

## Collection and Identification of Wild Fruits Tree/Shrub Species in Amhara Region, Ethiopia

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### Abstract

Indigenous trees with edible fruits/seeds are very important to improve food security and diversify household income sources. However, traditional practice of trading and planting of wild edible fruit or seeds. Such practice calls for identification of indigenous edible fruits and collection of their propagules to adopt and domesticate to enhance their economic. Seed collection surveys, and data such as wilderness, edibility or parts, seeds, collected at the field. People perceptions were captured from 78 informants using an informal interview, discussion and observation in the field. Most species taxonomically known and for those unknown, their specimens were collected and sent to Addis Ababa University Herbarium for identification. Their germination and field survival had been tested at nursery of Adet Research Center and Bezawit site in Bahir Dar surrounding district, respectively. We identified (4); taxonomically known (7) and unknown (1) out of 23 wild fruit species. A total of 23 wild edible woody plants seeds were collected per six districts in Amhara National Regional State of Ethiopia with an altitudinal range of 1200 to 2635m above sea level from 2008 to 2009. Of the 23 edible woody plants, only 12 species showed better germination except some species due missed data. The 12 species were planted out in the field and only 11 species were survived well. The 11 wild woody plants belong to 9 families. The 11 woody plants represent different life forms: 6 of them trees, followed 4 of them were shrubs and the remaining one was climber. Woody plants took different number of days to germinate. *Gardenia ternifolia* took the longest duration 77 days, while *Tamarindus indica* took 22 days which is the shorter time to germinate as compared to the other species. Thus, more research is needed to investigate maturity, fruit nutrition, economic value as well as their propagation and germination enhancement.

**Keywords:** Domestication, collection, identification, wild edible woody species

### Introduction

Wild edible plants (WEPs) mean species that are neither cultivated nor domesticated, but are available from their wild, and used as sources of food and medicines (Beluhan and Ranogajec, 2010). In this paper, wild' refers to non-cultivated plants gathered in the field (Pardo-de-Santayana et al; 2007). The scientists have recently realized the contribution of wild fruits to poverty reduction and their vital role in the livelihoods of many communities is getting good recognition (Garrity 2004; Ndoye et al. 2004; Schreckenberget al. 2006). The wild edible plants with high diversity are widely distributed in mountain forests and they are adapted to the local environment. These enabled them to grow easily with few input and be integrated into sustainable farming systems. In Ethiopia, the number of indigenous edible plant species is vast. Mengistu F. and Herbert H. (2009) estimated that 8% of the 7000 higher plant in Ethiopia are edible species of which 75% are categorized as indigenous, semi cultivated or naturalized (Zemedede and Mesfin, 2001). Analysis of some wild food plants demonstrates that, in many cases, their nutritional quality superior and an increasing desire for natural medicine and organically grown foods (Getachew Addis et al., 2005; Kebu B. and Fassil K., 2006).

Like elsewhere, forests and bush lands are cleared for cultivation.

More than 80% of the population in Ethiopia are residing in rural areas. These rural people preserve some of the more important indigenous species by either domesticating them on their farms and home gardens or by preserving and managing them in situ (Guinand Y, Dechassa L, 2000). As reported by Badege and Abdu (2003), practice of growing dispersed trees in farmlands characterizes a large part of the country's agricultural landscape. However, research and development initiatives in the country largely disregard indigenous fruit species (Guinand and Dechassa 2000; Getachew et al. 2005). They are still not valued as are some cultivated food plants, such as mango, orange, cabbage and banana (Bell, 1995; Guinand and Dechassa L., 2000; Ruffo et al., 2002; Demel Teketay et al., 2010). The traditional knowledge for their management and utilization is not exhaustively documented (Assegid A. and Tesfaye A. 2011). Teketay and Eshete (2004) reported that studies specifically dedicated to wild fruit trees are few. However, the provision of evidence based information on the existing species in the wild can provide as a step for fruit-based agro forestry development aimed at improving livelihoods and enhancing rural economy (Kindtet al. 2006).

Amhara National Regional State (ANRS) covers both low and highland areas of Ethiopia including the highest peak, Ras Dashan (4550m). These mountains are known to be extremely rich in species diversity and endemism. ANRS share similar flora and fauna of other mountain regions of Africa distinctive potential of indigenous fruit tree or shrubs mainly wild plants. But lack of information on the existing resource leads to threatening and endanger of the species. Fruit trees or shrubs principal component of agro forestry systems that

had provided benefits and services to the farmers that can help ensuring utilization in low agricultural productivity, and food insecure population (Amhara Development Association ADA, 2003). However, little information is available on the type and number of wild edible woody plants in ANRS. The aim of the study to collect, and identify wild edible plants in western amhara region, both for their domestication and integration in agro forestry system for alleviation of food insecurity besides their maintenance from species threaten at the wild.

## Materials and Methods

### Study area

The study conducted in amhara region in north western part of Ethiopia. Specifically located at three sites: fruit or seed processing and germination had been tested in adet agricultural research center, laboratory. Seedling survival rate carried out at Bezawit research site nearby Bahir Dar town located closer to river Abay. The plants planted and maintained sites with altitude range from 1780 m to 1800 m above sea level with mean rain fall varies 1170-1600mm annually similar to Bahir Dar city (thesis published, 2011)

The three life forms such as trees, shrubs and climber fruit or seeds are collected. Seeds collected from 2008 to 2009 depending on species maturity time in both high land and low land areas located between 9° 20' and 14° 20' north latitude 36° 20' and 40° 20' east longitude. Altitude ranges constitutes diverse altitudinal zones ranging from 1200meters below sea level and 2635meters above sea level. Particularly fruit and seed collection districts covers Denbecha, Bahir Dar Surrounding District, Dera, Dejen, Farta and Chagnie districts.

The majorities of the inhabitants primarily depend on subsistence agriculture, which is dominated by the cultivation of grain crops and animal husbandry, and live in small-scattered settlements.

The mother-tongue is Amharic; around Chagnie district a small proportion of the people are speaking Gumuz which is on the border of Amhara and Benishangul Gumuz region.

## Data Collection

### Surveys

The study employed both structured and semi structured questionnaires. Depending on the perceived variability, 8-12 household heads were randomly chosen from each site and interviews administered giving a total of 78 informants or households (83% men and 17% women). In the semi-structured interview arrangements, all interviewees were met on a one-to-one basis and asked the same standard questions in the local Amharic language, and some Oromo and Gumuz using interpreter at the border of Chagnie district.

Data was collected on wild fruit bearing species on accompanied field trips with agricultural development experts, elders and farmers through transect walk. This was done by reaching each farm of the sample households of the 8-12 farms per site. In this way, a total of 78 farms were visited across the twenty-three sites or Kebeles. Twenty three Kebeles were visited out of 3429kebeles per six districts in the region, on the basis of existed vegetation pockets or niches.

For each edible fruit bearing species met in each farm, its fruit and seed was picked up and recorded along with its specific agricultural niches (protected forests, farm lands and edges, back yards, river side, and high mountain vegetation). Similar to Beentje (1994) plants that had a height of 1.50 meter or more were considered in the census. In this study, wild fruit species are taken to mean those indigenous or naturalized woody perennial edible fruit bearing species that are normally known or regarded by the community as wild but for one or more reasons retained or brought in to the farmers' fields. In addition to the informant interviews, information was collected from respective agriculture experts and group discussions.

In Focus Group Discussions with 5 people using open-ended discussion guidelines that were mediated by the researcher teams, information was collected about wilderness of wild fruit bearing species, local names of the species or locality, marketability, maturity, edible part, propagation, and perceptions of people were recorded.

Altitude, plant forms and specimens were also collected for identification of unknowns. Other data's of the trees/shrubs were collected through field observations.

### Species identification

Most wild edible fruit species were identified in the field and most taxonomically known. If not specimens were collected for unidentified species for later identification (at Addis Ababa University Herbarium). The species were also identified in the field with the help of district experts, individual informants and with the help of literatures following similar method as Fentahun and Hager (2008), as well as using guide books such as '*Useful trees and shrubs of Ethiopia*' by Azene et al. (1993).

### Seed collection and processing

Well matured fruits or seed were collected either from the standing trees or failed or shed on the ground from mother trees. Some fruit were moist or flesh, irregular maturity and further processed to get viable seed for seedlings production. The seeds were roughly processed and separated from the fruit manually. All seed lots

were dried through sun radiation outside and put in plastic bags and stored in Adet agricultural research Laboratory at room temperature until tested for their purity and germination.

Handfuls of seeds were randomly taken from each of the species; samples 100 random seeds (total 2600 seeds) were weighted and tested for their purity. To determine seed weight 100 seeds were taken from each species and weighted by sensitive beam balance and expressed in grams (table 1). The weight of each 100 counted seeds and the number of seeds in it were used to calculate the average weight of seed in each species. Hot and cold water treatment was employed for some species before sowing in the nursery.

### Data analysis

The data collected were analyzed by means of descriptive statistics, with Microsoft Excel and SPSS (Statistical Package for Social Sciences, Version 17). In addition photographs have been used to support discussions.

### Results

The farmers in the study site live under different socioeconomic conditions in terms of education, income sources, food sufficiency levels, family size, age, gender and occupation.

The number of interviewed person's were 78 and all interviewed households were visited mainly for verification of the species on their local name, edibility, and habitats forms.

A total of 23 wild edible plant species were collected and most frequently the habitat of edible plants was at the wild in the study areas. Of the 23 wild edible woody plants, only 11 germinated and adapted. These 11 species belong to 9 families. Rubiaceae were found to be the most common family with 3 species. Other important families were Rhamnaceae, Arecaceae, Rosaceae, Caesalpinaceae, Apocynaceae, Moraceae, Flacourtiaceae, and Sapotaceae (1 species each). 11 edible plants represent 3 life forms: 6 trees, 4 shrubs and 1 climber (table 2). Wild edible plants studied in this paper accounted 3% of 413 WEPs from previously identified by Ermas *et al.* in 2011.

Table 1 present's background information (name of species, altitude, date of collection), seed weight and % purity of the 23 wild edible species collected in the 23 sites.

Table1: Wild edible plants in eastern and western Amhara region (Am-Amharic, Or-Oromifa)

no	Local name	Local Collected	Altitude (m)	Seed Collected Day, Month, year	total seed sampled	Weight in gram	no of pure seed	Weight in gram(gm)
1	Yewof Injory(አንጃሪ)	Denbecha	1660	14 December, 2000	100	0.36	25	0.08
2	Ishe, Shiye(አሺ)	Woramit	1900	20 may 1999	100	56.72	25	15.22
3	Gambilo (ጋምቤሎ)	Bezawit	1950	20 may 1999	100	1.21	25	0.35
4	Inkoy (አንኮይ)	Tis Abay			50	43.76	12	9.21
5	Gaba (ጋባ)	Wargajia	2045	22 may 1999	100	39.09	25	11.66
6	Marenta (ማረንታ)	Andassa	1800	20 may 1999	100	30.85	25	8.24
7	Foch (ፎካ)	Abaygorgy	1200	10 December 2000	100	87.25	25	19.12
8	Ingulmanzy (አንጉልማንዚ)	Mandura	1660	14/04/2000	30	80.25	7	11.74
9	Lok (ሎቅ)	Abaygorgy	1200	10 December 2000	100	11.75	25	1.57
10	bururie (ቡሩሩ)	Bakotabo	1700	12 December 2000	100	146.25	25	31.96
11	Roka (ሮቃ)	Abaygorgy	1200	16 may 1999	100	60.75	25	16.47
12	Gimero (ግምሮ)	Geray	1865	17 may 1999	50	12.04	12	3.57
13	Ashkaom (አሽቃም)	Woreta	1920	21 may 1999	100	0.77	25	0.9
14	Agam (አጋም)	Alem Saga	2300	22 may 1999	100	1.32	25	0.43
15	Zembaba (ሰሌን ዘምባባ)	Bakel	1900	17 may 1999	100	48.81	25	14.13
16	Beter Musie (በትረ ሙሴ)	Abaygorgy	1200	10 December 2000	100	22.56	25	6.28
17	Siha (ሲሃ)	Worgaja	*	16 December 2000	100	20.08	25	5.25
18	Inkoko (አንቆቆ)	Gembeha	*	13 December 20000	100	12.4	25	3.31
19	Isatlas (አሳት ላስ)	Bale Eyesus	2635	15 may 1999	100	5.76	25	2.06
20	Kega (ቱጋ)	Zengena	2560	18 may 1999	1000	2.83	25	0.76
	Kega(ቱጋ)	Alem Saga	2300	22 may 1999	100	1.79	25	0.48
	Kega(ቱጋ)	Gelawode	2530	23 may 1999	100	1.93	25	0.53
	Kega(ቱጋ)	wos						
	Kega(ቱጋ)	Anget Minch	2600	14 may 1999	100	2.03	25	0.5
21	Gimech Yabaguda (ገሙት-ጻ)	Mandura	1500	18 may 1999	100	*	25	*
22	Koshim(ኮሽም)	*	*	*	49	1.27	12	0.31
23	Gamburo, Abar (ጋምቡሮ)	Sebatamit	1850	20 may 1999	100	0.03	25	*

Note: \* whenever in this table indicates 'missed data'

Germination test was carried out for some species before sowing in the nursery as shown below in the

table 2.

Table 2: Wild edible plants and their germination life times at nursery

No	Botanical name	Local Name	Location Collected	Germination Time In Months/Days	Transplanting Age From Sowing
1	<i>Gardenia ternifolia</i>	Gambello	Pawiborder	2.17 months (77days)	4months 1days
2	<i>Grewiaferruginea</i>	Bururi	Bakotabo	*	*
3	<i>Ziziphusmauritiana</i>	<b>Qurqura</b>	<b>Worgaja</b>	<b>1.16months(46 days)(</b>	*
4	Unknown	Engulmanzy	Mandura	1.11months(41days)	3months 17days
5	<i>Tarennagraveolens</i>	<b>Lok</b>	<b>Abay Gorge</b>	<b>1.8months(38days)</b>	<b>2 months 17days</b>
6	<i>Tamarindusindica</i>	Roka	Abay Gorge	0.22months(22days)	2 months 17days
7	<i>Phoenix reclinata</i>	Selen	Bakel	2.18months(78days)	4months 1days
8	Mimusops kummel	Eshi	Woramit	*	*
9	<i>Carisaedulis</i>	Agam	*	*	*
10	<i>Dovyalisabyssinica</i>	Koshm	Gelawdewesse	1.2months(32days)	3months 16days
11	<i>Ziziphusmucrunata</i>	<i>Foch</i>	BakoTabo	1.8months(38days)	*
12	<i>Rosa abyssinica</i>	Kega	Gelawdewesse	2.8months(68days)	3months 16days
13	<i>Rosa abyssinica</i>	Kega	Alem Saga	1.28months(58days)	3months 16days
14	<i>Rosa abyssinica</i>	Kega	Zenzelma	2.8months(68days)	3months 16days
15	<i>Rosa abyssinica</i>	Kega	Angetminch	2.7months(67days)	3months 16days

Note:\* whenever in this table indicates 'missed data', the bold rows showed identified species

Their germination date of some wild edible species had been tested in days at the nursery of Adet Agricultural Research Center. Species such as *Gardenia ternifolia* took the longest duration (77days or 2.17monthes), which is longer time to germinate as compared to the other species. *Tamarindus indica* collected from abay George takes shortest as required 22days to complete their germination lives.

Percent contribution of different parts of the plant species that are edible depicts that fruits are the dominant part of the species that are edible.

Table 3: family wise list of wild edible plants adapted at Bezawit(Bahir Dar) surrounding

Family	Botanical name	Local Name	Habit	Edible part	Survival (%)
Rubiaceae	<i>Tarennagraveolens</i>	Loke	Shrub	Fruit	8
Rubiaceae	<i>Gardenia ternifolia</i>	Gambelo	Tree	"	80
Tiliaceae	<i>Grewiaferruginea</i>	lonquata	Tree	"	60
Rhamnaceae	<i>Ziziphusmauritiana</i>	<i>Qurqura</i>	Tree	"	87.5
Areaceae	<i>Phoenix reclinata</i>	Zembaba/selen	Tree	"	37.5
Rosaceae	<i>Rosa abyssinica</i>	Qega	Shrub	"	98
Caesalpiniaaceae	<i>Tamarindusindica</i>	Roka	Tree	"	13
Apocynaceae	<i>Carisaedulis</i>	Agam	Shrub	"	60
Moraceae	<i>Morusmesozygia</i>	Yewof Injury	Climber	"	8
Flacourtiaceae	<i>Dovyalisabyssinica</i>	Koshum	Shrub	"	80
Sapotaceae	<i>Mimusops kummel</i>	Eshi	Tree	"	63

Of the total wild fruit tree species, only eleven of them survived and adapted at Bezawit and similar agro ecological sites as listed beginning with family name (table 2).For some species, it is difficult to know with certainty whether they are native or not.

## Discussion

Rough information was gathered on 23 edible non-crop plant taxa that people in eastern and western Amhara region know and use. Most people also knew very well where to find them. Generally people's knowledge of plant uses increases with age that seems not to be the case for edible plants as reported in other nations by Phillips and Gentry (1993).

Most of the studied trees/ shrubs are reported to be edible elsewhere in Ethiopia and other parts of Africa. Most species (84.62%) grow in high altitude above 1500m. Some species (15.39%) are, however, found in low altitude areas. Species variation is caused by ecological variations within the region. Differences in altitude, climate and vegetation mean that very different plant species grow and are used in particular areas.

The knowledge of non-crop edible plants is widespread throughout the region. Every person and interviewee we spoke to knew various edible plants. Although on-crop edible plants have little economic importance compared to other economic activities, for some people selling fruits at local markets do provide some income for the poorest so as to supplement food as well as cash in order to meet their basic needs. According to A.Assefa and T.Abebe (2011) findings 12 species (40%) are consumed during famine. Famine foods consumed only when preferred alternatives are not available, and in situations where chronic food shortage

prevails (A.Getahun, 1974; GuinandandD.Lemessa, 2000; K.BalemieandF.Kebebew, 2006). Income and employment can be obtained from the sale of their fruits, leaves, juice and drinks from juices.in agreement with T.TeklehaymanotandM.Giday (2010) the fruits were dominant edible parts undertaken in amhara-gambela regional border such as Gambello consumed as a snack when ripe by ethnic communities of Gumuz (personal communication) and to a limited extent in making fruit juices.

Some of the wild edible trees were contributed as additional income sources. For example, Engulmanzy(*unknown*) and *M. kummel* fruits are harvested mostly freely from the wild and sold at weekly local and the daily urban markets in fresh conditions in agreement with the findings of previous studies conducted in western Amhara region (Mengistu Fentahun and Herbert Hager, 2009).Such edible tree species are popularly known as food plant within the area at small scale level. A few of other wild edible tree/shrubs not known by many people in the area in which case it may not exist elsewhere in the region. Although there were some variations in preferences, both within and between localities, relatively wild edible trees/shrubs like *Gardenia ternifolia* were particularly popular in Benishangul Gumuz. *Tarennna graveolens*(loke), *Ziziphus abyssinica* (Gaba) and *Vangueria apiculata* (Bururi),(*Phoenix reclinata*(SelenZembaba) in some extent known but the most peoples weren't interested in eating these fruits. Although they were relatively common in forests, and as wild trees on farms, they were almost unknown to most farmers. According to farmers some wild edible species such as Gambello probably took 20 years or more for maturity (personal communication).



ፎቶ : በከልሎ በተለያዩ ለከባቢዎቻችን የተሰበሰቡ የሚሰሉ የሜሳክ ዛፍ/ቁጥጥጎች

**CONCLUSION**

Only in 23 locations a total of 23 wild edible plants were collected from different parts of Amhara region.

Among those 12and 11 of them confirmed their germination, and adaptation, respectively.

Wild edible plants such as *Rosa abyissinica* ('kega') and *Morusmesozygia* ('yewof enjory') have poor survival as compared to the wild edible species. From the 11 species, Eshi and Ingulmanzy were familiar in local market and income sources.

In general, wild edible plants have shown poor germination, better survival and slower growth, especially the *Gardenia ternifolia* (Gambello), *Tarennna graveolens*(Lock), *Phoenix reclinata* (Selen), unknown(Ingulmanzy). Their germination and survival improvement and the development of vegetative propagation techniques might enhance tree establishment.

**Recommendation**

Due to, mismanagement and poor conservation, existing resources leads to threatening and endanger of the species. Thus, the responsible sectors should be given consideration when strategies are developed to fight food insecurity with the communities in protecting these valuable plant species either through agro forestry, ex-situ or in-situ conservation system.

Promotion required for the better utilization and conservation of wild edible plants as valuable resources to improve household food insecurity. While propagation and domestication of wild food plants should be started through participation of the local community and the efforts of governmental and non-governmental organizations. Family farmers should be diversifying their agro forestry crops and developing local markets which provide for both rural and urban communities with better varieties of food on their plates.

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