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Research Paper

Ethnobotanical Study of Wild Edible Fruit Tree and Shrub Species in Adola Rede and Odo Shakiso Midland Districts of Guji Zone, Southern Ethiopia

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Wild edible fruit tree and shrub species refer to species that are neither cultivated nor domesticated, but are available from their wild natural habitat and used as sources of food. The study was conducted to identify and document wild edible fruit tree and shrub species and to record indigenous knowledge and skill of rural communities regarding the management and utilization of wild edible fruit tree/shrub species in Adola Rede and Odo Shakiso Midland Districts of Guji Zone, in Southern Ethiopia. Ethnobotanical data was collected using key informant interview, semi-structured interviews and guided field observations. A total of 60 respondents were selected from the two study Districts by means of simple random sampling methods. A total of 36 wild edible fruit tree and shrub species were identified and documented. Out of them 72.2% of the species were tree species and the remaining 27.8% were shrub species. These species were distributed in 26 different families. Moraceae family contained the highest number of species with 4 species, Anacardiacea and Rutaceae families have 3 species followed by Flacourtiaceae, Rubiaceae and Astracea families represented by 2 species each. The other remaining 20 families were represented by one species each. *Carissa spinarum*, *Syzygium guineense*, *Flacourtia indica*, *Rosa abbysinica*, *Cordia africana*, *Rytigynia neglecta* and *Ficus sur* were found to be the most preferred wild edible fruit tree and shrub species of the study area respectively. Wild edible fruit tree and shrub species of the study Districts were mainly harvested year round, in dry and wet seasons and the most frequent gatherers were children and youngsters. The identified Wild edible fruit tree/shrub species of the study Districts often developed naturally in the wild and local communities of the area were used in situ management practice. Some of the Wild edible fruit tree and shrub species of the study area such as *Syzygium guineense, Flacourtia indica, Physalis peruviana, Haplocoelum foliolosum* and *Myrica salicifolia* were sold in the local markets of the study Districts to support household incomes. The present study found that Wild edible fruit tree/shrub species in the study area were threatened by anthropogenic factors including agricultural expansions, cutting for construction, un controlled fire setting, cutting for fuel wood and timber production. The output of a direct matrix ranking exercise showed that, *Flacourtia indica, Cordia africana, Syzygium guineense, Ficus thonningii, Carissa spinarum* and *Rytigynia neglecta* were the most threated Wild edible fruit tree/shrub species. Therefore, along with sustainable utilization and conservation of the existing wild edible fruit tree/ shrub species of the study area, priority should be given on urgent collection, domestication, propagation and cultivation of the most threatened wild edible fruit tree and shrub species of the study Districts.

Keywords: Edible, Fruit tree/shrub species, Marketability, Preference, Threated and Wild

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INTRODUCTION

Rural people derive a significant proportion of their food and energy requirements from various indigenous trees and shrubs, which are not cultivated (Nair, 1989). Wild edible fruit trees and shrubs are relevant to household food security and nutrition in some rural areas, particularly in the dry lands, to supplement the staple food, to fill seasonal food shortages, and as emergency food during famine (FAO, 1989; Guinand and Dechassa, 2000; Teshome and Sebsebe, 2002).

Rural peoples obtained income and employment from the sale or exchange of their fruits, leaves, juice and local drinks. Moreover, the indigenous edible fruit trees and shrubs species are adapted to the local culture and enviroment, and therefore propagate and grow easily, with few requirements for external inputs such as fertilizer and pesticides. Thus they can easily be integrated into sustainable farming systems (Ruffo *et al*., 2002).

For many years, the importance of wild edible fruit trees and shrubs in the subsistence agriculture of developing countries, as a food supplement or a means of survival during drought and famine, has been overlooked. Although many wild edible trees and shrubs species are used by the majority of the rural population, they are still not as appreciated or valued as are some cultivated fruit trees, such as mango, avocado, papaya and orange (Guinand and Dechassa, 2000; Ruffo *et al*., 2002; Demel *et al*., 2010).

Indigenous knowledge of wild plants in Africa is in danger of being lost, as habits, value systems and the natural environment change. There is a widespread decline in knowledge about wild food plants, especially among young people and urban dwellers. Therefore, to preserve this knowledge, which is potentially highly valuable for future generations, it needs to be recorded systematically (Zemede and Mesfin, 2005; Tigist *et al*., 2006; Demel *et al*., 2010).

In Ethiopia, where more than 80% of the population is rural, people have depended on their traditional knowledge for the utilization of wild edible fruit trees and shrubs in their surroundings. Despite the wider role of wild edible fruit trees and shrubs species in rural communities, their contribution, management and utilization are not exhaustively documented. This is particularly true for rural population living at Midland Districts of Guji Zone, in Southern Ethiopia.

However, there is no any researches so far done, on Ethnobotanical study of wild edible fruit tree and shrub species commonly used in the study area. This phenomenon suggests a need to conduct a research and document the wild edible fruit tree and shrub species and the associated indigenous knowledge of rural communities of the study Districts.

Therefore, the overall objective of this study was:**i)** to record commonly used wild edible fruit tree and shrub species of the study area, **ii)**to identify traditional knowledge and skill of rural communities of the area regarding the management and utilization of wild edible fruit tree and shrub species and **iii)** to identify major threats and conservation status of wild edible fruit tree and shrub species of the study area for better utilization of the resources in Midland Districts of Guji Zone, in Southern Ethiopia.

Materials and Methods

Description of the study area

The study was conducted at two selected Midland Districts of Guji Zone, in Southern Ethiopia (Figure 1). Specifically, it was conducted in Adola Rede and Odo Shakiso Midland Districts of Guji Zone. Adola Rede is one of the Districts found in Guji zone at a distance of 475 km from Addis Ababa. It has 28 rural kebeles and 3 urban kebeles, and it is characterized by three agro-climatic zones, namely lowland (60%), midland (29%) and highland (11%) (ARANRO, 2020). Traditional agriculture is still practiced by many farm households in this District. However, a semi-nomadic economic activity is also practiced as a means of livelihood by some of its residents. The mean annual rainfall and temperature of the District is about 1000 mm and 28C° respectively. The farmers of this District produce both in autumn and spring seasons. They produce cereal crops such as tef, bread wheat, food barley and maize, pulse crops such as haricot bean, and others such as fruits and vegetables. They also engaged in the production of coffee and chat as means of livelihood. Moreover, this District has a huge potential for livestock production as witnessed by farmer's livestock ownership. Cattle, goats, sheep, horses, mules, donkeys and poultry are livestock types that the District is endowed with (ARBoFED, 2017).

Odo Shakiso District is located at a distance of 490 km southeast from Addis Ababa, the capital city of Ethiopia. The main economic activity of the District is farming, mining, construction, etc. The District is characterized by three agro-climatic zones, namely highland, midland and lowland. The percentage coverage of each climatic zone is highland (33%), midland (47%) and lowland (20%). The mean annual rainfall and temperature of Odo Shakiso District is about 900 mm and 25C° respectively. Different types of crops which include tef, bread wheat, food barley, maize, haricot beans, rapeseed, fruits, and vegetables are produced in the District. Moreover, the District is known by livestock population such as cattle, sheep, goats, horses, donkeys, mules, camels, and poultry. All agricultural activities are under small-scale peasant holdings. Agricultural systems are characterized by traditional methods and the uses of modern agricultural inputs are very low (OSBoFED, 2020).

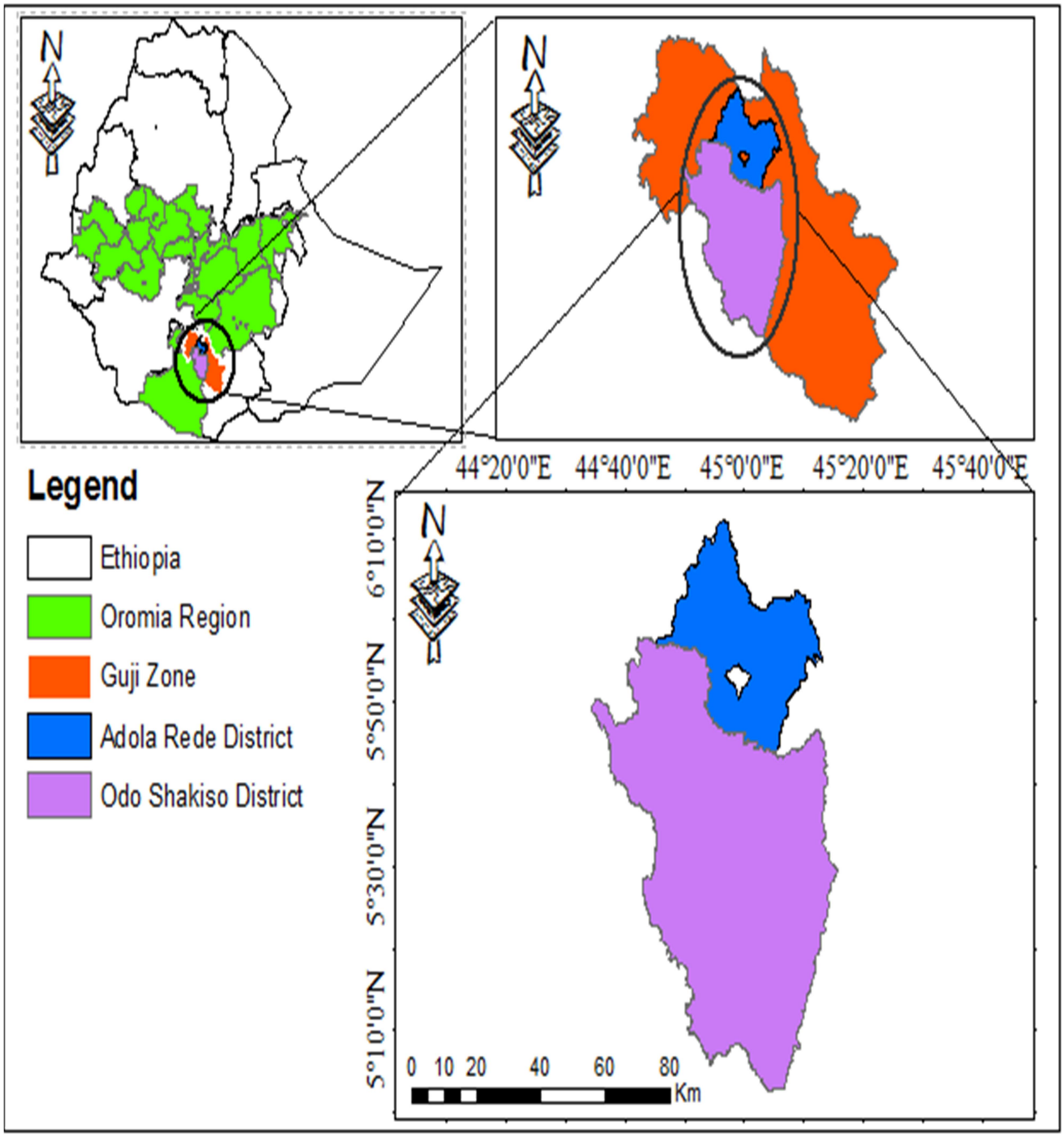

Figure 1. A map showing the study area

Method of data collection

Selection of the study area

Prior to the socio-economic survey, those Midland Districts of Guji Zone which have potential on growing of wild edible fruit tree and shrub species were identified. Based on the information gathered from Guji zone, two potential Midland Districts namely Adola Rede and Odo Shakiso Districts were selected. From each selected Districts, two peasant associations and a total of four peasant associations were selected and used for socio-economic survey.

Socio-economic survey

The socio-economic survey involves various data collection techniques, such as key informant interview, semi-structured interviews and field observations.

Key informant interview

In addition to the household interviews, necessary information was collected from 20 key informants from both Districts. These key informants are those living in the study area for a long time and which have good understanding about wild edible fruit tree and shrub species were selected by using snow ball method sampling. This information provides an overview of the socio-economic and biophysical environment of the study area and all the gathered information was used to prepare research questioners for household interview.

Semi- structured interviews

Semi-structured interviews were used with 60 respondent households randomly selected from Adola Rede and Odo Shakiso Districts of Guji zone. To obtain all necessary information about commonly growing wild edible fruit tree and shrub species of the study area from sampled households, a free-list technique was employed. This is an effective method that can even be used with children or illiterate people. All sampled households were asked independently the same question to freely name orally all the commonly growing wild edible fruit tree and shrub species they know as it comes into their memory.

Field Visits

As well, field visits was used to observe all commonly growing wild edible fruit tree and shrub species of the study area to collect additional information. By using the above various data collection techniques, necessary data which was respond the objectives of this study was collected from the two study Districts.

Data analysis

The data collected was summarized and analyzed by means of descriptive statistics. The illustrative tables and graphs were also used to summarize the data in precise form using the software programs such as Microsoft Excel and Statistical Packages for Social Sciences (SPSS).Ranking and scoring methods such as preference ranking and direct matrix ranking were conducted by using ten randomly selected key informants.

Results and Discussion

Demographic characteristics of respondents

A total of 60 respondent households, comprising (70%) male and (30%) female households were interviewed. In terms of age category, majority of the respondents (46.6%) were between 30 and 50 years old, 33.3% respondents were < 30 years old, 13.3% interviewed households were between 50-70 years old and the remaining 6.8 % respondent house

holds were>70 years old. The result of respondents education level showed that, illiterate (21.6 %), adult education (16.6 %), primary 1st cycle (20%), primary 2nd cycle (30%) and secondary and above were only 11.8% of the respondents. Respondents represent two major religious groups. Majority of the respondents 65% of them were christians. While, 35% of the respondent households were muslims. In terms of wealth category, 11.6% of the interviewed households were rich, 66.6% of the respondents were medium and the remaining 21.8% of interviewed households were poor. The respondent households marital status indicated that 71.6% were married and 28.4% of the respondents were single.

Diversity of Wild Edible Fruit Tree and Shrub Species

The finding of this study indicated that in Adola Rede and Odo Shakiso Midland Districts of Guji Zone a total of 36 commonly growing wild edible fruit tree and shrub species were recorded (Table 1).The number of wild edible fruit tree and shrub species identified in this study was higher than the number of species documented in former studies carried out by Yigremachew *et al.,* 2015, Abriham Demekristos, 2016 and Beressa Anbesa, 2016, in Central Ethiopia, Northern Ethiopia and Southern Ethiopia respectively. However, the number of species documented in this study was comparatively low compared with number of species identified in previous studies conducted by Tatek *et al.,*2020, Ashagre *et al.,*2016 and Berhane *et al.,* 2014 which was carried out in lowland areas of Ethiopia and in Southern Ethiopia. On their study findings they were documented 88, 46 and 52 wild edible species respectively. The lower number of wild edible fruit tree and shrub species identified and recorded in the present study may be associated with differences in local traditions and customs relating to the preferences and towards the use of wild edible fruit tree and shrub species for consumption purposes in different parts of the country.

Out of the identified wild edible fruit tree and shrub species of the study Districts, 72.2%of the species were tree species and the remaining 27.8% were shrub species (Figure 2).Therefore, this study indicated that the largest proportion of documented wild edible fruit tree and shrub species of the study sites were wild edible fruit tree species followed by wild edible shrub species. This result also coincides with the research findings of Tebekew *et al.,* 2018 and Fugaro *et al.,* 2018. On their earlier findings reported that a large number of the wild edible plant species recorded were trees in Quara District, Northwest Ethiopia and in Kedida Gamella Woreda, Southern Ethiopia respectively. Moreover, Zemede Asfaw and Mesfin Tadesse (2001) and Fentahun Mengistu (2008) showed that, species occurring as trees could be advantageous in view of getting hold of diverse utilization in relation to agro forestry system.

The results of this study illustrated that the identified wild edible fruit tree and shrub species of the study area were belonging to 26 families. From the identified commonly growing wild edible fruit tree and shrub species of the study Districts, Moraceae family contained the highest number of species with 4 wild fruit tree species, Anacardiacea and Rutaceae families have 3 wild fruit tree species followed by Flacourtiaceae, Rubiaceae and Astracea families represented by 2 wild fruit tree/shrub species each. The other remaining 20 families were represented by one fruit tree/shrub species each (Table 1).

Table 1. List of Wild Edible Fruit Tree and Shrub Species identified in Adola Rede and Odo Shakiso Midland Districts of Guji Zone, in Southern Ethiopia

Scientific name of the wild edible fruit tree/shrub species	Family name	Local name	Habit	Edible parts	Consumption method
Ficus vasta Forssk	Moraceae	Qilxuu	Tree	Fruit	Raw fruit
Ficus Sycomorus L.	Moraceae	Odaa	Tree	Fruit	Raw fruit
*Ficus thonningii*Blume	Moraceae	Dambii	Tree	Fruit	Raw fruit
Ficus sur Forssk	Moraceae	Harbuu	Tree	Fruit	Raw fruit
*Rhus natalensis*Krauss	Anacardiaceae	Daboobessa	Tree	Fruit	Raw fruit
*Rhus vulgaris*Meikle	Anacardiaceae	Xaaxxessaa	Tree	Fruit	Raw fruit
*Sclerocarya birrea(*A.Rich) Hochst	Anacardiaceae	Hudhaa	Tree	Fruit	Raw fruit
Carissa spinarum L.	Apocynaceae	Agamsa	Shrub	Fruit	Raw fruit
Haplocoelum foliolosum	Sapindacea	Canaa	Tree	Fruit	Raw fruit
Myrica salicifolia Hochest ex.A. Rich	Loganiaceae	Biiqqaa	Tree	Fruit	Raw fruit
Pittosporum Viridi florum sims	Pitosporaceae	Gaaloo	Tree	Fruit	Raw fruit
*Flacourtia indica(*Burm.f.)Merr.	Flacourtiaceae	Hagalaa	Shrub	Fruit	Raw fruit
Dovyalis abyssinica (A.Rich.) Warb.	Flacourtiaceae	Dhugoo	Shrub	Fruit	Raw fruit
Syzygium guineense(Wild.)Dc.	Myrtaceae	Badeessaa	Tree	Fruit	Raw fruit
Rosa abyssinica R. BR	Rosaceae	Goraa	Shrub	Fruit	Raw fruit
Cordia africana Lam	Boraginaceae	Waddeessa	Tree	Fruit	Raw fruit
Annona reticulata L.	Annonaceae	Gishxaa	Tree	Fruit	Raw fruit
*Gardenia ternifolia*Schumach. &Thonn.	Rubiaceae	Gambeelloo	Tree	Fruit	Raw fruit
Rytigynia neglecta(Hiern) Robyns	Rubiaceae	Miqee	Tree	Fruit	Raw fruit
Sterculia africana (Lour.) Fiori	Sterculiaceae	Qaraaruu	Tree	Fruit	Raw fruit
Celtis toka(Forssk.) Hepper and wood	Ulmaceae	Matoqomaa	Tree	Fruit	Raw fruit
*Ziziphus mucronata*Wild.	Rhamnaceae	Huqunquraa	Tree	Fruit	Raw fruit
*Phoenix reclinata*Jacq.	Arecaceae	Meexxii	shrub	Fruit	Raw fruit
*Physalis peruviana*L.	Solanaceae	Subbaa ruufoo	Shrub	Fruit	Raw fruit
Vernonia auriculifera	Asteraceae	Sarajjii	Tree	Fruit	Raw fruit
Blepharisperum Villosum	Asteraceae	Boniyyaa	Shrub	Fruit	Raw fruit
*Momordica foetida*Schumach	Cucurbitaceae	Suruphaa	Tree	Fruit	Raw fruit
Turraea hollistii	Meliaceae	Hirqaqamo	Tree	Fruit	Raw fruit
*Mimusops kummel*Bruce ex A.DC.	Sapotacea	Qolatii	Tree	Fruit	Raw fruit
Opuntia ficus-indica(L.)Miller	Cactaceae	Adaamii	Shrub	Fruit	Raw fruit
Brucea ferruginia	Simaroubaceae	Hadhowa	Tree	Fruit	Raw fruit
Balanites aegyptiaca(L.) Del.	Balanitaceae	Beddennoo	Tree	Fruit	Raw fruit
Vepris dainelli	Rutaceae	Arabee	Tree	Fruit	Raw fruit
Clausena anisata(Wild.) Benth.	Rutaceae	Xirdhoo	Shrub	Fruit	Raw fruit
Teclea nobilis Del.	Rutaceae	Hadheessaa	Tree	Fruit	Raw fruit
Ipomoea hildebranditii	Convolvulaceae	Amborkokee	Shrub	Fruit	Raw fruit

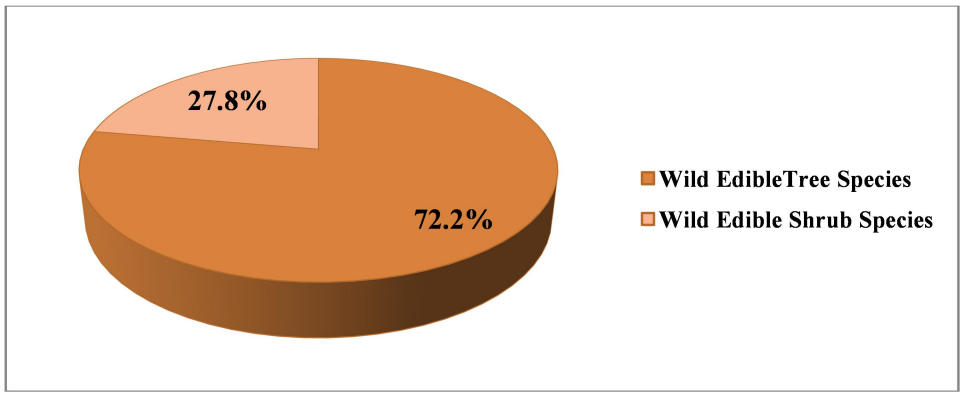

Figure 2. The distribution of wild edible fruit tree and shrub species in the study area

Preferences of wild edible fruit tree and shrub species

In the study Districts local communities of the area valued some wild edible fruit tree and shrub species over the other species. To distinguish most preferred wild edible fruit tree/shrub species of the study site preference ranking was conducted to rank some selected wild edible fruit tree/shrub species based on their criteria. From the two study Districts ten key informants were participated and ranked seven wild edible fruit tree and shrub species of the study site (Table 2). Each key informant was asked to think; order and rank the items based on their personal preference, community importance, or any other criteria set by them and this helps to indicate the most preferred wild edible fruit tree and shrub species by the communities.

Therefore, ranking of seven wild edible fruit tree and shrub species made by ten key informants showed that, *Carissa spinarum*, *Syzygium guineense,* and *Flacourtia indica* were the top three most preferred wild edible fruit tree and shrub species of the study site respectively (Table 2). As it is depicted in table 2, the remaining wild edible fruit tree/shrub species such as *Rosa abbysinica*, *Cordia africana*, *Rytigynia neglecta* and *Ficus sur* were ranked from 4^{rth}-7th respectively. Relatively similar to this study finding, botanical study conducted by Ashagre et al. (2016), indicated that *Cordia africana Lam., Syzygium guineense* and *Olea europaea* were the most preferred wild edible fruit tree species in Burji District, Segan Area Zone, Southern Ethiopia. As well, in three Districts of Amhara Region Ethiopia, Fentahun Mengistu(2008) on his study findings reported that *Ziziphus spina-christi*, *Rosa abbysinica, Carissa species* and *Syzygium guineense* were the most preferred wild edible species by local communities of the area.

However, species preference was reported to vary among difference areas and communities depending on species distribution, indigenous knowledge and economic pursuits of the community (Pauline & Linus, 2004). For example, the fruit of *Balenites aegyptiaca, Grewia vilosa* and *Acacia Senegal* were the top three most preferred edible fruit species by the local community of Afar and Oromo communities and in the buffer area of Awash (Tinsae Bahru et al., 2013).Another studies conducted by Tigist Wondimu et al. (2006) also indicated that *Balanites aegyptiaca, Ziziphus mucronata and Grewia bicolor* was the highest preferred edible plant species in Dheera town, Arsi, Ethiopia. Therefore, from the finding of this study and previous research works conducted in different parts of the country observed that, local communities preferences of wild edible species varies depending on specific agroecology, vegetation and lifestyles of the people.

Table 2. Preference ranking of seven wild edible fruit tree and shrub species of the study area based on their use as perceived by selected key informants

Wild edible fruit tree/shrub species	Key informants(R_1-R_{10})											
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	Total	Rank
Cordia africana	6	6	5	5	6	6	5	5	5	5	54	5th
Ficus sur	5	5	6	5	5	5	5	4	4	5	49	7th
Flacourtia indica	6	6	6	7	6	6	6	7	5	5	60	3rd
Rosa abbysinica	5	5	6	7	6	6	6	5	6	6	58	4th
Carissa spinarum	7	7	6	7	6	7	7	6	7	7	67	1st
Rytigynia neglecta	6	6	4	5	5	6	5	5	4	4	50	6th
Syzygium guineense	6	7	6	6	6	7	6	7	6	7	64	2nd

Note: "R" refers to key informants who participated in the ranking exercise

Season of collection and main gathers of wild edible fruit tree and shrub species

Wild edible fruit tree and shrub species harvesting season and use vary from place to place, species to species and even from tree to tree. This might be due to climatic and intra-specific variations (Getachew, 2001).The result of the current study also showed that wild edible fruit tree and shrub species in the study site were harvested and consumed in different seasons of the year. Similarly, Mekuanent Tebkew (2015) and Birhane *et al.,(*2014) reported that in Chilga District, North Western Ethiopia and in Maale and Ari Ethnic community, in Southern Ethiopia the wild and semi wild edible plant parts were gathered at different time of the year.

The majority of wild edible fruit tree/shrub species of the study Districts were collected and consumed during dry season. The others were collected during wet season and year round. In agreement with this study finding, Balemie and Kebebew (2006), indicated that time and frequency of harvesting of wild and semi wild edible plants depends on the plant parts and varies from place to place. For instance, from wild edible fruit tree and shrub species of the study area *Cordia africana, Ficus sur, Ficus Sycomorus, Rhus vulgaris* and *Myrica salicifolia* were harvested and consumed during dry season. Wild edible fruit tree/shrub species such as *Syzygium guineense, Carissa spinarum, Flacourtia indica* and *Rytigynia neglecta* were commonly gathered and consumed during wet season. However, key informants and respondent households reported that *Momordica foetida, Vernonia auriculifera, Rosa abyssinica* and *Physalis peruviana* were available throughout all seasons and consumed year round.

The survey results showed that, on collection of wild edible fruit tree/ shrub species local communities of the study Districts were considered gender and age of main gathers. Based on the findings of this study 52(86.6%) and 8(14.4%) respondent households indicated that the main gathers of wild edible fruit tree/shrub species of the study site were male and women respectively (Figure 3). This idea also supported with key informants. As the results of the current study indicated that in terms of age category 40(66.6%) and 20(33.4%) main gathers of the identified wild edible fruit tree and shrub species of the study area were children and youngsters respectively (Figure 3).

The result of this study is similar with previous findings of Tinsae Bahru *et al.* (2013) and Tilahun and Miruts (2010).On their study findings showed that collection of wild and semi wild edible plant species was done by children, youngsters and herds men and consume fruits at time of the year when available. However, the finding of this study is in contrary with study results of Tena Regassa *et al*. (2014) and Birhane Kidane *et al*.(2014). On their study findings they were reported that women and children were the major gatherers followed by men and all household in Chelia District, West Central Ethiopia and in Maale and Ari Ethinic community in south Ethiopia

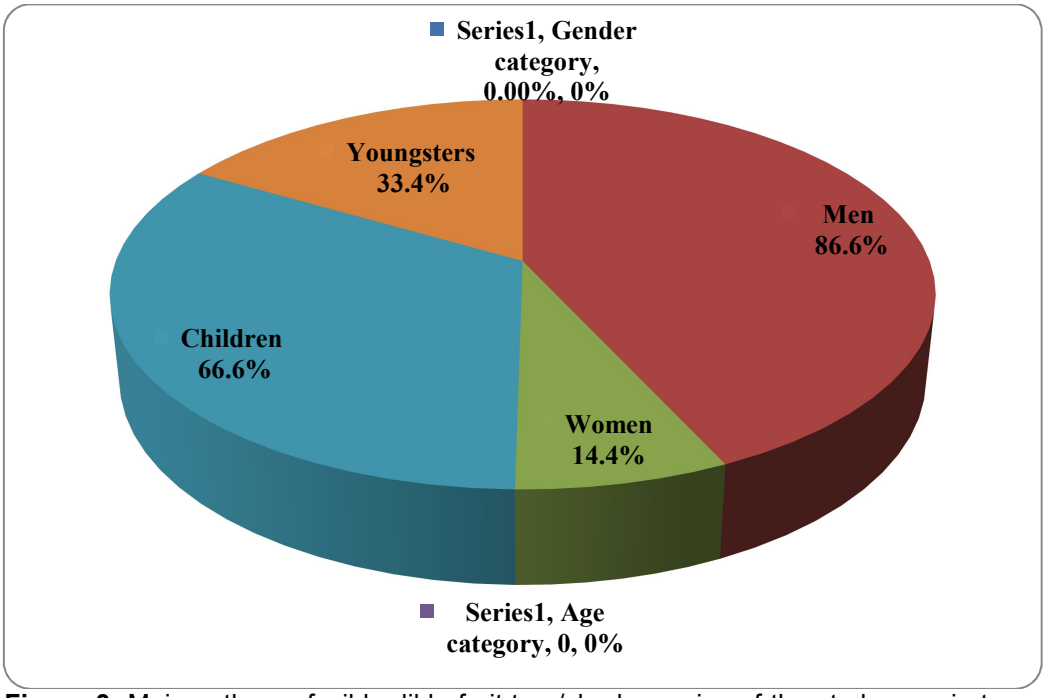

Figure 3. Main gathers of wild edible fruit tree/shrub species of the study area in terms of gender and age category

Indigenous knowledge transfer and practice of local communities

The present study has revealed that, local community of the study area have culture of transferring their indigenous knowledge on uses of wild edible fruit tree and shrub species from generation to generation as part of oral tradition. Out of the 60 respondent households 50(72%) reported that their knowledge of wild edible fruit tree and shrub species was acquired through observation and oral history. Whereas, 10(28%) indicated that they were acquired knowledge from elders. Informants in both study Districts stated that elder men usually share their indigenous knowledge of wild edible fruit tree and shrub species with their children.

Conservation and management practice of wild edible fruit tree and shrub species

Local communities of the study area have long term history and culture of conserving and managing both plantation and natural forests of the area. The majority of the identified wild edible fruit tree and shrub species in the study Districts often developed naturally in the wild. Regarding conservation and managements of the recorded wild edible fruit tree and shrub species of the study area key informants and respondent households stated that they were used in situ management practice. In situ management practice is the conservation of biota in the natural habitat. The term is mostly used for wild species. In the case of fruit species, it is associated with wild fruit species and occasional spontaneous seedlings of cultivated material growing in the natural vegetation.

However, from commonly growing wild edible fruit tree and shrub species of the study Districts farmers practice cultivating of *Cordia africana*, *Rosa abyssinica,* and *Dovyalis abyssinica* on their farm lands and around their homesteads which is an indication of the community moving toward domesticating wild edible fruit tree/shrub species. The finding of this study is supported with earlier findings of Debela Hunde et al. (2011) which was conducted in Central East Shewa of Ethiopia. On their study findings showed that local communities of their study area were used indigenous conservation strategies such as growing wild edible plants in grasslands, using agroforestry, and combinations of growing Wild edible plants as living fences and in agroforestry practice. Moreover, in agreement with this study finding Tinsae Bahru et al. (2013) reported that in the buffer area of Awash National Park, Ethiopia, due to their diverse uses wild edible plants such as *Acacia tortolis and Ziziphus mucronata* were left to widely grow on farm boundaries and watershed areas. Other frequently wild edible plants such as *Lantana camara*, *Prosopis juliflora* and *Balanites aegyptiaca* and *Senna accidentalis* were appear around homesteads as live fence and along roadsides and degraded areas. Similar to this study result, Fentahun and Hager (2010), reported the extent of integrating wild fruit-bearing species into agricultural landscapes of the Amhara region. On their study findings indicated that wild fruit-bearing species such *Ziziphus spina-christi (L)*, *Cordia africana*, *Tamarindus indica* and *Rosa abyssinica* were found integrated in the agricultural settings in the area. Furthermore, this study result is also in line with the finding of Degrande et al. (2006) and Agea et al. (2007) in other African countries who reported that in Uganda, Cameroon and Nigeria the practice of integrating fruit bearing wild edible plant species in to agricultural landscapes was very common.

Economic benefit and marketability of wild edible fruit tree/shrub species

Based on the informants the result of the study showed that, majority of wild edible fruit tree and shrub species of the study Districts was not common in the local market. In agreement with the present study Debela Hunde et.al (2011) on their study findings reported that majority of the Wild edible plants (75.7%) in east Shewa were not marketed.

However, some of the wild edible fruit tree and shrub species recorded in the study area were contributed for additional income sources. For example, *Syzygium guineense, Flacourtia indica, Physalis peruviana, Haplocoelum foliolosum* and *Myrica salicifolia* wild fruit tree species were harvested commonly from the wild and sold at weekly local and the daily urban markets. The finding of this study is supported with earlier studies conducted by Mersha Ashagre et al. (2016). On their study results reported that, in Burji District, Segan Area Zone of Southern Nations, Nationalities and Peoples Region, Ethiopia, in addition to their use for household consumption, some wild edible plants such as *Arisaema schimperianum, Syzygium guineense, and Ximenia americana* were sold in the local market of the study area to support household incomes. In agreement with this finding Baresa Anbesa, 2016 on his study finding reported that In Bule Hora Woreda Southern Ethiopia the wild edible plant called *Tamarindus indica L*. was sold in the local market. In semi-arid low lands of Southern Ethiopia also wild fruit tree species such as *Ximenia americana L*. and *Carissa spinarum* L. were marketable in Tsemay and Benna Districts (Assegid Assefa and Tesfay Abebe, 2011).

Other benefits of Wild edible fruit tree and shrub species of the study area

Based on the findings of this study, in addition to consumption purposes the role of wild edible fruit tree and shrub species was very significance. Informants mentioned that, other purposes of wild edible fruit tree and shrub species in the study sites including: serving as raw materials for house construction, for timber production, used for fire wood, used for coffee shade, serving for apiculture production and other miscellaneous uses. In agreement with this study finding Meragiaw et al.2015 reported that in Delanta, Northern Ethiopia the majority of the wild food plants including nutraceuticals were used for other purposes such as fodder, fuel woods, construction, farm tools and other miscellaneous uses.

Direct Matrix Ranking of other benefits of wild edible fruit tree/ shrub species showed that among the five wild edible fruit tree and shrub species *Cordia africana* was ranked 1st, *Syzygium guineense* ranked 2nd, *Rhus vulgaris* ranked 3rd and the others had consecutive values (Table 3).

Table 3. Results of Direct Matrix Ranking of other benefits of wild edible fruit tree and shrub species of the study area

Other uses	Wild edible fruit tree and shrub species				
	Ficus sur	*Syzygium guineense*	*Cordia africana*	*Rhus vulgaris*	*Carissa spinarum*
House construction	5	4	5	4	4
Timber production	0	4	5	4	0
Fire wood	0	5	5	5	5
Fodder	0	3	2	4	5
Coffee shade	5	5	5	1	0
Total	10	21	22	18	14
Rank	5th	2nd	1st	3rd	4th

Threats and conservation status of wild edible fruit tree and shrub species

In Adola Rede and Odo Shakiso Midland Districts many threats were affecting wild edible fruit tree and shrub species of the study area. Agricultural land expansion, cutting for construction, un controlled fire setting, cutting for fuel wood and timber production were found to be the major threats for wild edible fruit tree/ shrub species. The finding of this study is supported with previous findings of Ashagre *et al.,* 2016, Debela Hunde *et al.,* 2011 and Balemie *et al.,* 2006. On their study findings reported that in Burji District, Segan Area Zone of Southern Ethiopia, Semiarid Ethiopia and in Derashe and Kucha Districts, South Ethiopia respectively showed that agricultural expansion, overgrazing and fuel wood collection were found to be the most threatening factors.

About 38.3% and 25% of the respondent households indicated that agricultural land expansion and cutting for construction purposes were the major threats. As well, 11.6% and 13.5% of the informants reported that cutting for timber production and fuel wood collections also major threats. Whereas, 11.6% of the respondents showed that un controlled fire setting influence the conservation status of wild edible fruit tree/shrub species of the study area. The major identified threats of the study area reported by respondent households were supported by ideas of key informants. Therefore, key informants ranked agricultural land expansion 1*st*, cutting for construction purposes 2nd, cutting for fuel wood was ranked 3rd and the others had consecutive values (Table 4).

The result of this study indicated that from wild edible fruit tree and shrub species existed in the study Districts some of them were exploited more for their additional value. The output of a direct matrix ranking exercise showed that, *Flacourtia indica*, *Cordia africana, Syzygium guineense, Ficus thonningii*, *Carissa spinarum* and *Rytigynia neglecta* were the highest ranks on their exploited more for their non-food uses (Table 5).

Table 4. Direct Matrix ranking of major factors Threatening wild edible fruit tree /shrub species of the two study Districts

Major threats of wild edible fruit tree/shrub species	Key informants(R_1-R_{10})											
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	Total	Rank
Un controlled fire setting	3	3	4	4	3	3	4	4	3	3	35	5th
Agricultural land expansion	5	5	4	5	5	5	4	4	5	5	47	1st
Cutting for fuel wood	3	4	5	3	4	4	5	5	4	5	42	3rd
Timber production	3	4	4	4	5	3	4	4	3	4	38	4th
Cutting for Construction	4	4	5	5	4	4	5	5	5	4	45	2nd

Table 5. Preference ranking Values of six most threatened wild edible fruit tree and shrub species selected by key Informants

Wild edible fruit tree/shrub species	Key informants(R_1-R_{10})											
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	Total	Rank
Cordia africana	5	6	5	6	5	4	6	5	5	4	51	2nd
Syzygium guineense	4	5	4	4	4	5	4	4	4	5	43	3rd
Flacourtia indica	6	4	6	5	6	6	5	6	6	6	56	1st
Carisa spinarum	2	3	3	2	1	1	2	1	3	1	19	5th
Rytigynia neglecta	1	2	1	1	3	2	1	2	2	2	17	6th
Ficus thonningii	3	1	2	3	2	3	3	3	1	3	24	4th

Note: 6=most threatened species, 1=least threatened species and ''R'' refers to key informants participated in the ranking exercise

Concussion and recommendation

A total of 36 commonly growing wild edible fruit tree and shrub species belonging to 26 families were recorded in Adola Rede and Odo Shakiso Midland Districts of Guji Zone, in Southern Ethiopia. Out of the identified wild edible fruit tree and shrub species of the study Districts, majority of the species were tree species followed by shrub species. Local communities of the study Districts valued some wild edible fruit tree and shrub species over the other species. Therefore, ranking of wild edible fruit tree and shrub species conducted by local communities of the study site showed that, *Carissa spinarum*, *Syzygium guineense, Flacourtia indica, Rosa abbysinica*, *Cordia africana*, *Rytigynia neglecta* and *Ficus sur* were the most preferred wild edible fruit tree species of the study area respectively.

The current study revealed that Wild edible fruit tree and shrub species of the study site were mainly harvested year round, in dry and wet seasons and the most frequent gatherers were children and youngsters. In terms of indigenous knowledge transfer, local communities of the study area have culture of transferring their indigenous knowledge on uses and managements of wild edible fruit tree and shrub species from generation to generation as part of oral tradition. The finding of this study showed that majority of wild edible fruit tree and shrub species of the study Districts were not common in the local market. However, some of the wild edible fruit tree and shrub species such as *Syzygium guineense, Flacourtia indica, Physalis peruviana, Haplocoelum foliolosum* and *Myrica salicifolia* were harvested from the wild and sold at local markets and local communities of the study area were used these species for income generation.

In addition to the use for consumption purposes wild edible fruit tree and shrub species of the study Districts used for various purposes. These includes the use of wild edible fruit tree and shrub species for timber production, serving as raw materials for house construction, used for fire wood, used for coffee shade, serving for apiculture production and other miscellaneous uses. However, these multipurpose use of wild edible fruit tree and shrub species leads to the depletion and extinction of wild edible fruit species in the area.

Anthropogenic factors including agricultural land expansion, cutting for construction, un controlled fire setting, cutting for fuel wood and timber production were found to be the major threats for wild edible fruit tree/ shrub species of the study area. Therefore, local communities of the study Districts should develop conservation strategies along with sustainable utilization of the existing wild edible fruit tree and shrub species of the study area. Moreover, priority should be given on urgent collection, domestication, propagation and cultivation of the most threatened wild edible fruit tree and shrub species before the occurrence of extinction.

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REFERENCES

Abraham Demekristos Dirres(2016). Collection and Identification of Wild Fruits Tree/Shrub Species in Amhara Region, Ethiopia.Journal of Natural Sciences Research. www.iiste.org ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online) Vol.6, No.11, 2016

ARANRO (Adola Rede Agricultural and Natural Resources Office). (2020). Agricultural statistical abstract.

ARBoFED (Adola Rede Bureau of Finance and Economic Development). (2017). Socio- economic profile of Adola Rede.

Agea, J., Kabboggoza, J. and Waisaw, D. (2007). Diversity of indigenous fruit trees in the traditional cotton-millet farming system: the case of Adwari sub county, Lira district, Uganda. Afr. J. Ecol. (45): 39-43.

Assegid Assefa and Tesfaye Abebe (2011). Wild edible plant trees in the semi-arid low lands of Southern Ethiopia. Journal of Science and development ,1:5-19 .

Balemie K and Kebebew F(2006). Ethnobotanical study of wild edible plants in Derashe and Kucha Districts,South Ethiopia. J Ethnobiol Ethnomed. 2006;2:53.

Baressa Anbessa (2016). Ethnobotanical Study of Wild Edible Plants in Bule Hora Woreda, Southern Ethiopia. African Journal of Basic & Applied Sciences 8 (4): 198-207, 2016 ISSN 2079-2034 © IDOSI Publications, 2016 DOI: 10.5829/idosi.ajbas.2016.8.4.23529

Birhane Kidane, L.J.G., Maesen, V., Andel, T.V. and Zemede Asfaw and Sosef, M.S.M. (2014). Ethno botany of Wild and semi-wild edible fruit species used by Maale and Ari Ethinic community in south Ethiopia. Ethno botany Research and Application, pp 455-471.

Debela Hunde Feyssa, Jesse .T. Njoka, Zemede Asfaw and M. M. Nyangito(2011). Seasonal availability and consumption of wild edible plants in semiarid Ethiopia: Implications to food security and climate change adaptation. Journal of Horticulture and Forestry Vol. 3(5), pp. 138-149, May 2011. Available online http://www.academicjournals.org/jhf ISSN 2006-9782 ©2011

Degrande, A., Schreckenberg, K. and Mbosso, C. (2006). Farmers fruit tree growing strategies in the humid forest zone of Cameroon and Nigeria. Agroforest Syst 67: 159-175**.**

Demel Teketay., Feyera Senbeta., Maclachlan, M., Bekele, M. and Barklund, P. (2010). Edible Wild Plants in Ethiopia. Addis Ababa University Press, 575pp.

Fekere Fugaro and Melese Maryo(2018). Ethino Botanical Study Of Wild Edible Plants in Kedida Gamella Woreda, Kambatta Tembaro Zone, SNNPRS, Ethiopia.IJMPR 2018, 2(5), 01-09

Fentahun Mengistu (2008). Fruit tree species in the wild and in-home garden agroforestry: species composition, diversity and utilization in western Amhara region, Ethiopia. Dissertation in partial fulfillment of the requirements for a Doctorate Degree at the University of Natural Resources and Applied Life Sciences, Vienna. Institute of Forest Ecology, Department for Forest and Soil Sciences, 2008; 207.

Fentahun, M. and Hager, H. (2010). Integration of indigenous wild woody perennial edible fruit bearing species in the agricultural landscapes of Amhara region. Agroforest Syst 78: 79-95.

FAO. 1989. Forestry and Food Security. FAO Forestry Paper No. 90. Food and Agricultural Organization of the United Nations, Rome, Italy

Getachew O, (2001). Food source diversification: potential to ameliorate the chronic food insecurity in Ethiopia. The potential of indigenous wild foods. Workshop proceedings, 22–26 January 2001. Sudan, United States Agency for International Development

Guinand, Y. & L. Dechassa (2000). Indigenous food plants in southern Ethiopia: Reflections on the role of 'famine foods' at the time of drought. Pp 31-45. The Potential of Indigenous Wild Foods.

M Meragiaw, Z Asfaw1 and M Argaw(2016). Indigenous Knowledge (IK) of Wild Edible Plants (WEPs) and Impacts of Resettlement in Delanta, Northern Ethiopia. Research and Reviews: Journal of Herbal Science ISSN: 2278-2257(online), ISSN: 2348-9553(print) Volume 4, Issue 3 www.stmjournals.com

Mekuanent Tebkew (2015). Wild and semi-wild edible plants in Chilga district, Northwestern Ethiopia; Implication for food security and climate change adaptation. Global Journal of wood Science Forestry and wild life , 3(3): 072-082.

Mersha Ashagre, Zemede Asfaw and Ensermu Kelbessa(2016). Ethnobotanical study of wild edible plants in Burji District, Segan Area Zone of Southern Nations, Nationalities and Peoples Region (SNNPR), Ethiopia. Journal of Ethnobiology and Ethnomedicine (2016) 12:32 DOI 10.1186/s13002-016-0103-1

OSBoFED (Odo Shakiso Bureau of Finance and Economic Development). (2020). Socio-economic profile of Odo Shakiso

Pauline, M. & W. Linus. 2004. Status of indigenous fruits in Kenya. Pp. 36–62 in Review and Appraisal on the Status of Indigenous Fruits in Eastern Africa. International Plant Genetic Resources International (IPGRI) - Sub-Saharan Africa Forest Genetic Resources in the framework of Association of Forestry Research Institutions in Eastern Africa, Cotonou, Benin, and Nairobi, Kenya.

Regassa,T, Kelbessa, E.,Asfaw,Z.(2015). Ethnobotany of wild and semi wild edible plants of Chelia distrit,West Central Ethiopia. Science, Technology and Arts Research Journal 3,122-134

Ruffo, C.K., Birnie A. and Tengnäs B. (2002). Edible wild plants of Tanzania. Regional land managementunit, SIDA, Nairobi, Kenya. Pp 766.

Tatek Dejene, Mohamed Samy Agamy , Dolores Agúndez and Pablo Martin-Pinto(2020). Ethnobotanical Survey of Wild Edible Fruit Tree Species in Lowland Areas of Ethiopia.Forests 2020, 11, 177; doi:10.3390/f11020177

Tebekew,M, Gebremariam,Y.,Mucheye,T.,Alemu,A.,Abich, A., and Fikir,D(2018).Uses of wild edible plants in Quara District, North west Ethiopia: Implication for forest management. Agriculture and Food security,7(1),12

Teshome Soromessa and Sebsebe Demissew (2002).Some uses of plants by Benna Tsemay and Zeyise people, South Ethiopia. Ethiopian Journal of Natural Resources 4 (1): 107-122.

Tigist Wondimu, Zemede Asfaw and Enermu Kelbessa (2006). Ethnobotanical study of food plants around `Dheeraa` town, Arsi, Ethiopia. Ethiopian Journal of Science29:71-80.

Tilahun Teklehaymanot and Miruts Gidey(2010). Ethnobotanical Study of wild edible plants of Kara and kwego semi-pastoralist people in lower Omo River valley, Debub omo Zone, SNNPR. Journal of Ethnobiology and Ethnomedicine 6,23

Yigremachew Seyoum, Demel Teketay, Girma Shumi, and Melaku Wodafirash(2015). Edible Wild Fruit Trees and Shrubs and Their Socioeconomic Significance in Central Ethiopia. Ethnobotany Research & Applications 14:183-197 (2015).

Zemede Asfaw and Mesfin Tadesse (2001). Prospects for sustainable use and development of wild food plants in Ethiopia. Economic Botany55:47-62.