. & Thonn
	Clerodendrum cordifolium (Hochst.) A. Rich. (Verbenaceae)
Ajaegno (A)	*Cissus populina* Guill. & Perr. (Vitaceae)
Ajech (M)	*Drynaria volkensii* Hieron. (POLYPODIACEAE)
Ajela (A)	*Aspilia kotschyi* (Sch. Bip.) Oliv. (Asteraceae)
Ajella (A)	*Keetia gueizii* (Sond.) Bridson. (Rubiaceae)
Ajjeb Gowok (A)	*Pennisetum thunbergii* Kunth. (Poaceae)
Ajuwaella (A)	*Ipomoea aquatica* Forsk. (Convolvulaceae)
Ajuwaella (A)	*Ipomoea sepiaria* Roxb. (Convolvulaceae)
Ajuwaella (A)	*Ipomoea shupangensis* Bak. (Convolvulaceae)
Ajuwata (A)	*Psidium guajava* L. (Myrtaceae)
Akadomerlul (A)	*Pseuderanthemum tunicatum* (Afz.) Milne-Redh. (Acanthaceae)
Akadomerpap (A)	*Achyranthes aspera* L. (Amaranthaceae)
Akaldaegn (A)	*Achyranthes aspera L.* (Amaranthaceae)
Akano (A)	*Flueggea virosa* (Willd.) Voigt. (Euphorbiaceae)
Akarach (A)	*Loudetia arundinacea* (Hochst. ex A. Rich.) Steud. (Poaceae)
Akirro (A)	*Pennisetum petiolare* (Nees.) Benth. (Poaceae)
Akiru (A)	*Dichrostachys cinerea* (L.) Wight & Arn. (Fabaceae)
Akiwaega (A)	*Rottboellia cochinchinensis* (Lour.) Clayton. (Poaceae)
Akiya (A)	*Cleome gynandra* L. (Capparidacae)
Akochdial (A)	*Leptadenia hastata* (Pers.) Decne. (Asclepiadaceae)
Akogegn (A)	*Crossopteryx febrifuga* (Afzel. ex G. Don) Benth. (Rubiaceae)
Akuro (A)	*Leptadenia hastata* (Pers.) Decne. (Asclepidaceae)
Alak (A)	*Cadaba longifolia* DC. (Capparidaceae)
Alalo (A)	*Acacia seyal* Del (Fabaceae)
Alenki (A)	*Hippocratea pallens* Oliv. (Celastraceae)
Alumo (A)	*Oryza barthii* A. Chev. Poaceae
	Oryza longistaminata A. Chev. & Roehr. (Poaceae)
Alumo Manachol (A)	*Sorghum purpureo-sericeum* (Hochst. ex A. Rich.) Aschers. & Schweinf.(Poaceae)
Aluwa (A)	*Pithecellobium dulce* (Roxb.) Benth. (Fabaceae)
Ametegaela (A)	*Commelina imberbis* Ehrenb. ex Hassk. (Commelinaceae)
	Commelina zambesica C. B. Clanke. (Commelinaceae)
Amugnaedor (A)	*Amaranthus spinosus* L. (Amaranthaceae)
Anaedo (A)	*Cadaba farinosa* Forssk.(Capparidaceae)
	Maerua triphylla A. Rich. (Capparidaceae)
Angeri (A)	*Thelopogon elegans* Roem. & Schult. (Poaceae)
Angeri Merpap (A)	*Panicum comorense* Mez. (Poaceae)
Angich (A)	*Zanthoxylum lepreurii* Guill. & Perr. (Rutaceae)
Anono (A)	*Basilicum polystachion* (L.) Moench. (Lamiaceae)
Apina Ajowom (A)	*Tacca leontopetaloides* (L.) Kuntze. (Taccaceae)
	Amorphophalus gallaensis (Engl.) N. E. Brown. (Araceae)
Apitu (A)	*Chlorophytum blepharophyllum* Bak. (Anthericaceae)
	Chlorophytum gallabatense Schweinf. ex Bak. (Anthericaceae)
	Kaempfera aethiopica (Schweinf.) Solms-Laub. (Zingiberaceae)
	Ledebouria Kirkii (Bak.) Stedje. & Thulin. (Hyacinathceae)
Aponchuwaey (A)	*Ehinochloa crus-pavonis* (Kunth.) Schult. (Poaceae)
Appel (A)	*Pyrenacantha kuarabassana* Baill. (Icacinacae)
Apuda (A)	*Ethulia gracilis* Del. (Asteraceae)

Local name	Scientific name/Family
	Laggera pterodonta (DC.) Oliv. (Asteraceae)
Aretekodo (A)	*Commelina imberbis* Ehrenb. ex Hassk. (Commelinaceae)
	Commelina zambesica C. B. Clanke. (Commelinaceae)
Arim (A)	*Lannea welwitschii* (Hiern.) Engl. (Anacardiaceae)
Arumo (A)	*Ziziphus pubescens* Oliv. (Rhaminaceae)
Aruwano (A)	*Vangueria apiculata* K. Schum. (Rubiaceae)
Ataebi (A)	*Launaea taraxacifolia* (Wiild.) Amin. ex C. Jeffrey. (Asteraceae)
Atatoy (M)	*Maytenus grcilipes* (Welw. ex Oliv.) Exell. (Celastraceae)
Athow (A)	*Allophylus macrobotrys* Gilg. (Sapindaceae)
Atiben (A)	*Combretum capituliflorum* Fenzl ex Schweinf. (Combretaceae)
Atinotur (A)	*Acalypha ornata* A. Rich. (Euphorbiaceae)
Atiyho (A)	*Acalypha ornata* A. Rich. (Euphorbiaceae)
Atiyho merlul (A)	*Acalypha acrogyna* Pax. (Euphorbiaceae)
Atiyho merpap (A)	*Acalypha ornata* A. Rich. (Euphorbiaceae)
Awachuwaey (A)	*Corchorus aestuans* L.(Tiliaceae)
	Corchorus capsulariers L.(Tiliaceae)
	Corchorus fascicularies Lam.(Tiliaceae)
	Corchorus olitorius L. (Tiliaceae)
	Ccorchrus tridens L. (Tiliaceae)
Awik (A)	*Phyllanthus boehimii* Pax. (Euphorbiaceae)
Babuch (M)	*Argomuellera macrophylla* Pax. (Euphorbiaceae)
Bado (A)	*Crateva adansonii* DC. (Capparidaceae)
Baentae (M)	*Streptogyna crinita* P. Beauv. (Poaceae)
Bamu (A)	*Albizia grandibracteata* Taub. (Fabaceae)
Beyen (M)	*Elaeodendron buchananii* (Loes.) Loes. (Celastraceae)
Bitekot (M)	*Ventilago diffusa* (G. Don.) Exell. (Rhamnaceae)
Bodo (A)	*Crateva adansonii* DC. (Capparidaceae)
Bogajowom (A)	*Vigna membranacea* A. Rich. (Fabaceae)
Boliyr (M)	*Ricinus communis* L. (Euphorbiacea)
Bongi (M)	*Celosia trigyna* L. (Amaranthaceae)
Bot (N)	*Asparagus flagellaris* Baker. (Asparagaceae)
Botoloto (N)	*Chlorophytum gallabatense* Schweinf. ex Bak. (Anthericaceae)
	Ledebouria kirkii (Bak.) Stedje. & Thulin. (Hyacinathceae)
Bow (N)	*Ziziphus spina-christi* (L.) Deof. (Rhamnaceae)
Buna (A)	*Coffea arabica* L. (Rubiaceae)
Butot (N)	*Phyllanthus boehmii* Pax. (Euphorbiaceae)
Cary (M)	*Coffea arabica* L. (Rubiaceae)
Chaemen (M)	*Ficus sur* Forssk. (Moraceae)
Chamchir (A)	*Tapura fischeri* Engl. (Dichapetalaceae)
Chata (A)	*Croton sylvaticus* Krauss. (Euphorbiaceae)
Chikochiy (M)	*Malacantha alnifolia* (Bak.) Pierre. (Sapotaceae)
Chilwidy (A)	*Entada africana* Guill & Perr. (Fabaceae)
Chingi (M)	*Justicia glabra* Koening. ex Roxb. (Acanthaceae)
	Justicia nyassana Lindau. (Acanthaceae)
Chipolo (A)	*Stereospermum kunthianum* Cham. (Bignonaceae)
Chiwachiy (A)	*Malacantha alnifolia* (Bak.) Pierre. (Sapotaceae)
Chogaey (M)	*Elaeodendron buchananii* (Loes.) Loes. (Celastraceae)
Chol'en (M)	*Aneilema beniniense* (P. Beauv.) Kunth. (Commelinaceae)
Chol'en (M)	*Commelina diffusa* Burm.f. (Commelinaceae)
Chomo (M)	*Croton macrostachyus* Del. (Euphorbiaceae)
Chuwa (A)	*Tamarindus indica* L. (Fabaceae)
Cohomo (A)	*Saba florida* (Benth.) Bullock. (Apocynaceae)
Cora (A)	*Combretum adenogonium* Stud. ex A. Rich. (Combretaceae)
Dai (A)	*Blyttia fruticulosa* (Decne.) D. V. Field. (Asclepidaceae)
	Ipomoea eriocarpa R. Br. (Convolvulaceae)

Local name	Scientific name/Family
	Rhynochosia nyasica Bak. (Fabaceae)
Dampaey (M)	*Cordia africana* Lam. (Boraginaceae)
Dashu (M)	*Alchornea laxiflora* (Benth.) Pax. & K. Hoffm. (Euphorbiaceae)
Dego (A)	*Milicia excelsa* (Welw.) C. C. Derg (Moraceae)
Didaey (M)	*Zanthoxylum lepreurii* Guill. & Perr. (Rutaceae)
Dijwaey (A)	*Indigofera Garckeana* Vatake. (Fabaceae)
Dokaey (M)	*Ficus ovata* Vhal. (Moraceae)
Done (A)	*Dioscorea bulbifera* L. (Dioscoreaceae)
Dongaey (M)	*Leptaspis zeylanica* Nees ex Steud. (Poaceae)
Dot (A)	*Combretum adenogonium* Steud. ex A. Rich. (Combretaceae)
Duno (A)	*Combretum collinum* Fresen. (Combretaceae)
Duwae (M)	*Baphia abyssinica* Brummitt. (Fabaceae)
Duwong (A)	*Gardenia Ternifolia* Schum. & Thonn. (Rubiaceae)
Duwong (N)	*Amaranthus spinosa* L. (Amaranthaceae)
Echick (M)	*Morus mesozygia* Stapf. (Moraceae)
Egawach (N)	*Piliostigma thonningii* (Schum.) Milne-Redh. (Fabaceae)
Elaeru (A)	*Acmella caulirhiza* Del. (Asteraceae)
Emuy (M)	*Dracaena fragrans* (L.) Kor-Grawal. (Dracaenaceae)
Engop (N)	*Ficus sycomorus* L. (Moraceae)
Gedeji (M)	*Rinorea friisii* M. Gilbert. (Violaceae)
Gegem (M)	*Erythroxylum fischeri* Engl. (Erythroxylaceae)
Gelenchi (M)	*Veperis dainellii* (Pchi-Serm.) Kokwaro. (Rutaceae)
Geyo (A)	*Annona senegalensis* Pers. (Annonaceae)
Gidgid (M)	*Acalypha acrogyna* Pax. (Euphorbiaceae)
Gileh (M)	*Trichilia prieuriana* A. Juss. (Meliaceae)
Gnallo (A)	*Echinops longisetus* A. Rich. (Asteraceae)
Gniallo (A)	*Cissus populina* Guill. & Perr. (Vitaceae)
Gnibenekuru (A)	*Cucumis pustulatus* Naud. ex Hook.f. (Cucurbitaceae)
Gnibola (A)	*Hyparrhenia pilgeriana* C. E. Hubb. (Poaceae)
Gnikango (A)	*Ochna leucophloeos* Hochst. ex A. Rich. (Ochnaceae)
Gnikognjiw (A)	*Abutilon mauritanum* (Jacq.) Medc. (Malvaceae)
	Wissadula rostrata (Schumach. & Thonn.) Hook.f. (Malvaceae)
Gnilorbey (A)	*Hibiscus calyphyllus* Cavan. (Malvaceae)
	Hibiscus cannabinus L. (Malvaceae)
Gnim Jowok (A)	*Sesamum angustifolium* (Oliv.) Engl.(Pedaliaceae)
	Sesamum latifoliun L. (Pedaliaceae)
Gnimini (A)	*Sesamum indicum* L. (Pedaliaceae)
Gnimorbichang (A)	*Catunaregam nilotica* (Stapf.) Tirvengadum. (Rubiaceae)
Goboy (M)	*Trilepisium madagascariense* DC. (Moraceae)
Gojae (M)	*Manilkara butugi* Chiov. (Sapotaceae)
Goliy (A)	*Trichilia prieuriana* A. Juss. (Meliaceae)
Gomu (M)	*Aningeria altissima* (A. Chev.) Aubrev. & Pellgr. (Sapotaceae)
Gongor (M)	*Physalis peruviana* L. (Solanaceae)
Goy (A)	*Cordia myxa* L. (Boraginaceae)
Hoak (A)	*Dioscorea bulbifera* L. (Dioscoreaceae) -Cultivated species
Ja (A)	*Kigelia aethiopum* (Fenzl.) Dandy. (Bignonaceae)
Jaewach (A)	*Panicum porphyrrhios* Steud. (Poaceae)
Jemo (A)	*Erythroxylum fischeri* Engl. (Erythroxylaceae)
Joga (A & M)	*Alstonia boonei* De Wild. (Apocynaceae)
Jomaeh (M)	*Lannea welwitshii* (Hiern.) Engl. (Anacardiaceae)
Jongae (M)	*Bidens pilosa* L. (Asteraceae)
Juwaello (A)	*Vitex doniana* Sweet. (Verbenaceae)
Juwi Awaero (A)	*Eragrostis tremula* Hochst. ex Steud. (Poaceae)
Kachagin (M)	*Keetia gueizii* (Sond.) Bridson. (Rubiaceae)
Kaech (N)	*Crateva adansonii* DC. (Capparidaceae)

Local name	Scientific name/Family
Kaehe (N)	*Nymphaea nouchalii* Burm.f. (Nymphaeaceae)
Kaella (A)	*Bidens pilosa* L. (Asteraceae)
Kamel (N)	*Sclerocarya birrea* (A. Rich.) Hochst. (Anacardiacae)
Kanchi (M)	*Milicia excelsa* (Welw.) C. C. Beg. (Moraceae)
Karashoy (M)	*Polyscias fulva* (Hiern.) Harms (Araliaceae)
Kawon (M)	*Dioscorea praehensilis* Benth. (Dioscoreaceae)
Kegno (A)	*Combretum collinum* Fresen. (Combretaceae)
	Combretum molle A. Br. ex G. Don. (Combretaceae)
Keyo (A)	*Hippocatea africana* (Willd.) Loes. ex Engl. (Celastraceae)
Kijang (A)	*Lepidotrichilia volkensii* (Gurke.) Leroy. (Meliaceae)
Kiyang (M)	*Lecaniodiscus fraxinifolius* Bak. (Meliaceae)
Kiyho (A)	*Nymphaea nouchalii* Burm.f. (Nymphaeaceae)
Kiyo (A)	*Dorstenia barnimiana* Schwenif. (Moraceae)
Kobae (M)	*Celtis zenkeri* Engl. (Ulmaceae)
Kobaey (A)	*Celtis zenkeri* Engl. (Ulmaceae)
Kokaey (M)	*Celtis philippensis* Blanco. (Ulmaceae)
Kokeden (M)	*Anogeissus leiocarpa* (A. DC.) Guill. & Perr. (Combretaceae)
Kokomen (M)	*Cleome gynandra* L. (Capparidaceae)
Korbo (M)	*Amaranthus hybridus* L. (Amaranthaceae)
Koti (M)	*Trichilia prieuriana* A. Juss. (Meliaceae)
Kuri (M)	*Diospyros abyssinica* (Hiern.) F. White. (Ebanaceae)
Laang Dial (A)	*Ziziphus abyssinica* Hocht. ex A. Rich. (Rhaminaceae)
Laeren (M)	*Acacia seyal* Del. (Fabaceae)
Laero (A)	*Celtis toka* (Forssk.) Hepper & Wood. (Ulmaceaē)
Laewani (M)	*Crossoandria nilotica* Oliv. (Acanthaceae)
Lamon (M)	*Leptogramma pozoi* (Lagasca.) Heywood. (THELYPTERIDACEAE)
Lanng (A)	*Ziziphus spina-christi* (L.) Deof. (Rhaminaceae)
Laro (A)	*Pterocarpus lucens* Guill, & Perr. (Fabaceae)
Maero (N)	*Corchorus olitorius* L. (Tiliaceae)
Magedae (M)	*Panicum mximum* Jacq. (Poaceae)
Makatae (M)	*Cissus petaiolata* Hook.f. (Vitaceae)
Mano (A)	*Grewia velutina* (Forsk.) Vahl. (Tiliaceae)
Mella (A)	*Asystasia gangetica* (L.) T. Anderss. (Acanthaceae)
	Barleria grandicalyx Lindau. (Acanthaceae)
	Justicia glabra Koenig. ex Roxb. (Acanthaceae)
	Justicia ladanoides Lam. (Acanthaceae)
	Justicia nyassana Lindau. (Acanthaceae)
Meno (A)	*Ocimum canum* Sims. (Lamiaceae)
Mermego (M)	*Linocira giordanii* Choiv. (Oleaceae)
Mermet (M)	*Hilleria latifolia* (Lam.) H. Walter. (Phytolacaceae)
Miningi (M)	Crassocephalum montuosum (S. Moore.) Milne-Redhead. (Asteraceae)
Modo (A)	*Dioscorea praehensilis* Benth. (Dioscoreaceae)
Monchol (N)	*Diospyros mespiliformis* Hochst. ex A. DC. (Ebenacae)
Monotor (A)	*Cissus ruspolii* Gilg. (Vitaceae)
	Cyphostemma adenocaule (Steud. ex A. Rich.) Wild. (Vitaceae)
Moti (M)	*Tamarindus indica* L. (Fabaceae)
Moyo (A)	*Sarcocephalus latifolius* (J. E. Smith) E. A. Bruce. (Rubiaceae)
Mureduk (M)	*Amaranthus hybridus* L. (Amaranthaceae)
Muwana Ajowom (A)	*Dioscorea bulbifera* L. (Dioscoreaceae) -Wild species
Obado (A)	*Asparagus flagellaris* Baker. (Asparagaceae)
Obentaey (A)	*Streptogyna crinita* P. Beauv. (Poaceae)
Obodo (A)	*Asparagus flagellaries* Baker. (Asparagaceae)
Obuya (A)	*Ficus glumosa* Del. (Moraceae)
Ochik (A)	*Morus mesozygia* Stapf. (Moraceae)
Ochuwa (A)	*Indigofera arrecta* Hochst. ex A. Rich. (Fabaceae)

Local name	Scientific name/Family
	Tephrosia bracteolata Guill & Perr. (Fabaceae)
Odallo (A)	*Cordia gharaf* (Forssk.) Aschers. (Boraginaceae)
Okamo (A)	*Momordica foetida* Schamach. (Cucurbitaceae)
Okoy (M)	*Cardamine trichocarpa* A. Rich. (Brassicaceae)
Olam (A)	*Ficus sycomorus* L. (Moraceae)
Olan (A)	*Vepris dainellii* (Pichi-Serm.) Kokwaro. (Rutaceae)
Oluwa (A)	*Bulbostylis clareana* Hutch. ex Bodard. (Cyperaceae)
Olwaeto (A)	*Lonchocarpus laxiflorus* Guill. & Perr. (Fabaceae)
Omok (A)	*Ampelocissus schimperiana* (Hochst. ex A. Rich.) Palaneh. (Vitaceae)
	Ipomoea dichora Hochst. ex Choisy. (Convolvulaceae)
Omono (A)	*Capparis erythrocarpus* Isert. (Capparidaceae)
Ongok (M)	*Achyrospermum schimperi* (Hochst. ex Briq.) Perkins (Lamiaceae)
Opero (A)	*Olyra ltifoloia* L. (Poaceae)
Oredah (A)	*Ficus thonningii* Blume. (Moraceae)
Orimo (A)	*Sterculia africana* (Lour.) Friori. (Sterculiacae)
Orwaey (A)	*Xylopia parviflora* (A. Rich.) Benth. (Annonaceae)
Orwich (A)	*Bridelia scleroneura* Muell. Arg. (Euphorbiaceae)
Oryae (M)	*Xylopia parviflora* (A. Rich.) Benth. (Annonaceae)
Pabo (A)	*Grewia molis* A. Juss. (Tiliaceae)
Paepelen (M)	*Sclerocarya birrea* (A. Rich.) Hochst. (Anacardiacae)
Pedo (A)	*Andropogon schirensis* Hochst. ex A. Rich. (Poaceae)
Piado (A)	*Harrisonia abyssinica* Oliv. (Simaroubaceae)
Pijo (M)	*Solanum terminale* Forssk. (Solanaceae)
Pok (A)	*Terminalia laxiflora* Engl. & Diels (Combretaceaē)
	Terminalia macroptera Gull. & Perr. (Combretaceae)
Poni (A)	*Desmodium dichotomum* (Klein. ex Willd.) DC. (Fabaceae)
	Desmodium gangeticum (L.) DC. (Fabaceae)
Pow (A)	*Ficus vasta* Forssk. (Moracae)
Puley (M)	*Impatiens ethiopica* Grey-Wilson. (Balsaminaceae)
Put (A)	*Pseudocedrela kotschyi* (Schweinf.) Harms (Meliaceae)
Qad (N)	*Tamarindus indica* L. (Fabaceae)
Qualidi (A)	*Lannea fruticosa* (Hochst. ex A. Rich.) Engl. (Anacardiaceae)
Rid (A)	*Anogeissus leiocarpa* (A. DC.) Guill. & Perr. (Combretaceae)
Riyer (N)	*Indigofera brevicalyx* Bak.f. (Fabaceae)
	Senna obtusifolia (L.) Irwin. & Barneby (Fabaceae)
Saoy (M)	*Aningeria adolfi-friderici* (Engl.) Rob. & Gilb. (Sapotacae)
Sati (M)	*Albizia grandibracteata* Taub. (Fabaceae)
Sesesm (M)	*Acacia pentagona* (Schumach.) Hoof.f. (Fabaceae)
Shamen (M)	*Ficus sur* Forssk. (Moraceae)
Shimetiy (M)	*Ficus thonnigii* Blume. (Moraceae)
Siyal (N)	*Hygrophila auriculata* (Schumach.) Heine. (Acanthaceae)
Sow (N)	*Balanites aegyptiaca* (L.) Del. (Balanitaceae)
Tach (N)	*Ipomoea aquatica* Forsk. (Convolvulaceae)
Tachi (A)	*Daracaena fragrans* (L.) Kor-Grawal. (Dracaenaceae)
Tengi (M)	*Antiaris toxicaria* Lesch. (Moraceae)
Tengo (A)	*Antiaris toxicaria* Lesch. (Moraceae)
Terro (A)	*Echinocholoa rotundiflora* Clayton. (Poaceae)
Tibo (A)	*Sclerocarya birrea* (A. Rich.) Hochst. (Anacardiaceae)
Tid (N)	*Hibiscus calyphylus* Cavan. (Malvaceae)
	Hibiscus cannabinus L. (Malvacae)
Tigle (M)	*Solanum benderianum* Schimp. ex Engl. (Solanaceae)
Till (A)	*Hparrhelia dissoluta* (Steud.) Clayton. (Poaceae)
	Hyparrhenia filipendula (Hochst.) Stapf. (Poaceae)
Till (N)	*Hygrophila auriculata* (Schumach.) Heine. (Acanthaceae)
Tip (A)	*Acacia hockii* De Willd. (Fabaceae)

Local name	Scientific name/Family
	A. polyacantha Willd. (Fabaceae)
	A. sieberiana DC. (Fabaceae)
Toin (M)	*Balanites aegyptiaca* (L.) Del. (Balanitaceae)
Tow (A)	*Balanites aegyptiaca* (L.) Del. (Balanitaceae)
Tuworo (A)	*Sansevieria abyssinica* N. E. Br. (Agavaceae)
Tuytuy (A)	*Eichornia crassipes* (Mart.) Solms-Laub. (Pontederiaceae)
	Limnophyton obtusifolium (L.) Miq. (Alismataceae)
Ubaeyow (A)	*Imperata cylindrica* (L.) Raeuschel. (Poaceae)
Ubarro (A)	*Loudetia arundinacea* (Hochst. ex A. Rich.) Steud. (Poaceae)
Ubello (A)	*Turraea nilotica* Kotschy. & Peyr. (Meliaceae)
Ubollo (A)	*Annona senegalensis* Pers. (Annonaceae)
Uchaey (M)	*Selaginella abyssinica* Spring. (Selaginellaceae)
Uchino (A)	*Acacia hokii* De Willd. (Fabaceae)
	Acacia polyacantha Willd. (Fabaceae)
	Acacia senegal (L.) Willd. (Fabaceae)
Uchock (A)	*Solanum incanum* L. (Solanaceae)
Uchuwa (A)	*Indigofera arrecta* Hochst. ex A. Rich. (Fabaceae)
Udallu (A)	*Ficus dicranostyla* Mildbr. (Moraceae)
Ugoro (A)	*Azolla nilotica* L. (Azollaceae)
Ulaemo menan dago (A)	*Ximenia americana* L. (Olicaceae)
Ulaemo menanek tuwon (A)	*Maytenus senegalensis* (Lam.) Exell. (Celastraceae)
Ungerow (A)	*Capparis sepiaria* L. (Capparidaceae)
Upet (A)	*Piliostigma thonningii* (Schum.) Milne-Redh. (Fabaceae)
Upi (M)	*Celtis africana* Burm.f. (Ulmaceae)
Urogu (A)	*Cordia africana* Lam. (Boraginaceae)
Utiwaello (A)	*Hygrophila auriculata* (Schumach.) Heine. (Acanthaceae)
Utok (A)	*Cyperus alopecurides* Rottb. (Cyperaceae)
Utok (A)	*Cyperus reduncus* Hochst. ex Bock. (Cyperaceae)
Wachakem (M)	*Adathoda shimperiana* Nees. (Acanthaceae)
Wado (A)	*Butyrospermum paradoxum* (Gaertin.f.) Hepper (Sapotaceae)
Waet (N)	*Sorghum arundinaceum* (Desv.) Stapf.(Poaceae)
Wak (N)	*Flueggea virosa* (Willd.) Vigot.(Euphorbiacae)
Walwagno (A)	*Abrus precatorius* L. (Fabaceae)
Wekoy (M)	*Dioscorea bulbifera* L. (Dioscoreaceae) -Cultivated species
Welaelaey (M)	*Veperis dainellii* (Pchi-Serm.) Kokwaro. (Rutaceae)
Wiyo (A)	*Triumfetta pentandra* A. Rich. (Tiliaceae)
	Triumfetta rhomboidea Jacq. (Tiliaceae)
Woni (M)	*Mimusops kummel* Bruce. ex A. DC. (Sapotaceae)
Wulaeng (N)	*Ximenia americana* L.(Olacaceae)
Wur (N)	*Portulaca oleracea* L.(Portulacaceae)
Yagoy (M)	*Millittia ferruginea (Hochst.) Bak.* (Fabaceae)
Yakat (M)	*Hippocratea africana* (Willd.) Loes. ex Engl. (Celastraceae)
Yuya (M)	*Trichilia dregeana* Sond. (Meliaceace)