



**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF NATURAL & COMPUTATIONAL SCIENCES**  
**DEPARTMENT OF BIOLOGY**

Wild Edible Plant Resources in Guangua and Banja Districts and Contribution  
for Food Security

Adbaru Degualem

A Thesis Submitted to the Department of Zoological Science and Presented in  
Partial Fulfillment of the Degree of Masters in Biology

**August/ 2018**  
**Addis Ababa, Ethiopia**

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## Approval Sheet I

This is to certify that the thesis prepared by Adbaru Degualem entitled: “*Wild Edible Plant Resources in Guangua and Banja Districts and Contribution for Food Security* ” and submitted in partial fulfillment of the Degree of Master of Science (Biology) complies with the regulation of the University and meets the accepted standards with respect to originality and quality.

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## **ABSTRACT**

### **Wild Edible Plant Resources in Guangua and Banja Districts and Contribution for Food Security**

Adbaru Degualem

Addis Ababa University, 2018

Wild edible plants (WEPs) are commonly used to meet food requirements of rural people, especially during periods of food shortage. An ethnobotanical study of WEPs was conducted in Guangua and Banja districts of the Awi zone, Northwest of Amhara, Ethiopia. A total of 95 informants (78 males & 17 females) have involved in this study and help with the documentation of relevant ethnobotanical information about WEPs. Data collection and analyses employed simple statistics in ethnobotanical methods. The study resulted in documentation of 33 WEP species growing and utilized in the study area. These species are distributed in 28 genera & 22 families. Fruits were the most commonly used plant parts in the community (63.6%; 21 species) and most of them are eaten fresh as raw (78.8 %; 26 species). The result of preference ranking indicated that *Rosa abyssinica* is the most preferred wild fruit followed by *Mimusops kummel*. This was also supported by the pair-wise comparison. Direct matrix ranking analyses for the multipurpose species showed that *Cordia africana*, *Syzygium guineense* & *Mimusops kummel* as the most cited species used for different purposes. The informant consensus analysis showed that *Cordia africana* and *Rosa abyssinica* are the most threaten species due to diverse uses. Although informants listed *Mimusops kummel*, *Syzygium guineense*, *Ximenia americana* & *Cordia africana* as marketable food plants, it was *Syzygium guineense* & *Ximenia americana* that were available in the market. This might be due to availability of sufficient food resources in the season or could be loss of the resource and the associated knowledge.

**Keywords:** Ethnobotany, Indigenous Knowledge, Wild Edible Plant

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## **ACRONYMS AND ABBREVIATIONS**

AZADO	Awi Zone Agricultural Development Office
AZDPED	Awi Zone Department Of Plan and Economy Development
CSA	Central Statistical Agency
DRMFSS	Disaster Risk Management & Food Security Sector
FAO	Food and Agriculture Organization
GBDAO	Guangua and Banga Districts Agricultural Office
GBDRLMO	Guangua and Banga Districts Rural Land Management office
IBC	Institute of Biodiversity Conservation
IPMS	Improving productivity & Market Success
S.No	Serial number
WEPs	Wild Edible Plants

## CHAPTER ONE

### 1. INTRODUCTION

#### 1.1. Background and Justification of the study

Wild edible plants (WEPs) are plants that grow in wild natural habitats that are neither cultivated nor domesticated and used as a source of food. People living in the countryside of developing countries depend on WEPs to meet their food requirements during periods of food shortage. The consumption of WEPs seems more common in food insecure areas of the country as compared to relatively food sufficient areas (Shrestha & Dhillion, 2006). This trend of using WEPs during periods of food shortage is also common in Ethiopia, being important alternative food source for survival.

In addition to the use of WEPs as supplemental to the main diet and as alternative source of food areas, some of them serve as source of income to small-holder farmers in rural areas (Manyafu, 1971). However, these plants are categorized as underutilized or neglected crops since the economic potential of the plants have been poorly addressed and limited to local use only (Misra and Misra, 2016). Yet the plants provide essential vitamins, minerals, carbohydrates and proteins contributing to the health care significantly. Many WEPs are rich nutritionally as various reports presented these plants contain vitamins and micronutrients that supplements nutritional requirements (Kabuye, 1997).

Either as impact of researches or cultural trends, the use of the plants as source of food is continued being highly pronounced in developing countries (Jadhav *et al.*, 2011; Dogan *et al.*, 2013). Although WEP species are widely distributed in the country, well documented information about their taxonomy and uses is limited IBC( 2005). On the other hand rural communities have good culture of preserving useful plants including WEPs either on their

farms or in their home gardens (Guinand & Lemessa Dechassa, 2000). Therefore, it is likely that there are many more WEPs that were not yet documented. There were many ethnobotanical studies undertaken in different parts of the country, but more of these studies dealt with medicinal plants & little emphasis has been paid to WEPs. These calls for the importance of further study which is contribute to the comprehensive compilation of the countries resource in regard to WEPs. In different parts of the world the use of wild plant resource are still continued, because human beings require this wild plants as a source of medicine, food, spices, fence, and shelter construction, timber production etc (Acharya & R.Acharya, 2010). In Ethiopia there are about 7000 higher plants, from these plants 8% of them are indigenous edible plant species, 75% are categorized as indigenous, semi cultivated or naturalized (Zemedede Assfaw & Mesfin Tadesse, 2001). The idea of different researchers helps to study in Guangua and Banja districts that the ethnobotanists realize the present of a diversity of WEPs that serve the communities for different purposes. Knowledge and uses of these plants stile in problem so it needs a great assessment to encourage the local people to wisely manage and uses for food purposes to fill economic gape unless, due to different factors transfer of this indigenous knowledge from generation to generation is becoming in great challenges. In tow districts the researchers on WEPs did not found any document before, and this problem was initiated the researcher with intention to add one more new document in tow districts. It has been explored the WEPs in the area and document local knowledge & practices of peoples in the study areas so that WEPs can be cultivated for large population as food supplements & help in economic growth of the area and overcome food shortage by Encourage the local people as well as concerned body to insure food security

## **1.2. Research problem /statement of the problem**

Most of the populations in the study districts are found in rural areas and the lives of these peoples face several challenges, including deforestation, drought, land degradation and climate change as other Ethiopians. The same is true during the challenge they depend on WEPs means at the time of drought and food scarcity like 1977 (E.C). These and other factors were the reasons that the researcher focused to study in these two districts. On the other hand information is lacking on the ecological distribution & potential of WEPs for maintaining food security in other districts of Ethiopia including Guangua and Banja districts. Starvation and migration it is daily events for the local people particularly for Banja but they use WEPs unknowingly without considering their importance for food security that it needs farther research to save the diversity of these fruitfully plants as well as announce the importance of food security.

## **1.3. Objectives of the Research**

### **1.3.1. General objective**

The main objective of this study is to identify the importance of WEPs to food security, their diversity, and distribution and to document the knowledge related to use & conservation of the plants in Guangua and Banja districts, Amhara regional state of Ethiopia.

### **1.3.2. Specific objective**

- To collect and record WEPs found in Guangua and Banja districts.
- To identify the importance of WEPs to food security?
- To compile the diversity of WEPs
- To document plant parts used as food in the study area.
- To identify the habitat distribution of WEPs.
- To document how peoples use, threaten and conserve wild edible shrubs and trees in Guangua and Banja districts.

#### **1.4. Research Questions**

The research questions were prepared based on the objective of the research to record the knowledge of informants to get real and tangible information's about WEPs.

- What are WEPs species found in & around the study area?
- Which part of the plant part is used as food?
- How local peoples prepare & use the plants as food?
- Where is the distribution habitat of these plant species?
- What are the threats of WEPs in the study area?
- Who can select the best and the well known WEPs?
- How do peoples conserve these plants through their traditional practices? And what are the factors that threaten the WEPs.

#### **1.5. Hypothesis**

- In the study areas peoples use WEPs species as source of food and income by selling in urban markets.
- The local people of the study areas eat WEPs from the surrounding vegetation and secure their nutritional need when food shortage occurred.
- The knowledge on WEPs is the same in different social groups (age, education and sex)
- All individuals in the study areas may concern for WEPs to their conservation activity.

## **CHAPTER TWO**

### **2. LITERATURES REVIEW**

#### **2.1. The concept of Ethnobotany**

Ethnobotany is an important field of studies which enable to address the value of plants to the society and it gives clue how and when uses plant resources and also the way of managing them. According to researchers; Ethnobotany is the scientific investigation of the relationship between people and plants, that people used plants as indigenous culture as food, medicine, magic, building, household utensils and other purposes (Urga Kelbesa *et al.*, 2004). Ethnobotany is defined as the interaction of local people to classify, manage & use plants that are found within natural environment around them (Martin, 1995). Ethnobotanical studies in Ethiopia by considering its cultural, socioeconomic & nutritional values, wild plants are essential to assist the country's effort towards increasing food security as ((Ermias Lulekal *et al.*, 2011). And the information helps Ethiopia to better utilize its diverse fauna & flora, exploit their potential in sustaining food security & creating a healthy environment like that of suggested by (Zewdu Seyoum *et al.*, 2015). In different parts of a country, a number of researches have been conducted on ethnobotanical study. All these suggestions and others idea helps the researcher to asses specifically about WEPs in the studies area to put down certain information for ethno botanical data presentations.

#### **2.2. Wild Edible Plants and their Nutrition**

Wild edible plants are plants that occur on a wild or are grown in local scale, & are categorized as underutilized whose economic potential have been poorly addressed to only traditional and local use (Misra& M.K.Misra, 2016). In addition to cultivation crops, Ethiopia flora contains many wild plants that produce quantities of food so, natural habitats, farm lands & home gardens are sources of edible plants. In addition to cultivated plants, peoples in

developing countries use WEPs as food during the period of food deficit (Jadhav,V.D *et al.*, 2011 & Dogan & Ugulu, 2013). Especially in the time of starvation WEPs still play important roles in human nutrition (Khanal, 2006). FAO (2009) estimated that there are about 1.02 million peoples that are undernourished.

According to (Ermias Lulekal *et al.*, 2011) different parts of food plants like leaves, stems, fruits, flowers, tubers, barks, seeds, roots & others are still consumed for their dietary value in many communities around the global. Many WEPs are nutritionally rich & can supplement nutritional requirement..Generally the information available from the nutritional analysis of WEPs shows their potential contribution to dietetic diversity and food security.

### **2.3. Potential contribution of WEPs to food security**

As cited by Sabatsec *et al.* (2012) Seasonal food insecurity or shortage of enough food is the main problem in developing country in Ethiopia most of peoples in rural areas face several challenges like environmental degradation, drought, deforestation & climate change these results in a serious food insecurity among households. It was faced in tow districts occasionally because of the researcher focused to study about WEPS.

FAO (2004) estimates that in worldwide there were about 852 million people that are undernourished. Out of this 9 millions are in industrialized countries, 28 millions are in countries in transition and 815 million are from developing countries. FAO (2006) in the world the number of hungry peoples with shortage of food is growing at a rate of 4 million a year and in developing countries there are about 820 million peoples that suffer with shortage of food. FAO (2010), more than 35% of Ethiopian people are food insecure

Every living organisms in the world impossible to survive without plants so their

contribution for food security has fundamental value so, different researchers stated different values about plant diversity particularly WEPs. As suggested by (Cotton, 1996) almost all living organisms ranging from bacteria to large mammals gain protection and nourishment from plants. Humans derive food, medicines & a number of ecosystem services such as in purification, origin & recharge of water bodies, nitrogen fixation, cycling of nutrients as well as many more range of other products from plant biodiversity (Khanal,2006). When compared to domesticated plant food sources, wild plant foods tend to be overlooked. As cited by (Ermias Lulekal *et al.*, (2011), over 50 percent of the world's daily requirement of proteins & calories is obtained from only three crops; Wheat, Maize & Rice. The dependence on a few domesticated species limits food diversity & leads to over dependence on limited resources. By contrast more than 7000 species of plants are used for food in human history as ethnobotanical investigations suggested (Grivetti & Ogle, 2000).These indicated that there are many WEPs which are important but unknown by ethno botanists so, farther study in different districts have been ongoing processes. Wild sources of food are important for the poor and landless, and are especially important during times of famine or conflict when normal food supply mechanisms are disrupted. According to (Tardio *et al.*, 2006) even under normal conditions, wild plants have played an important role in complementing staple foods to provide balanced diets.

#### **2.4. Conditions of Wild Edible Plants in Ethiopia**

With varied topography and a wide spectrum of habitats, Ethiopia has a large number of endemic plants and animals (Ermias Lulekal *et al.*, 2011). Researchers showed that in Ethiopia there about 7000 higher plants and 8% of them are edible. Of these edible plants 203 wild & semi wild plant species are documented (Zemedede Assfaw & Mesfin Tadesse, 2001).

The rural populations in Ethiopia have a rich knowledge of WEPs and consumption of these plants are still an integral part of the different cultures in the country(Tilahun Teklehymanot & Mirut Giday, 2010).Wild food consumption is still very common in rural areas of Ethiopia particularly with children. Among the most common wild plant fruits consumed by children are, for example, fruits from *Ficus sur* , *Carissa edulis* & *Rosa abyssinica* plant species (Guinand & Lemessa Dechassa, 2000).

Ethnobotanical information on cultural, socio-economic & nutritional values of WEPs in Ethiopia is limited. Hence, there is still a need for documentation, nutritional analysis and domestication of WEPs to assist in the nationwide effort to combat food insecurity and ensure dietetic diversity as (Ermias Lulekal *et al.*, 2011).It is an alarm about food plants which needs farther investigation not only for today but also for tomorrow.

## **2.5. Threats and Conservation of Wild Edible Plants**

### **2.5.1. Threats of wild edible plants**

Based on researchers, indigenous people living in forests best know, use, & protect biodiversity. However, the survival & existence of indigenous people and their long term accumulated knowledge faces challenges as a result of modernization, genetic erosion on plant & animal resources, low recognition to their knowledge & varied culture and loss of biodiversity (Martin,1995, Balick & Cox, 1996, Negash, 2001). Environmental crises like global warming, loss of biodiversity & deforestation are becoming the major tribulations of human beings.

In Ethiopia WEPs are facing threats in natural habitats from various human activities such as fuel wood collection, harvesting for timber & walling or poles, etc (Kebu Balemie & Fassil Kebebew, 2006). These practices adversely affect WEPs in the country & lead to the

reducing of economically crucial food plants (Assefa Assegid & Tesfaye Abebe, 2011). When the plants that have been serving as the raw material for the preparation of the different remedies are being destroyed, the traditional practices associated with them would also diminish (Kumbi, 2007). Generally WEPs are threatened due to various human activities & natural causes such as habitat distraction (timber harvest, fuel wood collection, forest fire), over harvesting, over grazing, land use change/expansion of agricultural lands, developmental activities/, invasive species and climate change.

### **2.5.2. Conservation of Wild Edible Plants**

Conservation refers to the wise use and appropriate management of natural environment and its natural resources. There are some conservation actions that have been undertaken around the world, this includes in-situ (in their natural habitat as in nature reserves & parks) or ex-situ (in field gene banks, botanic gardens or cold rooms (,Tilahun Teklehymanot & Mirut Giday 2010). Researches recommend that WEPs in different parts of Ethiopia need conservation and documentation (Balemiekebu & Fassil Kebebew, 2006, Zemed Asfaw, 2009, Tilahun Teklehymanot & Mirut Giday, 2010). Several studies have demonstrated the roles of WEPs as sources of income for poor communities and as supplementary food sources during times of crises, Misuse of wild plant resources cause extinction of the useful WEPs, so wild plant resources require considerable conservation for sustainable usage in the future (Baressa Anbessa, 2016).

# CHAPTER THREE

## 3. MATERIALS AND METHODS

### 3.1. Description of the Study Area

#### 3.1.1. Geographical location

Guangua and Banja are districts located in Awi zone at the Northwestern part of Ethiopia. The town of Awi Zone is Injibara which is located 447km at the North West parts from Addis Ababa and it also located 128 kilometers at the Southern parts from the regional city, Bahir Dar. Guangua is located around Chagni at 54km at the Western parts from Injibara town while Banja is located around to Injibara. The geo-reference location of Guangua is between  $10^{\circ} 57''N/ 36^{\circ}30'E$  and  $10^{\circ}95''N 36^{\circ}50''E$  while that of Banja is between  $11^{\circ} 26''N 36^{\circ} 83''E/11^{\circ}16 N 36^{\circ}50''E$  (AWZPEO,2010)

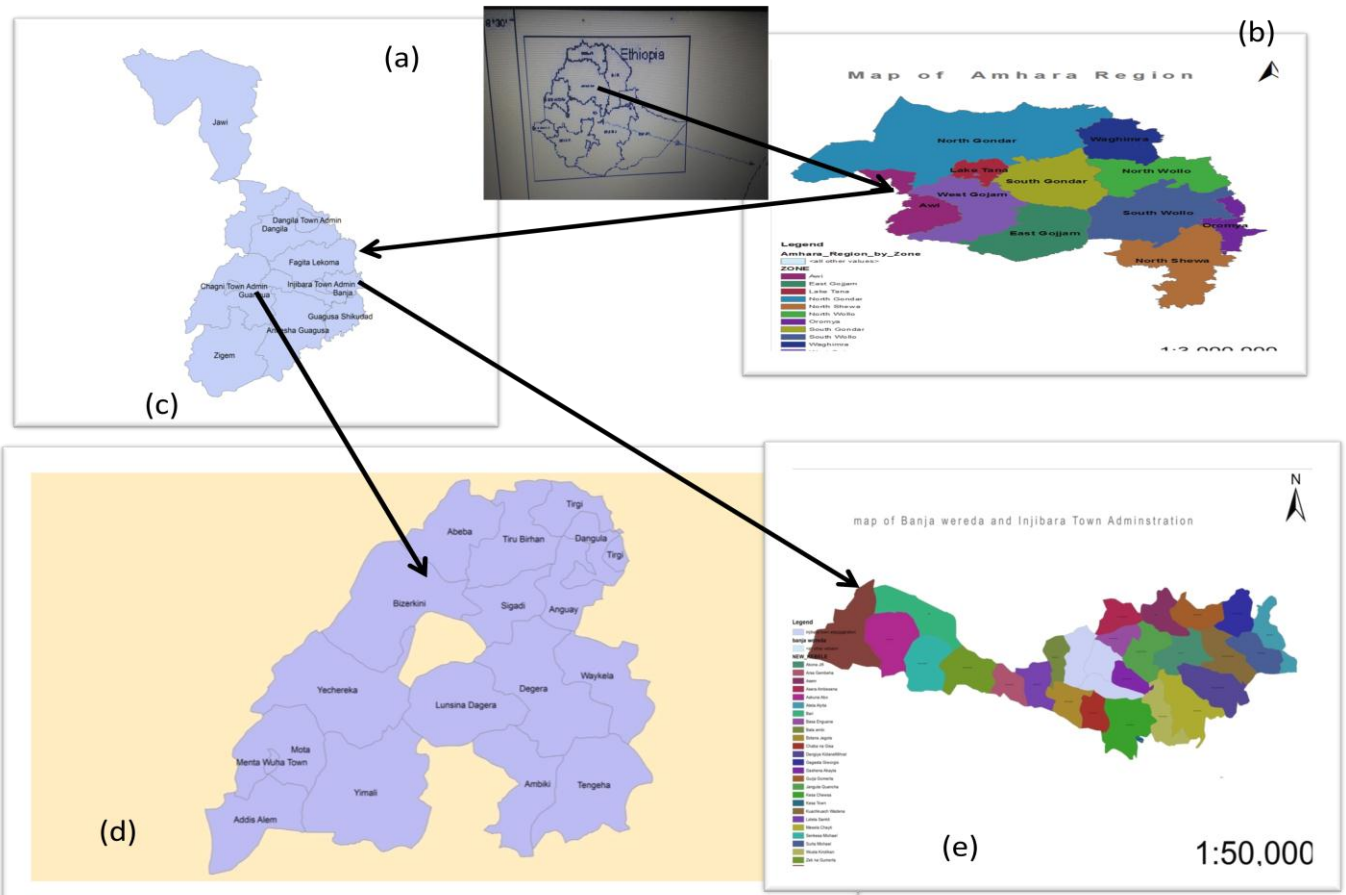


Figure 1 Map of the study area (a) Ethiopia, (b) Amhara, (c) Awi, (d) Guangua & (e) Banja

### 3.1.2. Geotopography

The altitude of Guangua district ranges from 1600 to 1710m. The total land area of Guangua district is 106914 hectare, 60% of the land is flat, 28% of it is mountain & hills, and 12% is a valley bottom. Altitude of Banja district ranges from 2227m up to 2544 m. The total land area of Banja district is 47915 hectars, 17.36% the land is flat, 82.64% is mountain & hills. The mountains in Banja districts are Asem, Asera and Gembaha mountains they have 2700, 2920, and 2920 m.a.s.l height respectively. The flat land area gets slit or sediment comes from the hilly areas (GBDRLMO, 2014).

### 3.1.3. Vegetation

The vegetation type in Awi zone is mainly Afromountaine Forest patches (Abiot Berhanu,2017). AWI Zone is located in the Amhara region of north west Ethiopia, roughly mid way between Debre Markos and Bahar Dar.The old peoples claimed that, the forest covered in former days were more condensed in the zonal area but due to growing the population numbers and heavy utilization of indigenous trees have been disappeared.

Guangua district is one of the districts in Amhara region that covers an area of 106,914, hectares. It is known that it's plain nature where flat land accounted, from these 12,145 hectars of land is covered by vegetation and 36,488.7 hectars is covered by shrubs and trees. The land considered useless due to stony covered is about 5838.8 hectars and the rest used to cultivate crops and serials. Also Banja district is one of the selected areas which cover an area of 47,915.808 hectares. On which 14,188.874 hectares of the area is covered with vegetation and 283.575 hectars is covered with shrubs and trees. Most of the area is mountain and hills which have better vegetation, shrubs and trees coverage than other areas (GBDAO, 2016).

The plant diversity mostly found in AWI ZONE around the study area their vernacular name in Awigne and Amharic as follow(Table 1).

**Table 1 List of plant species found in AWI ZONE.**

No	Scientific name	Family name	Vernacular name	
			Amharic	Awigni
1	<i>Allophylus abyssinicus</i>	Sapindaceae	Imbs	Intatal
2	<i>Ekebergiac apensis</i>	Meliaceae	Lol	Churi
3	<i>Schefflera abyssinica</i>	Araliaceae	Getm	Pimpini
4	<i>Adhatoda schimperiana</i>	Acanthaceae	Sensel(Smiza)	Lili
5	<i>Apodytes dimidiata</i>	Icacinaceae	Dong(Donga)	Zindi
6	<i>Crotalaria mildbraedii</i>	Fababceae	Yeayt ater	---
7	<i>Croton macrostachyus</i>	Euphorbiaceae	Bsana	Asisi
8	<i>Erythrina brucei</i>	Fabaceae	Korch	Buri
9	<i>Podocarpus falcatus</i>	Podocarpaceae	Zegba	Eji
10	<i>Acacia lahai</i>	Fabaceae	Cheba	Tisivi
11	<i>Albizia gummifera</i>	Fabaceae	Sesa	Kansini
12	<i>Millettia ferruginea</i>	Fabaceae	Brberra	---
13	<i>Cordia africana</i>	Boraginaceae	Wanza	Bugitsi
14	<i>Rosa abyssinica</i>	Rosaceae	Qega	Gmsi
15	<i>Rubus volkensii</i>	Rosaceae	Njorie	Njori
16	<i>Dovyalis abyssinica</i>	Flacourtiaceae	Koshim(agam)	Aguami
17	<i>Ficus sur</i>	Moraceae	Sholla,warka	Imwi,Mwi
18	<i>Carissa edulis</i>	Apocynaceae	Agam	Agam
19	<i>Hagenia abyssinica</i>	Rosaceae	Kosso	Shinchi
20	<i>Arundinaria alpina</i>	Poaceae(gramineae)	Qerkeha	Anini

Sources (AWZADO, 2015)/

#### 3.1.4. Population

According to central statistical agency (CSA, 2014).The total human population of the Guangua district is 127,771 of which 61,962 are males and 65,810 are females and the total population of Banja district is estimated about 90,989 of which 44,795 are males and 46,194 are females. The proportion of population between males and females are similar in both districts.

#### 3.1.5. Soil

Based on Guangua district agricultural office, the dominant soil type in the plains is red soil 80% and blue clay soil 20% (bentonite soil), in Banja red soil 25-30% and blue soil 70 –75% which have been registered in two Agricultural offices (Sources GBDADO, 2016).

#### 3.1.6. Rain fall

The mean annual rain fall in Guangua district is 1550 mm & the ranges from minimum and maximum rain fall is 1300 to 1800 mm. Meher rains start in May up to October. Mostly one cropping season with short rainy periods, & farmers for their crop production depends on meher rain season. In Ban district the mean annual rain fall is from 2200 mm to 2400 mm Meher rains starts in March up to the end of November. It has relatively long rain season (GBDADO, 2016).

**Table 2 The minimum and maximum rain fall and season of raining in the study sites**

Districts	Minimum rainfall	Maximum rainfall	Average rainfall	Seasons
Guangua	1300mm	1800mm	1550mm	May---October
Banja	2200mm	2400mm	2300mm	March-November

Sours (GBDADO,2016)

### 3.1.7. Climatic Condition

The Zone recognized to have three agroclimatic zones as Dega (10.7%), Weyna dega (73.2%), Kolla (16.1%) according to information was given by Zonal Dept of Planning and Economic Development(2010). In general agro climatic temperature mainly divide in to three climatic zones like Dega which is describes in the highlands usually between approximately 2300 - 3200masl. At altitudes below Dega are the” Woina dega”(1500 to 2300masl), and “kolla” and “Bereha”(below 1500masl). Based on the study area Guangua district average temperature is 22-27<sup>0</sup> C , the altitude of Guangua district ranges from 1600 to 1710m and has sub tropical or 100% Woina Dega type of climate. The altitude of Banja district ranges from 2227m up to 2544 m the area has 20% Woina dega and 80% Dega in which are different types of crops and livestock can be cultivated and different wild edible plants considered to be distributed. Average temperature is about 16-26<sup>0</sup>c (AWZDPED, 2010).

**Table 3 The Minimum and Maximum Temperature the study areas based on Altitude with chimerical condition**

Districts	Minimum Temperature in <sup>0</sup> c	Maximum Temperature in <sup>0</sup> c	Altitude in masl	chimerical Condition
Guangua	22	27	1600-1710	Woina Dega
Banja	16	26	2227-2544	Dega

Sources (G & BDADO, 2016) and AWZADO, 2015)

### 3.1.8. Economic Activity of the Society

Guangua is one of the surplus producing districts in the region which is endowed with beautiful diverse natural resources, with capacity to grow diverse annual & perennial crops. Cereal based farming is covers large areas. Banja district has low fertility in most areas because the topography of the land is upside down which is exposed for flood with rugged topography, low fertility & limited livestock population; however the community depends on cereal based farming systems. Banja districts in some extent they use irrigation crop production (GBDAO, 2016).

## **3.2. Methods**

### **3.2.1. Sampling area**

Most parts of Guangua district has flat land area, so the vegetation cover is poor & it is covered by crop plants, but some part are mountain & hills with a better vegetation cover. There are 12 rural kebeles in Guangua district from which three kebeles (Yimali, Bizrakani, and Tirigy) were selected. Banja district is mostly mountainous and hilly with relatively high coverage of vegetation. Of the total 26 kebeles found in the district, three kebeles (Chaba and Gissa, Asem and Gimbaha) have been selected. The main criteria for the selection of sites is the vegetation cover of the area, based on observation & information obtained from Guangua and Banja districts agricultural office.

### **3.2.2. Informant Selection**

A total of ninety five informants were selected from the two study districts, among which 82.1% of were males and 17.9% were females. These informants were categorized into three age groups (22-40 young, 41-58 middle and 59-76 elders). About 65.2% of the informants were uneducated/ illiterate, 2.1% followed church education and 32.7% of them followed modern education. About 87.4% of the informants were married, and 98.9% & 1.1% were followers of Orthodox and Adventist churches, respectively. The target population consist one of all inhabitants living in the six kebeles, and the sample population derived from residents aged above 4 years registered in the official population census of the kebeles (CSA, 2014). An informant has been selected based on purposive sampling, strict random methods and stratified random sampling methods based on the population number Chaba and Gissa 13/6012, Assem 17/8.308, Gimbaha 15/6936 and Yimali 18/8324, Bizrakani 21/9711 and Tirgi

16/7399 informants has been selected. In general, focus group discussion in each kebele has been conducted. An informant was included different age, sex, religion and education level groups.

**Table 4 Age, educational status, marital status, gender & religion of informants**

Age group/in yrs	Male	%	Female	%	Total%
22-40	43	45.3	9	9.5	54.7
41-58	31	32.6	8	8.4	41.1
59-76	4	4.2	-	-	4.2
Educational status	-	-	-	-	-
Uneducated/illiterate	48	50.5	14	14.7	65.2
Church education	2	2.1	-	-	2.1
Modern education 1-4	7	7.4	-	-	7.4
5-8	10	10.5	-	-	10.5
9-10	8	8.4	3	3.2	11.6
11&above	3	3.2	-	-	3.2
Marital status	-	-	-	-	-
Single	2	2.1	10	10.5	12.6
Married	76	80	7	7.4	87.4
Religions					
Orthodox	77	81.1	17	17.9	98.9
Adventist	1	1.1	-	-	1.1

### 3.3. Ethnobotanical data collection

The methods used in data collection were field observation, semi-structured interview, market survey, focus group discussion & interview.

#### 3.3.1. Field Observation

In the study districts 10(Ten) times field observations were conducted in the study sites with the help of guidance & interviewed informants, where most of WEPs are found. The purpose of the field observation was to collect all the relevant data including identification of edible

plant species, vernacular name of the plant, the parts used as food, habitat distribution of these plants, and documented using photographs (Appendix 1) .

### **3.3.2. Semi-structured interview**

A semi structured interview containing 17 questions (Appendix 8) have been prepared. These formulated questions, & questions rose depending on responses of an informant, was being focused on strategies to get brief information on WEPs in the study site. Questionnaires have been constructed in English language, but translated in to local people's language (Amharic) and (Awigna), and the time & place for interview were being selected based on the interest of the informants (Appendix 5).

### **3.3.3. Market Survey**

Market survey containing eight questions (Appendix 9) was made to record the varieties of WEPs and amount of edible plant parts sold in the market. The local markets, Injibara and Chagni markets have been visited in the study area. Interviews were conducted with peoples who sell these edible plant parts, to know the type of plant species and to determine the value (income) gained from such practice.

### **3.3.4. Focus Group Discussion**

A detail group discussion has been conducted in each study site and the discussion was made with elders, agricultural office experts, younger's and other peoples with 8-12 participants in each sites. The discussion containing eight questions have been conducted prior to data collection to list WEPs found in the study area & after data collection (specimen collection) to list the name of collected edible plants. At the end of the discussion the contribution of each informant was appreciated, indicating the value of their knowledge in wise use of WEPs and biodiversity conservation by the researcher.

### **3.3.5. Interview**

Interviews have been conducted individually or in a group to collect data on varieties of WEPs found in the study areas, seasons of consumption & parts that are used as food, age groups that use these foods, and when these foods being consumed has been identified.

### **3.3.6. Specimen collection**

Based on reconnaissance survey and selection of the study sites the information gained from the informants & field observation, edible plants specimens have been collected, identified & documented by the researcher. As much as possible fruits and leaves of edible plant species in the study area was collected & stored to study the type of WEPs by researcher.

## **3.4. Ethnobotanical data analysis**

### **3.4.1. Preference Ranking**

Ten plant species had been listed and ranked by the key informants based on their personal preference or perception following the procedure (Martin, 1995 and Cotton, 1996). The most preferred plant was assigned with the highest number 10, while the least preferred plant was given the lowest number which was 1. Based on the information gained from 7 key informants, Preference ranking of ten most popular & widely used WEPs was computed for taste, and valued (1-10, 10 = most preferred, 1 = least preferred).

Furthermore six threats of WEP species have been listed and ranked by the key informants based on their personal perception following the procedure explained by (Martin, 1995) ranging from six to one. The most threaten factor for edible plant species was given the highest score, which is 6 while the least threaten factor was given the lowest score, which is 1.

### **3.4.2. Paired Comparison**

Paired comparison was used for evaluating the degree of preferences or level of importance of certain selected plants following Martin (1995). After identifying five plant species which are used by a community, paired comparison had been carried out. The sequence of pairs was randomized by numbering the pairs from 1-5 in alphabetical order & the order within each pair was done by flipping a coin. The original order of the species was maintained for head, but the order was switch around for tails. Rank of species was given by adding numbers given by informants. Seven key informants and one agricultural officer total eight informants were selected to carry out this activity. Informants were asked to compare the given food plants based on their taste and allowed to give values for each pair according to their preference, the highest value (5) for the pair which they perceive best and the lowest value (1) for the pair which they assume is the least preferred. Middle level values for those pairs with intermediate preference. The scores given by the informants were summarized and ranked.

### **3.4.3. Direct Matrix Ranking**

Direct matrix ranking was carried following the method of Martin, (1995) and Cotton, (1996). Based on the information gathered from the informants and collected ethnobotanical data, eight most widely utilized multipurpose plant species were identified, scored & ranked by key informants. The scoring and ranking of species was mainly to see the magnitude & degree of importance to the local communities.

#### **3.4.4. Informant Consensus**

The researcher recorded the number of times a particular species mentioned by each informant. The informant consensus was helpful to see how frequently a particular species was mentioned by informants and was used in the analysis. It was also be used to confirm the authenticity of information by comparing it with other information given by other informants. Consequently, the responses of information that would not in harmony with each other could be rejected since they were considered as unreliable information by the researcher.

#### **3.5. Data Presentation**

The researcher selected a particular technique for application to the data analysis was being based on the effectiveness of the technique for sound interpretation of the results and identification of the inter relationships that may exist among the informants studied by simple statistical analysis of informants consensus.

#### **3.6. Ethical Consideration**

Starting from the beginning to the end of data collection special ethical consideration of the informants was taken based on the cultural view of the local communities. By respecting the informants' culture strictly I informed the objective of the research was not for commercial purpose or seeking income, but to inform them WEPs found around the study area have been used to benefit the community at present & future time if they are sustained wisely

## CHAPTER FOUR

### 4. RESULT AND DISCUSSION

#### 4.1. RESULTS

##### 4.1.1. Wild edible plants in the study area

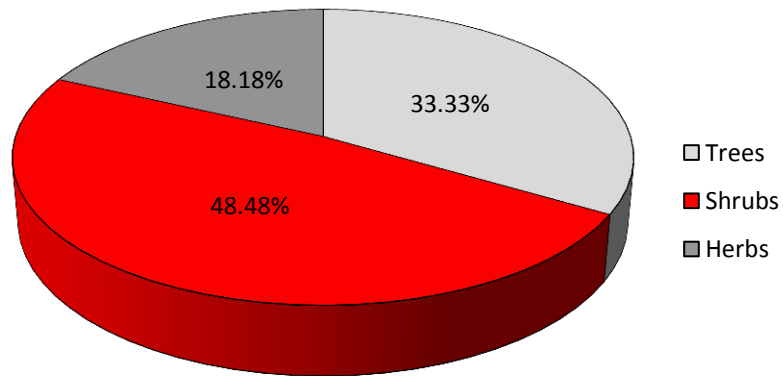
In this study area a total of 33 WEPs were recorded are used by the local people as a source of food (appendix,1). These plants were categorized into 22 families, 28 genera & 33 species. Family Moraceae contributed 15.15% of the species, Solanaceae contributed 9.09% of species and Fabaceae, Acanthaceae, Anacardiaceae, Rosaceae & Polygonaceae each contributed 6.06% and the rest 15 families contributed 3.03% of the species each (Table 5).

**Table 5. List of edible plant families & their number of species and percentage**

Family	No of Species	%
Acanthaceae	2	6.06
Anacardiaceae	2	6.06
Apocyanaceae	1	3.03
Arecaceae	1	3.03
Boraginaceae	1	3.03
Capparidiaceae	1	3.03
Cyperaceae	1	3.03
Ebenaceae	1	3.03
Fabaceae	2	6.06
Flacourtiaceae	1	3.03
Moraceae	5	15.15
Myrtaceae	1	3.03
Olacaceae	1	3.03
Oxalidiaceae	1	3.03
Polygonaceae	2	6.06
Rosaceae	2	6.06
Rubiaceae	1	3.03
Sapotaceae	1	3.03
Apiaceae	1	3.03
Solanaceae	3	9.09
Sterculiaceae	1	3.03
Tiliaceae	1	3.03

#### 4.1.2. Habits of wild edible plants

Regarding with the habit diversity of 33 plant species, 11(33.33%) were trees, 16 (48.48%) were shrubs, 6 (18.18%) were herbs, (Figure 2).



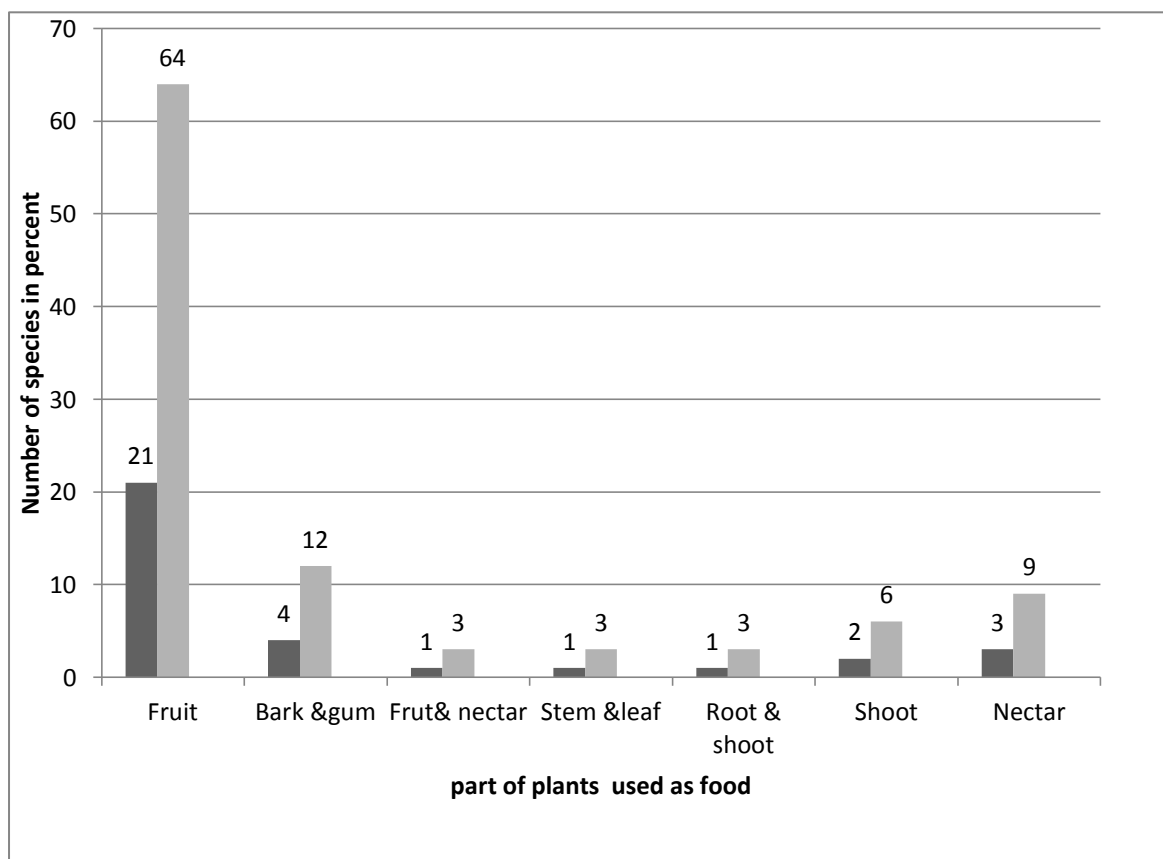
**Figure 2 Habits of plants in the study area**

#### 4.1.3. Plant parts used as food and conditions of preparation

In this study, different parts of the plants were reported to be used as foods. Fruits were the most commonly used plant parts in the community (Appendix4), which accounted for 63.6% (21 species). Barks of plants used as gum accounted for 12.1% (4 species), & others accounted for 24.2% (8 species) (Figure, 3). And in their mode of consumption, most of the plants were taken fresh as raw, which accounted 78.8% (26 species) (Table 6).

**Table 6 Plant parts used and mode of consumption by informant's consensus**

Plant part(s) used	Number of WEPs body parts used as food	%	Mode of Consumption	Number of Consumption	%
Fruit	21	64	Raw	23	69.7
Bark & gum	4	12	Pilled( Raw )	3	9.1
Frut& nectar	1	3	Sucking( Raw)	3	9.1
Stem & leaf	1	3	Rostated (cooked)	4	12.1
Root & shoot	1	3			
Shoot	2	6			
Nectar	3	9			
Total	33	100		33	100



**Figure 3 Wild food plant parts used per percent**

#### 4.1.4. Preference Ranking of Wild Edible Plants

The result obtained from the preference ranking analysis shows that *Rosa abyssinica* is the best preferred wild edible plant by the community followed by *Mimusops kummel*. The least preferred wild edible plant species from the list was found to be *Capparis tomentosa* ranked last (Table 7).

**Table 7 Food plants' rank based on preference rank analyses**

Species name of the plant	R e s p o n d e n t s							Total	Rank
	R1	R2	R3	R4	R5	R6	R7		
<i>Mimusops kummel</i>	9	8	10	8	9	8	9	61	2 <sup>nd</sup>
<i>Rosa abyssinica</i>	10	9	9	7	10	9	10	64	1 <sup>st</sup>
<i>Syzygium guineese</i>	8	6	7	6	8	7	6	48	5 <sup>th</sup>
<i>Ximenia americana</i>	7	10	8	10	6	6	8	55	3 <sup>rd</sup>
<i>Cordia africana</i>	4	7	6	9	7	10	7	50	4 <sup>th</sup>
<i>Rhus vulgaris</i>	3	5	1	2	2	3	3	19	8 <sup>th</sup>
<i>Ficus sur</i>	6	4	5	5	5	4	5	34	6 <sup>th</sup>
<i>Carissa spinarum</i>	2	2	3	4	1	1	2	15	9 <sup>th</sup>
<i>Ficus vasta</i>	5	3	4	3	4	5	4	28	7 <sup>th</sup>
<i>Capparis tomentosa</i>	1	1	2	1	3	2	1	11	10 <sup>th</sup>

#### 4.1.5. Paired Comparison for level of importance of wild edible plants

The five most useful wild food plants selected for pair-wise analysis were *Rosa abyssinica*, *Mimusops kummel*, *Ximenia americana*, *Syzygium guineense*, *Cordia africana*. The most preferred pair was found to be the pair that consists of *Syzygium guineense* and *Ximenia americana* while the pair containing *Cordia africana* and *Mimusops kummel* was selected by only 10 informants and ranked the last (Table 8).

**Table 8 Informant consensus results of paired comparison on five wild edible plants based on their taste**

No	paired items	Respondents								Total	Rank
		R1	R2	R3	R4	R5	R6	R7	R8		
1	<i>Rosa abyssinica, Mimusops kummel</i>	3	3	2	3	2	3	3	2	21	7
2	<i>Mimusops, kummel, Ximenia, Americana</i>	2	2	5	2	5	2	5	2	25	5
3	<i>Rosa abyssinica, Ximenia Americana</i>	3	5	3	5	3	3	3	3	28	2
4	<i>Cordia africana, Mimusops kummel</i>	1	2	2	1	1	1	2	2	12	10
5	<i>Rosa abyssinica, Cordia Africana</i>	3	3	3	1	1	3	3	1	18	8
6	<i>Cordia africana, Ximenia Americana</i>	1	5	5	5	5	1	5	1	28	2
7	<i>Syzygium guineense, Mimusops kummel</i>	2	4	2	2	4	4	2	2	22	6
8	<i>Syzygium guineense, Rosa abyssinica</i>	3	3	4	3	3	4	3	3	26	4
9	<i>Syzygium guineense, Ximenia americana</i>	5	5	5	4	5	5	4	5	38	1
10	<i>Cordia africana, Syzygium guineense</i>	1	4	1	1	4	4	1	1	17	9

#### 4.1.6. Direct Matrix ranking of multipurpose wild edible plants

People in the study area largely depend on the forests for various purposes such as food, Medicine, construction, market income, forage, fire wood. To assess the relative importance and to check the popularity of these multifunctional plants, Direct Matrix Ranking was employed. During the study edible plants were found to be multipurpose in addition to food values. In the ranking, eight commonly reported multifunctional plant species and six use categories were involved with eight key informants. The informants evaluate the functionality of those multifunctional food plants to the local people and indicated their scores for each food plants with each other (use values from 1-8, (8=highest value, 1=least value)) . Finally the function of the plants by each category summed up, evaluated and ranking takes place. And *Cordia africana*, *Syzygium guineense*, and *Mimusops kummel* ranked 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> respectively and *Rhus vulgaris* ranked least (Table 9).

**Table 9 Result of direct matrix ranking on eight multipurpose food plants**

Plant species name	Food	Medicine	Market income	Forage/food	Fuel wood	Construction	Total	Rank
<i>Mimusops kummel</i>	8	5	8	3	7	4	35	3 <sup>rd</sup>
<i>Rosa abyssinica</i>	8	4	6	5	2	1	26	7 <sup>th</sup>
<i>Syzygium guineense</i>	7	5	8	4	6	6	36	2 <sup>nd</sup>
<i>Ximenia americana</i>	7	5	7	2	6	2	29	5 <sup>th</sup>
<i>Cordia africana</i>	8	5	7	7	8	3	43	1 <sup>st</sup>
<i>Ficus sur</i>	7	5	6	6	6	2	32	4 <sup>th</sup>
<i>Rhus vulgaris</i>	7	1	1	8	7	1	25	8 <sup>th</sup>
<i>Carissa spinarum</i>	7	3	2	7	7	1	27	6 <sup>th</sup>

**4.1.7. Informant's Consensus for the well known wild edible plants**

Wild edible Plants which are popular due to the wide range of food resources that are well known by the local people being first cited. The outcome of this study showed that some wild edible plants are popular and highest informant consensus goes to *Cordia africana*, which was cited by 85 informants while *Carissa spinarum* was cited by only 42 and stood last (Table 10).

**Table 10 The top eight selected wild food plants according to informant's consensus**

Scientific name of the plant	Total no of citation	(%)	Rank
<i>Carissa spinarum</i>	42	44.2	8
<i>Cordia Africana</i>	85	89.5	1
<i>Ficus sur</i>	61	51.6	7
<i>Ficus vasta</i>	49	64.2	6
<i>Mimusops kummel</i>	79	83.2	3
<i>Rosa abyssinica</i>	83	87.4	2
<i>Syzygium guineense</i>	69	72.6	5
<i>Ximenia Americana</i>	75	78.9	4

#### 4.1.7. Marketable Wild Food Plants

The researcher was conducted the local market surveys in two towns near the study sites namely Chagni & Injebara to document wild food plants sold in local markets. Among the reported wild food plant species, informants listed *Mimusops kummel*, *Syzygium guineense*, *Ximenia americana*, *Cordia africana*, *Ficus sur* & *Rubus volkensii* as marketable edible plants. But only *Syzygium guineense* & *Ximenia americana* were available in the market.



(a) *Syzygium guineense*



(b) *Ximenia americana*

**Figure 4 (a) & (b) Most frequently sold (markatable) wild edible plants in chagni market**

**Table 11 Marketability and places of Market for wild edible plants**

S.No	Scientific name	Local name/Amharic/	Marketable	Place of Market	Types of WEPs found in the Market
1	<i>Syzygium guineens</i>	Doqma(Amh),	✓	Chagni	1,2,3,4,5,6&7
2	<i>Rubus species</i>	Njorie(Amh )	✓	Mentawuha	1,2,3,4,5,6&7
3	<i>Rosa abyssinica</i>	Qega(Amh)	✓	Tirgi	3,4&7
4	<i>Mimusops kummel</i>	IShe(Amh)	✓	Injebara	2&3
5	<i>Ficus species</i>	Shola(Amh )	✓		
6	<i>Cardia Africana</i>	Wanza(Amh)	✓		
7	<i>Ximenia Americana</i>	Enkoy	✓		

#### **4.1.8. Comparison of Knowledge on WEPs with in Different Informant Groups**

Much of the knowledge of WEPs in the study area was obtained from informants of younger ages (22-40), when compared with the elder people. This was evidenced from that informant older than age forty (41-58 & 59-76) mentioned less number of WEPs species. Males knew more WEPs than females

#### **4.1.10. Distribution of Food Plants in the Study Area**

The majority of food plant species were obtained from wild followed by Agricultural field, forests farm lands, riversides and home garden according to informants.

#### **4.1.11. Seasonal Availability of WEPs in the Study Area**

According to informants' knowledge the availability of WEPs varied in seasons. These plants were mostly abundant in winter (from December to February) 11 species (33.33%), autumn (from September to November) 8 species (24.24%), spring (March to May) 11 species (33.33%), & summer (from June to August) 3 species (9.09%).

#### **4.1.12 Gender Utilization Practices & Management of WEPs**

The house hold members participate in collecting, preparing for home consumption, managing and selling WEPs to maximize house hold income However, there were still prevailing attitudes in the community that more responsibility were given to women and children. All WEPs reported have been edible by inhabitants in the area. In normal circumstances they were mostly eaten by children.

#### **4.1.13. Threats of wild edible plants and indigenous knowledge**

In the study area rural people need plants in their livelihood for different aspects however, from the interview with informants various factors were recorded as the main threats to WEPs in Guangua & Banja districts. The most serious threat to WEPs in the study area were fragmentation & destruction of their habitats due to agricultural expansion, firewood

collection, charcoal production, plant use for house and fence construction, overgrazing, fire destruction and urbanization. As a result, the accessibility of wild food plants becomes less when compared with the past decade.

During both in group & individual discussions & key informants identified the most threaten factor to be fuel wood collection, followed by overgrazing, farmland expansion, collection of constructional & building materials, fire distraction & urbanization/modernization/ respectively (Table 12).

**Table 12 Threats to wild edible plants ranked by 7 key informants based on respondent's preference or perception**

Treating factor	R e s p o n d e n t s							Total	Rank
	R1	R2	R3	R4	R5	R6	R7		
Overgrazing	5	6	4	6	6	4	5	36	2 <sup>nd</sup>
Farmland expansion	6	3	5	4	4	5	4	31	3 <sup>rd</sup>
Fuel wood collection	4	5	6	5	5	6	6	37	1 <sup>st</sup>
Fire destruction/burned by fire/	1	2	1	1	3	2	3	13	5 <sup>th</sup>
Urbanization/modernization	2	1	2	2	1	1	2	11	6 <sup>th</sup>
Collection of constructional & building materials	3	4	3	3	2	3	1	19	4 <sup>th</sup>

#### **4.1.14. Conservation and management of wild edible plants in the study area**

The Guangua district of the study area had a remnant forest which was protected by local peoples and had better WEPs diversity, but Banja districts are poor in their species diversity however, the two study districts those have plants more abundant in church and forests. Most of the food plants were collected from farm lands and around homes. Most of the wild food plants have no any conservation or protection unless those that are found in church, farm land ,home garden, river side and mountain.



**Figure 5 Group discussion with key informants in Guangua districts**

## **4.2. DISCUSSION**

The most frequently used parts of the wild edible plants reported in this study are fruits. The dominance of fruits as edible parts has also been reported in several studies undertaken in different parts of Ethiopia (Zemedu Asfaw & Mesfin Tadesse, 2005; Getachew Addis *et al.*, 2005; Kebu Balemie & Fassil Kebebew, 2006; Tilahun Teklehaymanot & Mirutse Giday, 2010). This is due to the availability of these parts (64%) and best taste.

The mode of usage WEPs was mostly fresh and raw. This result is also in agreement with the findings of previous studies conducted in Southern Ethiopia (Guinand & Dechassa Lemessa, 2000; Kebu Balemie & Fassil Kebebew, 2006). Most of the wild edible trees and shrubs that require not further processing (29/33) species are consumed as emergency food, at a time of chronic food shortage.

*Rosa abyssinica* ranked first in the preference ranking analyses. This could be due to its abundance in the study area. The species occurs widely in both districts (Dega & Wina dega). On the other hand, the result of pair-wise comparison indicated the preference of *Syzygium guineense*, *Ximenia americana* as the best wild edible plants. The most probable explanation for this result might be the availability of the fruits in local markets. Fruits of the two species are the most frequently sold wild edible plant parts in the area according to informants. Thus,

in addition to the nature distribution, humans also aid the supply of the fruits even to those who are farther from the natural habitats of the plants.

In addition to provision of food the wild edible plants were found to be multifunctional in the area. The species with the highest diverse use was found to be *Cordia africana*. This explains that there is high pressure on this species. Since life cycle of the species is too long according to informant explanation, the population might be highly affected in the near future causing local extinction. Usage of the plants as fuel wood source is the most frequent mention from the informants. The local community uses different parts the trees for fire wood and charcoal production. This use of the plants is not only at household level but also as source of income. This is a major challenge to WEP in many parts of the country as it is reported in other studies (Guinand & Dechassa Lemessa, 2000; Tigist Wondimu *et al.*, 2006).

The low availability of WEP in the local market indicated the little awareness of the people about this use category. Knowledge gap about the nutritional importance of WEP by the local community and the whole population by large might also be another reason for the situation. A study conducted in Tanzania (Ruffo *et al.*, 2002) and other parts of Ethiopia (Getachew Addis *et al.*, 2005) also revealed that the sale of wild food plants supplements low farm returns and contributes additional income to households.

Habits of WEPs shrubs were the most harvested forms as source of food they were relatively common in the study area compared to edible tree & herb species. This could be associated with the abundance and year round availability of shrub species in the area. This shows that shrubs were the most harvested forms for food followed by trees & herbs`

According to informants males knew more WEPs than female implying males are more familiar with WEPs because of their day-to-day activities, mainly carried out in the field. The

knowledge difference between male and female informants was some existent different. According to different researchers young males of Ethiopian rural area have been reported to consume more wild edible fruits (Zemedede Asfaw & Mesfin Tadese, 2001).

Gender category in eating WEPs was not common but, males show slight difference because of opportunities to visit fields. Currently, there was an observed trend by households to maximize the management and utilization of WEPs both directly as human and livestock food, income generation and environmental services in some extent practiced.

The researcher obtained much of the knowledge of WEPs in the study area from informants of younger ages (22-40), when compared with the elder. This is because of the younger ones currently more contact WEPs as food than elders according to informants.

According to informants the majority of food plant species were obtained from wild followed by Agricultural field, forests farm lands, riversides and home garden. The fact that high number of food plant species was obtained from wilds suggests that wilds are a good option to conserve food plants in the study area.

## CHAPTER FIVE

### 5. Conclusion and recommendation

#### 5.1. Conclusion

A total of 33 WEPs were collected in Guangua & Banja districts Awi Zone Amhara region. Most of them were found and distributed in home gardens, forest, mountains, churches, farm lands & riversides. Informants stated that unfortunately the distribution indicated that it decrease from time to time.

Informants listed that the most treating factor of these WEPs were fuel wood collection, overgrazing & agricultural expansion respectively. As older informants aged(59-76) or (4 people) told us previously there were many more WEPs that now most of them have been passed away unless strong measurement takes places no one talk about WEPs tomorrow.

In the study districts the rural population was found to depend on their traditional knowledge for the utilization of plants in their surroundings. Despite the wider role of WEPs in rural communities, their contribution, management and utilization were not exhaustively documented. Because, in these area gives little consideration about ethnobotanical knowledge of WEPs and their roll to food security

According to the information attempted to conduct the use of WEPs in the study areas, they have great contribution during shortage of food in drought season and as survival of food source from these the researcher concluded that how many of them plays a role for food security. The use of eating WEPs products in the two districts still ongoing processes especially children's consumed them based on the seasonal availability.

Wild edible plants identified in the study area were available year round at different seasons. The fruiting of WEPs during all season especially at dry season has indicated the resistance nature of these plants to water stress environments means they are important during the drought seasons. Most of WEPs are adapted in Woina dega than Dega climatic conditions because most WEPs are available in Woina dega conditions. Findings in the study sites indicate that most preferred multipurpose WEPs have got the probability to be disappeared in a short period of time so, it is better to study the way of protection.

## 5.2. Recommendation

Depending on the research findings of the study the following recommendations are statted:

- ❖ In the study areas WEPs are used unwisely because of absence of knowing the consequence so agricultural officers must dealt with about it.
- ❖ Most WEPs undergo being disappeared unless measurement has been taken by the government and agricultural officers .
- ❖ The local people need supports through awareness raising education on the sustainable Utilization and management of WEPs resources agricultural officers and ministry of education
- ❖ Encourage the people to cultivate WEPs in their home gardens, farmlands, in the mountain side and at the edge of rivers may help to protect them by profficinal.
- ❖ Ethnobotanists must be coordinated with the government officers to practice the local peoples how to manage and conserve WEPs resources those needs to be maintained.
- ❖ The North Western parts of Amahara AWI ZONE need farther assessment to identify the types of WEPs, distribution and documentation to assure the role of them for food security and sustainability by ethnobotanists.
- ❖ Ethnobotanists must give the information for ministry of education to include the WEPs in to the curriculum grad (1-12) to aware of students.

## REFERENCES

- Acharya, K.P.& Acharya, R. (2010). Eating from the wild. Indigenous knowledge on wild edible plants in parroha VDC of Rupandehi district, Central Nepal, international journal of social forestry 3(1):28-48.
- Assefa Assegid & Tesfaye Abebe (2011). Wild edible trees & shrubs in the semi arid low lands of southern Ethiopia, journal of science & development, Hawasa University, Ethiopia,
- AWZ DPED (2010). Awi Zone Department of Plan & Economy Development of Annual Reports (unpublished)
- AWZADO (2015). awi zone agricultural development office annual report. (unpublished)
- Balick M.J. & Cox P.A. (1996). Plants, people & culture. The science of ethnobotany. Scientific American Library, New York pp 288.
- Baressa Anbessa (2016). Ethno botanical study of wild edible plants in Bule Hora District, Southern Ethiopia. Africa journal of basic & applied sciences 8(4):198-207.
- Cotton, C.M. (1996). Ethno botany. principles & applications, John Wiley & sons Ltd, chichester.
- Demle Teketay, Ynager Seyoum, Shumi, G., & Wodafrash, M. (2015). Edible wild fruit trees and shrubs & their socioeconomics significance in central Ethiopia. Ethno botany research & applications, 14:183-197.
- Dogan, Y., I. Ugulu & Durkan (2013). Wild edible plants sold in the local markets of Izmir; Turkey park. Journal of Botany 45(1):177-184.
- Ermiasse Lulekal, Zemed Asfaw, Ensermu Kelbessa & P.V. Damme (2011). Wild edible plants

- in Ethiopia A review on their potential to combat food insecurity Africa focus 24 (2):71-121.
- FAO (2004).The state of food insecurity in the world Monitoring progress towards the world food summit & millennium development goals
- FAO (2006).The state of food insecurity in the world eradicating world hunger-taking stock ten years after the world food summit
- FAO (2009).The state of food insecurity in the world Food & agriculture organization, Rome
- G&BARDO (2016).Annual report of Guangua & Banja district Agricultural & Rural Development Office (unpublished)
- G&BDAO,(20169). Guangua & Banja district Agricultural Office. ( unpublished)
- G&BDRLMO (2014).Guangua & Banja districts rural land management office. (unpublished).
- IBC (2005).Government of the federal democratic republic of Ethiopia: Conservation national biodiversity strategy & action plan. Institution of biodiversity conservation, Addis Ababa
- IPMS (2005).Improving Market surveys
- Jadhav,V.D.,S.D., MAHADKER & Valvi, S.R. (2011).Documentation & ethno botanical survey of wild edible plants from Kolhapur district, Recent Research in Science and Technology 3(12):58-63.
- Kabuye CHS: potential wild food plants of Kenya. In conservation & utilization of indigenous medicinal plants & wild relatives of food crops Edited by: Kinyua

AM, Kofi-Tsekpo WM, Dangana LB Nairobi, UNESCO; 1997:107-112.

Kebu Balemie & Fasil Kebebew (2006). Ethno botanical study of wild edible plants in Derashe & kucha districts, south Ethiopia. *Journal of Ethnobiology & Ethnomedicine* 2:53

Kelbessa Urga, Getachew Addis & Dawit Dikasso (2005). Ethno botanical study of edible wild plants in some selected districts of Ethiopia *Human Ecology*.

Khanal, M.M. (2006). Non timber forest products (ZTFPs) use in two villages in Lumbini Zone of Nepal. Msc. Thesis University of National resources & applied Life sciences Vienna.

Kumbi, E.T. (2007). Use & conservation of traditional medicinal plants by indigenous people in Gimbi District, Western Wellega, Ethiopia. Msc. thesis, Addis Ababa University, Ethiopia

Lemessa Dechassa, Guinand, Y. (2000). Wild food plants in Ethiopia: Reflections on the role of wild foods & famine foods at a time of drought. UN-Emergencies unit for Ethiopia

Manyafu J.L. (1971), *ISHS Acta Horticulture* 21 East Africa Horticultural symposium (*Acta Hort. ISHS*) 21:93-96.

Martin, G.J. (1995). *Ethnobotany: A method manual*. Chapman & Hall, London. Misra S. & Misra M.K. (2016). Ethno botanical & Nutritional evaluation of some edible fruit plants of southern Odisha, India *International Journal of Advances in Agricultural Science & Technology* 3(1):1-30

Mesfine Tadese, Sue Edwards & Inga Headberg (1995). *Flora of Ethiopia & Eritrea*, 2(2):417-436.

- Shrestha P.M & Dhillon S.S. (2006). Diversity & traditional knowledge concerning wild food species in a locally managed forest in Nepal, *Agro forestry systems*, 66:55-63.
- Tardio, J.M.P.De-Santayana& Morales, R.(2006).Ethno botanical review of wild edible plants in Spain.*Botanical Journal of the Linnaean society*.152:27-71.
- Tigist Wondimu, Zemedede Asfaw, & Ensermu Kelbessa (2006).Ethnobotanical study of food plants around ‘Dheeraa’ town, Arsi, Ethiopia. *SINET: Ethiopifan Journal of Science* 29 (1):71–80.
- Tilahun Teklehymanot & Mirut Giday (2010).Ethno botanical study of wild edible plants of kara & kwego semi-pastoralist people in lower omo river valley, Debub omo zone, SNNPR, Ethiopia. *Journal of Ethno biology & Ethnomedicine* 6:23
- Urga Kelbessa, Assefa Ayal & Guta Merga (2004). Traditional medicine in Ethiopia. Proceedings of a national workshop held in Addis Ababa, Ethiopia, 30 June-2 July 2003.EHNRI, Addis Ababa, Ethiopia.
- Wheeler, R., Mengistu Tefera.,& Getu Bekele (2012). Future agricultures, working paper,044.43-Ethiopia.
- Yonas Yemshaw (2004).The remnant forests of Ethiopia. In: proceedings of a national conference on forest resource of Ethiopia: status, challenges & opportunities. Institution of biodiversity conservation (IBC), Addis Ababa, Ethiopia.
- Zemedede Asfaw & Mesfin Tadesse (2001).Prospects for sustainable use & developments of wild food plants in Ethiopia. *Economic botany*, 55(1):47-62.

**Appendix 1-List of WEPs in the study area and their distribution**

NO	Scientific name of the plant	Family	Local name /Amharic/	Ha bit	Habitat	Distribution										
						Study site										
						Banja			Guangua							
Ch	As	Gi	Yi	Bi	Trgi											
1	<i>Abelmoschus esculentus</i> (L.)Moench	Malvaceae	Kema	H	Home garden	-	-	-	Xxx	Xxx	X					
2	<i>Acacia abyssinica</i> Hochst.ex.Benth.	Fabaceae	Girar	T	Forest	Xx	Xx	Xx	Xxx	Xxx	Xxx					
3	<i>Acanthus sennii</i> Chivo.	Acanthaceae	Kusheshle	S	Forest	X	X	X	Xxx	Xxx	Xxx					
4	<i>Agaricus bisporus</i> Var.	<i>Basidomycota</i>	Enguday	H	Forest	-	-	-	Xx	Xxx	Xxx					
5	<i>Capparis tomentosa</i> (Forssk.)Edgew.	Capparidaceae	Gumero	S	Forest	-	-	-	Xxx	Xxx	Xxx					
6	<i>Carissa spinarum</i> L.	Apocyanaceae	Agam	S	Forest	X	X	X	Xxx	Xxx	Xx					
7	<i>Cordia Africana</i> Lam.	Boraginaceae	Wanza	T	Forest garden	X	X	X	Xxx	Xxx	Xxx					
8	<i>Datura stramonium</i> L.	Solanaceae	Astenagir	H	Around home	Xx	Xx	Xx	Xxx	Xxx	Xxx					
9	<i>Dovyalis abyssinica</i> (A.Rich.)Warb.	Flacourtiaceae	Koshim	S	Forest	-	-	-	Xx	Xx	Xxx					
10	<i>Euclea racemosa</i> Murr.	Ebenaceae	Dedaho	S	Forest	-	-	-	Xxx	Xxx	Xx					
11	<i>Ensete ventricosum</i> Wild.	Musaceae	Ensete	H	Forest garden	Xxx	Xx	Xx	Xx	Xx	Xx					
12	<i>Embelia schimperi</i> vatke	Myrsinaceae	Inqoqo	S	Forest	Xxx	Xxx	Xxx	X	-	X					
13	<i>Ficus sur</i> Forssk	Moraceae	Sholla	T	Around river	Xx	Xx	Xx	Xxx	Xxx	Xxx					
14	<i>Ficus palmate</i> Forssk	Moraceae	Beles	T	Forest	-	-	-	Xx	Xx	-					
15	<i>Ficus vasta</i> Forssk	Moraceae	Warka	T	Forest	X	X	X	Xxx	Xxx	Xxx					
16	<i>Gardenia ternifolia</i> schumach.& Thonn.	Rubiaceae	Gambillo	T	Forest	-	-	-	Xxx	Xx	X					
17	<i>Justiciaschimperiana</i> (Hochest.E x.Nees)T.Andees	Acanthaceae	Simiza	S	Home& garden	Xxx	Xxx	Xxx	Xx	Xx	Xx					
18	<i>Lantana camara</i> L,	Anacardiaceae	Yergina genfo	S	Forest	-	-	-	Xx	Xx	X					
19	<i>Mimusopskummel</i> Bruce.ex.A.Dc.	Sapotaceae	Ishe	T	Forest	-	-	-	Xx	Xx	Xxx					
20	<i>Phoenix reclinata</i> Jacq.	Arecaceae	Selien	S	Fallows	-	-	-	Xx	Xx	Xx					
21	<i>Physalis peruviana</i> L.	Solanaceae	Komydero	H	Forest	X	X	X	Xx	Xx	X					
22	<i>Pterolobium stellatum</i>	Fabaceae	Kentefa	S	Forest	-	-	-	X	X	-					
23	<i>Rhus vulgaris</i> Meikle	Anacardiaceae	Ashikamo	T	Forest	-	-	-	Xxx	Xxx	Xx					
24	<i>Rosa abyssinica</i> Lindley.	Rosaceae	Kega	S	Forest	Xxx	Xx	Xx	Xxx	Xxx	Xxx					
25	<i>Rubus apetalus</i> Poir.	Rosaceae	Enzorgie	S	Forest	X	X	X	Xx	Xxx	Xxx					
26	<i>Rumex abyssinicus</i> Jacq.	Polygonaceae	Mokmoko	S	Forest garden	Xx	X	Xxx	Xx	Xxx	Xx					
27	<i>Rumex nervosus</i> Vahi.	Polygonaceae	Enbuacho	S	For ,gardn	Xx	X	Xx	Xx	Xx	Xxx					
28	<i>Rubus volkensii</i> Engl	Rosaceae	Injory/yedg	S	Forest	Xx	Xx	Xx	-	-	-					
29	<i>Schinus molle</i> L.	Anacardiaceae	Kndoberberi	T	Forest, garden	-	-	-	Xxx	Xxx	Xx					
30	<i>Solanum nigrum</i> L.	Solanaceae	Awut	H	Forest	-	-	-	X	X	X					
31	<i>Syzygium,guineense</i> (Wild.)Dc.	Myrtaceae	Dokma	T	Around river	-	-	-	Xxx	Xxx	Xx					
32	<i>Uritica simensis</i> Steudel	Uricaceae	Sama	H	For/gardn	Xxx	Xxx	Xxx	-	-	-					
33	<i>Ximenia americana</i> L.	Olacaceae	Enkoy	T	Forest	-	-	-	Xxx	Xxx	Xx					

Rare =x Spares=xx widely=xxx none = -  
Ch =chaba and gissa As =assem Gi =Gimbeha Yi = Yimali Bi = Bizracany Ti =Tirgi

**Appendix 2 The common wild edible plants distributed in Guangua district,**

NO	Scientific name of the plant	Family	Localname /Amharic/	Habit	Habitat	Distribution										
						Study site										
						Banja			Guangua							
Ch	As	Gi	Yi	Bi	Trgi											
1	<i>Abelmoschus esculentus</i>	Malvaceae	Kema	H	Home garden	-	-	-	xxx	Xxx	X					
2	<i>Agaricus bisporus</i>	<i>Basidiomycota</i>	Enguday	S	Forest	-	-	-	xx	Xxx	Xxx					
3	<i>Capparis tomentosa</i>	Capparidaceae	Gumero	S	Forest	-	-	-	xxx	Xxx	Xxx					
4	<i>Dovyalis abyssinica</i>	Flacourtiaceae	Koshim	S	Forest	-	-	-	xx	Xx	Xxx					
5	<i>Euclea racemosa</i>	Ebenaceae	Dedaho	S	Forest	-	-	-	xx	X	Xxx					
6	<i>Ficus palmate</i>	Moraceae	Beles	T	Forest	-	-	-	xx	Xx	Xx					
7	<i>Gardenia ternifolia</i>	Rubiaceae	Gambillo	T	Forest	-	-	-	xxx	Xx	X					
8	<i>Lantana camara</i>	Anacardiceae	Yergina genfo	S	forest	-	-		xx	Xx	X					
9	<i>Mimusops kummel</i>	Sapotaceae	Ishe	T	Forest	-	-	-	xx	Xx	Xxx					
10	<i>Pterolobium stellatum</i>	Fabaceae	Kentefa	S	Forest	-	-	-	x	X	-					
11	<i>Phoenix reclinata</i>	Arecaceae	Selien	S	Fallows	-	-	-	xx	Xx	Xx					
12	<i>Rhus vulgaris</i>	Anacardiceae	Ashikamo	T	Forest				xx	Xx	xx					
13	<i>Schinus molle</i>	Anacardiaceae	Kundoberberie	T	forest, garden	-	-	-	xx	Xx	Xx					
14	<i>Solanum nigrum</i>	Solanaceae	Awut	H	Forest	-	-	-	x	X	X					
15	<i>Syzygium guineense</i>	Myrtaceae	Dokma	T	around river	-	-	-	xxx	Xxx	Xx					
16	<i>Ximenia Americana</i>	Olacaceae	Enkoy	T	Forest	-	-	-	xx	Xx	Xx					

Rare =x      Spares=xx      widely=xxx      none = -

Appendix 3 The common wild edible plants found in both districts.

N O	Scientific name of the plant	Family	Local name /Amharic/	Habit	Habitat	Study site					
						Banja			Guangua		
						Ch	As	Gi	Yi	Bi	Trgi
1	<i>Acacia abyssinica</i>	Fabaceae	Girar	T	Forest	Xx	xx	Xx	xxx	xxx	Xxx
2	<i>Acanthus senni</i>	Acanthaceae	Kusheshle	S	Forest	X	X	X	xxx	xxx	Xxx
3	<i>Carissa spinarum</i>	Apocyanaceae	Agam	S	Forest	X	X	X	xxx	xxx	Xx
4	<i>Cordia Africana</i>	Boraginaceae	Wanza	T	Forest, garden	X	X	X	xxx	xxx	Xxx
5	<i>Datura stramonium</i>	Solanaceae	Astenagir	H	Around home	Xx	X	X	xxx	xxx	Xxx
6	<i>Embelia schimperi</i>	Myrsinaceae	Inqoqo	S	Forest	xxx	xx	Xx x	x	X	xx
7	<i>Ensete ventricosum</i>	Musaceae	Ensete	H	Forest, gardn	xxx	xx	Xx x	xx	Xx	xx
8	<i>Ficus sur</i>	Moraceae	Sholla	T	Around river	xx	xx	Xx	xxx	xxx	xxx
9	<i>Ficus vasta</i>	Moraceae	Warka	T	Forest	x	X	X	xxx	Xxx	xx
10	<i>Justicia schimperiana</i>	Acanthaceae	Simiza	S	Home, gardn	xxx	xxx	Xx x	xx	Xx	xx
11	<i>Physalis peruviana</i>	Solanaceae	Komydero	H	Forest, home	x	-	X	Xxx	Xxx	xx
12	<i>Rubus volkensii</i>	Rosaceae	Injory/yed ega/	S	Forest	xx	xx	Xx	-	-	-
13	<i>Rosa abyssinica</i>	Rosaceae	Kega	S	Forest	xx	X	Xx	Xxx	Xxx	xxx
14	<i>Rubus apetalus</i>	Rosaceae	Enzorgie	S	Forest	x	X	X	Xx	Xxx	xxx
15	<i>Rumex abyssinicus</i>	Polygonaceae	Mokmoko	S	Forest&garden	xx	X	Xx x	Xx	Xxx	xx
16	<i>Rumex nervosus</i>	Polygonaceae	Enbuacho	S	Forestgarden	x	X	X	Xx	Xx	x
17	<i>Uritica simensis</i>	Uricaceae	Sama	H	Forest&garden	Xxx	Xxx	xx	-	-	-

Rare =x Spares=xx widely=xxx none = -

Ch =chaba and gissa As =assem Gi =Gimbeha Yi = Yimali Bi = Bizracany Ti =Tirgi

**Appendix 4 Wild Edible plant species listed by informants based on mode of consumption, they use as food in the life and well known by local people in the six sites**

Scientific name	Local name in Amharic	Habits	Mode of consumption	Parts used	Banja district			Guangua district			T n=95
					Ch/G n=13	Ase n=17	Gim n=15	Yim n=18	BiZ n=21	Tir n=16	
<i>Abelmoschus esculentus</i>	Kema	H	Roasted	Fr&L	-	-	-	18	21	8	47
<i>Acacia abyssinica</i>	Girar	T	Chewing	Gu	-	-	-	2	4	1	7
<i>Acanthus senni</i>	Kusheshle	S	Raw, sap	Ne	-	-	9	12	16	11	48
<i>Agaricus bisporus</i>	Enguday	S	Raw, pilled	Sh	-	-	-	13	18	7	38
<i>Capparis tomentosa</i>	Gumero	S	Raw, ripen	Fr	-	-	-	7	9	6	22
<i>Carissa spinarum</i>	Agam	S	Raw, ripen	Fr	-	1	1	11	15	14	42
<i>Cordia Africana</i>	Wanza	T	Raw, ripen	Fr	8	12	10	18	21	16	85
<i>Datura stramonium</i>	Astenagir	H	Raw, sucking	Ne	2	3	3	9	8	7	32
<i>Dovyalis abyssinica</i>	Koshim	H	Rostated	Sh	-	-	-	10	13	11	34
<i>Euclea racemosa</i>	Dedaho	S	Raw, ripen	Fr	-	-	-	5	7	3	15
<i>Embelia schimperi</i>	Inqoqo	S	Raw	Fr	6	8	5	9	13	7	48
<i>Ensete ventricosum</i>	Ensete	T	Raw, ripen	Fr	7	6	10	8	11	9	51
<i>Ficus sur</i>	Sholla	T	Raw, ripen	Fr	9	10	8	12	12	10	61
<i>Ficus palmate</i>	Beles	T	Raw, ripen	Fr	-	-	-	14	20	10	44
<i>Ficus vasta</i>	Warka	T	Raw, ripen & chewing	Gu	2	4	5	10	18	7	49
<i>Gardenia ternifolia</i>	Gambillo	T	Raw, ripen	Fr	-	-	-	16	20	10	46
<i>Justicia schimperiana</i>	Simza	S	Flower nectar	Ne	11	13	9	12	18	7	70
<i>Lantana camara L,</i>	Yergina genfo	S	Raw, ripen	Fr	-	-	-	9	8	10	27
<i>Mimusops kummel</i>	Ishe	T	Raw , ripen	Fr	8	10	6	18	21	16	79
<i>Phoenix reclinata</i>	Selien	S	Raw, ripen	Fr	-	-	-	9	8	7	24
<i>Physalis peruviana</i>	Komidero	H	Raw	Fr	2	4	3	10	14	8	41
<i>Pterolobium stellatum</i>	Kentefa	S	Raw, chewing	B&G	-	-	-	3	6	4	13
<i>Rubus volkensii</i>	Injory/deg	S	Raw, ripen	Fr	13	16	14	-	-	-	43
<i>Rhus vulgaris</i>	Ashikamo	S	Raw, ripen	Fr	-	-	-	8	11	6	25
<i>Rosa abyssinica</i>	Kega	S	Raw, ripen	Fr	9	11	13	14	20	16	83
<i>Rubus apetalis</i>	Engories	S	Raw ripen	Fr	10	14	12	16	17	10	79
<i>Rumex abyssinicus</i>	Mokmoko	H	Raw ,pilled &spice	R, sh	3	5	2	9	11	8	38
<i>Rumex nervosus</i>	Enbuach	S	Raw, pilled	Shoot	5	4	6	10	9	5	39
<i>Schinus molle</i>	Kundoberberie	T	Roasted & spice	Fr&N e	-	-	-	10	20	8	38
<i>Solanum nigrum</i>	Awut	S	Raw, ripen	Fr	-	-	-	6	5	-	11
<i>Syzygium guineense</i>	Dokma	T	Raw, ripen	Fr	2	2	10	18	21	16	69
<i>Urtica.simensis</i>	Sama	H	Roasted	Sh&L	10	15	15	-	-	-	40

### Appendix 5. The season of WEPs being cultivated & local name in Awigna

NO	Scientific name of the plant	Local name /Amharic/	Local name /Awign/	Family	Habit	Habitat	Parts used	Seasons of cultivated	
								Guangua	Banja
1	<i>Abelmoschus esculentus</i>	Kema	Kema	Malvaceae	H	Home garden	Fr, leaf	September-October	--
2	<i>Acacia abyssinica</i>	Girar	Thaty	Fabaceae	T	Forest	Gum	January-May	April
3	<i>Acanthus senni</i>	Kusheshle	Dandur	Acanthaceae	S	Forest	Nectar	October-November	--
4	<i>Basidiomycota</i>	Enguday	Enguday	Agaricus bisporus	H	Forest	Steam	June-September	--
5	<i>Capparis tomentosa</i>	Gumero	Gumero	Capparidaceae	S	Forest	Fr	May-June	--
6	<i>Carissa spinarum</i>	Agam	Atsiri	Apocyanaceae	S	Forest	Fr	January-February	March-April
7	<i>Cordia Africana</i>	Wanza	Bugtsi	Boraginaceae	T	Forest, garden	Fr	October-December	January-March
8	<i>Datura stramonium</i>	Astenagir	Lifilifi	Solanaceae	H	Around home	Nectar	June-July	June- Octobe
9	<i>Dovyalis abyssinica</i>	Koshim	shnkursty	Flacourtiaceae	S	Forest	Fr	April-May	--
10	<i>Embliaschimperi</i>	Inqoqo	Enqoquy	Myrinaceae	H	Forest	Fr	March	April
11	<i>Euclea racemosa</i>	Dedaho	Thary	Ebenaceae	S	Forest	Fr	March	--
12	<i>Ensete ventricosum</i>	Ensete	Emparpar	Musaceae	H	Forest, garden	Fr	April-June	May-June
13	<i>Ficus sur</i>	Sholla	Emwy	Moraceae	T	Around river	Fr	February-March	April-May
14	<i>Ficus palmate</i>	Beles	Bisri	Moraceae	T	Forest	Fr	March	--
15	<i>Ficus vasta</i>	Warka	Duginy	Moraceae	T	Forest	Fr	January-February	March-April
16	<i>Gardenia ternifolia</i>	Gambillo	Bagury	Rubiaceae	T	Forest	Fr	April-May	--
17	<i>Lantana camara</i>	Yergina genfo	Hangury	Anacardiceae	S	Forest	Fr	February	--
18	<i>Justicia schimperiana</i>	Simiza	Lili	Acanthaceae	S	Home garden	Nectar	September-December	Oct, Dec
19	<i>Mimusops kummel</i>	Ishe	Ishe	Sapotaceae	T	Forest	Fr	Juanru-Fubrary	--
20	<i>Rubus volkensii</i>	Injory	Njorie	Moraceae	S	Forest	Fr	--	May-June
21	<i>Phoenix reclinata</i>	Selien	Selien	Arecaceae	S	Fallows	Fr	April-May	--
22	<i>Physalis peruviana</i>	Komydero	komydero	Solanaceae	H	Forest, home	Fr	October-November	--
23	<i>Pterolobium stellatum</i>	Kentefa	Kentefy	Fabaceae	S	Forest	Fr	April	--
24	<i>Rhus vulgaris</i>	Ashikamo	Ashikamy	Anacardiceae	S	Forest	Fr	March-April	--
25	<i>Rosa abyssinica</i>	Kega	Gimitsi	Rosaceae	S	Forest	Fr	April- May	April- May
26	<i>Rubus apetalus</i>	Enzorgie	Enjory	Rosaceae	S	Forest	Fr	February-April	--
27	<i>Rumex abyssinicus</i>	Mokmoko	Mhuwy	Polygonaceae	S	Forest, garden	Root, gshoot	September-November	--
28	<i>Rumex nervosus</i>	Enbuacho	Embochu	Polygonaceae	S	Forest, garden	Steam	September-November	Sep., Nov
29	<i>Schinus molle</i>	Kundoberberie	Kundoberbery	Anacardiaceae	T	Forest, garden	Fr	November-December	--
30	<i>Solanum nigrum</i>	Awut	-	Solanaceae	H	Forest	Leaf	June-July	--
31	<i>Syzygium guineense</i>	Dokma	Bahusty	Myrtaceae	T	Around river	Fr	April -May	--
32	<i>Urtica simensis</i>	Sama	Sami	Uricaceae	H	Forest, garden	Le&st	--	March-May
33	<i>Ximenia Americana</i>	Enkoy	Enquey	Olacaceae	T	Forest	Fr	Juanru-Fubrary	--

Summer

Autumn

Winter

Spring

## Appendix 6 List of informants

s.n o	Name of respondents	age	S ex	M.status	Religion	Educati on	Occupation	No of plant species
1	Abate Berie	53	M	Married	Orthodox	6 <sup>th</sup>	Farmer	8
2	Abaynesh Mengist	43	F	Single	Orthodox	illiterate	Farmer	6
3	Abeba Ajeb	43	F	Single	Orthodox	illiterate	Farmer	9
4	Abebe Agmas	46	M	Married	Orthodox	illiterate	Farmer	8
5	Abeje Wubie	30	M	Married	Orthodox	Illiterate	Farmer	9
6	Abeju Mekonen	42	F	Married	Orthodox	Illiterate	Farmer	5
7	Abere Mekonen	48	M	Married	Orthodox	7 <sup>th</sup>	Farmer	11
8	Adane Aboder	31	M	Married	Orthodox	10 <sup>+3</sup>	Natural resource	16
9	Adebabay Eyasu	28	M	Married	Orthodox	Illiterate	Farmer	9
10	Ademe Dantie	28	M	Married	Orthodox	illiterate	Farmer	9
11	Alebachew Mulat	23	M	Married	Orthodox	6 <sup>th</sup>	Farmer	8
12	Aligas Abate	27	M	Married	Orthodox	10 <sup>th</sup>	Farmer	13
13	Alemnew Tiru	55	M	Married	Orthodox	Illiterate	Farmer	7
14	Alemyihun Mihret	33	M	Married	Orthodox	5 <sup>th</sup>	Farmer	11
15	Amberbir Getnet	28	M	Married	Orthodox	Illiterate	Farmer	11
16	Arega Mognnet	32	M	Married	Orthodox	Illiterate	Farmer	8
17	Asafaw Derso	47	M	Married	Orthodox	7 <sup>th</sup>	Farmer	8
18	Asmamaw Gebey	23	M	Married	Orthodox	3 <sup>rd</sup>	Farmer	12
19	Asrat Abate	28	M	Married	Orthodox	10 <sup>+3</sup>	Crop	14
20	Awulew Tafete	50	M	Married	Orthodox	Illiterate	Farmer	6
21	Aychew nigusie	27	M	Married	Orthodox	9 <sup>th</sup>	Farmer	10
22	Azmeraw Amsalu	42	M	Married	Orthodox	Illiterate	Farmer	8
23	Bahiru Andargie	76	M	Married	Orthodox	Illiterate	Farmer	9
24	Baye Zeleke	39	M	Married	Orthodox	6 <sup>th</sup>	Farmer	10
25	Bimir Derso	31	M	Married	Orthodox	3 <sup>rd</sup>	Farmer	9
26	Birhanu Chanie	28	M	Single	Orthodox	12+3	Natural resource	11
27	Bizunesh Kassa	28	F	Single	Orthodox	10 <sup>th</sup>	Farmer	10
28	Chaklie Getnet	40	M	Married	Orthodox	Illiterate	Farmer	6

29	Chanie Birara	36	M	Married	Orthodox	Illiterate	Farmer	7
30	Derso ASmare	47	M	Married	Orthodox	Illiterate	Farmer	7
31	Derso Eshetie	72	M	Married	Orthodox	Illiterate	Farmer	5
32	Desalegn Sahilu	23	M	Married	Orthodox	6 <sup>th</sup>	Farmer	10
33	Dessie Gebey	25	M	Married	Orthodox	Illiterate	Farmer	9
34	Dessie Hailu	33	M	Married	Orthodox	Illiterate	Farmer	9
35	Desta Asmare	53	M	Married	Orthodox	8 <sup>th</sup>	Farmer	11
36	Enat Alem	42	F	Married	Orthodox	Illiterate	Farmer	7
37	Ergo Wotet	47	F	Single	Orthodox	Illiterate	Farmer	9
38	Eshetie Alebachw	33	M	Married	Orthodox	8 <sup>th</sup>	Farmer	11
39	Feleg Gebie	38	F	Single	Orthodox	Illiterate	Farmer	11
40	Fenta Belay	35	F	Single	Orthodox	Illiterate	Farmer	6
41	Fitfie Mekonen	41	F	Single	Orthodox	Illiterate	Farmer	8
42	Gared Gobezie	40	M	Married	Orthodox	Illiterate	Farmer	9
43	Gashaw Tegenaw	27	M	Married	Orthodox	7 <sup>th</sup>	Farmer	10
44	Gedamu Yenalem	32	M	Married	Orthodox	Illiterate	Farmer	9
45	Gedif Shimelash	47	M	Married	Orthodox	Illiterate	Farmer	9
46	Geremew Walle	45	M	Married	Orthodox	3 <sup>rd</sup>	Farmer	8
47	Getachew Tefera	23	M	Married	Orthodox	Illiterate	Farmer	11
48	Getaneh Muche	32	M	Married	Orthodox	Illiterate	Farmer	10
49	Adugna Agmas	52	M	Married	Orthodox	Church	Farmer	9
50	Wasif Haile	51	M	Married	Orthodox	Church	Farmer	10
51	Kassaw Ashagrie	53	M	Married	Orthodox	Illiterate	Farmer	8
52	Kassaye Tsegaw	22	F	Single	Orthodox	10+3	Kebele manager	12
53	Kegnnew Maru	31	M	Married	Orthodox	Illiterate	Farmer	9
54	Lakew Yehuala	41	M	Married	Orthodox	4 <sup>th</sup>	Farmer	9
55	Lealem Tesfa	23	M	Single	Orthodox	4 <sup>th</sup>	Farmer	10
56	Mategbosh Mihret	37	F	Married	Orthodox	Illiterate	Farmer	9

57	Mebratu Ashagrie	30	M	Married	Orthodox	Illiterate	Farmer	11
58	Mekonen Gobezie	42	M	Married	Orthodox	Illiterate	Farmer	9
59	Melese Adera	73	M	Married	Orthodox	Illiterate	Farmer	7
60	Mihret Workneh	70	M	Married	Orthodox	Illiterate	Farmer	9
61	Misganaw Genetu	43	M	Married	Orthodox	Illiterate	Farmer	10
62	Misganaw kebtie	51	M	Married	Orthodox	Illiterate	Farmer	7
63	Misganaw Wubet	37	M	Married	Orthodox	Illiterate	Farmer	11
64	Molla Haile	46	M	Married	Orthodox	Illiterate	Farmer	4
65	Mulat Arega	38	M	Married	Orthodox	Illiterate	Farmer	7
66	Mulu Alamrew	40	F	Married	Orthodox	Illiterate	Farmer	8
67	Mulu Baylie	47	M	Married	Orthodox	Illiterate	Farmer	5
68	Mulugeta Keadu	40	M	Married	Orthodox	Illiterate	Farmer	6
69	Muluneh Zewudu	37	M	Married	Orthodox	Illiterate	Farmer	9
70	Nigusie Belete	27	M	Married	Orthodox	10	Farmer	10
71	Sitotaw Amsalu	42	M	Married	Orthodox	Illiterate	Farmer	7
72	Tabotie Addis	23	F	Single	Orthodox	10+3	Health	9
73	Tadfie Adugna	55	F	Single	Orthodox	Illiterate	Farmer	4
74	Tebebal Adugna	62	M	Married	Orthodox	Illiterate	Farmer	5
75	Tensay Gedefaw	25	M	Married	Orthodox	10 <sup>th</sup>	Farmer	11
76	Tesfaye Mengist	24	M	Married	Orthodox	10+3	Animal production	10
77	Teshome Demsie	39	M	Married	Orthodox	4 <sup>th</sup>	Farmer	9
78	Tidersal Tafete	30	M	Married	Orthodox	Illiterate	Farmer	6
79	Tilahun Gessie	50	M	Married	Orthodox	Illiterate	Farmer	5
80	Tsegaw Tesfa	41	M	Married	Orthodox	Illiterate	Farmer	8
81	Walle Ashagrie	32	M	Married	Orthodox	12+4	Kebele agri. office leader	11
82	Walle misikir	57	M	Married	Orthodox	2 <sup>nd</sup>	Farmer	7
83	Wondalem Kassie	44	M	Married	Orthodox	Illiterate	Farmer	8
84	Wondimhun Desie	32	M	Married	Orthodox	Illiterate	Farmer	8

85	Worku Teka	45	M	Married	Orthodox	Illiterate	Farmer	6
86	Wubie Kebtie	35	M	Married	Orthodox	Illiterate	Farmer	9
87	Yeamlek tebabal	44	M	Married	Orthodox	Illiterate	Farmer	8
88	Yehuala Eshetie	70	M	Married	Orthodox	Illiterate	Farmer	9
89	Yehualaw Tsegaw	55	M	Married	Orthodox	Illiterate	Farmer	5
90	Yeshalem Dagneu	42	F	Married	Orthodox	Illiterate	Farmer	4
91	Yeshalem Tarekeg	28	F	Married	Orthodox	Illiterate	Farmer	10
92	Yinges Gizachew	27	M	Married	Orthodox	10+3	Plant science	14
93	Yirdaw Zewudu	37	M	Married	Orthodox	Illiterate	Farmer	8
94	Yosef Ejigu	31	M	Married	Adventist	12+3	Kebele agriculture officeleader	12
95	Zewudie Girma	35	F	Married	Orthodox	Illiterate	Farmer	5

### Appendix 7 List of key informants

No	Name of informants	age	Sex	Marital status	Religion	Education level	Occupation	No of plant species
1	Abeba Ajeb	43	F	Single	Orthodox	Illiterate	Farmer	9
2	Adane Aboder	31	M	Married	Orthodox	10 <sup>+3</sup>	Natural resource	16
3	Woleli Abate	27	M	Married	Orthodox	10	Farmer	13
4	Asrat Abate	28	M	Married	Orthodox	10 <sup>+3</sup>	Crop	14
5	Bahiru Andargie	76	M	Married	Orthodox	Illiterate	Farmer	9
6	Desta Asmare	53	M	Married	Orthodox	8 <sup>th</sup>	Farmer	11
7	Lilita Gebrie	38	F	Single	Orthodox	Illiterate	Farmer	10
8	Walle Ashagrie	32	M	Married	Orthodox	12 <sup>+4</sup>	Kebele agri.office leader	11
9	Abeje Eshetie	70	M	Married	Orthodox	Illiterate	Farmer	9
10	Yeshalem Tarekegn	28	F	Married	Orthodox	Illiterate	Farmer	10
11	Yinges Gizachew	27	M	Married	Orthodox	10 <sup>+3</sup>	Plant science	14
12	Yosef Ejigu	31	M	Married	Adventst	12 <sup>+3</sup>	Kebele agri. Office leader	12

## **Appendix 8 Questioners for Ethnobotanical data collection**

### **I General information**

Date-----village-----kebele-----district-----zone-----region-----  
---Name of respondent-----sex-----age-----country-----marital  
status-----level of education-----occupation(main job)-----  
religion----- orthodox-----protestant-----Muslim----other-----.

### **II. Data collection on wild edible plant**

1. Do you know any wild food plants? If yes (answer question 2)\_\_\_\_\_ .
2. List wild edible plants found in your area.
3. What is the most common habitats of a given wild food plants? And habit of plants?
4. Which part(s) of the wild edible plant(s) is/are used? Fruit(fr),leaf(lf),bark(bk), flower(fl), seed(sd), nectar(nc), latex(lx), sap(sp), rhizome(rz), root(rt)
5. In which seasons of a year these plants cultivated? (Throughout the year, summer, winter, autumn, spring)
6. How is the mode of consumption of wild foods? Raw (fresh), cooked, piling, specify others.
7. If prepared, how the wild edible plants are processing during food preparation?
8. Are wild food plants marketable? (Which plant species, their benefits, which age group sells).
9. Are there community members who depend on traditional wild edible plants as compared to cultivated crops? Why?
10. Are wild edible plants easily accessible in the study area?
11. Are there any division of wild food plants like famine foods, non famine foods?
12. What are the other uses of these wild edible plants?

13. Is there any interference between modernization and traditional wild food plants use in the area?
14. What are the threats to wild food plants in the area? List them.
15. Are there traditional wild food plant conservation methods in the area? If so, mention the management practices.
16. List the possible conservation methods.
17. What will be the future conservation methods for local peoples and other populations?

### **Appendix-9 Questions to collect data from market**

#### **I. General information**

S.no \_\_\_\_ date \_\_\_\_\_ kebele \_\_\_\_\_ village \_\_\_\_\_

Name of market place \_\_\_\_\_

Name of interviewer \_\_\_\_\_

Name of respondent \_\_\_\_\_

Religion: orthodox \_\_\_\_\_, protestant \_\_\_\_\_, muslim \_\_\_\_\_, others \_\_\_\_\_.

Marital status \_\_\_\_\_, level of education \_\_\_\_\_

Type of vendor: permanent \_\_\_\_\_, temporary \_\_\_\_\_

**II. Semi-structured interview questions to collect data on wild & semi-wild edible plants in the study area.**

1. What is the name of wild edible plant?
2. Where do these plants grow? in wild or home garden?
3. Which part of the plant part is used as food?
4. How can be the consumption of the plant? Way of consumption?
5. In which season these plants can be cultivated?
6. Does the income gained fulfill their needs?
7. How much sold now compared to the past?
8. What conservation method is used to sustain these plants for the future?

**Appendix 10-Questions for focus group discussion**

1. List wild food shrubs & trees found in the study area?
2. Where are the most common habitats for wild food plants?
3. List the plant species and the parts used as food?
4. Times and community group use wild edible plants more frequently?
6. Which edible plant species is marketable and are not?
7. Habit of the plant (shrubs or trees).
8. List threats of wild edible plants and conservation methods, if any?

**በአማርኛ የተዘጋጁ ጥያቄዎች**

1. በተፈጥሮ በቅለው በጫካ ወስጥ የሚገኙ የሚበሉ እጥዋት ስም ተናገሩ?
2. እነዚህ እጥዋቶች በብዛት የት ይገኛሉ?
3. የትኛውን ክፍልነው የምትበሉት  
ግንዱን፣ ቅጠሉን፣ ስሩን፣ ፍራውን፣ ዘሩን፣ አበባውን፣ አሙጫውን፣ ቅርፊቱን ወይስ ሌላ?
4. መቸ ወቅት ነው የሚደረሱት እስቲ ዘርዝሩት?
5. ገበያ በመሸጥ ገቢ ማግኘት ትችላላችሁ የትኞቹን?
6. ሁሉም የቤተሰብ አባል ይመገባቸዋል?
7. እነዚህ እጥዋቶች አሁን በብዛት ይገኛሉ የት የት አካባቢ?
8. ስትመገቡ እንዴት አድርጋችሁ ነው ተልጦ፣ ጥሬውን፣ በመመጥመጥ፣ አብስሎ?
9. የምትመገባቸው እህል ሲጠፋ፣ ድርቅ ሲሆን፣ ከብት ስትጠብቁ፣ ወይስ ሆን ብላችሁ ምሳ ወይም ቁርስ ብላችሁ ትሄዳላችሁ?
10. እስቲ በብዛት የምታወቁትን የምትጠቀሙትን እንዲሁም የሚጣፍጠውን እጥዋት ተናገሩ?
11. አሁን እነዚህ እጥዋቶች እየተጎዱ ነው ይባላል የትኞቹ ናቸው እየጠፉ ያሉ በምን ምክንያት ታዲያ ወደፊት እንዲት ማዳን ይቻላል?
12. ደጋው ላይ ነው ወይስ ወይና ደጋ ዱር; ላይ የሚበሉ እጥዋቶች የሚበዙ?

Data on wild edible plants in the study area by using local language Awigna

1. ካዌናኻዳዝኩንኩስታኹስታንኩካናኻፅካዋታቆማ?
2. ኩ ዙራሙራዳያግስታንኩኹስታንኩካዌንኩካናኻፅካዋዛራዛር?
3. እኒጃኹስታንኩካናኻፅካሜንቾያግስታኑዋዳይ?
4. ካናኻፅካውዋሺኒቤኒ? ኹስታው (ጉሚቲ፣ ዜር፣ ኻዲ፣ ኻፕ፣ አቢቢ፣ ስርያኹሳእሊው)
5. እኒካናኻፅካዋኒሱሳትዳ(ዋክትዳይ) ታምባኑ?
6. እኒካናኻፅካዋትጄይኹስታኑ?(ኩፔ፣ ሸኩሽስትካማ፣ እንጅካማያኹኪእሊውዳድስ)
7. ቱርታንኩያኹኒጊካስስቶካንትዲፅ?
8. እኒካናኻፅካምግብጌቤልዳዋይስታናማ?  
ዋሺኒድሚውአችዳዝኩንኩይዋያንኩ?
9. እኒካናኻፅካዋዋይካሚጊሚዬአግፅግስኑሮሜሴሬቱንኩአቕዝኩናማ?
10. ፅናትካስቾኹዙራሙራዳእኒካናኻፅካእሜአግስታናማ?

**PLATE**



**Plate 1 *Embelia schimperi* vatke (Inqoqo) as WEP by children**



**Plate 2** *Ximenia americana* (Enkoy) which is prepared for market



**Plate 3** *Rubus apetalus* (Enjory) the children consumed it as food



**Plate 4** *Ficus sur* Forssk (*Sholla*) collected by children for food



**Plate 5** *Carissa spinarum* (Agam)



**Plate 6** *Rosa abyssinica* (QEGA)



**Plate 7** *Justicia schimperiana* (Simiza )



**Plate 8** *Uritica.simensis* (Sama)

## DECLARATION

I declare that this thesis entitled “*Wild Edible Plant Resources in Guangua and Banja Districts and Contribution for Food Security*”, is my original work and all references used are duly acknowledged. It also has never been presented in any university for fulfillment of any degree program.

Name: Adbaru Degualem

Signature \_\_\_\_\_ Date \_\_\_\_\_

This work has been done under my supervision

Name: Tigist Wondimu (PhD)

Signature \_\_\_\_\_ Date \_\_\_\_\_