

Floristic Composition, Diversity and Management of Home-gardens in Uba-Debretsehay District, Southern Ethiopia: Implication for Biodiversity Conservation

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Abstract

Home-gardens contribute a lot to the fulfillment of ecological, socioeconomic, and cultural functions and local community needs. This study was conducted with the main objective of assessing the composition and measuring diversity of plant species grown in home-gardens of Uba-Debretsehay district, southern Ethiopia. Six sampling kebeles were purposively selected. 90 households were considered in this study for data collection. A total of 87 plant species belonging to 40 plant families were documented in the sampled home-gardens. Family-wise distribution showed that Fabaceae and Poaceae were the richest families concerning the number of plant species each represents. The home-garden plants documented in Uba-Debretsehay have a range of use values including food, medicine, cash, ornament, spice, and construction. Regarding altitude, *Ensete ventricosum*, a staple food, was cultivated in home-gardens situated in highland and midland areas. *Coffea arabica*, various fruits, and vegetables were cultivated in midland areas of the study area while *Mussa paradisica*, *Mangifera indica*, and *Saccharum officinarum* were cultivated at lower altitude areas. Home-gardens in Uba-Debretsehay district consist of different varieties of plant species and serve as a basic agro-ecosystem required for the cultivation and conservation of various plant species. Home-gardens situated in Kolla agroecology have relatively a higher diversity than home-gardens in Woynadega and Dega agro-ecology; however, the overall diversity is low. Agronomists, researchers as well as other concerned bodies need to contribute to conserving plant species cultivated in the home-gardens of the study area and maintaining their diversity to protect them from getting impacted by various factors (natural/environmental and man-made factors).

Keywords/Phrases: Ethnobotany, Home-garden, Diversity, Management, Uba-Debretsehay

1 Introduction

Home-gardens are integrated systems comprising various things in small areas that produce a variety of foods and agricultural products including staple crops, vegetables, fruits, and medicinal plants (Polegriand Negri, 2010). Home-gardens provide high diversity of resources for local households and significantly contribute to the conservation of native biodiversity (Larios *et al.*, 2013). According to Gebreegziabeher *et al.* (2011), about 80% of the Ethiopian population depends on agriculture for their livelihoods contributing to 42-45% of the total gross

domestic product of the country. Occurrences of high species diversity in home-garden have a range of socioeconomic and agroecological roles including the production of food and other products such as firewood, fodder, spices, medicinal plants, and ornamentals (Unofia *et al.*, 2012).

Traditional home-garden land use is viewed as one of the household strategies for the production of food, fuel-wood and fodder. It also serves as a way to maintain sustainable local agricultural practices. According to Abebe (2005), agroforestry home-gardens of the Southern Ethiopian highlands are dominated

by the native perennial crops, enset and coffee, and additionally include a large variety of staple food crops, vegetables and tree crops. These integrated land use systems are believed to enhance agriculture due to the association between multiple crops and trees on one hand and various crops that have ecological and economic benefits on the other and contributing to the efforts to maintain food security in the region (Negash & Niehof, 2004; Awas *et al.*, 2010). Traditional home-gardens cover a wider range of area in the Southern Nations Nationalities and People’s Regional State (SNNPRS) and are situated at an altitude between 1500m and 2300m above sea level, where moisture and temperature conditions are favorable for agriculture. These home-gardens are characterized by the two native perennial crops: Enset and Coffee. The “Enset-Coffee-Animal fodder” system of southern Ethiopia represents a typical multistory home-garden (Kippe, 2002; Kebebew & Urgessa, 2011). The cultivation of different crops in home-gardens is regarded as a strategy of farmers to diversify their subsistence and cash needs. Diversification also helps to stabilize yield and income in cases of incidences of disease and pests, and market

price fluctuations.

Scientific investigation is deemed necessary to examine the capacity of home-garden for the plant species it harbors as well as its potential to satisfy the ecological and household demands of the local community in Uba-Debresehay district. This study aimed at examining home-garden species diversity uses of plants grown in home-gardens and documenting the present home-garden management practices in Uba-Debresehay district that would provide relevant information required for determining the capacity and potential of home-gardens in the district and for the maintenance of sustainable biodiversity in the agroforestry home-gardens in SNNPRS.

2 Research Methods

2.1 Description of the Study Area

Uba-Debresehay district is located in the Gofa Zone of SNNPR, southern Ethiopia, at a distance of 530km from Addis Ababa and 275km from Hawassa town. The district is situated between 5°50’ – 6°10’N latitude and 36°40’ – 36°70’E longitude (Figure 1).

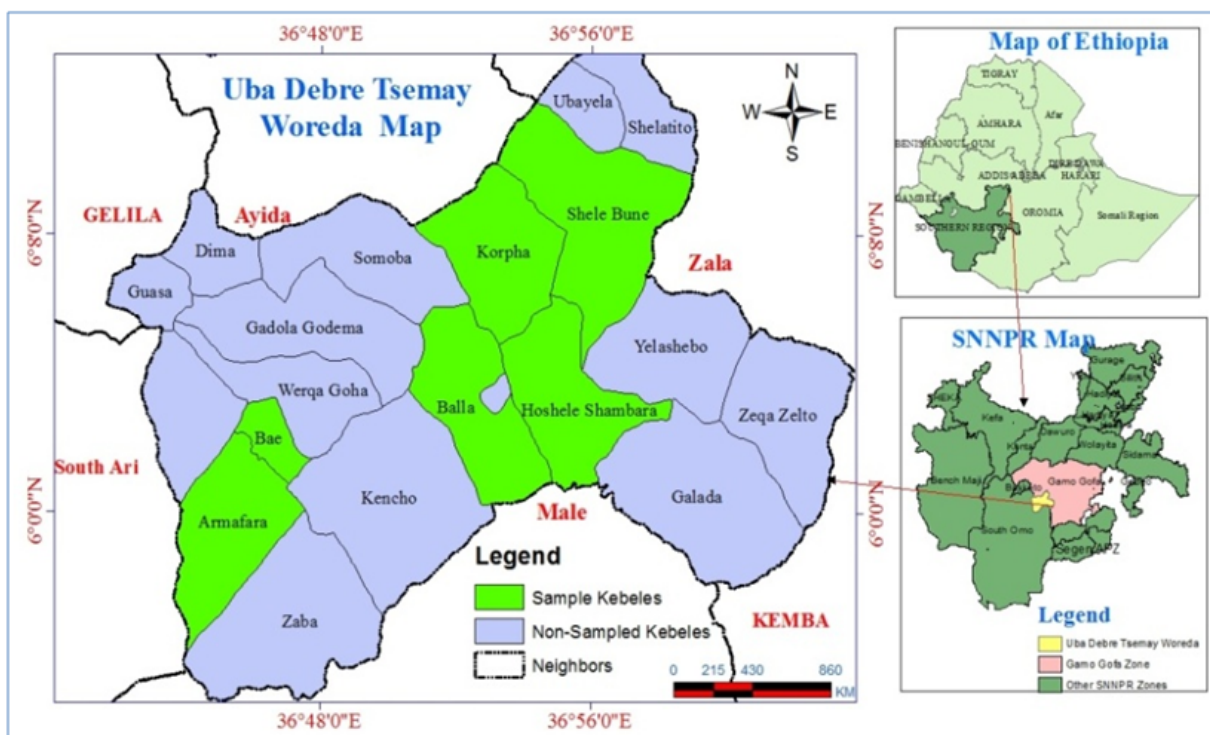


Figure 1. Map of the study area

The topography of the district is characterized by gorges, rugged mountains, plains, and plateaus spread over the elevation range of 950m to 3002m above sea level. The district is characterized by three traditional agroecological zones ('Kolla', 'Dega' and 'Woynadega') that contributed to variations in the distribution and diversity of plants in various parts of the district. According to the ARDO of Uba-Debretsehay District (2021), the district was characterized by 45% 'Kolla', 20% 'Woynadega', and 35% 'Dega' agroecology.

The annual rainfall that the study area receives varies from year to year with the amount of rainfall ranging from 550mm to 1200mm. The rainy season of the study area extends from March to November. The study area has a mean minimum and maximum annual temperature of 17.5°C and 28.2°C, respectively (Habtewold *et al.*, 2021). According to CSA (2007), the population of the district was estimated to be 87,132 (49% were males and 51% were females). The number of households existing in the district was 17,426 distributed in 20 'kebeles' (a smallest administrative unit in the district).

2.2 Sampling Techniques

Among the total *kebeles* in Uba-Debretsehay district, which were known by home-garden plant cultivation and management, six *kebeles* (two from *kebeles* that have altitudes between 2500-3002m. asl. [highland areas], two from *kebeles* that are characterized by elevation between 1500-2500m.asl. [midland areas], and two from lowland *kebeles* that are situated at altitudes between 950-1500m. asl. [lowland areas]) were considered for selection/sampling of home-gardens where data used in this study were collected. A random sample of 90 households (15 households from each sampled *kebele*) from households that have been practicing home-garden cultivation in the sampled *kebeles* was taken for data collection. In addition, a total of 12 key informants (two from each sampled *kebele*) were purposefully selected based on their history of traditional home-garden practice and cultivation of a wide range of plants.

2.3 Data Collection

Ethnobotanical data relevant to this study were gathered from sampled home-gardens and informants

following Martin (1995) and Cotton (1996) using a semi-structured questionnaire, interviews, focus group discussions (FGDs), field/expert inspection and assessment of composition & diversity of plant species cultivated in the home-gardens in the study area. A complete list of plant species cultivated in the home-gardens in the study area along with the information on their uses among the households of Uba-Debretsehay district cultivating the plants was presented in the annex. This information was obtained from each sampled household in the study area and their corresponding home-garden.

2.4 Data Analysis

Home-garden Diversity: Home-garden diversity across each agroecology in the study area was computed using the Shannon Winner diversity index (H') and presented along with their respective species richness value.

Shannon diversity was calculated using the equation:

$$H' = -\sum (P_i \ln - P_i)$$

Where, H' is the Shannon winner diversity index, \sum is a summation, P_i is proportion of the i^{th} species and \ln is the natural logarithm.

Jaccard's Coefficient of Similarity: Jaccard's coefficient of similarity was computed following Magurran (1988) and used to measure similarity between the sampled home-gardens in the study area and three other traditional home-gardens situated in other three districts in the country, taking plant species composition of unique and common plant species to the two home-gardens under comparison.

The Jaccard's coefficient of similarity was calculated using the equation:

$$J_s = c / (c + a + b);$$

where, J_s = Jaccard's coefficient of similarity;
 a = the number of species unique to the home-gardens in the current study area;
 b = the number of species unique to home-gardens in other districts being compared; and
 c = the number of species common to the two districts under comparison.

3 Results and Discussions

3.1 Floristic Composition of the Home-gardens in Uba-Debretsehay District

The local community in the study area cultivates various plant species in their home-gardens. A total of 87 plant species belonging to 69 genera and 40 families were documented in the sampled home-gardens in Uba-Debretsehay district. Among the plant families in the study area, Fabaceae & Poaceae

accounted for a 10.34% of plant species each, followed by Solanaceae (6.90%), Rutaceae (5.75%), and Brassicaceae, Euphorbiaceae & Mirtaceae each accounted for 4.60% of the total plant species encountered in the study area (Figure 2). A matrix containing the floristic composition of plants encountered in the sampled home-gardens in the study area along with their respective family names, life form or habits, and plant uses is provided in the annex section.

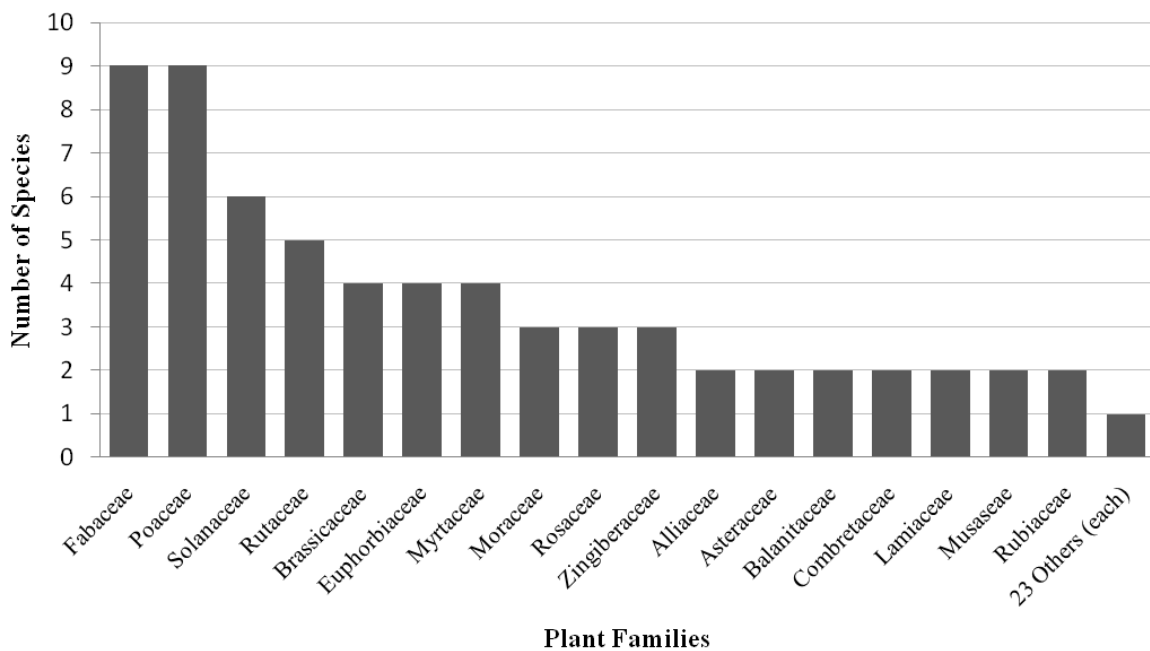


Figure 2. Major plant families and the number of corresponding plant species in the home-gardens in the study area

Fabaceae and Poaceae are found to be the richest plant families regarding the number of plant species they represent. Each of these plant families accounted for 10.7% of the total plant species encountered in the home-gardens in the study area. Family Solanaceae and Rubiaceae are recognized for their higher number of plant species that are cultivated in the home-gardens of the study area next to the family Fabaceae and Poaceae. These families each accounted for 5.88% of the total plant species in the home-gardens in the study area. Rutaceae, Brassicaceae & Euphorbiaceae each accounted for 4.71% of the total plant species encountered in the study area, while the family Rosaceae and Zingiberaceae each accounted for 3.53% of the total plant species encountered in the study area. A similar finding

was reported by Wassihun *et al.* (2003) and Tamirat (2011), where the family Fabaceae and Poaceae were placed at the top rank in the list of plant families presented together with the number of the respective plant species they were represented by.

Regarding the plant habit or growth form, the plant species encountered in the home-gardens in the study area are characterized by four major plant growth forms. A majority of the plant species encountered in the home-gardens in the study area are characterized as herbs. Herbs documented in the home-gardens in the study area have accounted for 43.68% of the total plant species encountered in the home-gardens in the study area, while trees, shrubs and climbers have accounted for 40.23%, 11.49%, and 4.60% of the total plant species respectively (Figure 3).

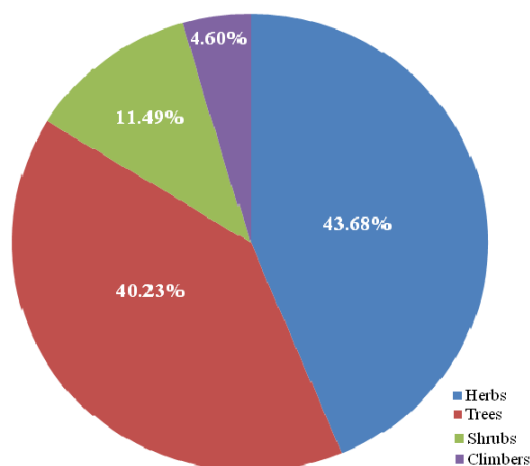


Figure 3. Growth forms and proportion of corresponding plant species encountered in the home-gardens in Uba-Debretsehay district

3.2 Diversity and Richness of Plant Species in the Home-gardens in the Study Area

Depending on the size and purpose which the home-gardens are established, the home-gardens in the study area have showed variations with respect to plant species diversity and richness. Home-gardens situated at ‘*Woynadega*’ agroecology have showed the highest diversity compared to home-gardens located in either ‘*Dega*’, or ‘*Kolla*’ agroecological areas. The least diversity is observed in home-gardens

situated at ‘*Dega*’ agroecological areas (Table 1). However, these data on overall species diversity in the home-gardens in the study area concerns empirical data only, and cannot directly be related to the functioning of the home-gardens. As the present analysis focused on crop species only, two major types of diversities were not yet incorporated in this study, i.e. diversity of tree species belonging to either the ecological or conservational functional groups or the genetic diversity in crop species.

Table 1. Diversity and richness of home-gardens situated in different agroecology in Uba-Debretsehay district

Agroecology where the Home-gardens are situated	Species Richness	Diversity (H')
‘ <i>Dega</i> ’	46	3.83
‘ <i>Woynadega</i> ’	59	4.08
‘ <i>Kolla</i> ’	55	4.01

As discussed above, the functioning of the home-gardens are highly related to the presence of the two major crop species namely, enset and coffee. Enset forms a major staple food for households, while coffee is the major cash crop providing income for household expenditures. Ecologically, both species can be grown in integration with each other and with another under-storey and upper-storey crops, providing ecological services such as erosion control, provision of organic matter, and regulation of water and temperature. Home-gardens are often described as generic land-use systems with high species diversity. It was found that taxonomically diverse plant groups

are managed in home-gardens in Uba-Debretsehay district, and are used by the local community for various purposes. This shows that traditional knowledge is contributing to the diversity of crops in the home-gardens of the study area. The result agreed with the findings of Asfaw & Nigatu (1995) and Wasihun *et al.* (2003). However, within and between these systems, important variations in crop diversity may occur. This spatial variation is related to temporal variation in species diversity resulting from dynamics in crop composition.

Homegarden composition can be affected by two main processes of change. The development of cash

crops might be influenced by socioeconomic variables like market accessibility as well as ecological factors like crop appropriateness. On the one hand, there is a tendency towards increased incorporation of cash crops as a result of adaptation to the expansion of commercial networks offering options for income generation. The advance of cash cropping depends on both ecological factors such as crop suitability and socioeconomic factors such as access to markets. Variations in these factors will gradually contribute for the occurrence of a wide range of home-garden types. At the other hand the area share of the two main crops, enset and coffee, is being affected by an increased emphasis on annual food crops as a result of rising land fragmentation. When there is a

food scarcity, small farmers sometimes lower their enset production area in favor of annual crops like maize or sweet potatoes. A variety of homegarden types will then progressively appear as a result of variations in these aspects.

3.3 Similarity of Home-gardens in Uba-Debretsehay and other Districts

The results of Jaccard’s similarity coefficients (Table 2) shows that the highest similarity coefficient of (40%) was obtained for the south and southwestern highlands of Ethiopia (Abebe, 2005), while the least (11%) was for the Ziway area (Giday, 2001). The reason for the lowest similarity might be attributed to the difference in agroecology.

Table 2. Jaccard’s coefficient of similarity (*J_s*) computed for the home-gardens in the current study area and other home-gardens in three other districts in Ethiopia (districts other than Uba-Debretsehay district)

Place where the home-gardens being compared are situated	Altitudinal Range	Species Richness	<i>a</i>	<i>b</i>	<i>a + b</i>	<i>c</i>	<i>J_s</i>
Uba-Debretsehay district, the current study area.	950-3002	87	-	-	-	-	-
Kochere district, Gedeo Zone (Tamrat, 2011).	1700-2500	165	20	100	120	65	0.35
Zeway (Giday, 2001).	1700-1830	33	73	21	94	12	0.11
South and southwestern highlands of Ethiopia (Abebe, 2005).	<i>na</i>	80	38	33	71	47	0.40

Key: *a* = number of plant species present unique to the home-gardens in the current study area; *b* = number of species unique to home-gardens in another district under comparison; *c* = number of plant species common to home-gardens in the current study area and the other district being compared; *J_s* = Jaccard’s coefficient of similarity; and *na* = not available.

3.4 Use Categories of Plants in the Home-gardens

The community in Uba-Debretsehay district has planted various types of woody plant species other than crops in their home-gardens. Woody plants that were managed in and around the home-gardens of the study area include *Eucalyptus camaldulnisis*, *Arundinaria alpine*, *Cordia africana*, *Juniperus procera*, and *Combretum molle*. These woody plant species are planted in home-gardens in the study area for various purposes/values such as food, extraction or

preparation of traditional medicine, source of income (from selling crops), farm implements & construction materials, firewood, spices & condiments and ornamental (Figure 4).

The results in this study showed that the majority of the plants grown in the home-gardens of the study area were good sources of food. This suggests that the primary goal of home garden establishment and plant cultivation might be to meet the household’s demand for food as reported by Wassihun et al. (2003).

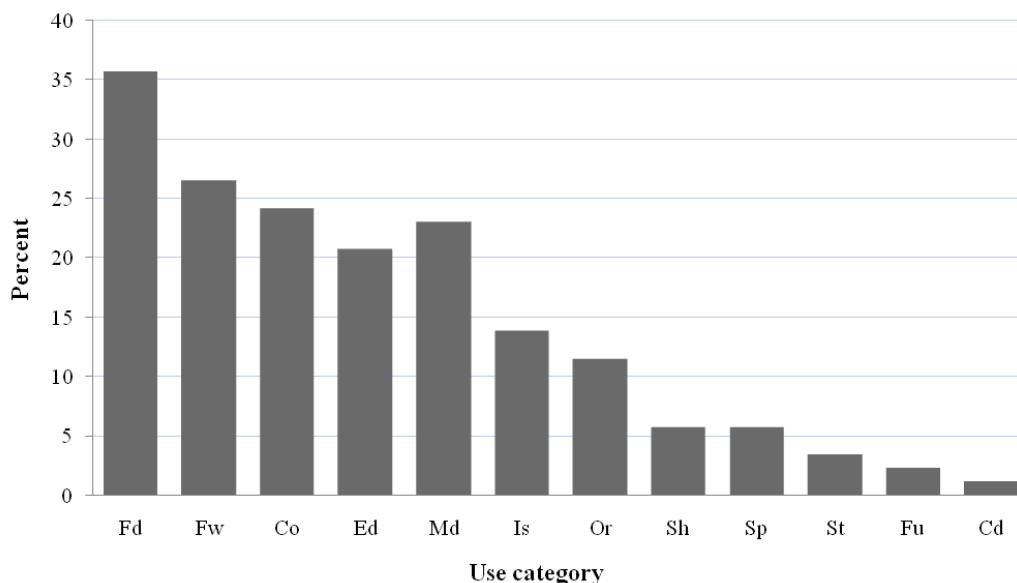


Figure 4. Use category of plants encountered in sampled home-gardens in Uba-Debretsehay district

Key: Ed=Edible, Md=Medicinal, Co=Construction of houses, Fw=Firewood, Or=Ornamental, Lf=Live fence, Fd= Source of Food, Fu= Construction of Furniture, Sh=Shade trees, Bh= Construction of Beehives, Is= Source of Income, St=Stimulants, Sp=Spices, Cd=Condiments.

3.5 Plants used as Food Sources

Among the plant species documented in the home-gardens studied, 31 plant species are cultivated for their food value constituting 35.63% of the total plant species documented in the study area (Figure 4). Re-

garding the horticultural categories, as indicated in Tamrat (2001), plants whose seeds are consumed are widely cultivated in the current study area indicating that these plant species have been playing a major role in the food system in the study area compared to fruit and root plants (Figure 5).

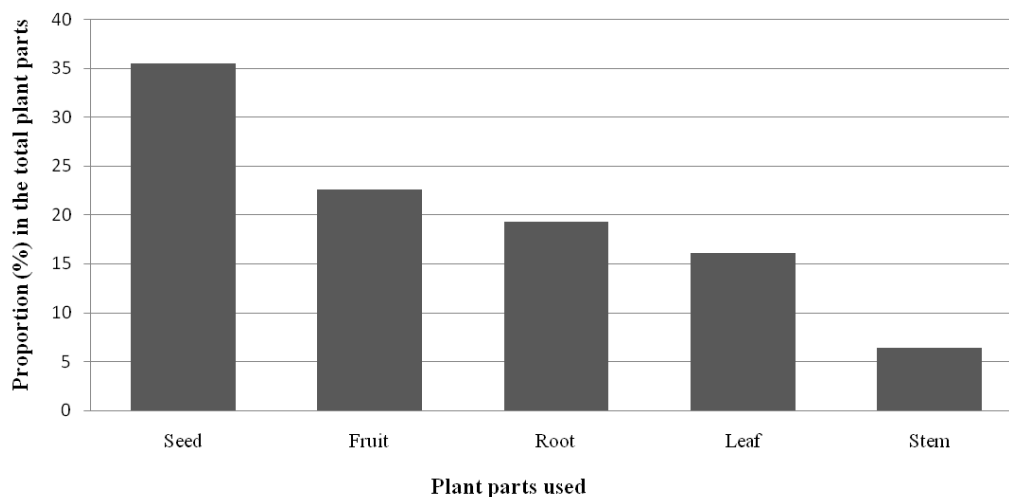


Figure 5. Plant parts used as source of food and their corresponding proportion

Ensete ventricosum was widely cultivated and the most commonly occurring crop in home-gardens in the higher altitudes (both ‘Dega’ and ‘Woynadega’

agroecologies) in the study area.

The result showed that *Zea mays*, *Ensete ventricosum*, *Moringa stenopetala*, and *Brassica carinata*

are widely cultivated (frequently occurring) in home-gardens in the study area and serve as the main

source of food for the local community (Figure 6).



Figure 6. Partial view of a home-garden in Uba-Debretsehay district where *Ensete ventricosum* was widely cultivated. (Photo taken by the author)

This result agrees with the finding of Tamirat (2011) in which *Ensete ventricosum* and *Zea mays* were reported to be among the top frequently occurring crops in traditional home-gardens in the Gedeo Zone.

3.6 Plants used as Spices

Several plant species are cultivated to make spices to enhance the flavor and taste of cooked dishes, butter, coffee, and tea. Five plant species that are used as spices or sources of spices were documented in the home-gardens in the study area. These are *Aframomum corrorima*, *Ocimum basilicum*, *Allium sativum*, *Curcuma longa* and *Zingiber officinale*. These plant species are commonly grown in home-gardens in the study area. Spices were consumed at the home, sold at the local market to pay for other family necessities, and utilized for other household needs.

3.7 Ornamental Plants

The local community at Uba-Debretsehay district cultivates various ornamental plants in their home-gardens. Along with other plant species cultivated in the home-gardens in the district, 10 ornamental plants used for ornamentation (beautification) were recorded from the home-gardens in Uba-Debretsehay district. The names of these ornamental plants are presented in the annex section.

3.8 Cash Crops

From the total of 12 cash crops encountered in the home-gardens in the study area, five plant species are commonly sold in the local market for household income. These cash crop species are *Musa paradisiaca*, *Catha edulis*, *Coffea arabica*, *Mangifera indica* and *Saccharum officinarum*.

3.9 Medicinal Plants

A total of 20 medicinal plant species that have been cultivated in the home-gardens of the study area and are used by the local community to treat various human ailments were documented. These medicinal plants accounted for 22.99% of the total number of plant species encountered in the home-gardens in Uba-Debretsehay district (Table 3 and Figure 4).

The local healers in Uba-Debretsehay district prepare different potential remedies to cure various human diseases/illnesses using their indigenous knowledge, from medicinal plants cultivated in their home-gardens and/or grown in the wild. These remedies are prepared in various forms including powder & liquid or semi-liquid among others and applied in several ways based on either the type/nature of the disease treated as well as the area (the body part) where the treatment is applied. Based on the area of application, remedies were made either for internal use that was taken orally (either swallowed or chewed) or directly applied in or on specific organs

such as the eye and ear and the external use (applied on the surface of the body part [on the affected part of a skin]). The experience or level of knowledge of the local healers living in Uba-Debretsehay district in remedy preparation from traditional medicinal plants and administration of remedies varies

from the healer to healer. According to Awas (2007), such variations might be due to differences in the age and educational level of healers, and their experience/frequencies of preparation of remedies for particular diseases/illnesses in the study area.

Table 3. List of medicinal plants encountered in the home-gardens in the study area and diseases that were treated by remedies extracted from them

SN.	Plant's Botanical Name	Disease/complications treated
1	<i>Allium sativum</i>	Liver disease
2	<i>Carica papaya</i>	Giardia, Amoeba & Malaria
3	<i>Catha edulis</i>	Asthma
4	<i>Citrus xaurantiifolia</i>	Stomach ache & common cold
5	<i>Croton macrostachys</i>	Cough
6	<i>Cucurbita pepo</i>	Chest pain
7	<i>Cymbopogon citrates</i>	Common cold
8	<i>Dodonaea angustifolia</i>	Rabies
9	<i>Eucalyptus globules</i>	Common cold
10	<i>Ficus lutea</i>	Wound, sore & boils
11	<i>Hagenia abyssinica</i>	Tapeworm
12	<i>Lepidium sativum</i>	Stomach ache
13	<i>Moringa stenopetala</i>	Stomach ache & hypertension
14	<i>Ocimum lamiifolium</i>	Skin irritation & allergy of solar radiation
15	<i>Ricinus communis</i>	Expelling placenta
16	<i>Ruta chalepensis</i>	Malaria, common cold & stomach ache
17	<i>Vangueria apiculata</i>	Tooth ache
18	<i>Vernonia amygdalina</i>	Stomach ache & common cold

Source: Survey date

3.10 Plants used for Construction

Among the total plant species cultivated in sampled home-gardens in the study area, 21 are used for construction purposes (Annex) accounting for 24.14% of the total plants recorded in the home-gardens of the study area (Figure 4). Some of the plants cultivated for construction were used for various other purposes by the community. It was indicated that *Eucalyptus camaldulnensis*, *Arundinaria alpina*, *Cordia africana*, *Juniperus procera*, and *Combretum molle* were among the top five preferred plant species for the construction of houses. *Arundinaria alpina* is used for house construction and furniture and is grown in the district at altitudes between 2500m

and 2850m asl. *Eucalyptus camaldulnensis* (Figure 7) was managed in the study area either as a large-scale plantation or a small pocket at the periphery of their farmlands or near homestead areas. It grows in highland, midland and lowland agroecologies and is utilized for hose construction, fencing, and firewood.

3.11 Home-garden Management

The community at Uba-Debretsehay district has been managing their home-gardens in various ways. One of the management approaches practiced by the local community at Uba-Debretsehay district is maintaining the diversity of the home-gardens by planting wide ranges of home-garden plant species in their



Figure 7. Woody plants cultivated for the purpose of house construction: (a) *Arundinaria alpine*; and (b) *Eucalyptus camaldulensis*. (Photo taken by the author)

home-gardens. Cultivating varieties of crops have enabled the community to maintain home-garden diversity and better utilize their home-garden resources by earning income from the sale of these crops and/or making use of the resources for their household consumption. Intercropping is another home-garden management activity that is widely practiced by the local community in the study area. Annual plants/crops were cultivated by intercropping with perennial plants.

The local community has been employing crop selection as a means of home-garden management practice. This home-garden management practice requires the selection and cultivation of particular plant/crop species based on each household's choice/preference. Households applying crop selection use one or more criteria or requirements for their preference of the crop types including quality or quantity of yield, the time a crop requires to establish & mature (produce the required yield), resistance to disease and tolerance to stress/shock (drought, salinity, acidity, *etc.*).

Moreover, organic fertilizer that is produced by the local community using animal manure and hey from litter falls and crop residue was widely applied in the home-gardens in Uba-Debretsehay district to maintain soil fertility. Besides the leguminous plants cultivated in the home gardens of the study area for soil fertility by fixing atmospheric nitrogen, plants such as *Cordia africana* and *Ficus sycomorus* are grown

in most home-gardens in the district for their contribution to increasing soil fertility and soil moisture retention.

3.12 Gender role in the Home-garden Management

Though agriculture is predominantly men's activity, women in the community in the Uba-Debretsehay district engage in farming activities and makes a great contribution to their households. Planting crops or trees, watering, weeding, and maintaining fences are all parts of managing a home-garden. In Uba-Debretsehay district, men and women both share responsibility for overseeing home-gardens. They employ leaf litter and animal manure to keep their soil fertile. Women in the district engage in the preparation & transportation of manures to the farm, tilling, sowing, weeding and harvesting of yields from their farms or home-gardens (Wassihun *et al.*, 2003). Moreover, most elderly people living in the study area spend most of their time in their home-gardens taking care of the crops/plants cultivated in their home-gardens.

4 Conclusion

Communities living in the Uba-Debretsehay district cultivate various plant/crop species in their home-gardens. These home-gardens are diverse and rich in plant species that are used as sources of food, medicine, cash (household income), ornament, *etc.*

Home-gardens in Uba-Debretsehay district consist of different types and/or varieties of plant species and serve as a basic agroecosystem used to cultivate as well as conserve a wide range of plants/crops.

The composition, diversity and richness of home garden plant species vary from one agroecology to another. *Zea mays*, *Eragrostis tef*, and *Moringa stenopetala* are found to be the main source of food in areas characterized by 'kola' agroecology while *Ensete ventricosum* grows in both 'Dega' and 'Woynadega' agroecologies. *Musa paradisiaca* is the most important cash crop in the study area followed by *Catha edulis*, *Coffea arabica*, *Saccharum officinarum* and fruit crops including *Mangifera indica* and *Persea americana* that helped the local community to earn money desired to satisfy their household needs.

Proper traditional home-garden management practice has a great contribution to biodiversity conservation and will promote food security. Home-gardens management practices utilized by the local community in Uba-Debretsehay district have contributed to maintaining crop diversity in the area. However, the selection of cultivated crops based on their resistance to disease, drought tolerance and high market values may have an impact on the genetic resources of some plant species. Repeated practice of crop selection will contribute to the loss of plant genetic resources in the study area.

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Conflict of Interest

The authors declares that there is no conflict of interest.

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Annex: List of plant species documented in the home-gardens of Uba-Debretsehay district

Botanical Name	Plant Family	Habit	Uses
<i>Acacia bussei</i> Harms	Fabaceae	T	Fw,Co,Sh
<i>Acacia Senegal</i> L.	Fabaceae	T	Fw,Co
<i>Aframomum corrorima</i> (A.Braun) P.C.M.Jansen	Zingiberaceae	H	Is,Sp
<i>Allium cepa</i> L.	Alliaceae	H	E
<i>Allium sativum</i> L.	Alliaceae	H	E,Md,Sp
<i>Annona squamosa</i> L.	Annonaceae	T	E
<i>Arachis hypogaea</i> L.	Fabaceae	H	Fo
<i>Arundinaria alpine</i> K.Schum.	Poaceae	H	Co,Fw
<i>Balanites aegyptiaca</i> (L.) Dell.	Balanitaceae	T	E,Co,Fw
<i>Balanites rotundifolia</i> (van Tieghem) Blatter	Balanitaceae	T	E,Co,Fw
<i>Beta vulgaris</i> L.	Chenopodiaceae	H	Fo
<i>Boswellia neglecta</i> S. Moore	Burseraceae	T	E
<i>Brassica carinata</i> A.Braun	Brassicaceae	H	Fo
<i>Brassica oleracea</i> L.	Brassicaceae	H	Fo
<i>Brassica rapa</i> L.	Brassicaceae	H	Fo
<i>Cajanus cajan</i> (L.) Millsp.	Fabaceae	Sh	E
<i>Canavalia ensiformis</i> (L.) DC.	Fabaceae	Cl	Fo
<i>Capsicum annuum</i> L.	Solanaceae	H	Fo
<i>Capsicum frutescens</i> Rodsch.	Solanaceae	H	Fo
<i>Carica papaya</i> L.	Caricaceae	H	Md,Fo
<i>Casimiro aedulis</i> La Llave & Lex.	Rutaceae	T	E
<i>Catha edulis</i> Forssk.	Celastraceae	T	St,Is,Md,Co
<i>Citrus aurantiifolia</i> (Christm.) Swingle	Rutaceae	T	E,Is,Md
<i>Citrus aurantium</i> L.	Rutaceae	T	E,Is
<i>Citrus reticulata</i> Blanco	Rutaceae	T	E
<i>Coffea arabica</i> L.	Rubiaceae	T	St,Md, Is
<i>Colocasia esculenta</i> (L.) Schott	Araceae	H	Fo
<i>Combretum collinum</i> Fresen.	Combretaceae	T	Co,Fw
<i>Combretum molle</i> R.Br. ex.G.Don	Combretaceae	T	Co,Fw
<i>Cordia africana</i> Lam.	Boraginaceae	T	E,Co,Fu,Fw,Is
<i>Croton macrostachys</i> Hochst. ex. A.Rich.	Euphorbiaceae	T	Co,Fw,Md
<i>Cucurbita pepo</i> L.	Cucurbitaceae	H	Fo,Md
<i>Curcuma longa</i> L.	Zingiberaceae	H	Fo,Sp
<i>Cymbopogon citrates</i> (DC.) Stapf	Poaceae	H	Or,Md
<i>Daucus carota</i> L.	Apiaceae	H	Fo
<i>Delonix regia</i> (Bojer ex. Hook.) Raf.	Fabaceae	T	Sh,Or
<i>Dioscorea bulbifera</i> Russ. ex Wall.	Dioscoreaceae	Cl	Fo
<i>Dodonaea angustifolia</i> Roxb.	Sapindaceae	Sh	Md,Fw
<i>Ensete ventricosum</i> (Welw.) Cheesman	Musaceae	H	Fo,Md,Or
<i>Eragrostis tef</i> (Zuccagni) Trotter	Poaceae	H	Fo,Is
<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	T	Co,Fw,Is
<i>Eucalyptus globules</i> Labill	Myrtaceae	T	Co,Md,Fw,Is
<i>Euphorbia tirucalli</i> L.	Euphorbiaceae	T	Fw,Co

Botanical Name	Plant Family	Habit	Uses
<i>Ficus lutea</i> Vahl.	Moraceae	T	Md,Fw
<i>Ficus sycomorus</i> L.	Moraceae	T	Co,Fw,Sh
<i>Grevillea robusta</i> A.Cunn.	Proteaceae	T	Or,Sh
<i>Hagenia abyssinica</i> (Bruce) J.F.Gmel.	Rosaceae	T	Md,Co
<i>Hordeum vulgare</i> L.	Poaceae	H	Fo
<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae	H	Fo
<i>Juniperus procera</i> Hochst. ex. Endl.	Cupressaceae	T	Co,Fw,Or
<i>Lepidium sativum</i> L.	Brassicaceae	H	Md
<i>Lycopersicum esculentum</i> Mill.	Solanaceae	H	Fo
<i>Malus sylvestris</i> Mill.	Rosaceae	T	E
<i>Mangifera indica</i> L.	Anacardiaceae	T	E,Is
<i>Manihot esculenta</i> Crantz	Euphorbiaceae	Sh	Fo
<i>Moringa stenopetala</i> (Baker fil.) Cufod.	Moringaceae	T	Fo,Md
<i>Morus alba</i> L.	Moraceae	T	E
<i>Musa paradisiacal</i> L.	Musaceae	H	Fo
<i>Nicotiana tabacum</i> L.	Solanaceae	H	St,Is
<i>Ocimum basilicum</i> L.	Lamiaceae	H	Sp
<i>Ocimum lamiifolium</i> Hochst. ex. Benth.	Lamiaceae	Sh	Md
<i>Olea europaea</i> subsp. <i>cuspidate</i> (Wall. & G.Don) Cif.	Oleaceae	T	Co,Fw
<i>Passiflora caerulea</i> L.	Passifloraceae	Cl	Or
<i>Persea americana</i> C.Bauh.	Lauraceae	T	E
<i>Phoenix reclinata</i> Jacq.	Areaceae	T	Co,Or,Fw
<i>Pisum sativum</i> L.	Fabaceae	H	Fo
<i>Podocarpus falcatus</i> (Thunb.) R.Br.	Podocarpaceae	T	Co,Fw,Fu,Or
<i>Psidium guajava</i> L.	Myrtaceae	T	E
<i>Rhamnus peinoides</i> L'Hér.	Rhamnaceae	Sh	Cd
<i>Ricinus communis</i> L.	Euphorbiaceae	H	Fw
<i>Rosa abyssinica</i> Lindley	Rosaceae	Sh	Or
<i>Ruta chlepeensis</i> L.	Rutaceae	Sh	E,Md
<i>Saccharum officinarum</i> L.	Poaceae	H	Fo
<i>Solanum nigrum</i> Lesch.	Poaceae	H	Fo
<i>Solanum tuberosum</i> L.	Solanaceae	H	Fo
<i>Sorghum bicolor</i> Kuntze	Poaceae	H	Fo
<i>Sorghum dochna</i> (Forssk.) Snowden	Poaceae	H	Fo
<i>Spathodea campanulata</i> Buch.-Ham. ex DC.	Bignoniaceae	T	Sh,Or
<i>Syzygium guineense</i> (Willd) Dc.f	Myrtaceae	T	Co,Fw
<i>Triticum aestivum</i> L.	Poaceae	H	Fo
<i>Vangueria apiculata</i> K. Schum.	Rubiaceae	T	Md,Fw
<i>Vernonia amygdalina</i> Del.	Asteraceae	Sh	Md,Co
<i>Vicia faba</i> L.	Fabaceae	H	Fo
<i>Vigna unguiculata</i> (L.) Walp.	Fabaceae	Cl	Fo
<i>Zea mays</i> L.	Poaceae	H	Fo,Fw,Is
<i>Zingiber officinale</i> Roscoe	Zingiberaceae	H	Sp

Key: T=Tree, Sh=shrub, H=Herb, Cl=Climber, E=Edible, Md=Medicinal, Co=Construction of houses, Fw=Fire wood, Or=Ornamental, Lf=Live fence, Fo=Fodder, Fu=Furniture, Sh=Shade, Bh=Bee hive making, Is=Income source/cash crops, St=Stimulants, Sp=Spice, Cd=Condiment.