

Effect of Wild Edible Fruit Plants on Socio-Economic Factor in West Hararghe Zone

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Abstract

Wild edible fruit plants are vital standing in worldwide as a subsidiary food hamper on regular mood. They are resources of existence for countryside societies with food and feed consumption, particularly during the times of scarcity, starvation, shocks, and dangers. So the study intended to evaluate, identify, and document scientific data, to get the constraint and opportunity potential of Wild edible fruit plants. Implementation through assessed species, partly used, habitat, mode of uses, flowering months, fruiting months, and factors of threats of wild edible fruits plants. In addition to food values, these floras deliver varied welfares to the existing public for income, fuel wood, barrier, manufacture, remedy, and feedstuff. The top five highly impersonated wild edible fruit plant species by respondents were *Psidium guajava*, *Mimusops kummel*, *Carissa spinarum* L., *Rosa abyssinica*, *Ficus sycomorus*, and *Oncoba spinosa* forssk. However, most of them were threatened by anthropogenic factors through misconception utilities. The threat factors such as land degradation and grazing, clearing of forests for agriculture, fire, timber and charcoal, Stem, leaves, root, and bark harvest. To alleviate, the entire threat of wild edible fruit plant species; a community-based forest management system, awareness creation, and growing of wild edible fruit plant species at farms and homesteads level, is mandatory for any forest resource users. Therefore; the most threatened and unregenerated wild edible fruit plant species of the study areas main concern should be given the acute collection, in-situ and ex-situ conservation, and promotion of on farm husbandry in the practice of agroforestry schemes. Further investigation should be considered on the collection, nutrient content analyses, in-situ and ex-situ conservation, wise utilization, and popularization of Wild edible fruit plants through forest management. These are vital points to be deliberated forward.

Keywords: *Threat Factors, Anthropogenic Effect, Constraint and Opportunity.*

Introduction

Wild edible fruit plants mention as a species that are neither cultured nor tame, which are obtainable from their uninhabited natural home and casted-off as a bases of sustenance (Beluhan, & Ranogajec, 2011). Although the main requirement of the most farming people on essential crop plants such as wheat, maize, and rice, the conservative consumption of wild edible plant products are casted-off as sustenance. They are ultimate food gaps and play a significant character in upholding livelihood safety for numerous public in unindustrialized nations during recurrent food scarcities, as backup food assistance (Balemie, Kebebew, & Asfaw, 2004). Furthermore, the native Wild edible fruit plants are adjusted to the indigenous philosophy and environment safety through natural mounting custom with a minutest prerequisite of

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exterior inputs and conservation such as management, fertilizer, and insecticides are the key benefit (Ruffo, Birnie, & Tengnäs, 2002).

Even though Wild edible fruit plants can effortlessly be combined into justifiable agricultural schemes by the widely held of the countryside residents, they are still not valued as cultured fruit trees, such as mango, avocado, papaya, and orange that caused by lack of scientific provision. On the other hand, several countries have given significance to the documenting of Wild edible fruit plants with the association of indigenous knowledge. Countries such as India, Mexico, Bolivia, Spain, and Turkey have in-depth Ethnobotanical evidence on Wild edible fruit plant's usefulness. By contrast, in Ethiopia conducted on Wild edible fruit plants benefits and nutritional analyses were superficial and addressed irrelevant ration of the country (Lulekal, et al., 2011).

In view of that; traditional facts of wild plants, fundamentally in Africa and predominantly in Ethiopia is threatened of being lost, as habits, living structures, and the regular setting change (Ruffo, Birnie, & Tengnäs, 2002). This study also reflected that the endangered of Wild edible fruit plants is due to more anthropogenic factors, such as land degradation and grazing, clearing of forest for Agriculture, fire, timber and charcoal, Stem, leaves, root, and bark harvest. These factors might be occurred as a result of care failure knowledge especially among the new generations, modernization, and urban dwellers to preserve Wild edible fruit plants to be valued for upcoming age group. Therefore, they desire to be conserved and maintained through sustainable utilization without jeopardizing it for future generations (Teketay, et al., 2010).

Commonly, irrespective of their significance; Wild edible fruit plants are tackled with serious intimidations of anthropogenic and environmental dynamics in the country because of farming expansion, overgrazing/overstocking, deforestation, and suburbanization (Addis, 2009; Asfaw, 2009; Tilahun, & Mirutse, 2010). In Ethiopia, more than 80% of the inhabitants are countryside; the people subject to their outmoded knowledge on utility of Wild edible fruit plants with superficial forms without comprehensive credential involvement, management, and utilization in their environments. This is predominantly exact in the study area of West Hararghe Zone; where rural publics of the area are contingent on Wild edible fruit plants for numerous devotions such as supplementary food, feed during bad times, and income and medicine with barely.

Nevertheless, there are no any investigates so far done, on Wild edible fruit plants in the study area to be as the incentive for legislators, NGOs, and end users to sustain consumption and management without jeopardizing the future generation. Therefore; the study intended to identify, evaluate and document Wild edible fruit plants associated with Ethnobotanical knowledge of indigenous communities on part used, habitat, perception, threat factors, linked to usefulness and controlling as well as to identify the constraint and opportunity potentials of Wild edible fruit plants as to be input for West Hararghe community and other related areas of the country.

Materials and Methods

Selection of the Study Area

Earlier of socio-economic assessment, from the study Zone, Weredas which have possible on growing of edible fruit trees and shrub species could be designated. Based on the info assembled, three potential Weredas from each agroecology zones could be selected. From three selected Weredas (Daro-Lebu, Chiro, and Gumbi-Bordode), from each two Kebeles were selected. A total of six kebele (Metegudesa and Jilbo from Daro-Lebu Wereda, Halewagora, and Nejabas from Chiro Wereda and Burqa Berkele and

Legarba from Gumbi Bordode Wereda could be designated and casted off for the socio-economic examination.

Description of the Study Areas

The study was taken in the west Hararghe zone, at three Weredas (Namely Daro-Lebu, Chiro, and Gumbi-Bordode). From each of the selected Weredas; 2 Kebeles and over 6 Kebeles were selected to obtain all necessary information about edible fruit tree and shrub species of the investigated areas.

Daro-Lebu Wereda is one of Wereda of West Hararghe zone in Oromia Regional State. It is located at 80 15'00" N-80 43'00" N latitudes and 400 17'00" E- 400 45'00" E longitudes. The Wereda is bordered by Habro in the northeast, East Arsi Zone, in the south-west, Hawi Gudina Wereda, in the north, Anchar Wereda, in the north, and Boke Wereda in the east. Daro-Lebu Wereda located at a distance of 118km and 478km from the Zonal town is Chiro and Addis Ababa; respectively. The average altitude is (1147-2300 m.a.s.l.).

The basic agro-climatic conditions are Weyina-dega (44%) and Kola (56%). Mechara Agricultural Research Center receives on average during the belg rainy season (February 26, March 90, April 157, and May 128mm) and the kiremt rainy season (June 101, July 144, August 158, and September 127mm). The mean annual temperature is 21°C with a mean annual minimum temperature of 15°C and a maximum of 28°C Mechara Agricultural Research Center. The farming system of Daro-Lebu Wereda is mixed farming. The main types of crops grown were Cash and cereal crops such as chat, coffee and teff, barley, maize, sorghum, etc. respectively.

Daro-Lebu had rapid population changes which demanded expanding of agricultural land, fuel wood consumption, and residential area. The worda had a total human population of 364613 of which 186097 (51.04%) are male and 178514.04 (48.96%) are female. Out of the total population, 13.56 % are urban dwellers. Population density is 82.53 persons per square kilometer and had a total area of 441788.7 hectares (4417.95/km²). The land use pattern of Wereda that cultivable land 86.8 %, pasture (1.8%), forest (4.14%), and remaining (7.26%) is considered mountainous and swampy.

Chiro Wereda is located in the West Hararghe Zone of the Oromia National Regional state at about 324 km East of Finfinne, the capital city of the Oromia regional state. The capital town of the Wereda is Chiro, which is also the capital town of the Zone. Normally the Wereda is divided into three major agro-ecological zones. These are Lowland with 22 kebele, Midland with 13 kebele, and highland altitude with 4 kebele. The Wereda bordered Mieso in the North, Gemechis in the South, Guba-koricha in the West, and Tulo in the East. Mixed farming is the dominant practice in the Wereda (98%) and the rest is toral production system (2%).

The Wereda is founded at an average altitude between (1100-2500 m.a.s.l.). From the total land area/topography of the Wereda, 45% is plain and 55% is a steep slope. The Wereda is mainly characterized by steep slopes and mountains with rugged topography, which is highly vulnerable to erosion problems.

The Wereda has a maximum and minimum temperature of 23 °C and 12 °C respectively and maximum and minimum rainfall of 1800 mm and 900 mm respectively. The rainfall type is bimodal and erratic. The main rainy season is from June to September for the highland and midland areas and from March to April for the lowland. The short rainy season is from March to May for the highland and midland and for the lowland around July. The amount of rainfall is relatively adequate in the highland and midland than in the lowland.

Soil types of Wereda are sandy soil, clay soil (black soil), and loamy soil types that are 25.5%, 32%, and 42.5%; respectively according to 2003 E.C. data from the Office of Agriculture and Rural Development.

The soil types differ with the topography mainly black soils are observed in the highland and midlands, while one can see red soil in the lowland areas. The total land area of the Wereda is 70,912.8 hectares out of which 31659.1 hectares is cultivated land, 30667.4 hectares is uncultivated land, 8104.3 hectares is covered by forest, and 482 hectares is grazing land. Unavailability of land is common in Wereda. Among the main causes is the increasing population density at a very alarming rate and land fragmentation due to high number of teenagers in the household. The average land holding eminence in the area is 4 (0.5-0.25 ha).

Gumbi-Bordode Wereda is found in the West Hararghe Zone of the Oromia National Regional state at about 300 km East of Finfinne, the capital city of Oromia regional state, and at the longitude, 09° 13' 05.2" North and 040° 45' 27.7" East. The capital town of distract is Bordode, which is located at 65 km North of Chiro, the capital town of the zone. The Wereda has only one major agro-ecological zone which is lowland. In the Wereda more of the farming community is agro-pastoralist covering 98% and 2% is postural community.

The Wereda is founded at an average altitude of 1310 m.a.s.l. Almost about 95% of the Wereda has plain topography (data from the Office of Agriculture).

The Wereda has a maximum and minimum temperature of 28 °C and 16 °C respectively and maximum and minimum rainfall of 750 mm and 500 mm respectively (data from Office of pastoral and Agro-pastoral Development of the Wereda). The rainfall type is mono-modal and erratic. The main rainy season is from mid-June to mid-August and the amount of rainfall is inadequate.

In the Wereda there are sandy soil, clay soil (black soil), and loamy soil types cover 10%, 75%, and 15%; respectively that data from the Office of Agriculture and Rural Development.

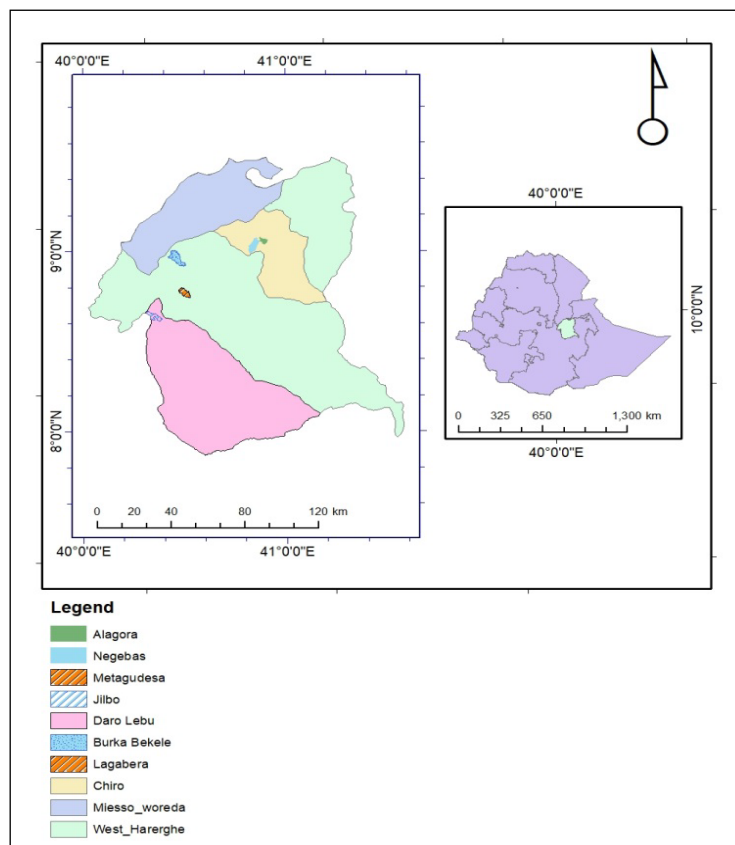


Figure 1. Study Area Map

Method of Data Collection

Socioeconomic Survey

The socioeconomic survey involved numerous data gathering procedures, such as key informer conversations, semi-structured inquiry form and focus-group deliberations. Semi-structured discussions were used with 120 defendant households that were randomly designated from 3 selected Weredas of the zone. From each of the selected Weredas; 2 kebeles were selected to obtain all essential info about Wild edible fruit plants of the study areas. This is an actual method that can even be used with children or uneducated people. All sampled households were requested autonomously with similar inquiries to freely name orally all the Wild edible fruit plants they know as it comes into their reminiscence. During the examination took place; diverse socio-economic issues (age, household size, sex, education, etc...) of the respondents were acknowledged. In addition to the household discussions, significant information was collected from key informers. These key informers were those alive in the study area for a long time and who have a good thoughtful of Wild edible fruit plants.

The collected data were providing an overview of the socio-economic and biophysical location of the study areas. As well, field visit was applied at each of the study areas/Kebele along the border of the natural forest near the study area to cross-check the reality and to observe the potential of all wild edible fruit plants for more info.

By using the overhead numerous data collection systems, essential data were collected to know indigenous knowledge of rural communities on utilization, role in food security, opportunity, constraints, perception, and factors of the threat of wild edible fruit plant species of the study areas.

Data analysis

The collected data were analyzed and employed with descriptive statistics, by Microsoft Excel and SPSS (Statistical Package for Social Sciences, version 16) to meet the objectives based on the given parameters.

Results and Discussion

Characteristics of Sample Household

Because of the country's cultural significance, men constituted the majority of the respondents in this study. Thus, 120 (91=76%) of the total responses were male, while the remaining (29=24%) were female. The survey result showed that the highest percentage of the respondents' age was found between 31-45 years (53%); while the lowest percentage was 66-70 years (5%) (Table 1). This indicated that the respondents were at a mature, adult age stage for data quality. The survey result showed that only 48% of the respondents were educated, while 52% were uneducated. The result of the household size of respondents indicated that the highest household size was 2-4 (59%); while the lowest household size was 10-12 (12%). The result of the agro-ecological zone of the study areas observed that (67%) was midland, while (33%) was lowland coverage.

The other main point is the result of farmland size showed that the highest percentage of farmland size was 0.13 ha (37%); while the lowest percentage was 2.5 ha (7%). This indicated that farmers suffered from farmland shortage.

Generally; socio-economic scenarios have an indirect impact on wild edible fruits neither managing nor destroying. For example; according to the respondents' responses; during the bad time, Wild edible fruit plants were eaten as food and feed. On the other hand; as a result of farmland shortage; there is the distraction of Wild edible fruit plants for agricultural expansion.

Table 1. Socio-Economics of Respondents' Information

Sex	Frequency	Percent	Average land holding in hectares	Frequency	Percent
Men	91	76	0.025 ha	28	23
Women	29	24	0.125 ha	11	9
Total	120	100	0.13 ha	44	37
Age			0.25 ha	11	9
18-30	22	18	0.5 ha	13	11
31-45	64	53	1 ha	8	7
46-65	28	23	2.5 ha	5	4
66-70	6	5	Total	120	100
Total	120	100	Agroecology zone		
marital status			Midland	80	67
Married	112	93	Lowland	40	33
Widowed	6	5	Total	120	100
devour	2	2	household size		
Total	120	100	10-12	14	12
Educational status			2-6	71	59
Non-educated	62	52	7-9	35	29
primary school	56	46	Total	120	100
secondary school	2	2			
Total 120		100			

Qualitative Description of Respondents on Wild Edible Fruit Plants

The respondents were asked crosscheck questions that were listed in (Table 2) below. The respondents were gotten from different sources those are from natural forests, river banks, farm boundaries, and postural lands.

The result of Wild edible fruit plants observed that the highest percentage source of Wild edible fruit plants was collected from the natural forest (34.2%); while the lowest source was collected from postural lands (9.2%).

The infusing factors of Wild edible fruit plants utilization were listed by respondents. The result of infusing factors of wild edible fruits indicated that the highest percentage (23.4%) was observed from supplementary food, feed, and income; while the lowest percentage (10%) was observed from Tradition and hunger of children during keeping of livestock (Table 2). This study in agreement with the other discoveries somewhere else indicates the supplementary role of Wild edible fruit plants needed during food gaps and famine (Abera, & Belay, 2022).

The role of Wild edible fruit plants in ecological and environmental values indicated that the highest value (35.1%) was observed from maintaining weather conditions and sustaining ecological balance, while the lowest value (16.6%) was recorded from attracting rainfall and making a green environment (Table 2).

The result of opportunities in utilizing Wild edible fruit plants indicated that the highest value (67.7%) was observed under the ability to grow naturally; while the lowest value (2%) was under income opportunity (Table 2).

The result of the limitation of Wild edible fruit plants indicated that the highest value (37%) was observed deforestation and overgrazing; the lowest observation (8%) was obtained from “Some of them have invasiveness manner” (Table 2).

The result of the trend of wild edible fruit plant production over the last 10 years observed that the highest value (90.8) was recorded as “decreasing”; while the lowest value (1.7) was observed as a “no change” alternative (Table 2).

The result on the perception of respondents in utilizing Wild edible fruit plants indicated that the highest value (41.7) was observed in “Seedlings have to be planted on farms and reduce deforestation”; while the lowest value (28.3%) was observed under “protected and sustained for future” (Table 2).

Some farmers are practiced limited management actions (growing in farms and homesteads). This is an indication of the community understands the value and brings under control Wild edible fruit plants. However, the controlling practices are inadequate compared to other staple food plants. Moreover, Wild edible fruit plants gathered in natural environments without care of the management and exposed to anthropogenic threats, which are deterioration of forest products, being choice/alternative food, cultural ignorance and lack of consciousness about the nutritional value of the products could make them being ignored for managing. This study in line with Fentahun, & Hager (2008) report a lower level of management for Wild edible fruit plants (Tebkew, Asfaw, & Zewudie, 2014).

Table 2. Qualitative Description of Respondents about Wild Edible Fruits across the Study Areas

1	Source of Wild edible fruit plants	Frequency	Percent
	✓ Natural forests	50	34.2
	✓ Around river area	33	27.5
	✓ Around farm boundary	26	21.7
	✓ On Pasture land	11	9.2
	Total	120	100
2	Influencing factors to use Wild edible fruit plants		
	✓ It is sweaty, Medicinal, and has no side effect	13	11.7
	✓ Supplementary food, feed& income	26	23.4
	✓ Supplementary food, feed& income during hanger	25	22.5
	✓ Tradition and hunger of children during keeping livestock	12	10.8
	Total	76	100
3	Role of Wild edible fruit plants in ecological and environmental values		
	✓ Attract rainfall and make a green environment	19	16.6
	✓ Improve soil and water conservation	34	28.3
	✓ Maintain climate change	24	20.0
	✓ Maintain weather conditions and sustain ecological balance	32	35.1
	Total	120	100
4	Opportunities in utilizing Wild edible fruit plants		
	✓ Ability to grow naturally	65	67.7
	✓ Income opportunity	2	2.0
	✓ Self-distribution	29	30.2
	Total	96	100
5	Constraints in utilizing Wild edible fruit plants		
	✓ Climate change	13	11
	✓ Deforestation and overgrazing	44	37
	✓ Some of them have an invasiveness manner	9	8
	✓ Lack of enough information	14	12
	✓ Agricultural expansion	40	33
	Total	120	100
6	The trend of Wild edible fruit plants production over the last 10 years		
	✓ Increasing	9	7.5
	✓ Decreasing	109	90.8
	✓ No change	2	1.7
	Total	120	100
7	Perception of respondents in utilizing Wild edible fruit plants		
	✓ All people should conserve those trees/shrubs	36	30.0

✓	Have to be protected and sustained for future	34	28.3
✓	Seedlings have to be planted on farms and reduce deforestation	50	41.7
	Total	120	100

Operational Description of Wild Edible Fruit Plants on Adaptation, Part Used, Habitat, Mode of Use, Flowering and Fruiting Months

The respondents were asked crosscheck questions that were listed in (Table 3) below. The respondents answered the questionnaires about wild edible fruits about habituate, part used habitat, mode of use, flowering, and fruiting months. In these processes; the adaptation result of wild fruits showed that the highest percentage (72%) was found from wild habituation; while the lowest percentage (16%) was from both wild /domestic habituation (Table 3).

In terms of part used of the wild fruits revealed that the highest percentage (98.2%) of part used was got from the fruit and this result coincides with Demise, & Asfaw, (2020), their study findings in a different part of Ethiopia reported that most of the Wild edible fruit plants' parts used were fruits; while the lowest percentage (1.8%) was got from /leaf/bark/root (Table 3). This study is in line with the work of Adal, (2004) that fruit uses accounted for 80% of wild edible food.

On the other hand, this is differentiated with the discovery of Tilahun, & Mirutse, (2010) studied in southern Ethiopia, that most Wild edible fruit plants were used as vegetables by harvesting their leaves, young twigs, leaf and stem. The other disagreement finding of this study reported by Ali-Shtayeh, et al. (2008) was that most of the edible plant parts were leaves that were used up after cooking.

The result on the habitat of wild edible fruit" species observed that the highest percentage (73.2%) was indicated from shrubs species; while the lowest percentage (3.6%) was got from herb species (Table 3). This study is in line with Ameni, (2003) that the most harvested wild edible fruits were recorded from shrubs than other categories.

The result on the mode of use of Wild edible fruit plants indicated that the highest percentage (96.4%) was used fresh; while the lowest percentage (3.6%) was gotten undercooked (Table 3). This study agrees with the findings of Balemie, & Kebebew, (2006), who reported that raw fruits contain the largest percentage of raw edible fruits. Raw edible fruits might be a good source of nutrients that does not lose their nutrients fresh; while boiled or cooked, some vital nutrients might be lost. The other results on flowering and fruiting months of wild edible fruits observed that the highest percentage (35.7% and 14.4%) months were April and July, and October and November, respectively; while the lowest percentage (1.8% and 7.1%) months were flowered in February, September, July, February, and April, respectively (Table 3).

In the parameters, in which Wild edible fruit plants correlated and related with adaptation, part used, habitat, mode of use, flowering, and fruiting months were well stated and counted in (Appendix Table 1).

Table 3. Structural Descriptions of Wild Edible Fruits in Percent on Habituate, Part Used, Habitat, Mode of Use, Flowering Months, and Fruiting Months

Adaptation of the species	Frequency	Percent	Flowering Months	Frequency	Percent
Wild	46	72.0	April and July	20	35.7
wild /domestic	9	16.1	April and May	7	12.5
Total	56	100.0	February	1	1.8
Part of the species used			February and April	2	3.6
Fruit	55	98.2	January	3	5.4

Fruit/leaf/bark/root	1	1.8	January and February	2	3.6
Total	56	100.0	June	4	7.1
Habitat of the species			March	2	3.6
Herb	2	3.6	May	15	26.8
Shrubs	41	73.2	Total	56	100.0
Tree	13	23.2	Fruiting month		
Total	56	100.0	October & November	8	14.3
Mode of uses			June	6	10.7
as it is	54	96.4	April	4	7.1
as it is/cooked	2	3.6	February	4	7.1
Total	56	100.0	January	4	7.1
			July	4	7.1
			March	4	7.2
			May	4	7.2

Association between Socio-Economic Factors and Wild Edible Fruit Plants' Parameter

Age correlated positively with household size ($p < 0.006$) which is statistically significant, and the other negatively correlated that Land hold size with Age ($p < -0.004$), and Education status with household size ($p < 0.031$) which showed statistically significant in (Table 4). A positive correlation indicated that both variables are increased with each other. In this situation, as age ranges rise or drop concurrently, household size increases or decreases (Table 4). On the other hand, a negative correlation indicates that as one variable decreases, the other increases. Therefore; when lands hold size increases; age categories decrease; and when education status increases; household size decreases (Table 4).

Shrubs correlated with fruits; direct uses correlated with trees and shrubs; food correlated with fruit, shrubs, and direct uses; feed correlated with fruit and direct uses; income correlated with fruit and direct uses; pasture

correlated with fruit, trees, shrubs, direct uses, food and income; farmers correlated with fruits, shrubs, direct uses, food, income, and pasture; young collectors correlated with fruits, trees, shrubs, direct uses, food, income, pastures, and farmers; men collectors correlated with fruits, direct uses, food, income, pastures, and farmers and

young; women collectors correlated with fruits, shrubs, direct uses, food, income, pastures, farmers, young and men; elder collectors correlated with feed are highly significant ($P < 0.0001$) and positively associated under the operational description of Wild edible fruit plants based on a given parameter (Table 4).

On the other hand, Land degradation correlated with farmers; forest clear for Agriculture correlated with fruit, trees, direct uses, food, income, pastures, farmers, young and women; fire and charcoal correlated with women are highly significant ($P < 0.001$) and positively associated under factors of threat for Wild edible fruit plants based on the given parameters (Table 5 Appendix).

**Table 4. Pearson Correlation between Socio-Economic Factors
(N = 120), Prob > |r| under H0: Rho=0**

Correlation with:	Sex	Age	Household size	Land hold size	Education status
Age	-0.006				
	0.949				
Household size	-0.031	0.251			

	0.740	0.006			
Land hold size	-0.054	-0.319	-0.06		
	0.56	0.004	0.514		
Education status	-0.083	0.079	-0.198	-0.02359	
	0.370	0.392	0.031	0.8033	

Conclusion and Recommendation

Wild edible fruit plants have a considerable character in complementary food delivery, revenue generation, modification, and nutritional security in altered parts of the country. Furthermore, the species are versatile, thus significant in supplementary food delivery, fodder, fuel-wood, income generation, biodiversity conservation, and nutritional security in various regions at the bad and good times among others. However, the species are underutilized and endangered by misconception factors of anthropogenic pressure in natural ecosystems. The misconception factors are land degradation and grazing, clearing of forest for agriculture, fire, timber and charcoal, Stem, leaves, root, and bark harvest.

Therefore, a community-based forest management system, awareness creation, and growing of wild edible fruit plants on farms and homesteads level are mandatory for any users to save such kinds of delusion problems. As well; supporting and promoting indigenous knowledge of farmers to wards encourage domestication, and in-situ and ex-situ conservation of Wild edible fruit plants through awareness creation, value addition, and commercialization should be taken as mandatory. All these arguments should help to maximize the multidimensional advantage of communities; while contributing to the sustainable utilization of wild edible fruit plant species eco-friendly.

Specifically; the most threatened and under-regenerated Wild edible fruit plant species of the study area priority should be given to the critical collection, domestication, in-situ and ex-situ conservation, and promotion of on-farm cultivation in the form of agroforestry systems.

The research gap should be focused on nutrient analysis, collection and in-situ and ex-situ conservation, genetic improvement, fruit processing, and analysis of the economic contribution of Wild edible fruit plant species.

Abbreviations

No.	Acronyms	Meaning
1	A	Land Degradation And Grazing
2	B	Clearing Of Forest
3	C	Fire, Timber And Charcoal
4	D	Stem, Leave And Bark Harvest
5	*	Significant At The 0.05 Level
6	**	Significant At The 0.01 Level
7	NS	Not Significant
8	m.a.s.l.	Meter Above Sea-Level
9	No.	Number

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Conflicts of Interest

There is no any conflict interest on this work.

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Appendix

Table 1. The Relationship with Source, Part Used, Habitat, Flowering, Mode of Uses, Flowering Months and Fruiting Months of Wild Edible Fruit Species

	Scientific name	Family name	Local name (Oromic)	Habituate	part used	Habitat	Mode of uses	flowering Months	Fruiting month
1	<i>Carissa spinarum</i> L.	<i>Apocynaceae</i>	Agamsa	Wild	Fruit/leaf/bark/root	Shrubs	fresh/cooked	June	September & October
2	<i>Hypoestes aristata</i>	<i>Acanthaceae</i>	Ambashok	wild /domestic	Fruit	shrubs	fresh	May	October &December
3	<i>flavescens</i>	<i>Tiliaceae</i>	Amurjii	Domestic	Fruit	shrubs	fresh	May	march
4	<i>Piper nigrum</i>	<i>Piperaceae</i>	Asgube/qundo	Wild	Fruit	shrubs	fresh	June	December
5	<i>Balanites aegyptiaca</i>	<i>Balanitaceae</i>	Badano	Wild	Fruit	shrubs	fresh	March	June
6	<i>Toddalia asiatica</i>	<i>Rutaceae</i>	Barbarisha	Wild	Fruit	shrubs	fresh	June	September
7	<i>Portulaca quadrifida.</i>	<i>Portulacaceae</i>	Gishxa	wild	fruit/leave	herb	fresh	January &February	October
8	<i>Myrica salicifolia. Rich</i>	<i>Loganiaceae</i>	<i>Bigqaa</i>	wild /domestic	Fruit	tree	fresh	April	December
9	<i>Physalis micrantha</i>	<i>Solanaceae</i>	<i>Bissi</i>	Wild	Fruit	herb	fresh	April	January
10	<i>Vangueria arispala</i>	<i>Rubiaceae</i>	<i>Bururi</i>	Wild	Fruit	shrubs	fresh	April	February
11	<i>Celosia anthelminthica</i>	<i>Amaranthaceae</i>	<i>Cicibaco</i>	Wild	Fruit	shrubs	fresh	April	April
12	<i>Rhus natalensis Krauss</i>	<i>Anacardiaceae</i>	Dabobessa	Wild	Fruit	shrubs	fresh	April & may	may
13	<i>Rhoicissus tridentata</i>	<i>Vitaceae.</i>	Dhangago	Wild	Fruit	shrubs	fresh	January	June
14	<i>Grewia tenax (Forssk.)</i>	<i>Tiliaceae</i>	Eka fila	Wild	Fruit	shrubs	fresh	April & may	July
15	<i>Salvadora persica</i>	<i>Salvadoraceae</i>	Fesob/riga ilke	Wild	Fruit	shrubs	fresh	April	august
16	<i>Annona reticulata</i> L.	<i>Annonaceae</i>	Gishxa	wild /domestic	Fruit	shrubs	fresh	April	September
17	<i>Syzygium guineense</i>	<i>Myrtaceae</i>	<i>Bedesa/goba</i>	Wild	Fruit	tree	fresh	February	June
18	<i>Capparis decidua</i>	<i>Capparidaceae</i>	Gomar	Wild	Fruit	shrubs	fresh	January	November
19	<i>Rosa abyssinica</i>	<i>Rosaceae</i>	Gora	Wild	Fruit	shrubs	fresh	April	December
20	<i>Rubus apetalus</i>	<i>Rosaceae</i>	Gora galo	Wild	Fruit	shrubs	fresh	April	January
21	<i>Momordica foetida</i>	<i>Cucurbitaceae</i>	Gura jarsa	Wild	Fruit	shrubs	fresh	April	February
22	<i>Albizia grandibracteae</i>	<i>Leguminosae-</i>	Halawagora	Wild	Fruit	shrubs	fresh	April	march
23	<i>Phoenix reclinata</i>	<i>Arecaceae</i>	Haxi	Wild	Fruit	shrubs	fresh	February &April	April
24	<i>Capsicum chinense</i>	<i>Solanaceae</i>	Habarbari	Wild	Fruit	shrubs	fresh	June	May
25	<i>Ficus sur (F. capensis)</i>	<i>Moraceae</i>	Habru	wild	Fruit	tree	fresh	January	June

26	<i>Grewia bicolor</i>	<i>Tiliaceae</i>	Haroresa	wild	Fruit	shrubs	fresh	April	July
27	<i>Ficus sycamorus</i>	<i>Anacardiaceae</i>	Hudha	wild	Fruit	shrubs	fresh	April & May	August
28	<i>Boscia salicifolia</i> Oliv.	<i>Capparidaceae</i>	Huduqable	wild	Fruit	shrubs	fresh	April	September
29	<i>Berchemia discolor</i>	<i>Rhamnaceae</i>	Jajjabaa	wild	Fruit	tree	fresh	April & May	October
30	<i>Oncoba spinosa</i> Forssk	<i>Flacourtiaceae</i>	Jilbo	wild	Fruit	tree	fresh	April & May	November
31	<i>Doryalis abyssinica</i>	<i>Flacourtiaceae</i>	Koshami	wild	Fruit	shrubs	fresh	May	December
32	<i>Cordia sinensis</i> Lam	<i>Boraginaceae</i>	Mandherro	wild	Fruit	shrubs	fresh	April	January
33	<i>Meriandra benegalensis</i>	<i>Verbenaceae</i>	Midhaan bera	wild	Fruit	shrubs	fresh	May	February
34	<i>lex mitis</i>	<i>Ebenaceae</i>	Miesa	wild	Fruit	shrubs	fresh	May	March
35	<i>Rytigynia neglecta</i>	<i>Rubiaceae</i>	Mijilo	wild	Fruit	shrubs	fresh	April	April
36	<i>Grewia schweinfurthii</i>	<i>Tiliaceae</i>	Mudhugure	wild	Fruit	shrubs	fresh	May	May
37	<i>Grewia ferruginea</i>	<i>Tiliaceae</i>	Ogomdii	wild	Fruit	shrubs	fresh	March	June
38	<i>Mimusops kummel</i>	<i>Sapotaceae</i>	Oladi	wild	Fruit	tree	fresh	January & February	July
39	<i>Myrsine africana</i> L.	<i>Myrsinaceae</i>	Qacamo	wild	Fruit	shrubs	fresh	May	August
40	<i>Embelia schimperi</i>	<i>Myrsinaceae</i>	Qacu	wild	Fruit	shrubs	fresh	May	September
41	<i>Acokanthera schimperi</i>	<i>Sterculiaceae</i>	Qaraaru	wild	Fruit	shrubs	fresh	April	October
42	<i>Euclea racemosa</i>	<i>Ebenaceae</i>	Qurqura	wild /domestic	Fruit	tree	fresh	February & April	November
43	<i>Ziziphus spina-christi</i>	<i>Rhamnaceae</i>	Qurqura janato	wild /domestic	Fruit	tree	fresh/cooked	April	December
44	<i>Tamarindus indica</i>	<i>Fabaceae</i>	Roga	wild /domestic	Fruit	tree	fresh	April	January
45	<i>Oncoba spinosa</i> Forssk.	<i>Flacourtiaceae</i>	Shibirqoli	wild	fruit	tree	fresh	May	February
46	<i>Acacia senegal</i> (L.)	<i>Fabaceae</i>	Sophensa	wild	fruit	shrubs	fresh	April	March
47	<i>Rhus glutinosa</i>	<i>Anacardiaceae</i>	Tilam	wild	fruit	shrubs	fresh	May	April
48	<i>Cactaceae</i>	<i>Cactaceae</i>	Tinii	wild /domestic	fruit	herb	fresh	April & May	May
49	<i>Combretum molle</i>	<i>Combretaceae</i>	Tuqaa/birecha	wild	fruit	shrubs	fresh	May	June
50	<i>Osyris quadripartita</i>	<i>Santalaceae</i>	Wato	wild	fruit	shrubs	fresh	Nay	December
51	<i>Cordia africana</i>	<i>Boraginaceae</i>	Wadesa	wild /domestic	fruit	tree	fresh	April & May	August&Septembr
52	<i>Acacia seyal</i> Del.	<i>Fabaceae</i>	Wantafulas	wild	fruit	tree	fresh	May	December
53	<i>Allophylus abyssinicus</i>	<i>Anacardiaceae</i>	Xaxesa	wild	fruit	shrubs	fresh	April	December
54	<i>Acacia seyal</i> del	<i>Fabaceae</i>	Xunxuna/wacu	wild	fruit	shrubs	fresh	May	October& Decembr
55	<i>Psidium guajava</i>	<i>Myrtaceae</i>	Zayitunaa	wild /domestic	fruit	shrubs	fresh	May	Septembr& Octobr

Table 2. The Major Factors of Threats for Wild Edible Fruits

species name	Family name	A=42.3%	B =45%	C=6.9%	D=5.7%	Total
<i>Puntia ficus-indica</i> (L.)	Cactaceae	4	0	0	0	4
<i>Carissa spinarum</i> L.	Apocynaceae	1	11	0	59	71
<i>Hypoestes aristata</i>	Acanthaceae	9	0	0	0	9
<i>flavescens</i>	Tiliaceae	1	0	0	0	1
<i>Piper nigrum</i>	Piperaceae	2	0	0	0	2
<i>Balanites aegyptiaca</i>	Balanitiaceae	2	0	0	0	2
<i>Toddalia asiatica</i> (L.)	Rutaceae	1	0	0	0	1
<i>Portulaca quadrifida</i> .	Portulacaceae	0	7	0	0	7
<i>Combretum molle</i>	Loganiaceae	1	13	0	0	14
<i>Physalis micrantha</i>	Solanaceae	3	0	0	0	3
<i>Vangueria arispala</i>	Rubiaceae	45	1	0	0	46
<i>Celosia anthelminthica</i>	Amaranthaceae	18	0	0	0	18
<i>Rbus natalensis</i> Krauss	Anacardiaceae	0	25	0	0	25
<i>Rhoicissus tridentate</i>	Vitaceae.	2	0	0	0	2
<i>Grewia tenax</i>	Tiliaceae	11	15	0	0	26
<i>Salvadora persica</i>	Salvadoraceae	2	0	0	0	2
<i>Annona reticulata</i> L.	Annonaceae	1	0	0	0	1
<i>Syzygium guineense</i>	Myrtaceae	0	34	0	0	36
<i>Capparis decidua</i>	Capparidaceae	1	0	0	0	1
<i>Rosa abyssinica</i>	Rosaceae	56	3	0	0	59
<i>Rubus apetalus</i> Poir.	Rosaceae	16	0	0	0	16
<i>Momordica foetida</i>	Cucurbitaceae	1	0	0	0	1
<i>Albizia grandibracteata</i>	Leguminosae-	1	0	0	0	1
<i>Phoenix reclinata</i> Jacq	Arecaceae	4	0	0	0	4
<i>Capsicum chinense</i>	Solanaceae	3	0	0	0	3
<i>Ficus sur</i> (F. capensis)	Moraceae	4	0	0	0	4
<i>Grewia bicolor</i>	Tiliacea	1	6	0	0	7
<i>Ficus sycomorus</i>	Anacardiaceae	29	18	0	0	47
<i>Boscia salicifolia</i> Oliv.	Capparidaceae	3	0	0	0	3
<i>Berberia discolor</i>	Rhamnaceae	0	5	0	0	5
<i>Oncoba spinosa</i> Forssk	Flacourtiaceae	4	10	0	0	16
<i>Doryalis abyssinica</i>	Flacourtiacea	1	1	0	0	2
<i>Cordia sinensis</i> Lam	Boraginaceae	5	20	0	0	25
<i>Lantana camara</i> L.	Verbenaceae	4	0	0	0	4

<i>lex mitis</i>	<i>Ebenaceae</i>	17	1	0	0	18
<i>Rytigynia neglecta</i>	<i>Rubiaceae</i>	1	0	0	0	1
<i>Ximenia americana</i>	<i>Tiliaceae</i>	2	3	0	0	5
<i>Grewia ferruginea</i>	<i>Tiliaceae</i>	11	0	0	0	11
<i>Mimusops kummel</i>	<i>Sapotaceae</i>	1	74	0	0	79
<i>Myrsine africana</i> L.	<i>Myrsinaceae</i>	1	0	0	0	1
<i>Embelia schimperi</i>	<i>Myrsinaceae</i>	25	0	0	1	26
<i>Acokanthera</i>	<i>Sterculiaceae</i>	3	3	0	0	6
<i>Euclea racemosa</i>	<i>Ebenaceae</i>	1	2	9	0	12
<i>Ziziphus spina</i>	<i>Rhamnaceae.</i>	1	0	30	0	31
<i>Tamarindus indica</i>	<i>Fabaceae</i>	0	14	0	0	14
<i>Oncoba spinosa</i>	<i>Flacourtiaceae</i>	4	42	0	0	46
<i>Acacia senegal</i> (L.)	<i>Acacia senegal</i> (L.)	3	0	0	0	3
<i>Rhus glutinosa</i>	<i>Rhus glutinosa</i>	0	1	0	0	1
<i>Combretum molle</i>	<i>Combretum molle</i>	1	0	0	0	1
<i>Osyris quadripartita</i>	<i>Osyris quadripartita</i> Decn	2	0	0	0	2
<i>Cordia Africana</i>	<i>Cordia africana</i>	0	36	0	0	36
<i>Acacia seyal</i> Del.	<i>Acacia seyal</i> Del.	0	0	17	0	17
<i>Allophylus abyssinicus</i>	<i>Allophylus abyssinicus</i>	27	0	0	0	27
<i>Acacia seyal</i> Del.**	<i>Acacia seyal</i> del.	10	0	0	0	10
<i>Psidium guajava</i>	<i>Psidium guajava</i>	5	94	0	0	99
Total		354	439	68	56	914

Table 5. Pearson Correlation Coefficients and Relationship within the Wild Edible Fruits Variable

Variables		Part used	Habitat		use mode	Purpose of utilization				More inspired by		Collected by			
		fruit	tree	shrubs	Direct	food	Feed	medicine	income	pasture	farmers	young	men	women	elder
Habitat	Tree	0.477**													
	Shrubs	0.681***	-												
			0.176 ^{NS}												
Use mode	Direct	0.992***	0.450**	0.716***											
Purpose of utilization	Food	0.951***	0.455**	0.728***	0.952***										
	Feed	0.515***	-	0.399**	0.501***	0.322*									
			0.022 ^{NS}												
	Medicine	0.112 ^{NS}	0.087 ^{NS}	-0.033 ^{NS}	0.111 ^{NS}	-0.119 ^{NS}	0.284**								
	Income	0.706***	0.464**	0.361**	0.680***	0.575***	0.487**	0.150 ^{NS}							

More inspired by	pastures	0.971***	0.515** *	0.645***	0.955***	0.952***	0.472**	0.014 ^{NS}	0.696***						
	Farmers	0.949***	0.493**	0.616***	0.920***	0.941***	0.421**	0.014 ^{NS}	0.574***	0.937***					
Collected by	Young	0.911***	0.546** *	0.576***	0.904***	0.944***	0.303**	-0.081 ^{NS}	0.594***	0.950***	0.893***				
	Men	0.794***	0.478**	0.428**	0.801***	0.680***	0.380**	0.475**	0.488**	0.690***	0.720***	0.626***			
	Women	0.879***	0.422**	0.708***	0.923***	0.872***	0.396**	0.079 ^{NS}	0.559***	0.849***	0.764***	0.815***	0.719***		
	Elder	0.488**	0.122 ^{NS}	0.234 ^{NS}	0.463***	0.318*	0.524***	0.316**	0.377**	0.388**	0.462***	0.223 ^{NS}	0.441**	0.308**	
Factor of threat	Land Degrading	0.493**	- 0.162 ^{NS}	0.409**	0.468**	0.450**	0.313**	0.147 ^{NS}	0.104 ^{NS}	0.468**	0.515***	0.482**	0.425**	0.339**	0.260 ^{NS}
	F.Cr.Agricultur	0.757***	0.625** *	0.428**	0.736***	0.750***	0.322*	-0.116 ^{NS}	0.774***	0.778***	0.736***	0.690***	0.472**	0.625***	0.391**
	Fire & Charcoal	0.235 ^{NS}	0.019 ^{NS}	0.424**	0.356**	0.293*	-0.007 ^{NS}	0.017 ^{NS}	0.027 ^{NS}	0.183 ^{NS}	0.059 ^{NS}	0.250 ^{NS}	0.281*	0.610***	-0.082 ^{NS}
, Correlation is significant at the 0.001 level;															