**Original Research Article**

**Wild edible fruit diversity and their traditional use for local livelihood in Dollo, Qorahay and Nogob zones, Somali region, Ethiopia**

**Abstract**

Study on the diversity of wild edible fruits and their traditional uses for local livelihood was conducted in the Dollo, Qorahay, and Nogob zones of the Somali region, Ethiopia. The main objectives were to assess the abundance, dominance, and diversity of wild edible fruit species, as well as to analyze the factors affecting their availability and use. Data collection involved extensive discussions with local communities, district agricultural experts, and locals. A survey was conducted using transect to identify representative areas for assessing species abundance. Twenty wild edible herbs, lianas, shrubs, and trees were identified across Warder and Qorahay districts, belonging to 8 families, with the most dominant being Apocynaceae, which comprised 6 species, followed by Malvaceae with 5 species. Together, the top three plant families accounted for approximately 30% of the total species recorded in the study area. Despite their ecological and nutritional importance, these wild edible plant species are underutilized and face increasing threats from overharvesting (contradictory) and environmental degradation. Therefore, it is crucial to raise awareness among rural households regarding the sustainable management, marketing, and domestic utilization of wild edible fruits.

***Key words:*** *livelihood, wild edible fruit, Diversity, Traditional uses*

## INTRODUCTION

Human beings are known to use wild plants in different ways since the begening of civilization, thus there is close relationship between people and plants (Rajbhandary, *et al*., 2020). Nature is bestowed with diverse life forms on which human beings survive and life is maintained. Before the start of domestication of plants, primitive man used to eat different types of fruits, leaves, and roots collected from the wild for survival. The primitive man through trial and error has selected many wild edible plants and subsequently domesticated them (Niveditha, 2017). The wild fruit plants are an important source of food, are nutritionally rich and can supplement nutritional requirements of human and livestock, especially the vitamins and micronutrients (Mohapatra and Panda, 2009) for communities below the poverty line, in many rural parts of the world (Chakravarty, *et al*., 2016). Rural people depend for nutrition, daily food security and primary health care on wild edible fruits. Wild edible fruits significantly influence the livelihood and food security in rural people (Rafiqul Islam, *et al*., 2019).

Edible wild fruit plants (EWFPs) refer to species that are neither cultivated nor domesticated but are available from their wild natural habitat and used as food sources (Beluhan and Ranogajec, 2010). Despite the primary reliance of most agricultural societies on staple crop plants, the tradition of eating EWFP products continues today. In addition to their role in closing food gaps during periods of drought or scarcity, they play an essential role in maintaining livelihood security for many people in developing countries (Afolayan and Jimoh, 2009). Besides, Ethiopian EWFPs are faced with threats related to habitat loss and degradation; hence a complementary in situ and ex situ conservation measure is vital to conserve the WEP wealth of the country (Ermias and Lulekal, *et al.*, 2011). EWFPs have been a focus of research for many ethnobotanists in recent decades. Currently, global interest is increasing in documenting ethnobotanical information on neglected wild edible food sources (Bharucha and Pretty, 2010). Since traditional knowledge on EWFPs is being eroded through acculturation and the loss of plant biodiversity and indigenous people and their cultural background, promoting research on wild food plants is crucial to safeguard this information for future societies (Asfaw, 2009). In Somali region there are diverse wild edible fruits. Wardher, Qabridar and Garbo are among potential area were availability of wild fruits very high. These valuable wild edible fruits remain undocumented in the region particularly in the shrub land. Indigenous knowledge about the use of WEFs has not been sufficiently documented, leading to a cultural erosion of their uses. This situation, greatly undermines their conservation and sustainable utilization. Therefore, this study is designed to research the wild edible fruits diversity and their traditional uses for local livelihood in Dollo, Qorahay and Nogob zones, Somali region, Ethiopia.

# **MATERIAL AND METHODS**

## Study area

The present study was carried out in 3 districts from Dollo, Nogob and Korahy (one district per each zone) selected due to their potential after a thorough discussion with locals. As the aim of this particular research was to study wild edible fruits bearing species, further discussions were made focused on the availability, abundance and distribution of the study species.

Kabri dahar district from Korahey, Garbo district From Nogob and Warder district from Dollo were selected. The selected study sites were found to be have the best habitats that harbour most of wild edible fruits species with good abundance.

## Data collection

### Vegetation

Transect walk and field observations were carried out to select representative area for vegetation data collection and three transact lines were laid after site selection in Ado kebele. In each transect 10 plots with a size of 20m x 20m were established. 30 plots in three transects were established in the study area. 90 plots in each site were surveyed for wild edible fruit bearing species. In each plot data of diversity, frequency and abundance of tree, tree/shrub and shrub species rooted in all sample plots was collected.

####  Sampling procedure and determination of sample size

**Selection of household respondents**

A multi-stage sampling procedure was used to select households. In the first stage three districts with abundance and distribution of the species were selected and in the second stage six kebeles were selected from two districts. Then the number of households who are native to the district and are well acquainted with the socio- economic uses of the gum and resin in the area were selected based on total number of households as per the formula developed by Green (1991).

N ≥ 50 + 8m----------------------------------------------------------------------------- (1)

N= Sample size required

 m= Variables/predictors (in our case, the variables were 10).

The number of households (N) selected were 130: N ≥ 50 + (8\*10) =130.

50, 45 and 45 households were randomly selected from Warder, Qabridahar and Garbo districts respectively.

##  Data collection

Close and open-ended questionnaires in native language were developed and face to face semi-structured interviews were under taken to assess the factors affecting wild edible fruit bearing species. 10 key informant interviews and 12 focus group discussions were conducted on the vegetation status, production, traditional uses, challenges faced and factors affecting the species production and conservation. The information generated here was used to validate the information collected from household respondents.

## Data analysis

Data was analysed by descriptive statistics such as frequencies and percentages to analyse the demographic characteristics of the house hold. Shannon diversity index was used to compute species diversity at the different sites.

**RESULTS AND DISCUSSION**

**Demographic and Socioeconomic characteristics**

130 samples completed the interview. Among these 30% were female respondents and 70 % were male. Average number of respondents family was about 6-10 which is about 44.6 (Table 1).

Observation Table No. 1. Demography of household respondents

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Alternatives** | **Total (n = 130** | **Percentage (%)** |
| Sex | Female | 39 | 30.0 |
|  | Male | 91 | 70.0 |
| Age  | 20-40 | 43 | 33.1 |
|  | 41-60 | 43 | 33.1 |
|  | 61-70 | 31 | 23.8 |
|  | >71 | 13 | 10.0 |
| Education | Illiterate | 107 | 82.3 |
|  | grade8-10 | 22 | 16.9 |
|  | >grade 12 | 1 | 0.8 |
| Household size | 1-5 | 28 | 21.5 |
|  | 6-10 | 58 | 44.6 |
|  | >10 | 44 | 33.8 |
| Land size | 0-3h | 77 | 59.2 |
|  | 4-5h | 40 | 30.8 |
|  | >6h | 13 | 10.0 |

Figure 1. Diagram showing comparative numbers of local users of wild edible fruit trees in the different localities selected

Wild edible fruit users in Warder and Kabri dahar were about 36% each, while in Garbo 11%.Non-user respondents in Warder, Kabridahar and Garbo were 14, 9 and 24% respectively.

Twenty WEFP species (herb, Liana’s shrubs and tree) were identified from Warder and Korahay. Eight families where identified, in terms of species richness. The dominant family was Apocynaceae with six species (25%) followed by Malvaceae five species (30%).

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Figure 2. Chart showing percent proportion of species belonging to different families reported during the present study

Observation Table No. 2. List of Wild edible fruit species

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Botanical name** | **Family** | **Vernacular name** |  **Habit** | **Parts used** |
| *Grewia penicillata* Chiov*.* | *Malvaceae* | Hohob | S | Fruit |
| *Grewia tenax* (Forssk.) Fiori | *Malvaceae* | Dhafaruur | S | Fruit |
| *Grewia villosa* Willd*.* | *Malvaceae* | Gomesh | S | Fruit |
| ???? | *Hydnoraceae* | Ciid | S | Fruit |
| *Gardenia fiorii*Chiov*.* | *Apocynaceae* | Himir | S | Fruit |
| *Cordia sinensis*Lam*.* | *Boraginaceae* | Madheedh | S | Fruit |
| *Givotiagosl ?????* | *Apocynaceae* | Gosey | S | Fruit |
| *Ziziphus mauritiana*Lam*.* | *Rhamnaceae* | Gob | T | Fruit |
| *Commelina* sp. | *Tiliaceae* | Kordhis | S |  |
| *Cucumella kelleri* (Cogn.) C. Jeffrey | *Cucurbitaceae* | Uneexo | H | Bud/root |
| *Cynanchum* sp.  | *Apocynaceae* | Dombir | H | Bud/root |
| *Pterodiscus speciosus*Hook*.* | Pedaliaceae | Cialal | H |  |
| ??????? | *Rubiaceae* | Jacjacle | Sh |  |
| *Cyperus obtusatus* (J.Presl & C.Presl) Mattf. & Kük. | *Cyperaceae* | Goon | H |  |
| *Ehicostemal**ASKAX (Askah) N Glossonema boveanum Decne. Asclepiadaceae. ---) N* *Giossonema thruppii Oliv. Asclepiadaceae. - ---) N,Og* *Glossonema revoilii Franch. Asolepiadaceae. - ASKAX-GEEL (Askah-gel) N* *Pentarrhinum insipidum E. May. Asclepiadaceae.* | *Apocynaceae* | Askax | H |  |
| *Hydnora abyssinica* Schweinf*.*  | *Tiliaceae**Hydnoraceae* | Liko | H |  |
| *Hydnora cornii* Vaccaneo*.* | *Hydnoraceae* | Like |  |  |
| *Capparis tomentosa* Lam*.* | *Capparidaceae* | Like |  |  |
| *Dobera glabra* (Forssk.) Juss. ex Poir. | *Apocynaceae* | Garas | T | Fruit/seed |
|  | *Tiliaceae* | Madaxbuq | L |  |
|  | *Malvaceae* | Kidi | T | Fruit |
|  |  | Midhacas | S | Fruit |
|  |  | Dhiin | S | Fruit |
|  |  | Ilcas | S | Fruit |
|  |  | Dhambac | S | Fruit |
|  |  | Maygaag | S |  |
|  |  | Mindoy | S |  |

Observation Table No. 3. Species richness, diversity of tree/shrub species in three districts of Somali Region

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Diversity and Richness** | **Warder** | **Qabridahar** | **Garbo** |
| **1** | Species richness (WEF bearing spp.) | 18 | 20 | 16 |
| **2** | Species evenness | 2.843 | 0.957 | 0.874 |
| **3** | Shannon-Wiener diversity of wild edible fruit spp. | 0.952 | 2.867 | 2.423 |

As per table 3, Kabri dahar has the highest species richness (20) ,followed by Warder (18) and Garbo (16). The species were more even in Warder 2.843 followed by Kabri dahar about 0.957 and Garbo 0.874 but in species diversity Wiener diversity index has identified that wild edible fruit species was the most diverse in Kabri dahar followed by Garbo and then Warder district.

Observation Table No. 4. Frequency, relative frequency, abundance and relative abundance of tree/shrub species at Warder district

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Local name of species in (Somali)** | **F** | **r-f** | **Abundance** | **r-abundance** |
| *Hohob* | 29 | 17.791 | 1122 | 79.40 |
| *Dhafaruur* | 22 | 13.496 | 67 | 4.74 |
| *Gomesh* | 20 | 12.269 | 40 | 2.830 |
| *Ciid* | 20 | 12.269 | 59 | 4.175 |
| *Himir* | 14 | 8.588 | 30 | 2.123 |
| *Madheedh* | 12 | 7.361 | 31 | 2.193 |
| *Gosey* | 6 | 3.680 | 11 | 0.778 |
| *Gob* | 5 | 3.067 | 6 | 0.424 |
| *Kordhis* | 3 | 1.840 | 4 | 0.283 |
| *Uneexo* | 2 | 1.226 | 2 | 0.141 |
| *Dombir* | 4 | 2.453 | 6 | 0.424 |
| *Cialal* | 5 | 3.0674 | 9 | 0.636 |
| *Jacjacle* | 3 | 1.840 | 4 | 0.283 |
| *Goon* | 5 | 3.067 | 5 | 0.353 |
| *Askax* | 1 | 0.613 | 1 | 0.070 |
| *Liko* | 4 | 2.453 | 7 | 0.495 |
| *Garas* | 5 | 3.067 | 5 | 0.353 |
| *Madaxbuq* | 3 | 1.840 | 4 | 0.283 |
| Total | 163 | 100 | 1413 | 100 |

In the table 4, in Warder district 18 wild edible fruit species were recorded. The three dominating species were *Hohob,* (which is commercialized and known as the most attractive wild fruit in the area), *Dafaruur* and *Ciid*. The rarest species was *Askax*.

Obsrvation Table No. 5. Frequency, relative frequency, abundance and relative abundance of tree/shrub species at Qabridahar district

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Local name of species in (Somali)** | **Frequency** | **R-frequency** | **Abundance** | **R- Abundance** |
| *Hohob* | 28 | 9.621 | 276 | 10.538 |
| *Dhafaruur* | 27 | 9.278 | 305 | 11.645 |
| *Gomesh* | 21 | 7.216 | 192 | 7.331 |
| *Ciid* | 24 | 8.247 | 207 | 7.903 |
| *Himir* | 21 | 7.216 | 182 | 6.949 |
| *Madheedh* | 22 | 7.560 | 156 | 5.956 |
| *Gosey* | 13 | 4.467 | 124 | 4.734 |
| *Gob* | 12 | 4.123 | 121 | 4.620 |
| *Kordhis* | 12 | 4.123 | 68 | 2.596 |
| *Uneexo* | 9 | 3.092 | 93 | 3.550 |
| *Dombir* | 11 | 3.780 | 147 | 5.612 |
| *Cialal* | 12 | 4.123 | 131 | 5.001 |
| *Jacjacle* | 23 | 7.903 | 118 | 4.505 |
| *Goon* | 7 | 2.405 | 79 | 3.016 |
| *Askax* | 9 | 3.092 | 74 | 2.825 |
| *Liko* | 5 | 1.718 | 80 | 3.054 |
| *Garas* | 6 | 2.061 | 74 | 2.825 |
| *Madaxbuq* | 17 | 5.841 | 62 | 2.367 |
| *Dheen* | 7 | 2.405 | 83 | 3.169 |
| *Kidi* | 5 | 1.718 | 47 | 1.794 |
| Total | 291 |  | 2619 |  |

As mentioned in the table 5, in Garbo district 16 different wild edible fruit species were recorded and the most dominating species were *Defaruur, Hohob* and *Ciid*. The rarest species was *Kidi.*

Observation Table no. 6. Frequency, relative frequency, abundance and relative abundance of tree/shrub species at Garbo district

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Local name of species in (Somali) | F | r-f | Abundance | r-abundance |
| *Hohob* | 30 | 6.818 | 415 | 9.290 |
| *Ciid* | 30 | 6.818 | 1434 | 32.102 |
| *Gombesh* | 30 | 6.818 | 329 | 7.3651 |
| *Jacjacle* | 30 | 6.818 | 279 | 6.2458 |
| *Askax* | 28 | 6.363 | 144 | 3.2236 |
| *Uneexo* | 27 | 6.136 | 165 | 3.6937 |
| *Dhambac* | 26 | 5.909 | 183 | 4.0967 |
| *Dhafaruur* | 27 | 6.136 | 214 | 4.7906 |
| *Mindoy* | 26 | 5.909 | 182 | 4.0743 |
| *Midhacas* | 27 | 6.136 | 158 | 3.5370 |
| *Dhiin* | 25 | 5.681 | 149 | 3.3355 |
| *Dombir* | 24 | 5.454 | 131 | 2.9326 |
| *Madheed* | 25 | 5.681 | 142 | 3.1788 |
| *Ilcas* | 28 | 6.363 | 166 | 3.7161 |
| *Maygaag* | 29 | 6.590 | 183 | 4.0967 |
| *Himir* | 28 | 6.363 | 193 | 4.3205 |
| Total | 440 | 100 | 4467 | 100 |

As mentioned in the table 6, in Garbo district, 16 wild edible fruit species were recorded and the top three dominating species were *Ciid, Hohob* and *Gombesh*. The rare species were *Dombir, Madheedand* and *Dhiin.*

**Traditional/Indigenous uses of wild edible fruit species**

Ten tree fruit species was identified as most valuable by the respondents based on their food, medicinal and other values. The various uses of these species are summarized in table 7. The traditional methods of fruit collection are picking, shaking stems and throwing objects to dislodge the fruits or even destructive harvesting as branches were lopped to harvest fruit in a short time. Most of the wild edible tree fruits in districts were eaten fresh and raw. Wild edible tree fruits play a vital role in subsistence, economy and livelihood of people in these small kebeles. A variety of these fruits with enormous economic potential can be seen grown in the districts. These fruits are used for food traditionally by native people as nutritional diet. Some fruit species are commercially important and also have medicinal value such as *Grewia penicillata* Chiov*.* and *Grewia tenax* (Forssk.) Fiori. *Hydro abyssinica???* and many others were used for spices and pickles along with medicinal and other uses. These species are free and accessible to the local community. Some of these food plants are supplementary nutrition.

Observation Table No. 7. Some wild edible tree fruit species and their indigenous uses

|  |  |
| --- | --- |
| **Botanical Name** | **Indigenous uses** |
| *Zizphusmauritiana* | Fruits edible, fodder, fuel wood, leaves are good ingredients for composts. It is highly valued for constriction, agricultural implements etc |
| *Grawiapenicilata* | Fruits are edible. Pulps of the fruits are sweet and juicy and can be stored for a longer time due to its high keeping quality. the fruits are used in treating constipation. Also used as house constriction and fodder |
| *Grewiatenax* | Fruit extracts used for curing constipation and steams used for poles. |
| *Grewiavillosa* | Fruits edible, leaves are good fodder. Seed is extracted from the fruit and used locally. It is believed to have medicinal properties and prevents constipation. |
|  *Hydro abyssinica* | Root or bud edible, traditionally it is used for the tooth pain and treatment of ellagic, the paste of it provides delicious fruit |
| *Dobera glabra* | Fruits edible, leaves are good fodder. Seed is extracted from the fruits and used as food after cooked. |
| *Cordia sinensis* | Fruits edible, fairly good nutritious fodder and fuel wood, the fruits and the leaves give a dark green dye |
| *gardenia florii**`* | Fruits are edible, and highly valued as a source of traditional fruit.  |

## Role of Wild edible fruits enhancing rural livelihood

According FG discussants, fruit trees make a variety of contributions to households’ livelihood. Direct consumption of the fruit has nutritional benefits while fruit sale is an important source of income particularly for women, children and old men. The wild fruit trees provide a range of environmental benefits and contribute to development of permanent wild fruits.??????

In this study, Respondents have exposed that wild edible fruit products enhance resilience to drought through different mechanism????. Respondents also indicated that wild edible fruit could play a great role in enhancing drought impact by enhancing income, serving as a source of food, micro-climate amelioration as well as environmental protection both from wind or rain by conserving soil and water.

**Marketing of Fruit Products**

Marketing of wild fruit products is studied by considering the situation in the district. As per the findings of the field visit, marketing of various fruit products such as *Zizphusmauritiana, grawiapenicilata, grewiatenaxand grewiavillosa*was carried out. According to FG discussants signposted to their confab??? that traditional marketing system is used via users of wild fruit to sell fruit product. In districts as the FGDs asserted, the local collectors usually interact with farmers on one-to-one basis, either buying from them at the field or at roadsides near villages markets where many fruit user are located. Local collectors, provincial wholesale markets and street market provide the most convenient way that users sell their produce. User respondents in the district generally distribute their main fruit crops to collectors (60%) and local markets (40%). These buyers usually supply fruit to larger smuggling market systems, and trade to Somalia and Somali land towns. This study is consistent with previous study of Bhawat (2017) that fruit farmers in Chanthaburi used traditional markets to sell the fruit products.

As the FGDs revealed, prices of the fruit products change through season. The prices of fruit during the last year is shown below.

Observation Table No. 8. Last year price of the fruits in the districts

|  |  |  |  |
| --- | --- | --- | --- |
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|  |  |  |  |

Focus groups discussants as well as the key informants stated that the price of the fruit products for the last five years have skyrocketed, because of the grave famine and starvation which has occurred in the region. The user respondents asserted in to their words that the price rise for the last year helped them to come over the drought and climate shocks. The asset or the income generated enabled the households to withstand drought consequences. According the KIs, wild fruits also play a great role on providing products and services. Those in the area provide food, fodder and shade for both animals and households.

**Major challenges affecting wild edible fruit species**

* poor market access,
* lack of skill in collection of fruit products
* lower price for fruit products
* inaccessibility of production area
* poor knowledge on production process, storage and quality of fruit product
* limited financial services
* absence of support from GOs and NGOs

# **CONCLUSION AND RECOMMENDATION**

Wild edible fruit species have an appreciable role in supplementary food provision, income generation, diversification and nutritional security in different parts of Ethiopia. Moreover, the species are multipurpose, thereby important for fodder, fuel-wood, and timber production among others. However, the species are underutilized and threatened by growing harvesting pressures in natural ecosystems. Many edible fruit-bearing wild species are in the early stage of domestication by farmers with low production. Most indigenous fruit species have not been brought up to their full potential in terms of quality, the scale of production, and the market indicates a pressing need for domestication and improvement of some wild edible fruits for increased production, diversifying income for small-scale farmers, sustainable utilization, and conservation of the species. Number of promising wild edible fruit species for domestication and wider cultivation is considerable in the region. A review identified widely utilized and priority wild edible fruit species based on their wider utilization, preference by the farmers/ user community, product marketability, and conservation needs for the species. Widely utilized and marketed priority wild edible fruit species for domestication and improvement include Zizphusmauritiana, grawiapenicilata, grewiatenaxand grewiavillosa.

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