



JIMMA UNIVERSITY
School of Graduate Studies
Department of Biology

**Plant Diversity and Management in the Home Garden of Abaya District: Ethno-
botanical approach; Borena Zone; south eastern Ethiopia.**

By

Bona Bare

**A Thesis submitted to the Department of Biology, College of Natural Sciences, Jimma
University, in partial fulfillment for the requirement for the degree of Master of Science in
Biology (General Biology).**

Major-Advisor: Kitesa Hundera (PhD)

Co advisor- Zewdue Achiso (M.Sc)

August, 2015
Jimma, Ethiopia

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Approved by the examining board

Name	Signature
Tokuma Negisho (Msc)	_____
Chairman, Head department	
Research advisor	
Kitesa Hundera (PhD)	_____
External Examiner	_____
Internal examiner	_____

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DECLARATION

I hereby, declare that this thesis is my original work and has not been presented for a degree in any other universities and that all sources of materials used for the thesis have been duly acknowledged.

Signature _____

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LIST OF ACRONYMS AND ABBREVIATIONS

ADDPBME.....Abaya district department of plan, budget, monitoring and evaluation

HHs.....house holds

JUjimma University

FGD focus group discussion.

IPGRI..... international plant genetic resource institute

OPERATIONAL DEFINITION

Plant diversity: the degree of variation of a system in any defined area.

Species diversity- is the number of different species in a particular area weighted by some measure of abundance.

Conservation: preservation and careful management of the environment and of natural resource

Management: the act of managing something.

Ethnobotany : the scientific study of the relation between plant and human being

ABSTRACT

Home garden is the traditional land use system around a homestead, where several species of plants are grown and called as “Dawoo” in Abaya district. However, plant diversity and its management were not well known. Therefore, this study was conducted to identify plant diversity and management in the home garden of the district. A total of 70 informants from eight kebeles were selected by using single population proportion and interviewed on plant diversity and management. The collected data was entered in MS Excel spread sheet using a descriptive statistical method such as frequency distribution and percentage to analyze and summarize data on useful home garden plant. The study found out that a total of 49 home garden plant species (belonging to 47 genera and 36 families) were recorded and identified in the study area. Of the total 49 identified species 21 of them were grouped in 8 families and the remaining 28 species are found single to their family. Comparing their families Fabaceae comes first contributing to four (4) species (8.1%) followed by Poaceae , Solanaceae and Astreraceae containing three (3) species (6.1%) each. With regard to the occurrence of plant species in the home garden Zea mays were the most common with the 68 (97%) followed by Enset ventricosum, 63 (90%), Musa paradisiaca , 54 (77.1%), Coffee arabica and Persa americna each 53 (75.7%). Fifty percent of food plant parts cultivated in the district is fruit followed by leaves with 23.1%, seed and stem 19.2% each, root 15.4% and bulb 3.8 %. In conclusion, plant diversity in the home garden of the study area is mainly affected by factors such as home garden handling and socio-economic status of the owner, lack of rain fall and lack of awareness. Awareness raising of local population and training on management of plant resource needs to be taken up seriously.

Key words: plant diversity, home garden, indigenous knowledge, home garden management

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Plant domestication most likely began around the dwellings of human settlements. The immediate area around the homestead offers increased availability of water, better soil fertility due to organic waste inputs, and easier protection of the crop against animals (Harlan, 1975). Facilitated by the close interaction between humans and plants within a home garden setting, many new crops have been developed in home gardens. This process continues, especially in parts of the world where there is still ample plant diversity available and where a ‘natural’ link between gardens and nature exist (Engles, 2002). Home gardens have been recognized as important sources of biodiversity, income and food, especially for low-income households (Gessler *et al.* 1996). Most projects on home gardens have sought to increase and diversify production mainly to improve the nutritional status of low-income households .The diversity of plant and animal resources as well as the complex cultural diversity including indigenous knowledge of the local communities in Ethiopia needs to be conserved and preserved (Afework, 2004).

Of the countries in tropical Africa, Ethiopia has a good practice of home garden agroforestry system. Four major agricultural systems including pastoralism, shifting cultivation, grain based cultivation and enset-based mixed cultivation are practiced in Ethiopia. Traditional agriculture based on the local varieties and variable plant populations adapted to local agronomic conditions and meet economic, social, cultural and ecological needs. The latter system as it occurs in southern and southwestern Ethiopia includes typical home garden agroforestry system (Westphal, 1975; Asfaw, 1997).

The home garden agroforestry systems can also be considered as micro-environments within the agroecosystems that preserve the function and resilience of the larger ecosystem. As an ecosystem, it contains multiple levels of diversity, including cultural, genetic and agronomic diversity. Moreover, it can be regarded as informal plant introduction and distribution centers. An analysis by IPGRI (1999) showed that permanent contacts between gardens, families and

local markets as well as the great diversity in individual gardens lead to continuous germplasm and information exchange among them.

Home garden cultivation is the result of accumulated knowledge practiced and managed over generations that is possibly evolutionary starting from shifting cultivation practices that were used to overcome problems of resources and to ascertain rights to land resources (Ageze *et al.*, 2013). One of the most vital functions that home gardens serve is intergenerational preservation and perpetuation of agrobiodiversity and indigenous knowledge on farming and useful plants (Asfaw and Woldu, 1997). Home garden is commonly defined as land use system involving deliberate management of multipurpose tree, shrubs intimate association with annual and perennial agricultural crops and invariably live stocks within the compounds of individual house, the whole tree crop, and animal unit is being intensively managed by family labour (Kumar and Nair, 2006)

The importance of home gardens in the production of food, medicine and other useful products for human beings is widely recognized; consequently, regular attempts to improve the productivity of this widespread agro-ecosystem. The realization that this 'farming' system is also an important reservoir of unique genetic diversity has more recently led to initiatives to study this system more carefully in order to obtain a better understanding of the role of home gardens in the management and conservation of genetic diversity in situ (Engles, 2002). The variety of plants in home garden of Ethiopia were preferred during dry seasons and shortage of food, potential for dry land, agro-biodiversity and multipurpose to human wellbeing, livestock and environmental services they provide (Feysa *et al.*, 2011).

The special arrangement of the crops in home gardens may be related to the various uses of the crops micro-environmental adaptation and their habit. The management of home gardens contain some food crops showing that the most important function of the home garden is food production (Hailu and Asfaw, 2009; Wondimu *et al.*, 2006; Asfaw, 1997; Okigbo, 1990; Fernandes and Nair, 1990;). The heterogeneity of ecology and know-how of people caused the diversity of home gardens and farm lands (Asfaw, 2012). Various authors pointed that a special focus has to be given to developing home gardens so that, indigenous and exotic useful plants could be maintained for the benefit of present and future generations (Asfaw, 1998).

1.2. Statement of the Problem

Even though we have rich and diverse ethno linguistic groups throughout the country, there is a wide gap in our knowledge about home garden data and information from various parts of Ethiopia. Complete identification, documentation, management activity and conservation action have not yet been made in Abaya district and there is no published information on the knowledge of home garden plant diversity in the district. Therefore, detailed study of the home gardens is desirable to identify plant diversity, management, factor that affect plant diversity and appropriate conservation measure. Thus, the present study was conducted to fill these gaps. The research question was:

- ↳ What type of plant species are found in the home garden of the study area?
- ↳ What is the contribution of home garden plant to the society of study area?
- ↳ How do local people manage the plant species that are found in their home garden
- ↳ What factors affect plant diversity in the study area?
- ↳ What is the associated indigenous knowledge for conservation and sustainable utilization

1.3. Objectives of the Study

1.3.1. General Objective

- ❖ The overall objective of the study is to assess Plant Diversity and Management in Home Gardens in Abaya District of Brena Zone in Oromiya Regional State by using Ethnobotanical approach.

1.3.2. Specific Objectives

- To document plant diversity in the home garden of the study area
- To explore the contribution of home garden plants in to the society
- To identify factors affecting home garden plant diversity in the study area
- To examine indigenous knowledge on management of home garden plants

1.4. Significance of the Study

The outcome of this study may contribute important information on documentation and organization of database on various plant species diversity and management in the home garden. The specimens of collected plant species in the home garden would be documented at Jimma University. Such documentation is used for teaching, taxonomic identification and for the management/ conservation of the studied plant in the same area.

1.5. Delimitation of the Study

To make the study manageable and feasible, the study is delimited to eight (8) kebeles in Abaya district of Borena zone , Oromia Regional State. The selection of the kebele was based on the potential of the home garden

CHAPTER TWO

2. LITERATURE REVIEW

2. 1.The Concept of Home Garden

The term home garden refers to the traditional land use system around a homestead, where several species of plants are grown and maintained by household members and their products are primarily intended for consumption by the family (Shrestha *et al.*, 2002). Home garden is an integrated system which comprises different things in its small area that produces a variety of foods and agricultural products including staple crops, vegetables, fruits, medicinal plants. Home gardening is a practice of integrated land-use and agricultural production system, which dates back for years throughout the tropical world (Hailu and Asfaw, 2011).

Home gardens are believed to have evolved from the shifting cultivation in order to overcome resource constraints, population pressure and consequent reduction in available land, labor and capital (Fernands and Nair, 1990). Engels (2002) described home garden agro forestry as logical production systems for crop plants that are consumed fresh, used on a daily basis, consumed in small quantities and requiring specific attention. Such crops include vegetables, spices, herbs, medicinal plants and special local varieties of major crops like sorghum, maize, sweet potato and enset.

The home garden is a small-scale traditional agricultural ecosystem, has played an important role in conservation and sustainably utilization of plant biodiversity as well as in adaptation to the changes in climatic conditions of the environment. It is the result of accumulated knowledge practiced and managed over generations that is possibly evolutionary starting from shifting cultivation practices that were used to overcome problems of resources and to ascertain rights to land resources (Ageze *et al.*, 2013). A common interpretation of home gardens is that it is a system for the production of subsistence crops for the gardener and his family. Home garden can be immediately surrounding the home or slightly further away, but still near to the residential area that may or may not have the additional role of production of cash crops. Home gardens represent land use systems involving deliberate management of multipurpose trees, shrubs, annuals and perennial agricultural crops, spices herbs and medicinal plants, and invariably

livestock within the compounds of individual houses, where the whole crop-tree-animal unit being intensively managed by family members (Watson and Eyzaguirre, 2002;) .This diverse group of plantings which surrounds so many houses is a mixed garden, and a cornerstone of rural life.

According to Keller (2003), home garden has the following common characteristics: Place of proximity to home; Small in plot size, Cultivation of different vegetables, fruits and other crops, production mainly for family consumption and sale if in excess, managed by household members namely wife, husband and children; and use of low cost input for cultivation

2.2. Home Garden around the World

The last couple of decades have testified an increasing worldwide interest in home gardens, bringing to light their potential for sustained subsistence farming and biodiversity conservation (Christianity, 1990). At present, home gardens are widespread in the tropical and subtropical regions of Asia (Godbole, 1998), Africa (Okigbo, 1990) and Central and South America (Padoch and De Jong, 1991). Wezel and Bender (2003) documented Plant species diversity of home gardens of Cuba and its significance for household food supply. A research conducted in the home garden of Nicaragua indicate that home gardens ranged in size between 200 and 14,000 m², with an average of 3,240 m². These home gardens are arranged in to different management zones consists of different plant species such as fruit trees, ornamentals with shade trees and shaded coffee (Mendez *et al.*, 2001).

The cultivation of fruits, vegetables and ornamentals in home gardens has a long tradition in northeast India, especially among the hill tribes residing in the states of Assam, Manipur, Nagaland and Meghalaya. Studies from south-west Bangladesh (Motiur *et al.*, 2006) and northeastern Bangladesh (Motiur *et al.*, 2005) reported that on an average 15.9% and 11.8% of household income is derived from home gardens respectively. Many home garden systems around the world have been studied for plant diversity and for their economic value. Among the agricultural sites worked in traditional communities from swiddens or fallows to permanent

fields ,home gardens are often sites of the greatest agro biodiversity, particularly in the humid tropics(Kehlenbeck and Maass, 2004; Sunwar *et al.*, 2006).

2.3. Home Garden in Africa

Many of African countries considers home garden as the site where useful plants are found and also site where the relation of human and plants is explained. Example, the ancient names for Egypt underscore the relation between the land, the people, and it agriculture (Khattab, 2000). Knowledge of crops of ancient Egypt can be deduced from the artistic record but definite proof comes from the desiccated remains of home garden plants themselves. Gebaru (2005) studied plant species diversity of home garden in EL .Obied, Central Sudan of tropics vary greatly in species, species richness, structural complexity and size and most of them display different vegetation layers making them typical agro forestry system .

Agbogid and Adolor (2013) studied home garden in maintenance of biological diversity in Nigeria. Linares (1996) studied cultivating biological cultural diversity of home garden in urban farming of Cassamance in Senegal and home gardening which is the surviving food security strategy in the Nandom traditional area of upper west region in Ghana. The home garden is an essential part of the food production system in rural areas in Ghana in supplementing household field production. Agro-ecological conditions are known to have great influence on plant species composition in home gardens.

2.4. Home Garden plant diversity in Ethiopia

The home gardens in Ethiopia were earlier covered in studies of agricultural systems which alluded to their contributions to food production and maintenance of species. The presence of home gardens in different areas of Ethiopia is indicated by different names applied in different cultures of Ethiopia. They are referred to as ‘Daaddaa/Emeriyaa’ in Dawro language, ‘Yeguarowersha’ in Amharic and ‘Dawoo’ in the Oromo language, ‘Daddeegoyo’ in Kefa language, ‘Daniogade’ in Gamo language and Darkwa in Welayta (Seta *et al.*, 2013).Traditional

home gardens of Ethiopia demonstrate a sustainable agricultural practice that is environmentally, friendly and allows the harvesting of diverse products in response to the needs of farming families and urban dwellers .Hailu and Asfaw (2011) studied that in parts of Ethiopia, home gardens and other traditional agro forestry systems are found in a complex state like in the enset-based home garden in southern and southwestern.

Home gardens have been described as ‘living gene banks’ in which a variety of germ plasm, in the form of indigenous varieties, landraces and rare species thrive side by side and has been preserved through generations (Haile *et al.*, 2009). Seta *et al.*, (2013) described home garden as multi-storied and multi-purpose. This heterogeneous environment of home gardens provides favorable growing conditions for wide varieties of useful plants.

Ethiopia has different plant diversity within different climatic condition throughout the country. Out of these plant species, most of them are found in different home garden of Ethiopia. According to Ageze (2013), two hundred fourteen plant species were recorded in the home garden of the Loma and Gena district of Dawaro Zone and these are distributed in 174 genera and 63 families. Fabaceae stood first containing 21(12.07 %) genera and 24 (11.21 %) species, Asteraceae came in the second place with 18 (10.34 %) genera and 29 (13.55 %) species, and Poaceae in the third with 17 (9.77 %) genera and 17 (7.94 %) species. The families Fabaceae, Asteraceae and Poaceae were among the plants that are frequently used by the Dawro people. Ageze *et al.*, (2012) Reported that, Dawaro people have a tradition of diversifying their home gardens at least with enset, coffee, spices, vegetables, medicinal plants and fruits with other multipurpose plants. They knew that diversified home gardens provide balanced diet, medicine and income; the owner could not be affected by starvation, disease and poverty.(Mokkonin *et al.*, 2013) studied that there were 112 plant species identified and documented from Holeta town. These plant species were classified into 93 genera and 43 families. From 112 plants species identified, 6.25% were indigenous plants such as *Enset ventricosum*, *Juniperus procera* and 35 species were wild plants which grow, and 70 species were cultivated crops. The growth form of the species were 49 (43%) herb species, 32 (29%) tree species, 28 (25%) shrub species, and 3% were climber plants.

2.4.1. Food Plant Diversity

Food plant includes those plants consumed by humans as major constituents. Plant products that are used as food can come from any part of the plant such as Seeds, fruits, leaves, stem, root and flowers. Such plant foods are largely obtained from the conventional crops that are purposely grown in the home garden. Asfaw (1997) reported that there are more than 130 species of cultivated food plants distributed in about 35 angiosperm families in the whole of Ethiopia. According to Zerihun *et al.*,(2011) the most cultivated crops in the home garden of Jimma Zone were enset ,avocado, cabbage ,maize. These crops were cultivated in the home garden for consumption and sale. However, the purpose of cultivating specific crop was quite different among house hold.

2.4.2. Fodder Plant Diversity

Fodder or animal feed include those plant materials harvested and fed to domestic animals and grazed and browsed in wild. Now a day due to people need plant for their daily life activity and agricultural environment grazing fodder is scarce in highly cultivated areas and is less available during the prolonged dry season or when there is drought. There are few reports on some fodder plants of Ethiopia. Abebe *et al.*, (2001) studied about some multipurpose fodder trees in relation to farmers of Ethiopia.

2.4.3. Medicinal Plant Diversity

The indigenous knowledge on medicinal plants appears when humans started and learned how to use the traditional knowledge on medicinal plants Traditional knowledge of medicinal plants and their use by indigenous healers and drug development in the present are not only useful for conservation of cultural tradition and biodiversity but also for community health care and drug development in the local people. (Emiru *et al.*,2011). In Ethiopia, more than 95% of traditional medical preparations are of plant origin and more than 80% of the people dependent on plant for their health services. The wide spread use of traditional medicinal among both urban and rural population in Ethiopia could be attributed to cultural acceptability , efficacy against certain types of diseases, physical acceptability and economic affordability as compared to modern medicine

(Abebe, 2001). Bekele (2007) mentioned that, the use of medicinal plants is common phenomenon in Ethiopia, nearly 70% of humans and 90% of livestock population in the country use plant based traditional medicines as their major health care system. According to the World Health Organization (WHO) about 65-80% of the world's population in developing countries depends essentially on plants for their primary healthcare due to poverty and lack of access to modern medicine (Awoyemi *et al.*,2012). A total of forty nine medicinal plant species were identified in Gimbi district. Of these, 40 (81.6%) species were reported from the wild while the rests were from home garden cultivated by the community (Abera, 2014)

2.4.4. Fence Plant Diversity

Plants used for fence in rural areas of Ethiopia were obtained mostly from the edible plant found in the environment. These edible plants were used by the locality for different purpose such as fence, food, medicine, construction, fire wood and timber. These fence plants are distributed in different home garden of Ethiopia (Asfaw and Tedesse, 2001).

2.5. Contribution of Home Garden

The contribution of home gardens is to improve the nutritional status of rural and urban families and the increase of vegetable production in the tropics (Wastos and Eyzaguirre, 2001). Intrinsic to the nature of home gardens are the intimate relationships that exist between their human and agro ecological components (Mergen, 1987). Home garden zones are easily visualized and their location, size and plant species composition reflect deliberate management strategies. Plants and their local uses, which are included in zones, provide additional information on a farmer's management priorities and socioeconomic needs.(Mendez *et al.*,2001).The major functions of home gardens particularly in rural areas are subsistence production and income generation (Kumar and Nair, 2004). Because of high plant diversity in the home gardens, a wide spectrum of multiple-use plant products can be generated with relatively low labour, cash or other inputs. In seasons of scarcity home gardens with their diverse products available year round, contribute towards food security. They also fulfill many social, cultural and ecological needs. The multi-layered, forest-like vegetation structure of home gardens contributes substantially to the ecological sustainability of the village ecosystems (Kehlenbeck and Maass, 2004). This vegetation structure prevents soil erosion, provides habitat to wild plants and soil

microorganisms and promotes a favorable micro-climate for the household. Because of their richness in plant species, home gardens are regarded as an ideal production system for in situ conservation of plant species. Home garden systems provide an additional food supply and cash income for the people (Das and Das, 2005).

According to Agbogidi and Adolor (2013), home gardens provide health, environmental and enjoyment advantages for the gardener. It is also a way to save money and eat healthier foods. The benefits of a home garden make the physical exertion in costs of gardening worth the effort. The major reason given for the increase in cultivation of home gardens is the provision of food and income. Another reason is (1) the convenience of their location around the home; (2) It makes one save time and money to go somewhere else to buy produce. It can also help to save money on the food itself; (3) Growing one's own food gives complete control over the chemicals and products used during the growing process. A home garden allows one to pick the produce when it is ripe; (4) A garden provides the opportunity to make a positive environmental impact and (5) Planting a garden provides enjoyment for many home owners. Watching your garden grow from bare ground to ripe produce or beautiful plants, offers a sense of satisfaction. Gardening also offers a form of moderate outdoor exercise.

2.6. Factor Affecting Plant Diversity in the Home garden

Study conducted by Hailu and Asfaw (2011) in Sabata town Oromia regional state, identified seven major factors that affect the composition of plant species in the home gardens. These are water availability, Socio-economic condition, home garden size, agricultural input support (seed/seedling provision), home garden handling, Crop pests and lack of awareness. Availability of water, socio-economic conditions and home garden size are identified as the top three factors affecting home garden plant composition. The low availability of water is the major factor affecting off-season production of their garden crops and for the reduction of plant diversity which corroborates with Asfaw (1997) and Seta (2007) who found that the diversity of plant species in home gardens and in many environments is limited by the availability of adequate water. Plant diversity of home garden in space and time varies depending on a combination of external and intrinsic factors that are mainly related to the categories agro-ecology (Fresco, 1993; Hoogbrugge and Soemarwoto, 1987; Christianity *et al.*, 1986). Agro-ecological factors such as

elevations, climate, or soil quality may limit plant diversity in home garden. Generally species richness is said to decrease with increasing elevation (0-1500) due to decreasing mean temperature (Karyono, 2000).

2.7. Management of Plant Diversity in Home Gardens of the Ethiopia

Management and conservation of plants began with prehistoric human's undertaking of domesticating wild plants. It is a long and complex process and many plants are found in various stages of domestication as a result of human selection in the home garden (FAO, 1999). According to Hailu and Asfaw (2011), a number of local management practices are carried out in the home gardens of the Sabata town and the maintenance of diverse taxa of plants species is made possible by cultivating and protecting a mixture of herbs, lianas, shrubs and trees based on the need and decision of the family members. In this study management activities are carried out with minimal ecological cost due to the low utilization of chemical inputs. Soil enrichment is maintained by including leguminous species among the crops cultivated and by incorporating organic fertilizers such as house refuses, animal manures and crop residue. Similar findings reported by previous researchers (Seta, 2007 ; Asfaw, 1997).

The advantage of the management of home gardens and agroforestry is that they improve microclimates by sustaining permanent plant cover, improving soil, water and other resources, reducing carbon emissions, increasing sequestration, and storing it above and below ground, decline in reducing vulnerability and ensuring food security wherever they occur (Asfawe, 2010). Therefore, up-scaling the value of home gardens and agro forestry systems can help create ecologically balanced environments (environmental protection) to improve agricultural production and better livelihood support (Asfaw, 2010). Ageze *et al.*, (2013) reported that, the intermixing of multipurpose plants in home gardens and in the farm field benefited the indigenous people and men were more knowledgeable than women regarding the use of trees and shrubs that were collected from the wild and planted in the home gardens. On the other hand, women were more knowledgeable than men regarding the use of herbaceous species grown in home gardens. The special arrangement of the crops in home gardens may be related to the various uses of the crops micro-environmental adaptation and their habit. The management of

home gardens contains some food crops showing the most important function is food production. Biodiversity maintenance must be integrated with agricultural practices that can have multiple ecological and socioeconomic benefits, particularly to ensure food security. Agro biodiversity through traditional farming systems contributes to rural livelihoods based on subsistence agriculture mainly built with food security targets production types of home garden plant species (Hailu and Asfaw ,2011).

2.7.1. Conservation of Home garden Plants

Plant domestication most likely began around the dwellings of human settlements. The immediate area around the homestead offers increased availability of water, better soil fertility due to organic waste inputs, and easier protection of the plant species against animals (Waston and Eyzaguirre, 2001). Facilitated by the close interaction between humans and plants within a home garden setting, many new crops have been developed in home gardens. This process continues, especially in parts of the world where there is still ample plant diversity available and where a ‘natural’ link between gardens and nature exist. In trying to determine how home gardens can best contribute to conservation, it is necessary to understand the way in which environment, crop biology and farmers management are affecting the extent and distribution of genetic diversity. This involves determining what diversity is maintained by farmers, where and when it is maintained and how and by whom (Engels, 2002).

Crop plant diversity is maintained in home gardens when it meets producers’ needs. The high diversity of species in home gardens plays wide socioeconomic and ecological roles. Because it is related with the production of food and other products such as firewood, fodders, spices, medicinal plants and ornamentals (Christanty, 1985). Prevention of environmental deterioration commonly associated with monoculture production systems, income generating sites (Hoogerbuugge and Fresco, 1993) and in situ conservation of agro-biodiversity (FAO, 2001; Watson and Eyzaguirre, 2002). Generally, home gardens serve as refuges to a number of plant species, particularly those not widely grown in the larger agro ecosystems. Moreover, they are the place of enormous indigenous knowledge (Eyzaguirre and Linares, 2004).The unwise use and over exploitation can slowly eliminate a plant species from the environment. As plant species is lost from a locality, the information contained in it will also be slowly blurred and finally become lost forever.

CHAPTER THREE

3. MATERIALS AND METHODS

3.1. Description of Study Area

3.1.1 Geographic Location

The study was conducted in Abaya woreda which is found in Borena zone of Oromia regional state, Southern Ethiopia. The geographic location of the district is $6^{\circ} 14'N$ Latitude and $30^{\circ}10'E$ Longitude. The capital of the district is Guangua and found at about 365 km far from Addis Ababa to the south direction on the Addis Ababa Moyale international road. It is located at about 200 km from capital city of Borena zone in north direction. The district shares boundaries with Sidama zone in the north direction, Galana District in the South, Gedio in the east direction and lake Abaya to the west direction. (ADADPBME, 2014)



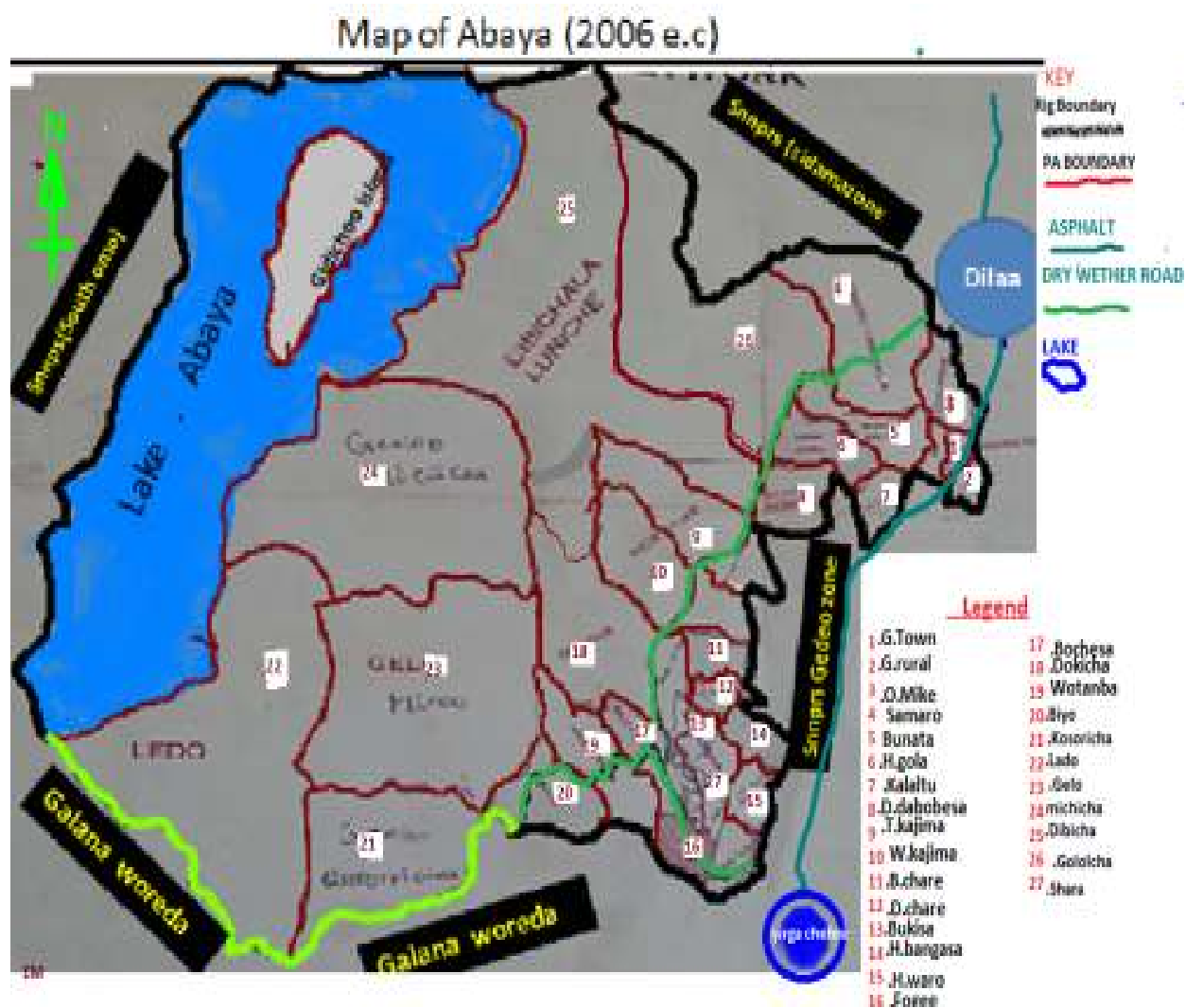


Figure .1. Location and map of study area, source (ADADPBME, 2014)

3.1.2. Population density

According to the data of the year 2014 the total population of Abeya district is 126,684 of which averagely 48.99% male and 51% female. At present the district has 27 kebele of which 17 of them are under (cold midland “baddadaree qorraa and hot mid land “Baddadareehoo’aa”) and 10 of them are under warm climate “Gammoojjii” agro ecology (ADADPBME,2014).

3.1.3 The ethnicity of district population

The indigenous people of study area are Guji Oromo, the eldest branch of the Oromo ethnic group in Ethiopia. Oromo is the largest ethnic group in eastern Africa (Dalle, 2005).

3.1.4. Agro Climatic Zone

The altitude of the woreda ranges from 1200-2060 m.a.s.l The agro climatic condition of the district is sub divided in to Cold mid-land(badda-daree qorraa) , Hot mid-land (badda daree hoo'aa) and Warm climate (Gammoojjii). Even though there is no high land area in the district, 70% is sub-humid and 30% is warm climate. The annual mean temperature of the district ranges from 16°C-28°C, the mean annual rainfall ranges from 900-1040mm. There are two major rainy seasons. The first season is from March to May “ Arfasa “ and second season starts from September to November “ Ganna “ (ADADPBME,2014)

3.1.5. Land Use and Livelihood System

The District has a total area of 187,137km² and from farm land 44,302.85km², pasture 63,999.80km², Natural forest 9,016.70km², plantation forest 1,088.70km², other/swampy, marshy, degraded and shrubs and water body 62,295km² the land cover of the district.

Table 1: Land use by type and size coverage

	Land use type	Size in hectar
1	Potential arable land	44,302.2
1.1	Land covered by annual and perennial crops	26715.5
1.2	Land covered by irrigation	1368.45
1.3	Land covered by coffee	9553.98
1.4	Land covered by enset and agro industry	2476
2	Pasture land/grass land	35978.03
3	Natural forest	12404.74
4	Water body	62925
5	Other /swampy and marshy	580
	Total	187134

3.1.6. Soil

According to the district agricultural and rural development office the percentage coverage of the soil approaches the following figures. Clay loam-68, Clay loam clay-15.25%, Sandy loam-11%, Sandy soil-5.75%. The district's economic base is agriculture; this includes cash crop and filed crop production and animal rearing. The major crops produced in the area are coffee, maize, teff, hairy coat bean, inset, sweet potato, and varieties of fruit crops (ADADPBME, 2014).

3.2. Survey and Site Selection

Reconnaissance survey was made in eight kebeles in Abaya district from November 16, 2014 to November 24, 2014 to select study site. Based on agro ecology of the district eight kebeles were selected. Data collection was conducted from March 2015 to May 2015

Table 2 :The study sites of the district

No	Kebele	Distance from the center In Km	Range of altitude a.s.l
	Guangua	Center	1500__1600m
1	Shara	42 Km to South	1700—1800m
2	Foge	39 Km to South	1700—1900m
3	HafursaBangasa	37Km to South	1650—1900m
4	Odo Mike	4Km to North west	1500—2000m
5	Bunata	7Km to West	1500—1650m
6	Samaro	12Km to North	1185—1500m
7	Gololcha	35Km to North	1200—1400m
8	Dabaka	18.5Km to North west	1300—1550m

3.3. Study design

The study design employed was community-based cross sectional quantitative design complemented by qualitative methods

3.4. Sample Size and Sampling Technique

3.4.1. Sample Size

From a total of 27 kebeles 8(30%) kebeles were selected purposively based on the potential of the home garden plant species. Of the selected 8 kebeles 70 informants (55 male and 15 female) between the age of 20 and 80 selected. These sample size was calculated by using single population proportion with the margin error of 9% and proportion of 78% (Hailu and Asfaw,

2011).
$$n = \frac{Z_{\alpha/2}^2 PQ}{d^2}, \text{ or } n = Z_{\alpha/2}^2 p(1-p) \text{ divided } d^2$$

Q is equal to P(1-P)

Where n is sample size, d is the margin error,

p= previous population studied and

z^2 is the given value and α is the level of significance.

The total household (HHs) in Abaya Districts 126,420 and the total household in the selected 8 Kebeles of Abaya District is 9565

3.4.2. Sampling Technique

Sample of informants of one kebele was selected from eight kebeles by using proportion to population size as shown below in schematic diagram. This means number of sample divided by total population of the households in eight kebeles multiplied by total households in individual kebeles. $(N/T \times p_i)$ Where N=number of sample, T=total number of households in eight kebeles p_i =number of house hold in one kebeles

Example = $70/9565 \times 1069 = 8$

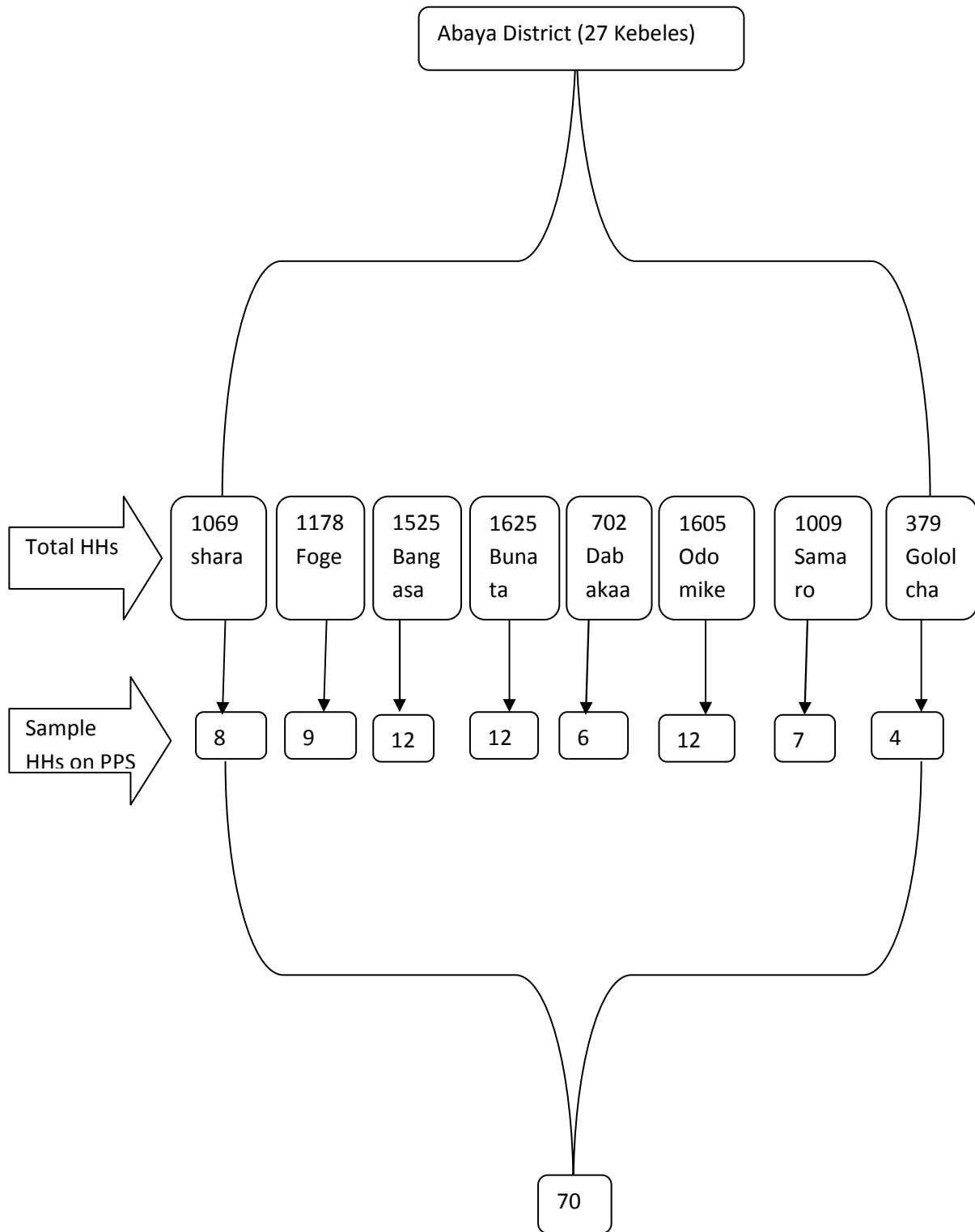


Figure 2: Schematic diagram of sampling technique

3.5. Source of Data

Data for this research was collected from both primary and secondary source. Secondary data was collected from journals, research article and different books and primary data was collected from local people and agricultural office of the district.

3.5.1. Materials

Different materials were used for data collection home garden plant types in the study area. For example, plant press, scissor or knife, news paper, cola, alcohol, bloater, flash disk, Note book and the like for plant preservation; digital camera and tape recorder for collecting photographs and to record the plant home-gardens and the information given by the informants respectively.

3.6. Data Collection Tools

Ethnobotanical technique used in the data collection semi-structured interview and direct observation of individual home garden .Group discussion with the respondent were also used for the purpose of comparison of useful plant species. During interview essential information were asked about home garden plant such as local name of plants, parts used, growth forms and how they manage their home garden were asked and documented by the researcher. Additional information was collected on the note book for detail analysis and documentation after the response of respondent.

3.6.1. Observation

Observation and house hold survey were made in all selected kebel and relevant information was collected from the informants.

3.6.2. Interview

Information on plant diversity, purpose of the home garden plants and how they manage their home garden were collected through household interview.

3.6.3 .Group discussion

Three group discussions were held for two consecutive days with the discussant that were selected purposively in which one group contain three key informants on the bases of agro ecology of the district. The groups were asked to compare home garden plant species that is the most available in their garden.

3.7. Identification of plant species

Based on information given by respondents preliminary identification was done in the field, collecting specimens of each useful plant with local name attached on individual plant species, the family name and range of altitude in which the plant were found . All the plant species in the home garden were collected from the sampled gardens using different materials and made ready for taxonomic identification. The collected plant specimens were identified at herbarium of JU using taxonomic literatures and volumes of the flora of Ethiopia and deposited in the herbarium of Jimma University

3.8. Data Analysis

3.8.1. Quantitative data analysis

After data collection, it was cleaned and entry made using excel 2007. Then, entered data were re-cleaned and analyzed using descriptive statistical method. Then we reported the finding using frequency, rate, ratio and percentage. In addition, tables and graphs were also used for reporting the findings.

3.8.2. Qualitative data analysis

Data were also collected through focus group discussion and note were taken during discussion. Then, the notes were repeatedly read and well understood. Later on, transcription and translation were done after which thematic area was identified and reported accordingly.

3.9. Ethical Consideration

Official letter were given from JU to Abaya district through the researcher for the purpose of study. So the researcher explain the purpose of the study, asked the voluntariness of the respondents and informed that the information obtained was only used for the study and confidential

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1. Indigenous Classification of Home garden of Study Area.

People of Abaya district have indigenous classification of their home garden in to different components as land for homestead (lafa manaa), land for spices & enset (lafa worqichaa), land for coffee (lafa bunaa) and other cereals. But most of the local people have a trend of planting different species of plant with in small area of land at the back of their home.

4.2. Plant diversity in the Home garden of Abaya District.

A total of 49 home garden plant species belonging to 47 genera and 36 families were recorded and identified in the study area. All of these recorded and identified plant species from the home garden are useful to the community in their daily life. Comparing the families Fabaceae comes first contributing four (4) species (8.1%) followed by Poaceae , Solanaceae and Astreraceae containing three (3) species (6.1%) each. Musaceae , Rutaceae, Myrtaceae and Malvaceae represented by two(2) species (4.08%) each and the remaining twenty eight (28) families had one(1) species each(Table 4). The highest numbers of species recorded in individual's home garden were 23 (57%) and the least were 3(8%). The average values obtained were 14(35%) figure 3.

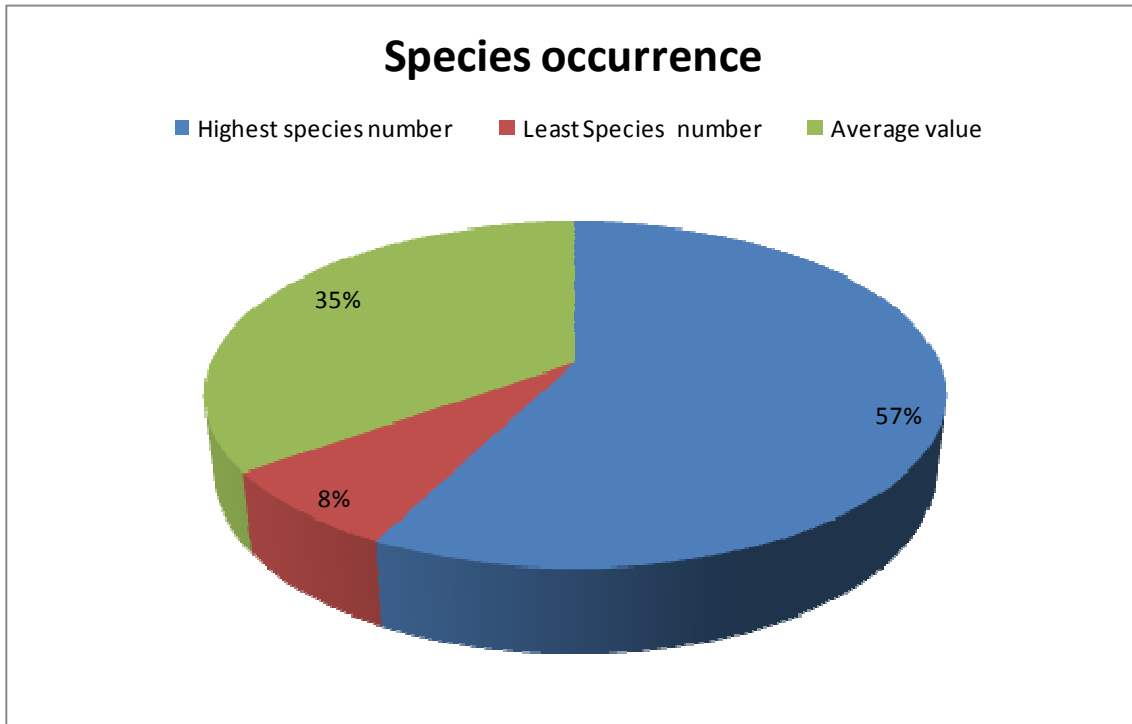


Figure 3: Plant diversity occurred in Abaya district, 2014

This finding is in line with the result reported by (Ageze *et al.*, 2013; Hailu and Asfaw, 2011) even though, there is variation in the total number plant species. This variation may be due to difference in agroecology and the time period when this research was conducted. The families *Fabaceae*, *Asteraceae* and *Poaceae* were among the plants that are frequently used by the people in the home garden of Ethiopia Ageze *et al.*, (2013). These families are the top three largest families in the flora of Ethiopia and Eritrea (Kelbessa *et al.*, 2013). In this study *Fabaceae* is the frist family followed by *Poaceae*, *Solanaceae*, *Asteraceae* and *Rutaceae* that is frequently used by Guji people in Abaya district.

Table 3: Distribution plant species in different families in home garden of Abaya district, 2015

No	Family name	Scientific Name	Number of species	%
1	<i>Fabaceae</i>	<i>Lablab purpureus</i> <i>Millettia ferruginea</i> <i>Pterolobium stellatum</i> <i>Calpurnia aurea</i>	4	8.1
2	<i>Poaceae</i>	<i>Eragrostis teff</i> <i>Saccharum officinarum</i> <i>Zea mays</i>	3	6.1
3	<i>Solanaceae</i>	<i>Capsicum annum</i> <i>Solanum indicum</i> <i>Lycopersicon</i>	3	6.1
4	<i>Asteraceae</i>	<i>Vernonia amygdalina</i> <i>Vernonia auriculifera</i> <i>Echinops giganteus</i>	3	6.1
5	<i>Rutaceae</i>	<i>Citrus sinensis</i> <i>Ruta chalepensis</i>	2	4.1
6	<i>Myrtaceae</i>	<i>Psidium guajava</i> <i>Ecalyptus grandis</i>	2	4.1
7	<i>Musaceae</i>	<i>Musapara disiaca</i> <i>Enset ventricosum</i>	2	4.1
8	<i>Malvaceae</i>	<i>Sida rhombifolia</i> <i>Gosypium hirsutum</i>	2	4.1
9	The remaining 28 (57.2%)species one each		1	42.8

With regard to the occurrence of plant species in the home garden *Zea mays* were the most common with the frequency of 68 (97%) followed by *Enset ventricosum* 63 (90%), *Musa paradisiaca* 54 (77.1%), *Coffea arabica* and *Persa americna* each with the frequency of 53 (75.7%), *Ipomoea species* (74.3%), *Brassica carinata* (67.1), *Millettia ferruginea* (65.7), *Lablab purpureus* (55.7%) and *Vernonia amygdalina*(48.6%).

Table 4: Plant species occurrence in the home gardens of Abaya district, 2015

No	Scientific Name	Local name	frquency	% frequency
1	<i>Zea mays</i>	Boqqolloo	68	97.1
2	<i>Enset vetricosum</i>	Worqicha	63	90.0
3	<i>Musapara disiaca</i>	Muuzii	54	77.1
4	<i>Coffea arabica</i>	Buna	53	75.7
5	<i>Persea americana</i>	Abukaatoo	53	75.7
6	<i>Ipomea species</i>	Boyina	52	74.3
7	<i>Brassica carinata</i>	Shaanaa	47	67.1
8	<i>Millettia ferruginea</i>	Dhadhaatuu	46	65.7
9	<i>Lablab purpureus</i>	Hamaraa	39	55.7
10	<i>Vernonia amygdalina</i>	Ebicha	34	48.6
11	<i>Colocasa esculenta</i>	Godarree	32	45.7
12	<i>Cordia africana</i>	Wodessaa	32	45.7
13	<i>Vernonia auriculifera</i>	Reejjii	30	42.9
14	<i>Ecalyptus grandis</i>	Barzaaffii diima	22	40.0

4.2.1. Plant Growth Habit

Based on the result obtained from the study the habit diversity of plant species were as follows, tree occupied the first position with 18 species (36.7%) followed by shrubs, 14 species (28.5%), herbs with 13 species (26.5%) and climbers with 4 species or 8% (Figure 3). This finding agrees with investigations of Seta *et al.*, (2013) in such a way that the diversity of tree species was the leading growth form followed by shrubs as it was reported. Similarly, the indigenous knowledge of classifying plant biotic components into different aspects helped the people to manage biodiversity giving due attention to the structures of home gardens in limited plots of land. Their

indigenous knowledge on classifying plants in to different aspects also helped the study and made the documentation of the information easier

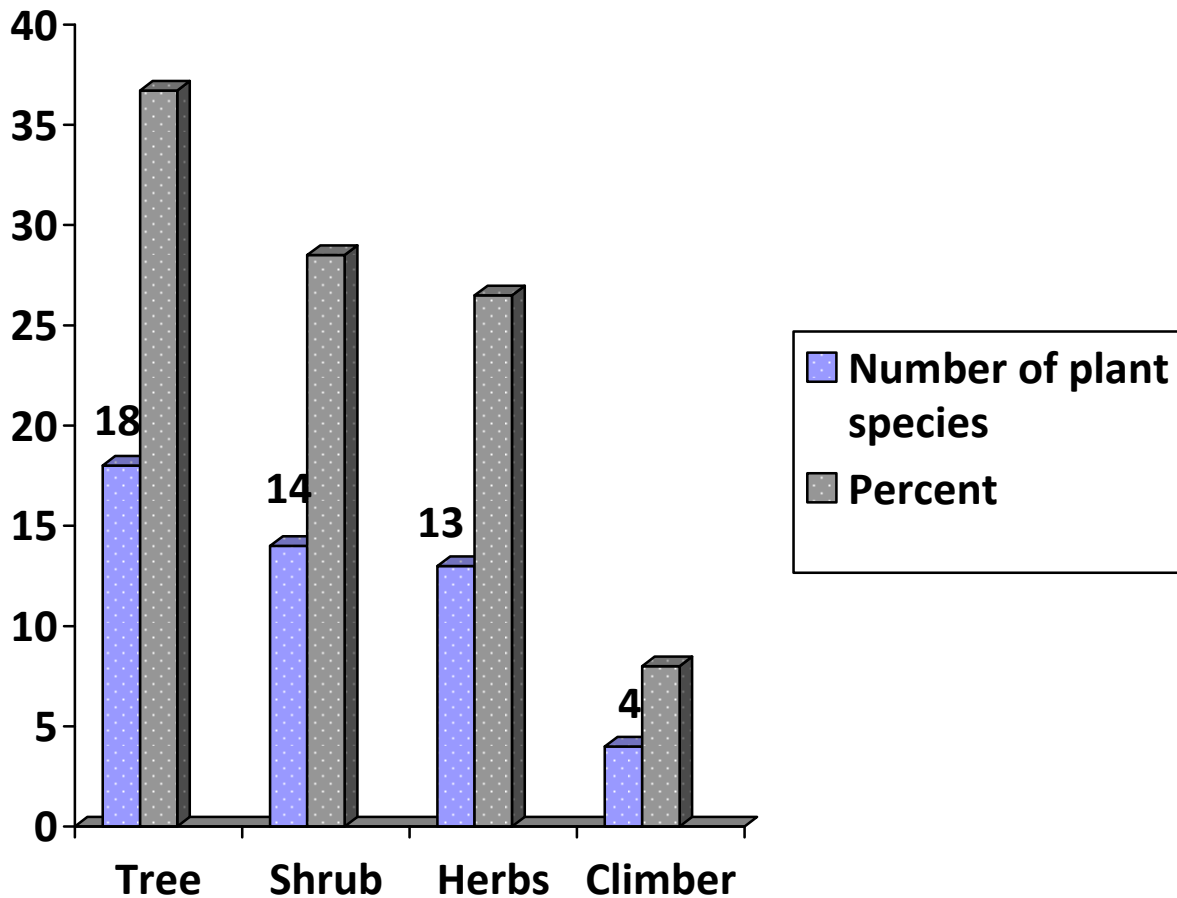


Figure 4: Habit of plant species in the home garden of Abaya District, Borena Zone, 2015

4.3. Major Plant Use Categories

Home garden plant species of Abaya district were grouped under food plant, fodder plant, cash crop, fence plant, medicinal, fire wood and construction (Table- 6). Quantitative analyses of ethnobotanical information from the respondents indicate that, there is high consistence of plant use among informant for daily activity of their life. This investigation agrees with the result obtained by Tewabech and Ephrem (2014) in the home garden of Hintalo Wejerat of Tigray, Northern Ethiopia

Table 5: Use value category of plant species in Abaya district, 2015

N0	Use value category	Species	% of species
1	Food plant	26	53.1
2	Fodder plant	11	22.4
4	Fence plant	12	24.5
5	Medicinal plant	8	16.3
6	Fire wood	11	22.4
7	Construction	13	26.5

4.3.1. Food Plants

People of Abaya district get many services from cultivated and wild food plants that are found in their home garden. Out of twenty six species 21 species (80.76%) of them provide food, 12 species (46%) cash crops, 6 species (23.1%) fodder and 2 species (7.6%) of them provide spices (Table 7). Plant products that are used as food can come from any part of the plant such as fruits, Seeds, leaves, stem and root. Such plant foods are largely obtained from the conventional crops that are purposely grown in the home garden. Asfaw (1997) mentioned that there are more than 130 species of cultivated food plants distributed in about 35 angiosperm families in the whole of Ethiopia. According to Zerihun *et al.*, (2011) the most cultivated crops in the home garden of Jimma Zone were *Enset*, avocado, cabbage, maize and coffee. In this study cultivated food plant were collected from 20 genera and 26 species which is related with the result obtained by Zerihun *et al.*, (2011). These crops were cultivated in the home garden for consumption and sale. However, the purpose of cultivating specific crop was quite different among house hold. This is also supported by 68 years old respondents from district. As he said each and every species of plant in the home garden of each house hold do have specific purpose for individual Gardner.

Table 6: Major Food Grown in the Abaya District Borena zone, 2015

Crop category	Scientific name	Family name	Local	Habit
Cereals	<i>Zea mays</i>	<i>Poaceae</i>	Boqqolloo	H
	<i>Lablab purpureus</i>	<i>Fabaceae</i>	Boloqqee	H
	<i>Eragrostis teff</i>	<i>Poaceae</i>	Xaafii	H
	<i>Rhynchosia stipulosa</i>	<i>Fabaceae</i>	Kalaalaa	Cl
Fruits	<i>Persea americana</i>	<i>Lauraceae</i>	Abukaatoo	T
	<i>Mangifera indica</i>	<i>Anacardiaceae</i>	Magoo	T
	<i>Musa paradisiaca</i>	<i>Musaceae</i>	Muuzii	Sh
	<i>Citrus sinensis</i>	<i>Rutaceae</i>	Burtukaanii	Shr
	<i>Morinda citrifolia</i>	<i>Rubiaceae</i>	Abukeerii	T
	<i>Annona chrysophylla</i>	<i>Annonaceae</i>	Gishxaa	T
	<i>Psidium guajava</i>	<i>Myrtaceae</i>	Zayitoonii	T
	<i>Ananas comosus</i>	<i>Bromeliaceae</i>	Anaanassii	Sh
	<i>Carica papaya</i>	<i>Caricaceae</i>	Paappayaa	sh/T
	<i>Flacourtia indica</i>	<i>Flacourtiaceae</i>	Hagalaa	T
Cash crop	<i>Coffea arabica</i>	<i>Rubiaceae</i>	Buna	T
	<i>Saccharum officinarum</i>	<i>Poaceae</i>	Shonkoora	Sh
	<i>Catha edulis</i>	<i>Celastraceae</i>	Caatii	Sh
Vegetables	<i>Brassica carinata</i>	<i>Brassicaceae</i>	Shaanaa	H
	<i>Allium sativum</i>	<i>Alliaceae</i>	Qullubbii adii	H
	<i>Cucurbita pepo</i>	<i>Cucurbitaceae</i>	Baaqulaa	Cl
	<i>Capsicum annuum</i>	<i>Solanaceae</i>	Qaaraa	H
	<i>Lycopersicon esculenta</i>	<i>Solanaceae</i>	Timaatimii	H
Root crop	<i>Colocasia esculenta</i>	<i>Araceae</i>	Godarree	H
	<i>Ipomoea species</i>	<i>Convolvulaceae</i>	Boyinaa	Cl
	<i>Ipomoea batatas</i>	<i>Solanaceae</i>	Maxaxisha	H
	<i>Enset ventricosum</i>	<i>Musaceae</i>	Worqicha	Sh

Key : T= tree, Sh = shrub ,H= herbs and Cl= climber

The high number of food plant species in Abaya district is mainly represented by nine species of herbs (34.6%) and useful parts include fruit, leaves, stems and roots.

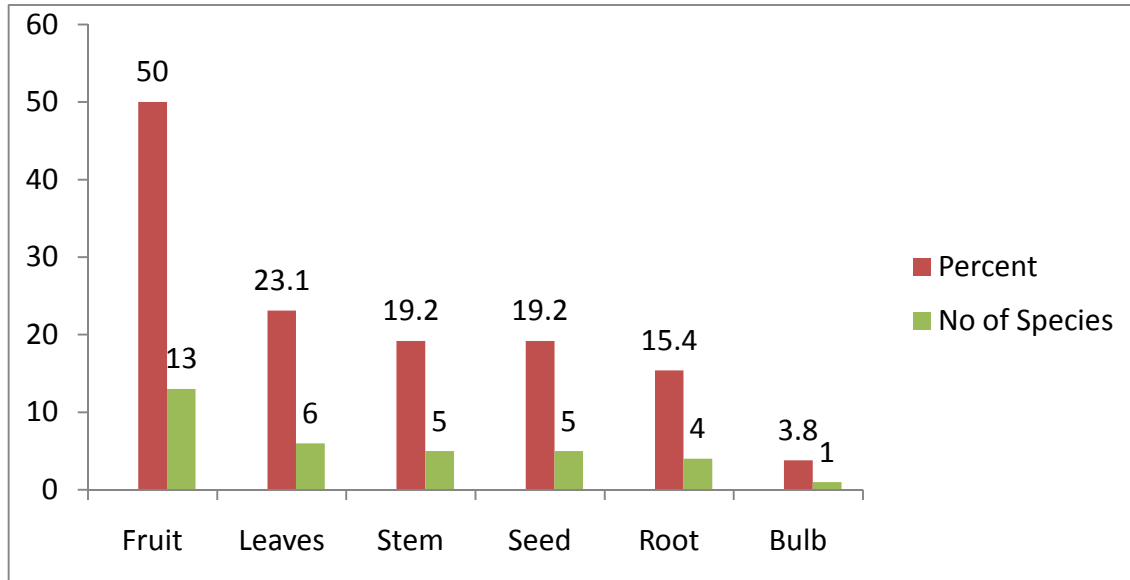


Figure 5 : Parts used of cultivated plants in Abaya district Borena zone, 2015

Fifty percent of food plant parts cultivated in the district is fruit followed by leaves with 23.1%, seed and stem with 19.2 each, root with 15.4% and bulb 3.8 %. This result indicates that the majority of food plant cultivated in the home gardens of the Abaya district are fruits that are for subsistence production or for income generation. The subsistence could of course be either through direct subsistence production or indirect subsistence production (Figure 4 parts used of cultivated plants). Direct subsistence production manifested by plant species producing edible fruits like avocado (*Persea americana*), mango (*Mangifera indica*), banana (*Musa paradisiacal*), orange (*Citrus sinensis*), papaya (*Carica papaya*), guava (*Psidium guajava*) and ananias (*Ananas comosus*).

4.3.2. Fodder Plant

Twenty-two percent of the useful plants were identified as fodder plant species, distributed among 9 families. Poaceae and Musaceae constitute 22% while Fabaceae, Lauraceae, Asteraceae, Ulmaceae, Solanaceae, Tiliaceae, and Malvaceae each 11.1% (Table 5). Of the 11 fodder species encountered, 54.5% have food value ,(36.4%) medicinal value,(45.5%) used for fire wood and more than (9%) are used for fence. In terms of habit of fodder plants that were identified, trees contain (45.5%), shrubs (27.3%) and herbs constitute 27.3% (Figure 5). But People leaves in the warmer area of the districts are pastoralist and use grasses as the main fodder plant for their animals. Many grass and herbaceous species are usually used for animal fodder (Senbeta *et al.*, 2013). However, in this study grasses, herbs, shrubs and trees species are considered to be fodder plants. This result agrees with Senbeta *et al.*, (2013) who reported nine species of shrubs and trees as important sources of animal fodder from Yayu, Sheko , Harena and Bonga.

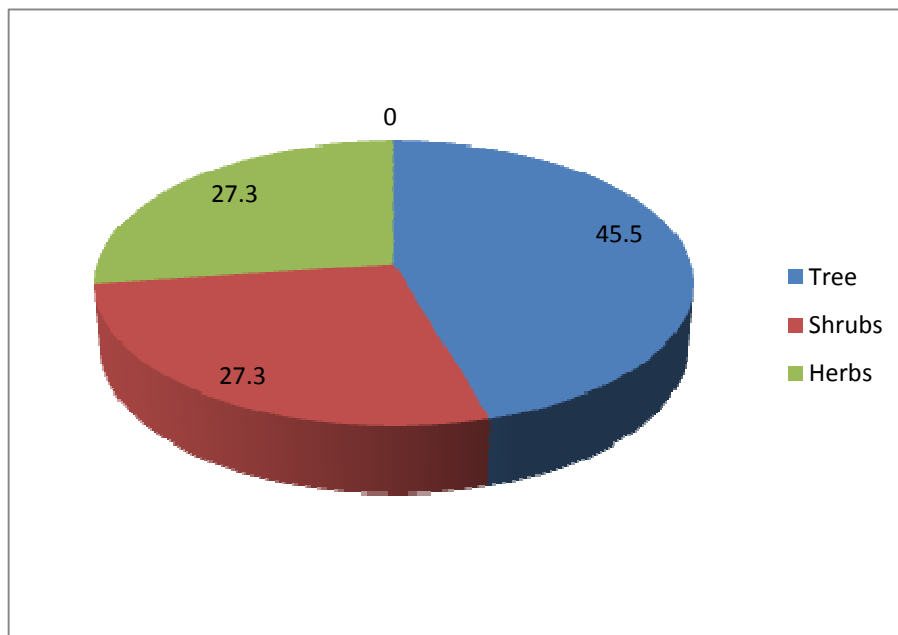


Figure 6: percent of fodder plant in terms of habit in Abaya district, 2015

4.3.3. Fence and wild edible Plants in Study Area

A total of twelve species (24.5%) of fence plant were recorded in the home garden of study area. Most of these fence plants also serve as wild edible plants. The wild edible plants were about twenty –three species comprising 49 of the total plant species encountered in the home garden of Abaya district. Local people of the study area used home garden plant species such as *Vernonia auriculifera*(Reejjii), *Pterolobium stellatum*(Gorrxaa), *Solanum indicum*(Hiddii), *Sanseveria abyssinica*(Algiisa), *Ecalyptus grandis* (*Baarzafii diimaa*), *Crotone macrostachyus* (*Mokkonniisa*), *Albuca abyssinica* (*Qorsa bofa*), *Vernonia amygdalina* (Ebicha) and *Albizia gummier*(Gorbee) for fencing(table 8). Most of these fencing plants are wild edible plants. The relatively higher percentage of fence plants in the current study may be due to the more intensive utilization of plants by more humid regions compared to inhabitants of pastoralists in warm climate. The wild edible plants are reserve foods that fill the food deficit gap (Cunningham 2001; Asfaw and Tedesse, 2001) and also may have future potential as food crops fodder and fence. In this study most of the wild edible plants in the home garden of the district have contributed services such as fence, fodder, fire wood, construction, medicine and other miscellaneous activity for local communities. In doing so Astraceae and *Fabaceae* took the first position followed by *Boraginaceae*, *Euphorbiaceae* *Hyacinthaceae* *Solanaceae* *Malvaceae*, *Tiliaceae*, *Lamiaceae*, *Meliaceae*, *Ulmaceae*, *Mimosaceae*.

Table 7: List of fence and wild edible plant in the home garden of Abaya district, 2015

No	Scientific Name	Family name	Local name	Habit
1	<i>Cordia africana</i>	<i>Boraginaceae</i>	Woddeessa	T
2	<i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Ebicha	Sh
3	<i>Ricinus communis</i>	<i>Euphorbiaceae</i>	Qobboo	Sh
4	<i>Echinops giganteus</i>	<i>Asteraceae</i>	Qosorruu	T
5	<i>Albuca abyssinica</i>	<i>Hyacinthaceae</i>	Qorsa bofaa	Sh
6	<i>Solanum indicum</i>	<i>Solanaceae</i>	Hiddii	Sh
7	<i>Sida rhombifolia</i>	<i>Malvaceae</i>	Karaabaa	Sh
8	<i>Vernonia auriculifera</i>	<i>Asteraceae</i>	Reejjii	T
9	<i>Croton macrostachyus</i>	<i>Euphorbiaceae</i>	Mokkonniisa	T
10	<i>Grewia bicolor</i>	<i>Tiliaceae</i>	Harooressa	Sh
11	<i>Ocimum americanum</i>	<i>Lamiaceae</i>	Damakasee	Sh
12	<i>Trichilia emetica</i>	<i>Meliaceae</i>	Aanannoo	T
13	<i>Celtis kraussiana</i>	<i>Ulmaceae</i>	Mottoqamaa	T
14	<i>Millettia ferruginea</i>	<i>Fabaceae</i>	Dhadhatu	T
15	<i>Calpurina aurea</i>	<i>Fabaceae</i>	Ceekata	Sh
16	<i>Albizia gummiera</i>	<i>Mimosaceae</i>	Gorbee	T
17	<i>Ruta chalepensis</i>	<i>Rutaceae</i>	Xeenadamii	H
18	<i>Sanseveria abyssinica</i>	<i>Agavaceae</i>	Algiisa	Sh
19	<i>Triumfetta tomentosa</i>	<i>Tiliaceae</i>	Daangulaa	T
20	<i>Pterolobium stellatum</i>	<i>Fabaceae</i>	Gorxaa	Cl
21	<i>Rhamnu sprinordes</i>	<i>Rhamnaceae</i>	Geeshoo	Sh
22	<i>Gosypium hirsutum</i>	<i>Malvaceae</i>	Mukajirbii	Sh
23	<i>Ecalyptus grandis</i>	<i>Myrtaceae</i>	Barzaafii diima	T

Key : T for tree, Sh for shrub, H for herbs and Cl for climbers.

4.3.4. Medicinal Plant Diversity in the Study Area

A total of 8 species (16.3% of the species) were identified as medicinal plants (Table 9). However, this list is far from complete. Local people of the district did not want to indicate medicinal plants for many reasons, the first one is that if they tell someone, the plants might lose their effectiveness, and also because they fear they may lose income obtained from the plant. In terms of habit, these medicinal plants were found in different growth forms such as shrubs 75% Tree/shrub 12.5 % and herbs 12.5 %. Leaves and roots were the plant parts most frequently used followed by exudates (Table 9). Medicinal value is the largest plant use category for most indigenous rural people (Coe and Anderson 1999; Rossato, Leita~ Filho and Begossi 1999). But in the case of Abaya district, it is the third most important category. Pastoralists especially are highly dependent on these traditional medicines because they live in remote areas where health care centers are not common.

Table 8: Traditional Medicinal Plants as home garden Used by Abaya district, 2015

Name of Species	Habit	Parts used	Mode of preparation	Used for
<i>Musa paradisiaca</i>	Sh	Ex	Secretion is added on cut surface of human skin	Dry wound on the skin
<i>Vernonia amygdalina</i>	T/sh	L	Crushed by mixing with water and drunken	Stomach ache of calf
<i>Brassica carinata</i>	H	S	Crushed and mix with small amount of water	Skin wound and “michii “
<i>Albuca abyssinica</i>	Sh	Ex	Secretion is given for attacked individual	Snake bite
<i>Solanum indicum</i>	Sh	R	Chewed by peeling the upper part of root	Stomachache (human)
<i>Sida rhombifolia</i>	Sh	R/S	Stem is crushed and used It also used for brushing teeth	Tooth ache
<i>Ocimum americanum</i>	Sh	L	Crushed and used	“ Michii”

Table 2: Cont.....

<i>Calpurina aurea</i>	Sh	L	crushed with water adds on the skin	Skin disease (cattle)
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Key : T for tree, T/Sh for tree or shrub, Sh for shrub, H for herb , S for seed ,L for leaves, Ex for exudates, and R for root

4.3.5. Multipurpose Plant in Study Area

Local people of the study area are experienced in growing multipurpose trees, shrubs and herbs surrounding their house. Frequencies of species occurrence were selected by three group of discussant in which one group has three key informants. The informants were select species that have more useful to local people from the more useful to the least use. Accordingly seven multipurpose plants were preferred and given the rank. Based on selection by the informants, the most frequently encountered multipurpose plants during the study period in the order of importance were *Ensete ventricosum*, *Perseea amricana*, *Millettia ferruginea* *Cordia africana*, *Croton macrostachyus*, *Coffea arabica* and *Musa paradisiaca*. Local people cultivated the most important ones with varied uses. For example, *Perseea amricana* was used for Food, fodder, fire wood, construction, shade and soil fertility and it takes the top rank followed by *Millettia ferruginea*, *Cordia africana* with five uses. The result of seven multipurpose species preference ranking indicate that the local people were using persea americana , *Milleta ferruginea*, *Cordia africana*, *Croton macrostachyus* for more of fire wood and building followed by shade purposes for *Coffea arabica*. *Millettia ferruginea* and *Cordia africana* were also well-known multipurpose species. *Enset ventricosum* and *Musa paradisiaca* were also included in this use matrix even though the attributes selected were more of trees. This result was nearly confirmed with the result of Ageze *et al.*,(2013). The more the multiple uses for local people, the more conservation of that plant resource through cultivation and protection in and around home gardens. However, the size of home garden, the agro ecology and the type of soil it needs for its growth and individual needs determined the number and type of each species grown in the home

gardens (Ageze *et al.*, 2013). The evidence for this were the report from 68 years old male respondents from the district.

4.4. Factors Affecting Home garden Plant diversity Abaya District

Plant diversity in the home garden of the study area is mainly affected by environmental influence and cultural attitude. On the basis of response given by respondents 40% of plant diversity in the home garden of Abaya district is influenced by absence of proper management or home garden handling, 24% occurred due to socio-economic status of home garden owner and 15% is affected by absence of rain fall. Lack of awareness and cultural thought has contributed 4.2% and 1.4 respectively. This is because people in the study area are found distantly from the center and seventy percent depend on home garden plant for day to day activity. They use the home garden plant especially edible one for fire wood and char coal but they do not substitute when they cut the previous one. They also consider that nature will substitute it even though we use more. Accordingly, more than 60% of the respondents response indicate that home garden of the study area is affected by factors such as *home* garden handling and socio-economic status of the owner (Table 10). This investigation agrees with the result reported by Hailu and Asfaw (2011). Again, 68 years old of respondents from Abaya district justify that these factors are the main contributors to the decrease of plant diversity in the home garden of the district.

Table 9: Report of Factor Affecting Plant diversity Abaya distirct, Oromia region, 2015

No	Factors	frequency	%
1	Home garden handling	28	40
2	Socio economic status	17	24
3	Lack of rainy fall	11	15.7
4	Lack of awareness	3	4.2
5	Cultural preference	1	1.4

4.5. Management of Home garden in Abaya District

Respondents were asked to tell whether they are managing the plant species or not. Accordingly, about 64 % of the respondents stated that they are not managing the useful plant species in their locality due to different reasons like absence of home garden handling and lack awareness. This perception was reflected in the same way in study areas of the district. An informant from the district revealed that, indigenous knowledge of managing different plant species in small home garden is obtained from their families or close relatives, which open knowledge to transfer. A good observed in some area of the district is that local people take care of edible plant such as *Millettia ferruginea* and *Cordia africana* that serves as shading to other plant species like *Coffea arabica* and *enset ventricosum* in the garden.

Table 10: Report about management of home garden plant , 2015

Response	Well managed	Not well managed	Reason
yes	17 (24.48%)	-	Following advice given from agricultural supporter of district.
no	-	45 (64.26%)	absence of home garden handling, lack of awareness
do not respond 8(11.2%)	-	-	-

However, there are variations in managing to plant species around the warm and mid land area of the district. The main role of home garden plant is to fulfill the need of each family member. To do so, each family member has their contribution in managing plant species. In most of the home gardener males are the leader in arranging the garden for seed distribution. The female and children are involved in managing and cleaning weeds from the garden. The same case were reported by Ageze *et al.*, (2011) which was stated as men were more knowledgeable than women regarding the use of trees and shrubs that were collected from the wild and planted in the home gardens. On the other hand, women were more knowledgeable than men regarding the use of herbaceous species grown in home gardens. Women also cultivated and managed root and tuber, vegetable crops, spices, condiments and medicinal plants. For example, taking of fresh products

of these plants to the market was carried out only by women otherwise by children. Such activity is expected to conserve the plants of multipurpose value with the indigenous practices. Species of different types were inter mixed in many home gardens that have multipurpose function and managed by local peoples. The intermixing of multipurpose plants in home gardens benefited the indigenous people. Species such as *Enset ventricosum* and *Musa paradiscica* were mixed in the coffee garden with trees and shrubs.

According to Ageze (2011) trees are scattered growing in association with noticeable enset stands in the home garden. A thick stand of enset is found frequently on back sides of the house, the other side being taken up by other crops. The enset garden of the study sites shifts its position slightly when young plants are placed on margins instead of being fitted into the gap created when maturing plants are harvested. Similarly, in the present study enset play great role in supporting the life of the society as food and cash income in the district and has common feature as observed in the home garden of Wolayta and Gurage reported by Asfaw and Zerihun, (1997).

4.6. Threat and Conservation home garden plant in the study area

Local people of study area were asked whether threaten plant species known from their home garden or not. Some of them respond that plant known by local name Waaccuu was lost from the local area. The reason they gave for this were climate change and agricultural expansion. These reasons agrees with the report which stated as deforestation due to agricultural expansion, over-harvesting, fire, cultivation of marginal lands, overgrazing and urbanization appear to be threatening the plant resources and their habitats in Ethiopia (Senbete & Denich 2006, Senbete *et al.*, 2007, Woldemariam *et al.* 2002). Such threats can be a challenge for the future well-being of humanity and the environment. For example, some medicinal plant species in Ethiopia are reported to have been already threatened through the overuse for marketing or domestic consumption purposes, e.g., *Hagenia abyssinica* (Asfaw *et al.*, 2001). This holds true for many of the other useful plant species in many parts of the country. Although Ethiopia has already developed policies and strategies that enhance sustainable use and conservation of biodiversity, including plants, the threats are still continuing. So far, the impacts of these policies and strategies are very slow or inadequate. Apparently, sustainable use of plant resources is a timely issue in Ethiopia because of the continued resource degradation in many parts of the country. The issue of plant conservation in Ethiopia today calls for categorical studies and documentation

of useful plant species before environmental change (e.g., climate change) and cultural transformation destroy the last remaining biophysical entities and the associated knowledge base. Innovative options like eco-agricultural, maintenance of traditional farming systems and linking conservation with utilization by community need to be carefully developed and implemented.

CHAPTER FIVE

5. CONCLUSION

An ethno botanical study on home garden of Abaya district resulted in the documentation of 49 plant species which belongs to 47 genera and 36 families from the home garden. Regarding the use categories, there are 26 food plant, 11 fodder plant, 8 medicinal plants, 12 fence plant species and 13 plant species used for construction. . In terms of their families *Fabaceae* comes first contributing to four(4)species(8.1%) followed by *Poaceae* , *Solanaceae* and *Astreraceae* containing three (3) species (6.1%) each. *Musaceae* , *Rutaceae*, *Myrtaceae* and *Malvaceae* represented by two(2) species (4.08%) each and the remaining twenty eight (28) families had one(1) species each. In terms of parts used, trees were occupied the first position with 18 species (36.7%) followed by trees,14 species (28.5%) , shrubs 13 species (26.5%) and climbers 4 species (8%). Plant species such as *Ensete ventricosum*, *Perseeaamricana*, *Millettiaferruginea*, *Cordia africana*, *Croton macrostachyus*, *Coffea arabica* and *Musa paradisiaca* were those used as multipurpose function. In the study area, traditional knowledge of management on home garden plant passes from generation to generation and elders are more knowledgeable than youth in traditional practice. In conclusion, Plant diversity in the home garden of the study area is mainly affected by factors such as *home* garden handling and socio-economic status of the owner, lack of rainy fall and lack of awareness. Therefore, awareness should be raised among healers so as to avoid the loss of indigenous knowledge and to continue its sustainable use.

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CHAPTER SIX

6. RECOMMENDATION

- Local people of study area should be involved in management and conservation of home garden plant resources and their indigenous knowledge in their locality.
- Encourage home gardening for plant biodiversity conservation and management as well as for ecological interventions
- Awareness raising of the local population and training on the Management and sustainable utilization of plant resources needs to be taken up seriously
- Identifying effective plant resource and encouraging the local people to grow plants in the home garden.
- Promote in situ conservation of useful plant through people participation
- Promoting the establishment of local botanical garden starting at woreda level to ensure The ex situ conservation of valuable plants
- Concentrated efforts should be needed by research institution and other government and non government organization by providing the local community energy efficient technology to minimize fuel wood and charcoal conception

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APPENDIX

JIMMAUNIVERSITY

College of Natural Science

Department of Biology School of Graduate Studies

Appendix I format for collecting data check list of semi: structured Questionnaires

I General Information of the respondents

Name _____ age _____ sex _____ date _____

Serial number _____

Religion: Orthodox _____ Protestant _____ Muslim _____ others _____ ethnicity _____

Education status: education (grade level) _____
non educated _____

Occupation _____ locality _____ kebele _____ village _____

Marital status: single _____ married _____ Divorced _____

For how long you have lived in the area _____

II Questionnaires for Home garden data

1. How do you classify your home garden? A/ area for house B/area for spice C/ cereal and fruit

D/ others

2. List all plan species found n your home garden and their uses

(BiqilootadawookeessankeessattiargamanhundaaMaqaa fi faayidaaisaanitarreessaa)

No	Name of plants (local)	Uses of plants
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

2.1. Do you have Plant used as food in your home garden? A/ Yes B/No . If yes fill the following

	Plant name (local)	Habit										Habitat			
1															
2															
3															
4															
5															

2.2. Do you have Plant used as fodder in your home garden? A/ Yes B/ No . If yes fill the following

No	Plant name (local)	Parts used	habit										Habitat		
1															
2															
3															
4															
5															

2.3. Do you have Plant used as medicine in your home garden? A/ Yes B/ No . If yes fill the following

N O	Plant name (local)	Parts used				habit						Habitat			
1		roo t	see d	fr ui t	Flow er/le af	tr ee	shr ub	her b	Cli m ber	Ep i Ph yte	Cu Lt Vat ed	WI ld	Bo th		
2															
3															
4															
5															
6															

3. Do you have plant used for multipurpose in your home garden? A/ Yes B/No . If yes fill the following e

No	Plant name(local)	Parts used	habit	habitat
1				
2				
3				
4				
5				

4. How do you manage and conserve different species of plants in the home garden?

5. What kind of traditional management you utilize in order to conserve the home garden plant in the area? (mala aadaa akkamtti fayyadamuu biqiloota dawoo keessanii kunuunissitu?)

6. Who support your home garden plants in the area? A/ local people, B/ government C/ NGO

7. Which factors of the following is mainly affect plant in your home garden? A/ lack of rainfall

B/ socio-economic status C/ home garden handling D/ lack of awereness

8. Are there threats to different species of plant in the home garden? A/ Yes B/ No If yes , choose the following (miidhaa biqiloota ratti dhaqabsiisan keessaka mtuirra hamaa dha?)

No	Name of plants(local)	Threats					
		Drought	food	fire	agriculture	construction	cultivated
1							
2							
3							
4							
5							

II Question prepared for group discussion

9. Which plants have more useful to local people

No	Name of plant	use	Rank given				
			4	3	2	1	0
1							
2							

Key: 4= best, 3= very good, 2= good, 1= less, 0= least

Appendix 2: Plant Species collected from the home garden of Abaya district

	Scientific name	Family name	Local name	Use vale of plants	Habit
1	<i>Enset ventricosum</i>	<i>Musaceae</i>	Worqih	F,fd and mi	H
2	<i>Coffea arabica</i>	<i>Rubiaceae</i>	Buna	Cp, Fw, Co, Fe	Sh
3	<i>Eeagrostis tef</i>	<i>Poaeae</i>	Xaafii	F, Fd	H
4	<i>Mangifera indica</i>	<i>Anacardiaceae</i>	Mangoo	F, M	T
5	<i>Colocasia esculenta</i>	<i>Araceae</i>	Godarree	F	H
6	<i>Ipomoea species</i>	<i>Convoluaceae</i>	Boyinaa	F	Cl
7	<i>Musa paradisiaca</i>	<i>Musaceae</i>	Muuzii	F, fd, M	Sh
8	<i>Rhamnus prinordes</i>	<i>Rhamnaceae</i>	Geeshoo	Sp	Sh
9	<i>Catha edulis</i>	<i>Celastraceae</i>	Caatii	Cp	Sh
10	<i>Gosypium hirsutum</i>	<i>Malvaceae</i>	Mukajirbii	Mi	Sh
11	<i>Cordia africana</i>	<i>Boraginaceae</i>	Woddeessa	FW,Ti,Con, Fe, Sh	T
12	<i>Saccharum officinarum</i>	<i>Poaceae</i>	Shonkooraa	Cp	H
13	<i>Zea mays</i>	<i>Poaceae</i>	Boqqolloo	F, Fd, Fw	H
14	<i>Lablab purpureus</i>	<i>Fabaceae</i>	Boloqqee	F	H
15	<i>Capsicum annum</i>	<i>Solanaceae</i>	Qaaraa	F	H
16	<i>Citrus sinensis</i>	<i>Rutaceae</i>	Burtukaanii	F	T
17	<i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Ebicha	Fdr, Fw, M, Fe, Co	Sh
18	<i>Ricinuscommunis</i>	<i>Euphorbia</i>	Qobboo	Fe ,Fw	Sh
19	<i>Lycopers icon</i>	<i>Solanaceae</i>	Timaatimii	F	H
20	<i>Brassica carinata</i>	<i>Brassicaceae</i>	Shaanaa	F, M	H
21	<i>Echinops giganteus</i>	<i>Asteraceae</i>	Qosorruu	Fe, Co, Fw	T
22	<i>Albuca abyssinica</i>	<i>Hyacinthaceae</i>	Qorsa bofaa	M , Fe	Sh
23	<i>Solanum indicum</i>	<i>Solanaceae</i>	Hiddii	M, Fw, Fe	Sh
24	<i>Sida rhombifolia</i>	<i>Malvaceae</i>	Karaabaa	M, Fd	Sh
25	<i>Vernonia auriculifera</i>	<i>Asteraceae</i>	Reejjii	Fe, Fw, co,	T
26	<i>Allium sativum</i>	<i>Alliaceae</i>	Qullubbiadi	F, M	H
27	<i>Crotone macrostachyus</i>	<i>Euphorbiaceae</i>	Mokkonniisa	Fw.Co, Fe,Ti,Sh	T
28	<i>Cucurbite pepo</i>	<i>Cucurbitaceae</i>	Baasqulaa	F	Cl
29	<i>Grewia evolutejuss</i>	<i>Tiliaceae</i>	Harooressa	Fd, Mi	Sh
30	<i>Rhynchosia stipulosa</i>	<i>Fabaceae</i>	Kalaalaa	F	Cl
31	<i>Carica papaya</i>	<i>Caricaceae</i>	Paappayaa	F	Sh

Appendix 2 cont...

32	<i>Ananas comosus</i>	<i>Bromeliaceae</i>	Ananaasii	F	H
33	<i>Ocimum americanum</i>	<i>Lamiaceae</i>	Damakasee	M	Sh
34	<i>Persea americana</i>	<i>Lauraceae</i>	Abukaatoo	F ,Fd ,Fw, Co, sh	T
35	<i>Psidium guajava</i>	<i>Myrtaceae</i>	Zayitoonii	food	T
36	<i>Trichilia emetica</i>	<i>Meliaceae</i>	Aanannoo	Fe, Co	T
37	<i>Celtis kraussiana</i>	<i>Ulmaceae</i>	Mottoqamaa	Fd, Fw , Co	T
38	<i>Millettia ferruginea</i>	<i>Fabaceae</i>	Dhadhatu	Fd, Fw ,Co, M, sh	T
39	<i>Annona chrysophylla</i>	<i>Annonaceae</i>	Gishixaa	F	T
40	<i>Pterolobium stellatum</i>	<i>Fabaceae</i>	Gorxaa	Fe	Cl
41	<i>Calpurina aurea</i>	<i>Fabaceae</i>	Ceekata	M	T
42	<i>Albizia gummiera</i>	<i>Mimosaceae</i>	Gorbee	Co, Fw	T
43	<i>Ipomoea batatas</i>	<i>Solanaceae</i>	Maxaxisha	F, Fd	H
44	<i>Ecalyptus resinifera</i>	<i>Myrtaceae</i>	Barzaafii diima	Co, Fw, Fe,Ti	T
45	<i>Morinda citrifolia</i>	<i>Rubiaceae</i>	Abukeerii	F	T
46	<i>Ruta chalepensis</i>	<i>Rutaceae</i>	Xeenadamii	M	H
47	<i>Sanseveria abyssinica</i>	<i>Agavaceae</i>	Algiisa	Fe	Sh
48	<i>Triumfetta tomentosa</i>	<i>Tiliaceae</i>	Daangulaa	Co	T
49	<i>Flacourtia indica</i>	<i>Flacourtiaceae</i>	Hagalaa	F	T

Key: F=food, Fd= fodder, M= medicine, Co= construction, Fe = fence, Cp= cash crop,

Mi= miscellaneous and Ti = timber

Appendix 3: List of plant species used as food in home garden of Abaya district

Scientific name	Family name	Local	Habit
<i>Zea mays</i>	<i>Poaceae</i>	Boqqolloo	H
<i>Lablab purpureus</i>	<i>Fabaceae</i>	Boloqqee	H
<i>Eragrostis tef</i>	<i>Poaceae</i>	Xaafii	H
<i>Rhynchosia stipulosa</i>	<i>Fabaceae</i>	Kalaalaa	Cl
<i>Persea americana</i>	<i>Lauraceae</i>	Abukaatoo	T
<i>Mangifera indica</i>	<i>Anacardiaceae</i>	Magoo	T
<i>Musa paradisiaca</i>	<i>Musaceae</i>	Muuzii	Sh
<i>Citrus sinensis</i>	<i>Rutaceae</i>	Burtukaanii	Sh
<i>Morinda citrifolia</i>	<i>Rubiaceae</i>	Abukeerii	T
<i>Annona chrysophylla</i>	<i>Annonaceae</i>	Gishxaa	T
<i>Psidium guajava</i>	<i>Myrtaceae</i>	Zayitoonii	T
<i>Ananas comosus</i>	<i>Bromeliaceae</i>	Anaanassii	H
<i>Carica papaya</i>	<i>Caricaceae</i>	Paappayaa	T
<i>Flacourtia indica</i>	<i>Flacourtiaceae</i>	Hagalaa	T
<i>Coffea arabica</i>	<i>Rubiaceae</i>	Buna	T
<i>Saccharum officinarum</i>	<i>Poaceae</i>	Shonkooraa	H
<i>Catha edulis</i>	<i>Celastraceae</i>	caatii	Sh
<i>Brassica carinata</i>	<i>Brassicaceae</i>	Shaanaa	H
<i>Allium sativum</i>	<i>Alliaceae</i>	Qullubbii adii	H
<i>Cucurbita pepo</i>	<i>Cucurbitaceae</i>	Baaqulaa	Cl
<i>Capsicum annuum</i>	<i>Solanaceae</i>	Qaaraa	H
<i>Lycopersicon esculenta</i>	<i>Solanaceae</i>	Timaatimii	H
<i>Colocasia esculenta</i>	<i>Araceae</i>	Godarree	H
<i>Ipomoea species</i>	<i>Convolvulaceae</i>	Boyinaa	Cl
<i>Ipomoea batatas</i>	<i>Solanaceae</i>	Maxaxisha	H
<i>Enset ventricosum</i>	<i>Musaceae</i>	Worqicha	H

Key : T= tree, Sh = shrub ,H= herbs and Cl= climbers

Appendix 4: Plant species and parts used in the home garden of Abaya district

No	Scientific Name	Family name	Local name	Parts used
1	<i>Enset ventricosum</i>	<i>Musaceae</i>	Worqicha	Root ,stem, leaves
2	<i>Coffea arabica</i>	<i>Rubiaceae</i>	Buna	Seed
3	<i>Eragrostis tef</i>	<i>Poaceae</i>	Xaafii	Seed
4	<i>Mangifera indica</i>	<i>Anacardiaceae</i>	Mangoo	Fruit
5	<i>Colocasia esculenta</i>	<i>Araceae</i>	Godarree	Root
6	<i>Ipomoea species</i>	<i>Convolvaceae</i>	Boyinaa	Root
7	<i>Musa paradisiaca</i>	<i>Musaceae</i>	Muuzii	Fruit and stem
8	<i>Rhamnus prinoides</i>	<i>Rhamnaceae</i>	Geeshoo	Stem and leaves
9	<i>Catha edulis</i>	<i>Celastraceae</i>	Caatii	Leaves
10	<i>Gossypium hirsutum</i>	<i>Malvaceae</i>	Mukajirbii	Fruit
11	<i>Cordia africana</i>	<i>Boraginaceae</i>	Woddeessa	Stem
12	<i>Saccharum officinarum</i>	<i>Poaceae</i>	Shonkooraa	Stem and leaves
13	<i>Zea mays</i>	<i>Poaceae</i>	Boqqolloo	Seed ,stem and leaves
14	<i>Lablab purpureus</i>	<i>Fabaceae</i>	Boloqqee	Seed
15	<i>Capsicum annum</i>	<i>Solanaceae</i>	Qaaraa	Fruit
16	<i>Citrus sinensis</i>	<i>Rutaceae</i>	Burtukaanii	Fruit
17	<i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Ebicha	Stem and leaves
18	<i>Ricinus communis</i>	<i>Euphorbia</i>	Qobboo	Stem and seed
19	<i>Lycopersicon</i>	<i>Solanaceae</i>	Timaatimii	Fruit
20	<i>Brassica carinata</i>	<i>Brassicaceae</i>	Shaanaa	Seed ,stem and leaves
21	<i>Echinops giganteus</i>	<i>Asteraceae</i>	Qosorruu	stem
22	<i>Albuca abyssinica</i>	<i>Hyacinthaceae</i>	Qorsa bofaa	leaves
23	<i>Solanum indicum</i>	<i>Solanaceae</i>	Hiddii	Root and stem
24	<i>Sida rhombifolia</i>	<i>Malvaceae</i>	Karaabaa	Leaves and stem
25	<i>Vernonia auriculifera</i>	<i>Asteraceae</i>	Reejjii	Whole parts
26	<i>Allium sativum</i>	<i>Alliaceae</i>	Qullubbii adii	Bulb ,leaves
27	<i>Crotone macrostachyus</i>	<i>Euphorbiaceae</i>	Mokkonniisa	Stem
28	<i>Cucurbita pepo</i>	<i>Cucurbitaceae</i>	Baasqulaa	Fruit

Appendix 4 cont...

29	<i>Grewia bicolor</i> Juss	<i>Tiliaceae</i>	Harooressa	Stem and leaves
30	<i>Rhynchosia stipulosa</i>	<i>Fabaceae</i>	Kalaalaa	Seed
31	<i>Carica papaya</i>	<i>Caricaceae</i>	Paappayaa	Fruit
32	<i>Ananascomosus</i>	<i>Bromeliaceae</i>	Anaanasii	Fruit
33	<i>Ocimum americanum</i>	<i>Lamiaceae</i>	Damakasee	Leaves
34	<i>Persea americana</i>	<i>Lauraceae</i>	Abukaatoo	Fruit
35	<i>Psidium guajava</i>	<i>Myrtaceae</i>	Zayitoonii	Fruit
36	<i>Trichilia emetica</i>	<i>Meliaceae</i>	Aanannoo	Stem
37	<i>Celtis kraussiana</i>	<i>Ulmaceae</i>	Mottoqamaa	Leaves and stem
38	<i>Millettia ferruginea</i>	<i>Fabaceae</i>	Dhadhatu	leaves ,seed and stem
39	<i>Annonachrysophylla</i>	<i>Annonaceae</i>	Gishixaa	Fruit
40	<i>Pterolobium stellatum</i>	<i>Fabaceae</i>	Gorxaa	Stem
41	<i>Calpurina aurea</i>	<i>Fabaceae</i>	Ceekata	Leaves
42	<i>Albizia gummiera</i>	<i>Mimosaceae</i>	Gorbee	Stem
43	<i>Ipomoea batatas</i>	<i>Solanaceae</i>	Maxaxisha	Root
44	<i>Eucalyptus resinifera</i>	<i>Myrtaceae</i>	Barzaafii diima	Stem
45	<i>Morinda citrifolia</i>	<i>Rubiaceae</i>	Abukeerii	Fruit
45	<i>Ruta chalepensis</i>	<i>Rutaceae</i>	Xeenadamii	Leaves
47	<i>Sanseveria abyssinica</i>	<i>Agavaceae</i>	Algiisa	Whole parts
48	<i>Triumfetta tomentosa</i>	<i>Tiliaceae</i>	Daangulaa	Stem
49	<i>Flacourtia indica</i>	<i>Flacourtiaceae</i>	Hagalaa	Fruit

Appendix 5: List of fence and wild edible plant in the home garden of Abaya district

No	Scientific Name	Family name	Local name	Parts used	Habit
1	<i>Cordia africana</i>	<i>Boraginaceae</i>	Woddeessa	Stem	Tree
2	<i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Ebicha	Stem and leaves	Shrub
3	<i>Ricinus communis</i>	<i>Euphorbia</i>	Qobboo	Stem and seed	Shrub
4	<i>Echinops giganteus</i>	<i>Asteraceae</i>	Qosorruu	stem	Tree
5	<i>Albuca abyssinica</i>	<i>Hyacinthaceae</i>	Qorsa bofaa	leaves	Shrub
6	<i>Solanum indicum</i>	<i>Solanaceae</i>	Hiddii	Root and stem	Shrub
7	<i>Sida rhombifolia</i>	<i>Malvaceae</i>	Karaabaa	Leaves and stem	Shrub
8	<i>Vernonia auriculifera</i>	<i>Asteraceae</i>	Reejjii	Whole parts	Tree
9	<i>Crotone macrostachyus</i>	<i>Euphorbiaceae</i>	Mokkonniisa	Stem	Tree
10	<i>Grewia bicolor Juss</i>	<i>Tiliaceae</i>	Harooressa	Stem and leaves	Shrub
11	<i>Ocimum americanum</i>	<i>Lamiaceae</i>	Damakasee	Leaves	Shrub
12	<i>Trichilia emetica</i>	<i>Meliaceae</i>	Aanannoo	Stem	Tree
13	<i>Celtis kraussiana</i>	<i>Ulmaceae</i>	Mottoqamaa	Leaves and stem	Tree
14	<i>Millettia ferruginea</i>	<i>Fabaceae</i>	Dhadhatu	Leaves and stem	Tree
15	<i>Calpurinaaurea</i>	<i>Fabaceae</i>	Ceekata	Leaves	Shrub
16	<i>Albizia gummiera</i>	<i>Mimosaceae</i>	Gorbee	Stem	Tree
17	<i>Ruta chalepensis</i>	<i>Rutaceae</i>	Xeenadamii	Leaves	Herbs
18	<i>Sanseveria abyssinica</i>	<i>Agavaceae</i>	Algiisa	Whole parts	Shrub
19	<i>Triumfetta tomentosa</i>	<i>Tiliaceae</i>	Daangulaa	Stem	Tree
20	<i>Flacourtia indica</i>	<i>Flacourtaceae</i>	Hagalaa	Fruit	Tree
21	<i>Rhamnu sprinordes</i>	<i>Rhamnaceae</i>	Geeshoo	Whole parts	Shrub
22	<i>Gosypium hirsutum</i>	<i>Malvaceae</i>	Mukajirbii	fruits	Shrub
23	<i>Ecalyptus grandis</i>	<i>Myrtaceae</i>	Barzaafii diima	whole	Tree

Key : T for tree, Sh for shrub ,H for herbs and Cl for climbers.

