



Diversity and Ethnobotany of Wild and Semi Wild Edible Plants and their Marketability in Central Zone of Tigray, Ethiopia

Sibhatleab Hints^a and Gebrekidan Abrha^{a*}

^a *Abergelle Agricultural Research Center, Tigray Agricultural Research Institute, Ethiopia.*

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://prh.globalpresshub.com/review-history/1724>

Original Research Article

Received: 11/08/2024

Accepted: 15/10/2024

Published: 21/10/2024

ABSTRACT

Thousands of species of wild fruits, leaves, seed, root and tuber are consumed as food and source of income in developing countries. The objective of this study was to identify the wild and semi wild edible plants, factors that threat, marketability, and, to document phenology and management of wild and semi wild edible plants. The study area were classified in to three agro-ecology lowland (<1500), midland (1500-2300) and high land (2300-3200 m.a.s.l.). From each agro-ecology three representative kebeles were selected purposefully based on the existence of wild and semi wild edible plants. Household survey, key informant and focus group discussion were held to collect the required data. A total of 28 wild and semi wild edible plants were identified as edible plants. The identified wild and semi wild edible plants 75 % were trees, 14.3 % were shrubs, and 10.7 % were shrubs/Tree. From the identified edible plants as food source: 23 (82.1%) were fruit, 2 (6.9%) root,

**Corresponding author: E-mail: gereaa07@gmail.com;*

Cite as: Hints, Sibhatleab, and Gebrekidan Abrha. 2024. "Diversity and Ethnobotany of Wild and Semi Wild Edible Plants and Their Marketability in Central Zone of Tigray, Ethiopia". *Asian Journal of Research and Review in Agriculture* 6 (1):593-600. <https://jagriculture.com/index.php/AJRRA/article/view/134>.

1 (3.4%) seed, 1 (3.4%) young shoot and 2 (6.9%) gum (exudate) or sap. The major threats of wild and semi wild edible plants are shortage of viable seed and poor natural regeneration, deforestation, disease, drought, agricultural expansion, free grazing, poor management and protection/fencing activities, and settlement. *Ziziphus spina Christi*, *Cordia africana*, *Balanites aegyptiaca*, *Diospyros mespiliformis*, *Tamarindus indica*, *Mimusops kummel* and *Ximenia americana* are the only identified marketable wild and semi wild edible plants. The available wild and semi wild edible plant lacks intensive management activities.

Keywords: Agricultural expansion; food source; marketability; phenology; wild edible.

1. INTRODUCTION

“In Ethiopia most rural peoples depend on wild resources including wild edible plant to meet their food needs in time of food crisis and drought” [1, 2]. “Wild edible plants (WEP) provide staple food for indigenous people, serve as complementary food for nonindigenous people and offer an alternative source of cash income for poor communities” [3]. “In Ethiopia, there are about 370 indigenous food plants (belonging to 70 different families) out of which 182 species (40 families) are shrubs/trees with edible fruits/seeds. WEPs play a great role in ensuring food security and improve the nutrition in the diets of many people in developing countries” [4]. “Wild plants are an integral part of the diet of many rural Ethiopians at times both of food plenty and scarcity” [5]. “Many people in Tigray region were using wild edible plant as a source of food during

drought season and war time” [6]. There is limitation of scientifically documented on the available wild edible plants and their overall livelihood importance in Tigray. The overall objective of this research project was to identify the wild and semi wild edible plants, to identify factors that threat wild and semi wild edible plants, to identify marketable part of wild edible plants, to document phenology and management of wild and semi wild edible plants in Tigray.

2. MATERIALS and METHODS

2.1 Description of Study Area

This research study was conducted in central zone of Tigray at three wereda which are known as K/Temben, T/Abergelle and S/Samre wereda (Fig. 1).

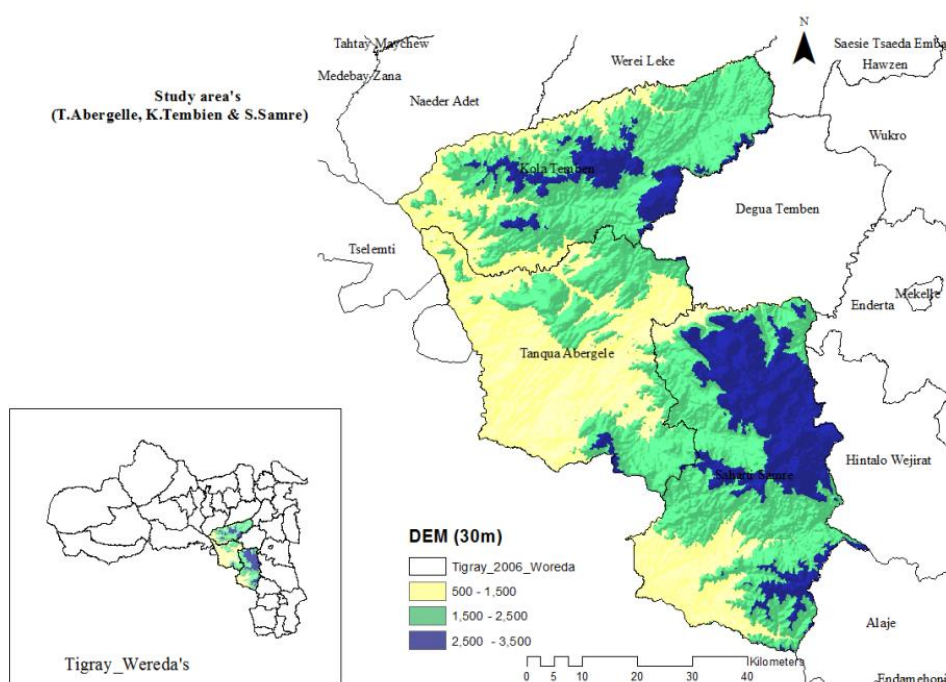


Fig. 1. Map of study area

2.2 Sampling Methods

Site selection: Before conducting actual data collection district agricultural office, extension agents and local administrations were informed about the purpose of the study. Preliminary survey was conducted at dry season to get an insight about wild and semi wild edible plants and possible sites. The study area were classified in to three agroecology lowland (<1500), midland (1500-2300) and high land (2300-3200 m.a.s.l) [7]. From each agro-ecology three representative Kebeles were selected purposefully based on availability of wild and semi wild edible plants [8].

2.3 Sampling Key Informants and Respondents

Key informants (KIs) are defined as people who have been living in the study area for a long time and are most knowledgeable about wild and semi wild edible plants. KIs were used to stratify households (HHs) in the respective sampled kebeles in to wealth categories and for identification of local names of wild and semi wild edible plants. The method yields a study sample through referrals made among people who share or know of others who possess some characteristics that are of research interest. A total of eight key informants from each kebele were selected.

To undertake this research activity sampling of respondents that could give the required information for each objective were selected. Accordingly, total woreda households were used to determine the sample size of the respondents that involved in the interview based on [9]. Then, the sample size was allocated proportionally to each kebeles of the woreda.

$$n = \frac{N}{(1 + N * e2)}$$

The name of all HHs living in the study site were obtained from the kebele's office and crosschecked with KIs at each site for its inclusiveness. Primarily, the criteria for differentiating HHs into different wealth categories will set by KIs. From the determined sample size of all wealth groups the number of females and males to be interviewed were proportional which helps to see their difference in knowledge on edible plants.

2.4 Group Discussions

Group discussion was used to categorization of resources, to local names, use values and

factors threaten wild and semi wild edible plants. A brief group discussion were conducted at each kebele with 15-20 key informants represents community elders, religious/ spiritual elders, knowledgeable persons, shepherds, other men and women in the community prior to ethno botanical data collection. This also strengthens by free-listing method.

The major human and natural factors that possibly threaten the survival of underutilized wild and semi wild edible plants were identified through preliminary assessment. Thus, based on the relative importance of the threatening factors, priority ranking were conducted by five KIs using the method of [10]. One to five scores were assigned where one was for the least while five was for the most destructive threat. Then, all ranks were sum up, and total ranking were conducted to determine the main threats.

2.5 Direct Field Observation

Direct field observation through transect walk method were used to observe the interaction between local people and plants on their surroundings. Hence, it involves recording the habitat, the habit and characteristics of plants known to be lost after specimens are dried such as flower, fruit and leaf color; leaf scent and any other important characteristic feature expected to be difficult to observe, know or guess from the dried specimen and the associated voucher specimen collection. In addition, it is used to investigate traditional management and conservation practices.

2.6 Market Survey

Wild and semi wild edible plants market survey were carried out in the study area by talking with the producers, collector, sellers and consumers in order to collect information. Simple market survey was applied on urban centers, based on market days. Various wild and semi wild plants were observed being exchanged.

2.7 Data Analysis

SPSS software and preference ranking were applied for data analysis.

3. RESULTS and DISCUSSION

3.1 Wild and Semi Wild Edible Plants

The study area indicates high number of available wild and semi wild edible plant and rich

in biodiversity. However it is highly affecting from anthropogenic and natural problems from time to time. A total of 28 wild and semi wild edible plants were identified as edible plants in Tanqua-Abergell, Kolla-temben and Seharti-samre districts (Table 1). Among the total species three species were unidentified their scientific name and family name however the remaining 25 species belongs to 17 families. Similarly [11], found 30 wild edible trees and shrubs in the semi-arid lowlands of Southern Ethiopia however [12] yielded a total of 46 wild edible plant species belonging to 37 genera and 29 families.

The identified edible plants had diversified edible parts as food source: 23 (82.1%) were fruit, 2 (6.9%) root, 1 (3.4%) seed, 1 (3.4%) young shoot and 2 (6.9%) gum (exudate) or sap. The study of [5] reveals that 44.2% were fruits; 16.2% roots, tubers, bulbs, corms, or rhizomes; 14.3% leaves; 8.4% seeds; 7.8% stem, young shoots, stem bark, or pseudo trunk; 5.2% gum (exudate) or sap; and 3.9% flower (whole/nectar). Mode of consumption of the edible plant was without any

process (raw) consumed for most of the identified wild edible plants. However for *Adansonia digitata* consume with milk additive for consumption. The result similarly reported by [13] as there diversity of wild edible plants and fruit is the higher edible part.

The identified wild and semi wild edible plants 75 % were trees, 14.3 % were shrubs, and 10.7 % were shrubs/Tree (Fig. 3). The family *Ebenaceae*, *Fabaceae* and *Malvaceae* had the highest proportion of wild edible species, contributed three species each (Fig. 2).

Most of the edible wild plants have no cause for health problem but when there is excess consumption of *Ziziphus spina christi* happens some feeling of discomfort like abdominal bloating. A few of the reportedly edible species caused health problems that sometimes lead to fatality [5]. The study of [14] finds 60 species of wild edible plants which higher than this study however both studies recognize most of the wild edibles are fabaceae family.

Table 1. List of wild and semi wild edible plants, edible part and mode of consumption

S.N	Scientific name	Local name	Edible part	Mode of consumption	Additive
1	<i>Carissa edulis</i>	Agam	Fruit	Raw	--
2	<i>Commiphora africana</i>	Anqua	Root	Raw	—
3	<i>Cordia africana</i>	Awhi	Fruit	Raw	—
4	<i>Cordia monoica</i>	Awhi chiringah	Fruit	Raw	—
5	<i>Diospyros mespilliformis</i>	Aye	Fruit	Raw	—
6	<i>Acacia sieberiana</i>	Chea	Gum	Raw	—
7	<i>Acacia etbaica</i>	Seraw	Gum	Raw	-
8	<i>Ficus vasta</i>	Daero	Fruit	Raw	-
9	<i>Adansonia digitata</i>	Dima	seed /Fruit/	Raw	Milk
10	<i>Ziziphus spina christi</i>	Geba	Fruit & seed	Raw, Dried	-
11	<i>Tamarindus indica</i>	Humer	Fruit	Raw, Dried	Water
12	<i>Euclea racemosa</i>	Kulio	Fruit	Raw	—
13	<i>Mimusops kummel</i>	Kumel	Fruit	Raw	-
14	<i>Syzygium guineense</i>	Liham	Fruit	Raw	-
15	<i>Balanites aegyptiaca</i>	Meq'ie	Fruit	Raw	—
16	<i>Ximenia americana</i>	M'leo	Fruit	Raw	—
17	<i>Grewia ferruginea</i>	Tsimqua/mosequa	Fruit	Raw	—
18	<i>Ficus sycomorus</i>	Sagla	Fruit	Raw	—
19	<i>Diospyros abyssinica</i>	Tselimo	Fruit	Raw	—
20	<i>Pittosporum viridiflorum</i>	Cheqemte	Fruit	Raw	—
21	Unidentified	Amlo	Fruit	Raw,	—
22	Unidentified	Fachequa	Root	Raw	—
23	<i>Ziziphus mucronata</i>	Abtere/dukuala gaba	Fruit	Raw	—

S.N	Scientific name	Local name	Edible part	Mode of consumption	Additive
24	<i>Unidentified</i>	Mata	Fruit	Raw	—
25	<i>Rumex nervosus</i>	Hohot	Young shoot	Raw	—
26	<i>Grewia flavescens</i>	Betremishe	Fruit	Raw	—
27	<i>Grewia villosa</i>	Hable	Fruit	Raw	-
28	<i>Sterculia africana</i>	Guchne	Fruit	Raw, Dried	—

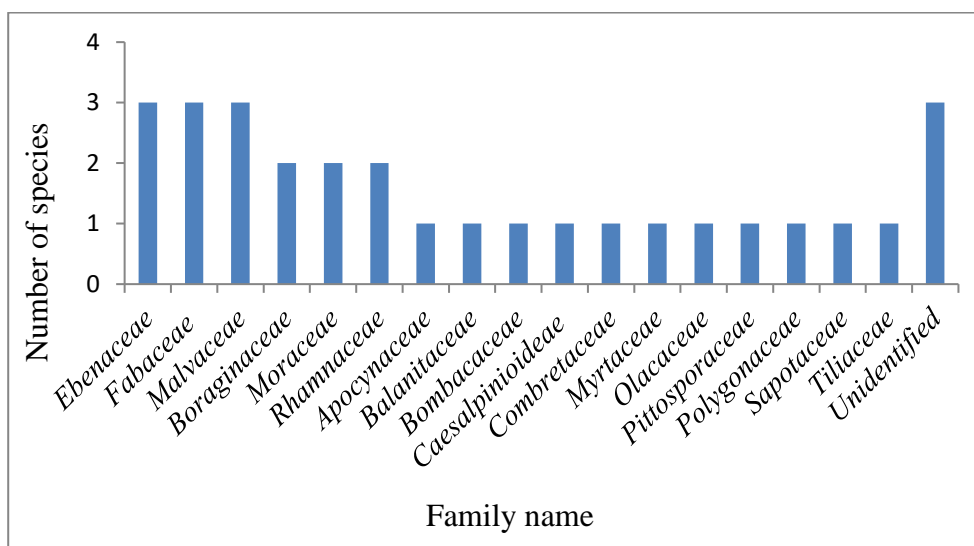


Fig. 2. Dominant families of wild and semi wild edible plants from study area

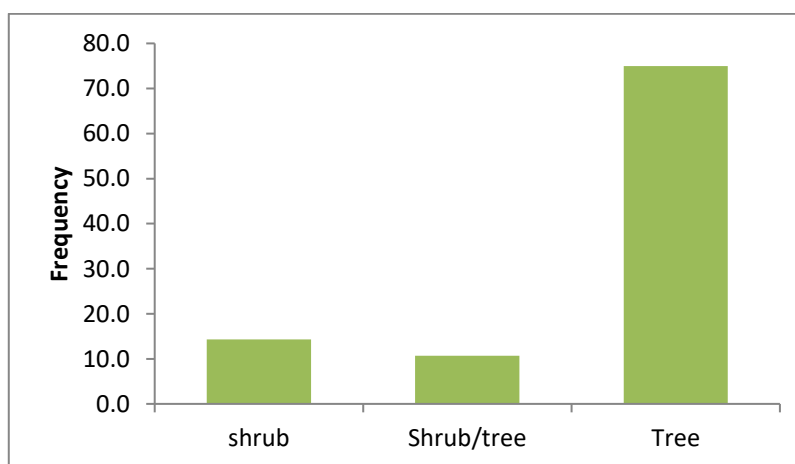


Fig. 3. Growth habit of wild and semi wild edible plants

The consumption period for all the wild edible plant is not affected from drought period. They consume all at any season with considering the production or goodness of the season.

3.2 Marketability of Wild and Semi Wild Edible Plants

There is a trend of selling wild and semi wild edible plants in the study area. However

comparing the available number of wild and semi wild edible plant the number of marketable wild edible are too little. The reason was because of their limited production potential, high demand, lack of awareness and their access. *Ziziphus spina Christi*, *Cordia africana*, *Balanities aegyptiaca*, *Diospyros mespiliformis*, *Tamarindus indica*, *Mimusops kummel* and *Ximenia americana* are the only identified marketable wild and semi wild edible plants (Table 2). “Income

Table 2. Identified marketable wild and semi wild edible plants

List of marketable edible plant	Local name	Marketable part	Unit	Unit price (birr)	Seller group
<i>Ziziphus spina christi</i>	Gaba	Fruit	Chiret KG, shehane Cup	150-300 3-5 1	Younger, Adult
<i>Cordia africana</i>	Awhi	Fruit	Cup	1	Younger, Adult
<i>Diospyros mespiliformis</i>	Aye	Fruit	Cup Kg/shehane	4 5-8	Younger, Adult
<i>Tamarindus indica</i>	Humer	Fruit	Number	--	Younger
<i>Balanites aegyptiaca</i>	Meqi'e	Fruit	Kg/Shehane	5-10	Younger
<i>Mimusops kummel</i>	Kumel	Fruit	Cup/ Shehane	5-15	Younger
<i>Ximenia americana</i>	Mule'o	Fruit	Cup KG/shehane	1-2 5	Younger, Adult

N.B "shehane" is for locally used measurement.

derived from the sale of wild plant is of particular importance to the poorer households, which must supplement food production with cash in order to meet their basic needs. In addition to their use for household consumption, the identified wild edible trees and shrubs are marketable, and provide an opportunity to supplement household incomes" [11]. [15] reported that wild edible plants apart from their food and medicinal values; they are used for different purposes. [16] Reported that wild edibles and non-timber forest product are the main source of income for local community. The study of [17] also the identified wild edible plants are important in nutrition (macronutrient and minerals).

3.3 Management Activities and Phenology of Wild and Semi Wild Edible Plants

The available wild and semi wild edible plant lacks intensive management activities. There are limited management activities for selected semi wild edible plants that found at their farm land or home garden. *Ziziphus spina christi*, *Cordia africana*, *Balanites aegyptiaca* were some the semi wild edible plants that getting management activities. Pruning, thinning, plantation and fencing are the identified management activities for wild and semi wild edible plants found at home garden or farm lands. *Ziziphus spina christi* was getting intensive management at home garden, as an agroforestry tree, as it was using as source of food, income and for different construction materials. In North west Ethiopia, farmers allow some plants to regenerate and grow in their fields. *B. aegyptiaca* were grown in farmlands because of its role for food (fruit) and

shade (both human and livestock) during dry season [18]. The flowering, fruit setting and ripening of the wild and semi wild edible plant studied at different season for the identified plants (Fig. 4). This was advantageous for the consumer and it makes available year round.

3.4 Factors Threatening Wild and Semi Wild Edible Plants

In this study there are different factors threatening for the availability and sustainability of wild and semi wild edible plants. The major threats to the wild edible plants are; 1) Deforestation, Illegal cutting for different purposes; like for fuel wood, for agricultural tools, and construction purpose 2) Pest, insects and termite; for *Ziziphus spina christi*, *Balanites aegyptiaca* 3) Drought and wind problem 3) Agricultural expansion, free grazing and animal browsing 4) Poor awareness, management and protection/fencing activities 5) Shortage of viable seeds and poor natural regeneration of *Ficus vasta* and *Ximenia Americana* 6) Settlement/ human population growth and over harvesting. The study of [15, 8, 18] shows that the WEPs were threatened by anthropogenic factors including agricultural expansion, deforestation, free grazing, fuel wood and constructions. Agricultural land expansions, wild fire, fuel wood collection, overgrazing, and overharvesting are the main reasons for the destruction of wild edible plants. Of these factors, agricultural land expansion ranks first followed by overgrazing and fuel wood collection. Wild edible trees and shrubs face some challenges that threaten their existence. According to the respondents, the expansion of agriculture is the major threat, followed by the fire hazard [11, 18].

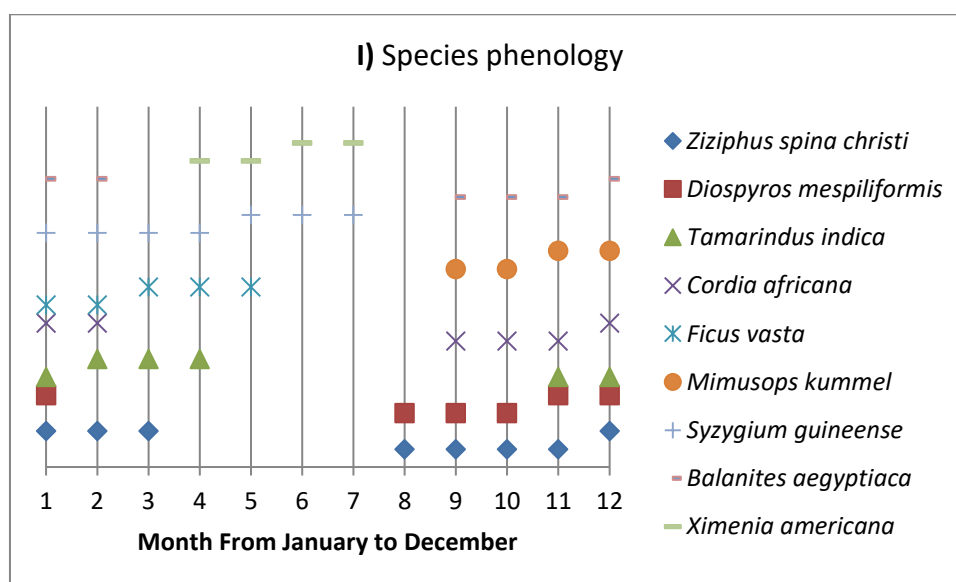


Fig. 4. Phenology and management of wild and semi wild edible plants

4. CONCLUSION AND RECOMMENDATION

Tigray is endowed with an important wild and semi wild plant species. Since antiquity, people have used wild plants as source of food and now a days using for market purpose as source of income. Currently, many of these species are seriously threatened by different natural and anthropogenic factors. This research project is therefore part of the effort aimed at documenting the availability and marketability of the edible wild plants. This result revealed that about 28 wild and semi wild edible plant species are used for consumption. The local community can utilize the wild edible plants as one coping strategy at drought season and normal season. Their fruit setting period was different despite contributing the whole year for consumers. However, there is a poor management and conservation activity for the edible plants. To get maximum benefit from wild and semi wild edible, it would be valuable to select and domesticate healthy edible wild plant species at the same time as scientifically investigating their nutritional composition and toxicology. Moreover, it is needed for conservation measure and management intervention at region level.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image

generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Lulekal E, Asfaw Z, Kelbessa E, Van Damme P. Wild edible plants in Ethiopia: A review on their potential to combat food insecurity. *Afrika Focus*. 2011;24(2):71-122.
- Balemie K, Kebebew F. Ethnobotanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia. *J Ethnobiol Ethnomed*. 2006;2:1-9.
- Ju Y, Zhuo J, Liu B, Long C. Eating from the wild: diversity of wild edible plants used by Tibetans in Shangri-la region, Yunnan, China. *J Ethnobiol Ethnomed*. 2013;9:1-22.
- Food and Agricultural Organization. *Forests for Improved Nutrition and Food Security*; 2013.
- Addis G, Urga K, Dikasso D. Ethnobotanical study of edible wild plants in some selected districts of Ethiopia. *Hum Ecol*. 2005;33(1):83-118.
- Giday M, Teklehaymanot T. Use of wild edible and nutraceutical plants in Raya-Azebo District of Tigray Region, northern Ethiopia. *Trop Med Health*. 2023;51(1):58.

7. Azene M. Watershed Management: Effects and Problems, the case of Meret Project in Kebelie-Chekorti Sub-Catchment, Kalu Woreda, Amhara Regional State [dissertation]. Addis Ababa University; 2007.
8. Mishra A, Swamy SL, Thakur TK, Bhat R, Bijalwan A, Kumar A. Use of wild edible plants: can they meet the dietary and nutritional needs of indigenous communities in Central India? *Foods*. 2021; 10:1453.
9. Yamane T. *Statistics: An Introductory Analysis*. 2nd ed. New York: Harper and Row; 1967.
10. Cotton CM. *Ethnobotany: Principles and Applications*. 1st ed. Oxford: John Wiley & Sons; 1996. p. ix-424.
11. Assefa A, Abebe T. Wild edible trees and shrubs in the semi-arid lowlands of Southern Ethiopia. *J Sci Dev*. 2011;1(1):5-19.
12. Ashagre M, Asfaw Z, Kelbessa E. Ethnobotanical study of wild edible plants in Burji District, Segan area zone of Southern Nations, Nationalities and Peoples Region (SNNPR), Ethiopia. *J Ethnobiol Ethnomed*. 2016;12:1-15.
13. Asfaw A, Lulekal E, Bekele T, Debella A, Tessema S, Meresa A, Debebe E. Ethnobotanical study of wild edible plants and implications for food security. *Trees Forests People*. 2023;14:100453.
14. Amente DA. Ethnobotanical survey of wild edible plants and their contribution for food security used by Gumuz people in Kamash Woreda, Benishangul Gumuz Regional State, Ethiopia. *J Food Nutr Sci*. 2017;5(6):217-24.
15. Berihun T, Molla E. Study on the diversity and use of wild edible plants in Bullen District, Northwest Ethiopia. *J Bot*. 2017;2017(1):8383468.
16. Mishra A, Swamy SL, Thakur TK, Bhat R, Bijalwan A, Kumar A. Use of wild edible plants: can they meet the dietary and nutritional needs of indigenous communities in Central India? *Foods*. 2021;10(7):1453.
17. Mokria M, Gebretsadik Y, Birhane E, McMullin S, Ngethe E, Hadgu KM, Tewolde-Berhan S. Nutritional and ecoclimatic importance of indigenous and naturalized wild edible plant species in Ethiopia. *Food Chem Mol Sci*. 2022;4:100084.
18. Tebkew M, Gebremariam Y, Mucheye T, Alemu A, Abich A, Fikir D. Uses of wild edible plants in Quara District, Northwest Ethiopia: implication for forest management. *Agric Food Sec*. 2018; 7(1):1-14.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://prh.globalpresshub.com/review-history/1724>