

Ethnobotanical study of wild edible plants used by Meinit Ethnic Community at Bench-Maji Zone, Southwest Ethiopia

Abebe Yimer (✉ abebeyimer2010@gmail.com)

Jimma University College of Agriculture and Veterinary Medicine

Sirawdink Fikereyesus Forsido

Jimma University College of Agriculture and Veterinary Medicine

Getachew Addis

Ethiopian Public Health Institute

Abebe Ayelgn

Center of food science and nutrition, Addis Ababa University

Research Article

Keywords: Wild edible plant, Meinit sociocultural community, traditional knowledge, Bench-Maji Zone, food category

Posted Date: September 21st, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-907812/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background

Meinit sociocultural community have a long tradition of using wild edible plants (WEPs) for food, spice, medicine and income generation. These locally collected wild edibles are consumed during food scarcity and as supplement to staple food. WEPs also provide cheaper source of dietary energy, vitamins and micronutrients for rural subsistence farmers. However, the utilization and management of WEPs have been declining due to dietary shift, climatic and anthropogenic factors. Despite the rich botanical diversity and ample traditional knowledge on the use of WEPs by the Meinit sociocultural community, the ethnobotanical documentation of WEPs is very scant. Therefore, the study aimed to record an ethnobotanical investigation of WEPs used by the Meinit sociocultural community.

Methods

Focused group discussion (FGD), key informants' (KI) interview using semi-structured interview questions, guided field walk, preference ranking and pairwise comparisons were applied during ethnobotanical study of WEPs. Descriptive statistics were used for data analyses.

Results

A total of 66 WEPs species from 34 families were recorded. Asteraceae (seven species) contributed to the highest number of species followed by Fabaceae (six species), Amaranthaceae and Moraceae (five species each); among which 28 species were herbs, 14 were shrubs, 13 were climbers and 11 were trees. The WEPs are gathered from farm, fallow land, woodland, grassland and forest. The WEPs were consumed as raw, boiled, stewed, baked and local beverage. Boiling was frequently used in traditional cooking practice for leafy vegetables, roots and tubers. Soup or local dish prepared from wild edible vegetables and accompanied with porridge or flatten bread is relished by the community.

Conclusion

The study districts have rich resource of WEPs and untapped traditional knowledge associated with the use of these plants for food, medicine and income generation. However, the availability of the WEPs and their traditional knowledge have been declining from time to time.

Background

Wild plants and animals were used as source of human food before the beginning of agriculture. (1, 2). Wild edible plants (WEPs) are still commonly used for food throughout the world. WEPs contribute for food and nutrition security, medicine, income generation, cultural or social value, source of genetic resource, protecting the environment, aesthetic value. Further it is also used as animal fodder, construction material, fuel, cosmetics, and farm tools (3–5).

WEPs are consumed as staple food, supplement to main dish, filling the gap of food shortage and safety net during famine period (4, 6, 7). As a result, food and nutrition security can better be achieved through the use of WEPs as food, nutraceuticals, source of income, and available under harsh environmental conditions due to the broader adaptability of WEPs (8, 9).

Ethiopia is endowed with diverse fauna and flora, and untapped wild edible plant resources. Previous research revealed that about 8% of the nearly 7000 higher plant species in Ethiopia are edible. Among these, about 203 wild and semi-wild plant species are recorded (10). Moreover, the country has ample traditional knowledge (TK) on utilization of WEPs and still this TK has been practiced elsewhere in the country (11, 12). *Amaranthus* spp., *Moringa stenopetala*, *Adansonia digitata* and *Opuntia ficus-indica* are wild plant species that have been used as food source and income generation for many rural people in Ethiopia.

Consumption and use of WEPs still persist in many remote rural areas of Ethiopia. In the southern part of the country, Guraferda, Meinit Goldiye and Meinit Shasha districts in particular, where Meinit ethnic community dwells, WEPs are extensively utilized to prepare local recipes such soup/sauce, beverage, bakery products and maintaining health care. In these districts, fruits, leaves, roots, tubers and few seed from wild plant species are commonly consumed as raw, boiled, stewed, fried and occasionally baked forms. Despite wider use of WEPs for food in Ethiopia, the associated TK has not been comprehensively and systematically documented.

In addition to their deep TK on use, these communities also have the wisdom of preserving WEPs through sun drying to increase their shelf life. In some localities of the study area, planting and field conservation of WEPs in home garden have also been practiced. However, the availability of WEPs is declining overtime mainly due to anthropogenic activities whilst the TK on utilization of WEPs has also been dwindling by acculturation, introduction and expansion of cash crops cultivation (11, 13).

Ethnobotanical studies on WEPs are vital to document the diversity of species and their associated TK. This inventory helps to scale up use of selected WEPs, conserve the species and document the traditional knowledge associated with WEPs. Furthermore, the study provides baseline information on WEPs, which is essential for further research, use by planners and policy makers. Although some ethnobotanical studies have been conducted in Ethiopia, there is no information on the knowledge and use of WEPs by the Meinit sociocultural community in Bench-Maji zone of Ethiopia. There is an urgency to document information surrounding WEPs and associated TK of the Meinit sociocultural community of Ethiopia. Therefore, this research aims to record wild edible plant

species consumed and associated TK of Meinit sociocultural community in Bench-Maji zone of Southern Nation and Nationalities and Peoples Region (SNNPR), Ethiopia.

Material And Methods

Study area

The study was conducted in selected areas of Bench-Maji zone of SNNPR, Ethiopia where the Meinit community dwell. Bench-Maji administrative zone was purposively selected as the zone has rich source of plant diversity and TK on the use of WEPs. In this context, discussion was held with experts from zone and woredas/districts/ agricultural offices, which later recommended potential woredas with rich experience on use and tradition of WEPs. A total of three districts, namely, Guraferda, Meinit Goldiye and Meinit Shasha were selected for the study (Fig.1).

These three study districts are located between dry Kolla to wet Weyna-Dega agro-climatic zone. The Kolla is ranged between an altitude of 500 to 1500m from sea level and received annual rainfall of less than 900mm in dry, 900 to 1400mm in moist and more than 1400mm in wet kolla sub climatic zone. Weyna-Dega zone is covered from 1500 to 2300m in altitude and subdivided into dry, moist and wet Weyna-Dega that obtained the equal annual rainfall amount with respective kolla sub climatic zone(14). The general characteristic of the study site is described in Table 1.

The main economic activity of the Meinit socio cultural community is subsistence agriculture supplemented by hunting of wild edible animals and gathering of WEPs. In agro-pastoralist society, the source of food is dependent on smaller scale agriculture, hunting and gathering of forest products of both animal and plant origin.

Table 1 Description of the study sites

Characteristics	Study districts		
	Guraferda	Meinit Goldiye	Meinit Shasha
Population	116,561	141,954	199,349
Household	17,462	23,895	19,700
Area hectare(ha)	228,281	165,700.47	293,100
Altitude range(m)	559 to 2389	500 to 2060	1224 to 1968
Rainfall(mm)/year	1750 to 6000	1601 to 2400	1500 to 2000
Temp range(°C)	18 to 33	18 to 34	29 to 33
Agroclimatic zone	Moist Weyna-Dega 20%,Wet-Kolla 80%	Wet Weyna-Dega 10%, moist Kolla 30%, & moist Weyna-Dega 60%	Wet Weyna-Dega 15% ,moist Kolla 80% & 5% dry kolla
Boundaries	Northeast	Sheko	-
	East	South Bench	Decha (Kefa zone)
	Southeast	Meinit Shasha	-
	West	Gambella region	Kasha(Bench woreda)
	North	Gambella region	Chena (Kefa zone)
	South	Bero	Meinit Shasha
Ethnic composition	Meinit,Bench, Sheko,Megengir, & others	Meinit, Bench and others	Meinit, Dezi and others

Source: Compile data of districts plan commission office and population data from Bench-Maji zone (15, 16).

Data collection

Reconnaissance survey and informant selection

Reconnaissance survey was conducted in Bench-Maji zone before the actual data collection. The survey was employed to obtain general information about the study area; knowledge and practice surrounding use of wild plants for food. During the reconnaissance survey, preliminary data was gathered from community leaders, traditional healers, religious leaders and governmental agricultural development agents. The past and current practices about the use, availability, accessibility of WEPs; and vegetation coverage were discussed with these knowledgeable persons. Guided field walks were conducted to observe the geographical feature of the study site.

Meinit sociocultural community was selected based on the reconnaissance survey as the community widely uses WEPs. The Meinit dwells in Guraferda, Meinit Goldiye and Meinit Shasha districts of Bench-Maji zone. A total of 12 study kebeles (lowest administrative structure in Ethiopia) were selected from three study districts each contained four kebeles. Malagonak, Dankila, Peliya, and Berg were selected from Guraferda district. Gimbab, Kushanta, Chat, and

Goma from Meinit Goldiye district while Kudim, Aira, Yirni and Bas kebeles were from Meinit Shasha district. By the guidance of district agricultural development agent, these study sites were selected based on proximity to the town and residence of Meinit socio cultural community.

A total of 36 key informants (17) were recruited using snowball sampling to collect general information on use of WEPs (18). Briefly, three persons from each kebele were randomly asked to list six key informants each that can provide adequate information on use of WEPs and associated knowledge. From the total of 18 KIs listed, top three ranked KIs were selected for the study from each of the 12 kebeles that formed a total of 36 KIs.

Focused group discussion (FDG) was also held using knowledgeable informants after obtaining their informed consent, and using pre-prepared topics of discussion. One FGD per kebele was conducted involving participants composed of eight to ten persons. Two FGDs per study site were conducted to obtain information surrounding WEPs, which was later triangulated with the information collected through household interview. During the FGD, the participants freely listed edible wild plants and their detail associated traditional knowledge. (19, 20).

A list of households was obtained from each kebele administration and potential study participants were selected using simple random sampling method, which was generated using Minitab statistical software version 17 (MINITAB 2010). A total of 198 of which 135 male and 63 female household informants were used for this study. Informants aged 18 to 75 years (median=35) have participated in the interview.

Information was collected by semi-structured interview, direct observation, KI, FGD, preference ranking, pairwise comparison, and guided field walk (19, 21). The interviews included a free listing of WEPs, local name, habitat, growth form (habit), edible parts, collection season, mode of preparation and preservation, and medicinal use. Threats and conservation practices on the WEPs were also recorded. Based on rural community plant use knowledge, WEPs are categorized into fruits, vegetables, beverage and spice/culinary use. Prior to interview, oral informed consent was obtained from study participants. Interviews were conducted in the Meinit language, or translated into Amharic language whenever possible. Actual ethnobotanical study was conducted from May 2019 to March 2021.

Plant specimen collection and identification

Voucher specimen of each WEP was collected following the standard procedure (19, 21). After listing WEPs, plant specimens were collected in guided field walk assisted by KIs, and sometimes collected specimens were presented to FGD participants to authenticate the local name with the plant. Plant specimen collection trips were arranged following phenology and abundance of the plant both in the dry and wet season. As far as possible, plant specimens having reproductive organs and other unique features were collected.

Description of locality, plant's local name, collection date, growth form, natural habitat and other details as appropriate were recorded on site of collection. Moreover, photographs and videos were captured during the specimen collection. Voucher specimens of the most edible plants were collected, processed and transported to National Herbarium of Addis Ababa University for identification.

Voucher specimens were then identified using Flora Volumes of Ethiopia and Eritrea(22-28) and deposited in the herbarium.

Data analysis

Descriptive statistics were used to analyze and organize the qualitative data. Percentage, pie chart, tables and bar graphs were used to illustrate the results. Some ethnobotanical data were organized using Microsoft Excel spread sheet. Minitab statistical software version 17 was used for random selection of informants.

Results And Discussion

Results

Wild edible plants diversity

In this study, a total of 66 WEPs species, which belonged to 34 families and 50 genera were documented (Table 2). The most represented families were Asteraceae (seven species) followed by Fabaceae (six species), Amaranaceae and Moraceae (five species each). Solanaceae, Cucurbitaceae and Acanthaceae contributed to three edible plant species each whilst Verbenaceae, Rubiaceae, Portulacaceae, Polygonaceae, Myrtaceae, Dioscoreaceae, and Commelinaceae contributed to two species each. The remaining 20 families were represented by one species each.

Table 2 Wild edible plants of Meinit sociocultural community

Botanical Family	Scientific name	Local name	Growth Habit	Edible part(s)	Consumption & Preparation mode	Specific use	Collection method
Acanthaceae	<i>Thunbergia alata</i> Boj. ex Sims	Karkakubu	Herb	Young leaves	Boiled	Leafy vegetable	Plucking
	<i>Justicia heterocarpa</i> T Anders.	Antidy	Herb	Leaves	Boiled	Leafy vegetable	Plucking
	<i>Asystasia gangetica</i> (L.) T Anders.	Torbol	Herb	Leaves	Boiled	Leafy vegetable	Plucking
Amaranthaceae	<i>Celosia schweinfurthiana</i> Schinz	Korayit	Herb	Leaves	Boiled	Leafy vegetable	Plucking
	<i>Celosia trigyna</i> L.	Welbete	Herb	Leaves	Boiled	Leafy vegetable & medicinal	Plucking
	<i>Aerva lanata</i> (L.) Juss. ex Schultes	Holly	Herb	Leaves	Boiled	Leafy vegetable	Plucking
	<i>Amaranthus spinosus</i> L.	Bukut	Herb	Leaves	Boiled	Leafy vegetable	Plucking
	<i>Amaranthus dubius</i> Thell.	Bukut	Herb	Leaves	Boiled	Leafy vegetable	Plucking
Apocynaceae	<i>Carissa spinarum</i> L.	Muchakerech	Shrub	Fruit pulp	Raw	Fruit & medicinal	Picking
Araceae	<i>Sauromatum venosum</i> (Ail.) Kunth	Wenut	Herb	Tuber	Boiled	Root vegetable	Digging
Asteraceae	<i>Bidens carinata</i> Cufod. ex Mesfin	Gingu	Herb	Leaves	Boiled	Leafy vegetable	Plucking
	<i>Lippia grandifolia</i> Hochst. ex Walp	Metoch	Shrub	Leaves	Hot-drink (brewed)	Beverage	Plucking
	<i>Aspilia mossambicensis</i> (Oliv.) Wild	Beshayt	Shrub	Leaves	Boiled	Leafy vegetable	Plucking
	<i>Galinsoga quadriradiata</i> Ruiz & Pavon	Baytena	Herb	leaves	Boiled	Leafy vegetable	Plucking
	<i>Sonchus oleraceus</i> L.	kolfidekamajun	Herb	Young leaves	Boiled	Leafy vegetable	Plucking
	<i>Vernonia auriculifera</i> Hiern	Garut	Shrub	leaves	Boiled	Leafy vegetable & medicinal	Plucking
	<i>Bidens macroptera</i> (Sch.Bip.exChiov.)	Balti	Herb	leaves	Boiled	Leafy vegetable	Plucking
Basellaceae	<i>Basella alba</i> L.	Amut	Climber	leaves	Boiled	Leafy vegetable	Plucking
Brassicaceae	<i>Cardamine trichocarpa</i> A. Rich.	Kineteshojun	Herb	Leaves	Boiled	Leafy vegetable	Plucking
Capparaceae	<i>Capparis sepiaria</i> L.	Kodoch	Climber	leaves	Boiled	Leafy vegetable	Plucking
Capparidaceae	<i>Cleome gynandra</i> L.	Tichawoch	Herb	leaves	Boiled	Leafy vegetable	Plucking
Caryophyllaceae	<i>Drymaria cordata</i> (L.) Schultes	Sisente	Herb	leaves	Boiled	Leafy vegetable	Plucking
Celasteraceae	<i>Maytenus arbutifolia</i> (A.Rich.) Wilczek	Kuknit	Shrub	Young leaves	Boiled	Leafy vegetable	Plucking
Commelinaceae	<i>Commelina benghalensis</i> L.	Zobut	Herb	leaves	Boiled	Leafy vegetable	Plucking
	<i>Commelina diffusa</i> Burm.f	Zobut	Herb	leaves	Boiled	Leafy vegetable	Plucking
Convolvulaceae	<i>Ipomoea tenuirostris</i> Choisy	Ra	Climber	Young leaves	Boiled	Leafy vegetable	Plucking
cucurbitaceae	<i>Cucumis dipsaceus</i> Ehrenb. ex	Kakashut	Climber	leaves	Boiled	Leafy vegetable	Plucking
	<i>Peponium vogelii</i> (Hook. f.) Engl.	Entach	Climber	Fruit pulp	Raw	Fruit	Picking

	<i>Momordica foetida</i> Schumach.	Bererit	Climber	Tuber	Boiled	Root vegetable	Digging
Dioscoreaceae	<i>Dioscorea praehensilis</i> Benth.	Entut	Climber	Tuber	Boiled	Root Vegetable	Digging
	<i>Dioscorea bulbifera</i> L.	Lekut	Climber	Tuber	Boiled	Root Vegetable	Digging
Euphorbiaceae	<i>Acalypha ornata</i> A. Rich.	Kirijaj	Herb	Leaf	Boiled	Leafy vegetable	Plucking
Fabaceae	<i>Senna petersiana</i> (Bolle) Lock	Gudimoch	Shrub	Fruit pulp	Raw or juice	Beverage	Picking
	<i>Vigna membranacea</i> A. Rich	Shotademodoroy	Climber	Leaf/seed	Boiled	Leafy vegetable	Plucking
	<i>Tamarindus indica</i> L.	Rach	Tree	Fruit pulp	Raw or juice	Beverage& medicinal	Picking
	<i>Dolichos sericeus</i> E. Mey.	Ra-modoroy	Climber	Leaf	Boiled	Leafy vegetable	Plucking
	<i>Dolichos sericeus</i> E. Mey.	Gelach	Climber	Leaf	Boiled	Leafy vegetable	Plucking
	<i>Senna obtusifolia</i> (L.) H.S. Irwin & Barneby	Godach	Shrub	Leaf/seed	Boiled or hot drink	Beverage	Plucking
Hypericaceae	<i>Garcinia buchananii</i> Baker	Chodut	Tree	Fruit	Raw	Fruit	Picking
Lamiaceae	<i>Vitex doniana</i> Sweet	Gorogit	Tree	Fruit	Raw	Fruit raw	Picking
Moraceae	<i>Ficus glumosa</i> Del.	Barach	Tree	Fruit	Raw	Fruit	Picking
	<i>Ficus platyphylla</i> Del.	Fadut	Tree	Fruit	Raw/dried	Fruit	Picking
	<i>Morus mesozygia</i> Stapf	Gonjut	Tree	Fruit	Raw	Fruit	Picking
	<i>Trilepisium madagascariense</i> DC	Gagut	Tree	Fruit	roasted	Baked/medicinal	Ground picking
	<i>Ficus sur</i> Forssk.	Boboch	Tree	Fruit	Raw	Fruit	Picking
Myrsinaceae	<i>Embelia schimperi</i> Vatke	Kemjach	Shrub	Fruit	Raw	Fruit & medicinal	Picking
Myrtaceae	<i>Eugenia bukobensis</i> Engl.	Golasit	Tree	Fruit	Raw	Fruit	Picking
	<i>Syzygium guineense</i> (Willd.) DC.	Chorut	Tree	Fruit	Raw	Fruit	Picking
Nyctaginaceae	<i>Boerhavia erecta</i> L.	Belach	Herb	Leaf	Boiled	Leafy vegetable	Plucking
Olacaceae	<i>Ximenia americana</i> L.	Aurasech	Shrub	Fruit	Raw	Fruit& medicinal	Picking
Passifloraceae	<i>Basananthe hanningtoniana</i> (Mast.) WJ de Wilde	Rebdegoron	Climber	Leaf	Boiled	Leafy vegetable	Plucking
Piperaceae	<i>Piper umbellatum</i> L.	Ogach	Shrub	Leaf	Hot drink(brewed)	Beverage	Plucking
Poaceae	<i>Sporobolus pyramidalis</i> P. Beauv.	Keri	Grass	Seed	Baked	Flatten bread	Stripped
Polygonaceae	<i>Rumex abyssinicus</i> Jacq.	Solosolo	Herb	Leaf/tuber	Boiled	Condiment	Plucking & digging
	<i>Rumex nepalensis</i> Spreng.	Girshut	Herb	Leaf	Boiled	Leafy vegetable	Plucking
Portulacaceae	<i>Portulaca oleracea</i> L.	Chinguru	Herb	Leaf/stem	Boiled	Leafy vegetable	Plucking
	<i>Portulaca quadrifida</i> L.	Chinguru	Herb	Leaf/stem	Boiled	Leafy vegetable	Plucking
Rosaceae	<i>Rubus apetalus</i> Poir.	Gormach	Climber	Fruit	Raw	Fruit raw	Picking
Rubiaceae	<i>Galium aparinoides</i> Forssk.	Katikonoy	Herb	Leaf	Boiled	Leafy vegetable	Plucking
	<i>Mussaenda arcuata</i> Poir	Carafurchit	Shrub	Fruit	Raw	Fruit raw	Picking
Solanaceae	<i>Solanum nigrum</i> L.	Chaw	Herb	Leaf	Boiled	Leafy vegetable	Plucking

						& medicinal	
	<i>Physalis peruviana</i> L.	Chunchoch	Herb	Fruit	Raw	Fruit	Picking
	<i>Solanum dasyphyllum</i> Schumach.	Turkit	Shrub	Leaf	Boiled	Leafy vegetable	Plucking
Ulmaceae	<i>Celtis philippensis</i> Blanco	Shoboch	Tree	Leaf	Boiled	Leafy vegetable	Plucking
Verbenaceae	<i>Lantana trifolia</i> L.	Liptowelly	Shrub	Fruit	Raw	Fruit	Stripped
	<i>Lippia adoensis</i> Hochst. ex Walp.	kushita	Shrub	Leaf	Boiled	Leafy vegetable & condiment	Plucking

Plant growth form

This study revealed that collected plant species exist in five different growth habits, namely, herbs (28 species), shrubs (14 species), climbers (13 species) and trees (11 species). Therefore, herbs occupy the highest proportion of WEPs (42 %) followed by shrubs (21%).

Edible plant parts

This investigation showed that 66 plant parts from 66 wild plant species are used for food by the Meinit sociocultural community. Accordingly, 59% were leaves, 29% fruits, 6% roots and tubers, 3% leaf or seed, 1.5% leaf or tuber, and 1.5% seed edible plant part was recorded in this study. Leaves revealed that the highest edible part was followed by fruits.

Collection season and harvesting method

WEPs used by the Meinit community are collected for food at four seasons of the year in Ethiopia. These seasons are winter, spring, summer and autumn in which the season consists of three months of the year from June to August, September to December, November to February and March to May respectively. Depending on phenology of the respective WEPs species, 27 edible plant parts are collected for food in all season. The highest number of edible plant parts (33) were also collected during the short rainy season of autumn (March to May), while 18 edible parts were available for use during winter rainy season (June to August). Following the prolonged rainy and short dry seasons, most wild edible vegetables and fruits were available. The lowest collection months were collected on September to November (four species) and December to February (two species).

The collection methods varied between and within WEPs. The study revealed that picking, plucking, digging, and ground collection are the primary way of gathering methods.

Ripe mature fruits (17 species) were harvested by picking from the tree or shrubs, but gagut fruit was collected from the ground. Most wild leafy vegetables (42 species) were plucked from the intact plant whereas root and tubers (four species) were harvested by hand digging. Two species were collected by stripping harvesting method.

Plant habitat

WEPs were collected from the varied natural environment. Cultivated land, bushy grassland, riverbanks and forest were the significant WEP habitat. Over 33% of WEPs were collected from cultivated land and followed by bushy grassland (18%). The third largest natural habitats were riverbank and forest habitat that each comprised 14% and 11% respectively (Fig 2).

Preparation and consumption of WEPs

Poru (porridge) and sasko/flatten bread is a popular staple food prepared from maize, sorghum or amaranthus/katila/ which is usually eaten with sauce/soup made from cultivated vegetables or wild vegetables. The WEPs used either alone or composite with another vegetable in preparation of local recipes for example relish, deko/spices and chemo /hot drink.

Meinit ethnic community typically use traditional methods of WEPs food preparation and preservation technique; namely boiling, stewing, brewing, non-oil frying and sun drying Figure 5.

Over 40% of WEPs were consumed in form of boiling (Figure 3). About 23% of wild edible fruits commonly consumed in raw forms except gagut fruit was eaten in forms of roasted, boiled or stewed form and sometimes pounded into powder to prepared porridge and sauce. Nearly 13% WEPs were consumed as stewed forms. Whole grain maize or sorghum is usually stewed with a variety of cultivated and wild edible vegetables.

Use category of WEPs

Wild vegetables

Many wild green vegetables, roots and tubers were eaten in boiled as relish, and a few wild including entut and lekut tubers, were eaten in boiled or fried (Table 3). Wild vegetables are mainly served to prepare local dishes such as sauce, soup and condiments, which are usually prepared by mixing of two or more locally available cultivated or wild green vegetables. During the shortage of cultivated vegetables, wild green alone was used to prepare the sauce or soup.

Stewed product or boiled grain was the other staple food locally prepared by cooking whole maize grain added with legumes, root and tuber. WEPs such as bitena, bikut and sisente wild vegetables and gagut fruit were mixed to prepare the stew.

Wild fruits

The survey result revealed that about 19 fruits were eaten raw and a few fruits consumed in fruit juice or an ingredient in the local beverage to make borde (Table 3).

Table 3 Mode of preparation of WEPs for food

Food categories	Number of species	Specific food type	Number of species
Green vegetables	51	Soup or sauce	40
		Mix with boiled grain or legume	11
Root and tuber vegetables	4	Boiled or fried	4
Fruit	22	Eaten raw	19
		Eaten boiled	2
		Roasted and pounded	1
Beverage	9	Juice	2
		Borde	3
		Chemo	3
		Coffee substitute	1
Culinary spice	5	Flavoring	3
		Coloring for butter	1
		Flatten bread	1
Dried product	6	Fruit	2
		Vegetable	3
		Root and tuber	1
Medicinal	12	systematic apply	10
		Topical apply	2

Beverage

A few decades ago, the Meinit cultural community prepared their hot beverage from forest resources. The community has long a tradition in the preparation and use of beverages from WEPs. WEPs traditionally used an ingredient to prepare local beverages such as borde, chemo and fruit juice. Nine species were used for local beverage preparation (Table 3).

Borde is one of commonly used traditional alcoholic beverage which make from maize or sorghum grain by fermentation. For the last few decade, wild roots such as wenut and gudimoch fruit were added to enhance the flavor and taste of borde. Wild keri grain which is relative to cultivated teff seed, is famine crop used to prepare local recipe called borde.

Fruit juice is a type of non-alcoholic beverage which locally processed from rach and gudimoch wild edible fruits. Rach and gudimoch fruits used traditionally to make juice which consumed alone or added to other staple food to enhance color, flavor and taste.

Coffee beverage made from the coffee bean is uncommon tradition in Meinit cultural community. Instead they commonly used chemo drinks. Chemo is a main cultural hot beverage which prepared from coffee leaf, some spice and herbs both cultivated or WEPs. This hot drink is usually accompanied by staple food such as poru/porridge and boiled root and tuber diet. In old time, in the absence of coffee leaf or other spice, WEPs were used to prepare chemo drink. For instance, metowoch and ogach wild edibles were used as either an ingredient for the main component or use as a substitute to prepare chemo hot beverage. Moreover, godach and kushta WEPs were used for making a hot drink that substitutes a tea or an ingredient for making chemo.

Culinary use and spice

About five WEPs were serves for culinary and spice purposes (Table 3). WEPs were used to enhance the flavor and color of the food. For instance, solosolo root was used as a colorant for butter. Kushta and beshayt WEPs were commonly used to add taste and flavor to a variety of local recipes. Keri wild edible grain seed eaten alone as flattened bread or porridge when cultivated crops are lost by drought.

Dried product of wild edible plant

The survey result showed that about six WEPs was preserved by the sundrying (Table 3). Wild or cultivated vegetables were collected from the field, clean the dirt and diseased parts, trimmed, and then chopped a knife and exposed to sunlight. Some wild vegetables such as gingu, baytena, tikawoch and most cultivated vegetables were collected during the surplus season and preserved by sun drying to use during the offseason.

Dried wild fruits, roots and tubers were seldom used today on the study site which the drying practice of these WEPs was ceased or not implemented now. In the pre-ancestor's time, that fadut, gudimoch and wenut tuber were sundried to use during unavailable time. Dried fadut fruit was either eaten in roasted form or stewed or boiled with other cultivated grain. Dried gudimoch fruit was eaten by making it to juice or as one component of borde making. Dried wenut tuber flour was sometimes added to prepare of borde during a shortage of maize or sorghum grain

Medicinal use of wild edible plants

The WEPs presented in Table 4 were perceived as folk medicine. These folk medicinal food plants survey to treat several ailments such as wound healing, stomachache, deworming and headache. The mode of preparation and application of nutraceutical wild plant species were boiled, decoction, dried, and juice for systemic or topical application.

Table 4 Medicinal use of WEPs

No	Plant species	Local name	Parts used	Ailment treated	Mode of preparation	Route of administration
1	<i>Trilepisium madagascariense</i> DC	Gagut	Stem sap	Wound healing, Itching skin	Drop the sap on wounded part	Topical use
2	<i>Solanum nigrum</i> L.	Chaw	Leaf	Gastric and constipation, diabetic people, blood pressure	Cooked the edible leaf	Systemic
3	<i>Ximenia americana</i> L.		Fruit	inflammation	Decoction of the fruit	Systemic
		Aurasech	Root bark/changes to red	Cough and chest-ache	Root bark dried and milled and drink with water or added with chemo	Systemic
4	<i>Celosia trigyna</i> L.	Welbete	Leaf	Ascaris	Cooked the leaf	Systemic
5	<i>Embelia schimperi</i> Vatke	Kemjach	Fruit	Amebaiasis	Eaten raw	Systemic
6	<i>Tamarindus indica</i> L.	Rach	Fruit/leaf	<i>Malaria</i>	Leaf juice or chewing leaves	Systemic
7	<i>Rumex nepalensis</i> Spreng.	Girshut	Root	Deworms, Amebaiasis	Chewing raw	Systemic
8	<i>Carissa spinarum</i> L.	Muchakerech	Root	Snakebite, Wound, Boils (<i>bigunji</i>)	Chewing root	Systemic
9	<i>Vernonia auriculifera</i> Hiern	Garut	Bark/stem/root	Toothache	Carefully heat the diseased teeth only	Topical use
10	<i>Cleome gynandra</i> L.	Tikawoch	Flower	Tonsil	Chewing	Systemic
11	<i>Ficus platyphylla</i> Del.	Fadut	Sap	Itching skin	Drop sap	Topical use
12	<i>Mussaenda arcuata</i> Poir	Karafurchit	Fruit	Deworming, Ascaris/ Roundworms	Boiled fruit	Systemic

Marketability of wild edible plants

The market survey and response of KI revealed that the marketability of WEPs had been declined. The decline of market value was due to the local dietary change, less choice of the younger generation on WEPs, introducing of modern food in market and decline of availability of WEPs. The respondents revealed that balti leaf, sisente leaf, and entut root were sold in the market before few decades. Still now only chaw leaves have been marketed at Guraferda district. It created income generation for rural households; these wild green vegetables contributed to food security and nutrition security.

Status of WEPs

Availability of WEPs was declined from time to time as forest coverage is degraded by human activities such as the expansion of cultivated land, fuelwood and house construction (Table 5). The other threat contributed for loss of WEPs is natural disaster such as climate change variability (drought and heavy rain).

Table 5 Priority ranking of threatening factors on wild edible plants by eight key informants (1 = least threat, 2 = less, 3 = medium, 4 = more and 5 = most threat).

Threats	Key informants								Score	Rank
	KL ₁	KL ₂	KL ₃	KL ₄	KL ₅	KL ₆	KL ₇	KL ₈		
Agricultural land expansion	4	3	2	3	4	2	3	4	25	1
Introduction of modern food	3	2	2	1	2	3	2	3	18	3
House construction	2	1	2	3	3	4	2	3	20	2
Charcoal	2	1	1	2	2	1	3	1	13	5
Climate change	1	2	3	1	3	2	2	2	16	4

Discussion

Botanical description

A high number of WEP species were documented in the study districts. Sixty-six WEPs species composed from 50 genera and 34 families were recorded in study area. Asteraceae, Fabaceae and Amarantaceae families had the highest proportion of edible plants.

The number of WEPs recorded in the present study was comparable with previous records(29), greater than the (30), but lower than (13) elsewhere studied in Ethiopia. This difference could be attributed to the main biodiversity of plant species divergent from place to place. The traditional knowledge of the people on the use of plants may be varied.

Most WEPs recorded in these studies were also recorded in Ethiopia by (31), ten species in Kemash district Beneshangulgemuz; (13), eight species and (32), seven species in Konso southern Ethiopia. Other records were found in African countries Uganda by(33), nine species;(34) 16 species in Kitui country Kenya. It may be attributed that the gathered WEPs are popular and widely available across African countries.

Growth habit

The recorded WEPs were exhibited in different forms such as trees, shrubs, herbs and climbers. The present study found that herbs (42%) were the highest growth forms, followed by shrubs (21%) and climber (20%). Trees (17%) were recorded the lowest growth form. These indicated that the use and knowledge of herbs for food and medicine might be highly associated by the community. The highest citation may be also linked that herbs were more available and easily harvested than other edible parts.

This was in agreement with other findings(35, 36) herbs was highest growth forms. In contrast with the study of (30, 37) trees was the highest growth forms whereas shrubs followed by herbs was the highest growth habit(38). These variations in growth form might be arise from different agro-ecological variations across the study area, directly affecting the composition and type of plant community.

Plant edible parts

Edible parts of fruits, leaves, root and tubers, and seed were documented WEPs in the Meinit cultural community. Leaves (65%) were the most edible parts followed by fruits (28%). Roots and tubers (6%), and seeds (1%) were the minimally consumed edible parts.

These study was contrast to the findings (39) that fruits (28%) followed by leaves (25%) and the present report also contrast to study of (40), in Bullen District North west Ethiopia where fruits had the most edible plant than leaves and tubers. Similar result was reported (41) in Uganda that herbal plant species were the highest consumed WEP part and the same report showed by (42), in Shurugwi district, Zimbabwe, that wild edible vegetables were the most consumable plant parts followed by fruits. This may be the fact that wild green vegetables are provided to an ingredient of local dish preparation and harvested easily near distance than other wild edible parts.

Mode of preparation and consumption

WEPs were prepared in forms of different traditional processing and preservation methods. Some of the recorded methods were boiling, frying, and sun drying whilst consumed in forms of raw, boiled and fried.

Fruits mainly consumed raw or ripen fresh and in juice forms. This study was in agreement with the finding (37, 43) in Ethiopia that most fruit eaten fresh or raw and many leafy vegetables were consumed in boiled or cooked forms. Similar reports were also reported by (44) in Mabira Central Forest Reserve, Uganda that wild fruits were often eaten as snacks when ripe, whereas leafy vegetables were cooked to make soup.

All collected leafy vegetables were eaten boiled whilst the root and tubers were eaten boiled or fried by wood flame. Despite the drying practice of WEPs ceased today, sun drying was used to dry wild leafy vegetables such as bikut, baytena, Gingu, chaw and tikwoch to consume during off season. Similar results were reported by (45, 46) that after cooking some wild edible leafy vegetables were preserved by sun drying method to later use whereas solar drying were applied for preservation of WEPs (47).

Collection season and harvesting methods

Over 44% (29) of wild edible vegetables and roots and tubers were collected and available all-season. About 27% (18) leafy vegetables are seasonal available edible wild crops that collected or existed during the rainy season. Similar results were observed by (48), who found that wild edible vegetables were gathered following the winter and spring rainy season. These edible wild leafy vegetable picked young leaves and shoots manually from their natural habitat. This is because of wild edible vegetables growth with minimum soil moisture and have short life cycle.

The majority of fruits 20% (13) collected from late March to early June. Following short dry season, store food becomes depleted and most dry season wild fruits were collected. The present study was supported by other reports elsewhere in Ethiopia (37, 49) that fruits collected during the dry season and start of rainy period when shortage of food crops exist. These may be due to the fact that wild edible fruits are drought resilient food crops.

Root and tubers were collected during the dry season between late December to early June. Consuming the root and tubers during dry season believed that taste and palatability of roots and tubers are increased. According to studies conducted by (50) that wild edible roots and tubers mainly consumed and harvested in dry condition.

Habitat

WEPs existed in the varied agro-ecological zone and were collected from diverse habitat which including cultivated land, bushy grassland, forest, forest margin, fallow land, woody grass land and riverbank.

The majority (22%) of WEPs were collected from wild cultivated land and almost comparable number (18%) were gathered from bush grass land. A similar result was found by (51) in Uvinza Miombo Woodlands of Tanzania that the highest number of respondents cited WEPs were collected from farm or cultivated land. This is the fact that the major WEP part was herbs generally available in cultivated and bush grass lands.

In contrast to the present study by (38, 52) most WEPs were gathered from wild habitats such shrub lands, bush lands and some grasslands. These variations may be raised from difference of locality and type of collected plant that varied environmental requirements.

Food categories/WEPs use

The collected WEPs were categorized into different groups based on their use. There edible wild plants were used as vegetable, fruit, beverage, culinary use, dried product, and medicinal.

Vegetable

Composite of varied wild and cultivated vegetable were cooked together to reduce the bitterness of some wild green or during scarcity of vegetables. Similar findings were reported by (53) that wild edible vegetables are mixed with domesticated vegetables to improve the palatability. In line with present study, the findings of (54) revealed that WEPs were boiled together during time of scarcity and to increase palatability.

Wild edible vegetables are mainly boiled alone or mix of other vegetable for accompaniment of staple food such as porridge, flatten bread and stewed grain. The study was in agreement with the findings of (30) reported in Kara and Kwegu people in South Omo, Ethiopia that wild vegetables cooked to sauce or porridge. Other reports showed that vegetable dishes were commonly made as relish which accompanied with maize, millet and sorghum porridge (42, 55). This shows that wild leafy green vegetables served as the side dish for accompaniment of staple food in developing country.

Fruit

About 22 wild plant species were categorized under edible fruit. The survey results showed that ripe wild fruits opportunistically gathered and eaten either raw, boiled, roasted and pounded fruit. This result is comparable with report (56) that major fruit was consumed raw, cooked with maize and sorghum flour, roasted, or boiled and processed into juice.

Beverage

Wild edibles can be served either as a component of an ingredient in making local beverage or use alone to produce homemade fruit juice. According to some KI, each fruit juice drunk alone or served with porridge as a relish, and some locality added with Beso. This study in agreement with the study conducted in west central Ethiopia by (43), who found that WEPs served for preparing local alcoholic, non-alcoholic beverage (herbal tea), making traditional meal (bread, injera and porridge) and suit gum.

Similar reports were found by (57), Limpopo Province in South Africa, WEP species used for making non-alcoholic juices and alcoholic drinks such as traditional beer. The consistent result was also reported by (58), in Nigeria that various traditional beverages are prepared from lesser-known indigenous fruits and vegetables.

Based on some KI, godach/nigrocoffee and ogach were served as substitute of coffee. Beshayt and kushita, used as spice for chemo making. These results in agreement with the finding of (29), in Derashe and Kucha districts, South Ethiopia, reported that *Lanatana rhodesiensis* are served as hot drinks (coffee and tea substitutes). These results show that different sociocultural community has common traditional knowledge in the preparation of local beverage from WEPs.

Culinary use/ Spice and condiment

Wild herbs and shrubs were added to local dish as a spice for food colorant, aroma and taste. The study depicted that few WEP species such as beshayte, kushita/ kese and solosolo were sometimes used as spice and condiments. Similar results were observed by (59, 60) that some aromatic WEPs serves as condiments and spice for a local dish.

Medicinal value

Meinit ethnic communities have been utilized plants for human and livestock medication. WEPs are not only to provide dietary nutrient but also provided a medicine for the rural community.

This study revealed that about 18% of gathered edible wild plants have both food and medicinal value. For instance, chaw, gagut, karafurchit, welbete, muchakerech, kemjach, aurachech, and garut were recorded as food-medicinal plants. Food -medicinal plant species were served to treat range of ailments of humans such as mosquito bites, snake bites, inflammation, headache, stomachache, chest ache, wound healing and deworm. Comparable results were found by (42, 61) that some WEPs were served both food and medicinal use. As the KI believed that consuming chaw leaves has a good taste and medicinal value such as stomachache, constipation and good for diabetic patient. Other studies conducted by (62, 63) depicted that WEPs are used for food value and their medicinal role.

Marketability of wild edible plants

The study showed that the marketability of WEPs declined from time to time as the traditional knowledge on the use and consumption of these edibles was loss. According to some KI, balti leaf, sidente leaf, and entut root were sold locally, but now only chaw leaves have been marketed. Chaw green leaf has high market demand and is sold as bunches of leaves. Based on the demand and supply of chaw leaves, one handful of bunch leaves sold about 5 Birr at the local market. These results supported by (64, 65) who found that WEPs usually sold at market which it creates job opportunities and income generation for rural households.

Threats and conservation of WEPs

The traditional knowledge on the use and diversity of WEPs was eroded due to anthropogenic activities and natural disasters. This is in good agreement with the reports of (66) that manmade and ecological environments were the main drivers of change in consumption and availability of WEPs. In line with the present study, (2, 7, 29, 40) in Ethiopia, reported that WEPs face disappearing in their growing environment from diverse anthropogenic activities. This human induced threaten factors were done deliberately or unconsciously by people who alarmingly eroded the biodiversity.

As we observed at the field, a few older adults have started conserving practice of some WEPs around the home (ex-situ conservation) and at field (in-situ conservation). For example, entut, lekut root/tuber, ticawoch have been planted around the home garden and some others protected areas. The present study is in agreement with the finding by (67) that over half of the informants have grown wild edible fruits and shrubs. Comparable result was reported by (68) Tshopo district, DR Congo, the result revealed that gathering *Dioscorea* tubers in the forest still practiced by some people, while others used from domesticating them over time.

We observed some effect of climate change on biodiversity degradation as it resulted land slide and water flood by heavy rain or expansion of drought at some pocket area. Surprisingly, nearly all informants were not recognized the effect of climate change.

Conclusion And Recommendation

Wild edible plants are an integral part of the livelihood of the Meinit ethnic community. The study site has rich plant diversity and untapped traditional knowledge on the use of the wild edible plant. Although the availability and production of agricultural crops are increasing, the tradition of gathering wild edible plant knowledge still practice in the area. These wild edible plants consumed raw or locally processed forms such as cooking, alcoholic or non-alcoholic beverages. Boiling is a widely used traditional processing technique of the local people. Wild edible vegetables seasonally available and highly consumed food category served for preparation of soup or relish local recipe that accompanied with staple food mainly porridge) and flatten bread.

Wild edible plants are used to supplement the cultivated crop, to fill the gap in time of food scarcity or an option during a famine period. Some collected wild edible plants serve for nutraceutical value for treating varied ailments. However, the traditional knowledge on the use and diversity of wild edible plants has been changed due to anthropogenic factors.

Recommendation

The collected wild edible plants will significantly support in food and nutrition security and promoted intensively breeding and domestication programs. The anthropogenic and natural hazards are highly affecting the number of wild edible plants. Thus in-situ and ex-situ conservation practices should be implemented. Comprehensive nutritional, toxicity level, phytochemical and amino acid composition analysis also should be conducted. In sum, the government should include in food and agricultural policies and the researchers should give attention in exploitation the potential use of wild edible plants.

Abbreviations

SNNPR: Southern Nation and Nationalities and Peoples Region, WEPS: wild edible plants, FGD: Focus group discussion, KI: key informants

Declarations

Acknowledgements

The authors wish to thank the Bench-Maji Agriculture office experts, local leaders and all community at the study districts who support this study. We would like to thank Jimma university college of Agriculture and Veterinary medicine for provide the financial support and college community for their unreserved help. The author also would like to thank Mrs Shewangiziw Lemma for facilitating and Mr. Melaku Wendafrash for identifying wild edible plants to be deposit at national herbarium of Ethiopia.

Funding

Funds for the study were provided by College of Agriculture and Veterinary Medicine, Jimma University a research fund of serial number AgvmPHM/18/02.

Availability of data and materials

During this research study all data collected and analyzed are included in published paper.

Authors' contributions

AY was carried out data collection, analysis and drafting of the manuscript of the paper. SF was responsible for English language editing, GA was contributed for editing the manuscript and identifying some common WEPS. AA was drafting the proposal and editing the research paper. Accordingly, all authors were contributed supervise and reviewed the manuscript.

Ethics approval and consent to participate

Protocol was submitted to research and postgraduate studies program at College of Agriculture and Veterinary Medicine, Jimma University and ethical clearance obtained from the research and postgraduate studies program office.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

References

1. Bhatia H, Sharma YP, Manhas R, Kumar K. Traditionally used wild edible plants of district Udhampur, J&K, India. *J Journal of ethnobiology ethnomedicine*. 2018;14(1):1–13.
2. Tebkew M, Gebremariam Y, Mucheye T, Alemu A, Abich A, Fikir DJA. Uses of wild edible plants in Quara district, northwest Ethiopia: implication for forest management. *Agriculture Food Security*. 2018;7(1):1–14.
3. Ulian T, Diazgranados M, Pironon S, Padulosi S, Liu U, Davies L, et al. Unlocking plant resources to support food security and promote sustainable agriculture. *Plants People Planet*. 2020;2(5):421–45.
4. Shumsky SA, Hickey GM, Pelletier B, Johns TJE. Understanding the contribution of wild edible plants to rural social-ecological resilience in semi-arid Kenya. *Ecology Society*. 2014;19(4).
5. Carvalho AM, Barata AMJWP. Mushrooms. The consumption of wild edible plants. *Wild Plants, Mushrooms Nuts: Functional Food Properties Applications* Ch. 62017. p. 159 – 98.
6. Addis G, Asfaw Z, Woldu Z. The role of wild and semi-wild edible plants to household food sovereignty in Hamar and Konso communities, South Ethiopia. 2013.
7. 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 Journal of ethnobiology ethnomedicine*. 2016;12(1):1–15.
8. Zhang L, Chai Z, Zhang Y, Geng Y, Wang YJJoe. Ethnobotanical study of traditional edible plants used by the Naxi people during droughts. *Journal of ethnobiology ethnomedicine*. 2016;12(1):1–16.
9. Ebert AWJS. Potential of underutilized traditional vegetables and legume crops to contribute to food and nutritional security, income and more sustainable production systems. *J Sustainability*. 2014;6(1):319–35.
10. Asfaw Z, Tadesse MJEB. Prospects for sustainable use and development of wild food plants in Ethiopia. *J Economic Botany*. 2001;55(1):47–62.
11. Molla EL, 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):71–121.

12. Mengistu F, Hager HJEr. Wild edible fruit species cultural domain, informant species competence and preference in three districts of Amhara region, Ethiopia. *J Ethnobotany research applications*. 2009;6:487–502.
13. Addis G, Urga K, Dikasso D. Ethnobotanical study of edible wild plants in some selected districts of Ethiopia. *Human Ecology*. 2005;33(1):83–118.
14. Bekele-Tesemma A, Birnie A, Tengnas BJRSU. Swedish International Development Authority. Useful trees and shrubs for Ethiopia; 1993.
15. CSA. The 2007 Population and Housing Census of Ethiopia. Central Statistical Agency Addis Ababa, Ethiopia; 2007.
16. Belay H. Drivers of Land Use/Land Cover Change in the Guraferda District of Bench Maji Zone, Southwestern Ethiopia. *Research & Reviews: Journal of Ecology and Environmental Sciences*. 2018;6(1):52–62.
17. Zeghichi S, Kallithraka S, Simopoulos AP, Kypriotakis Z. Nutritional composition of selected wild plants in the diet of Crete. *World Rev Nutr Diet*. 2003;91:22–40.
18. Russell Bernard H. Research methods in anthropology-qualitative and quantitative approaches. AltaMira Press; 2002.
19. Martin PJ. Sounds and society: Themes in the sociology of music. Manchester University Press; 1995.
20. Cotton CM, Wilkie P. Ethnobotany: principles and applications. John Wiley & Sons Chichester; 1996.
21. Alexiades MN. Collecting ethnobotanical data: an introduction to basic concepts and techniques. *Advances in Economic Botany*. 1996;10:53–94.
22. Edwards S, Demissew S, Hedberg I. Vol. 6: Hydrocharitaceae to Arecaceae: Addis Ababa: Addis Ababa University; 1997.
23. Edwards S, Mesfin T, Hedberg I. Canellaceae to euphorbiaceae. In: *Flora of Ethiopia and Eritrea* 2, Part 2. 1995. p. p.456.
24. Edwards S, Mesfin T, Sebsebe D, Hedberg I. Magnoliaceae to flacourtiaceae. *Flora of Ethiopia and Eritrea*. Vol. 2, Part 1. Ethiopia: The National Herbarium Addis Ababa, 2000. p. 532.
25. Hedberg I, Edwards S. Pittosoraceae to araliaceae. *Flora of Ethiopia and Eritrea*. Vol. 3. Addis Ababa: The National Herbarium Addis Ababa University; 1989. p. 659.
26. Hedberg I, Edwards S, Nemomissa S. Apiaceae to dipsacaceae. *Flora of Ethiopia and Eritrea*. Vol. 4. Part 1. Addis Ababa: The National Herbarium; 2003.
27. Hedberg I, Ensermu K, Edwards S, Sebsebe D, Persson E. Plantaginaceae. In: Hedberg I, Ensermu K, Edwards S, Sebsebe D, Persson E, editors. Vol. 5. Addis Ababa: The National Herbarium 2006. p. 690.
28. Mesfin T. Asteraceae. In: Hedberg I, Friis I, Edwards S, editors. *Flora of Ethiopia and Eritrea*. Vol 4, Part 2. *Flora of Ethiopia and Eritrea: The National Herbarium*; 2004. p. 408.
29. Balemie K, Kebebew F. Ethnobotanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia. *J Ethnobiol Ethnomed*. 2006;2(1):1–9.
30. Teklehaymanot T, Giday M. Ethnobotanical study of wild edible plants of Kara and Kwegu semi-pastoralist people in Lower Omo River Valley, Debub Omo Zone, SNNPR, Ethiopia. *J Ethnobiol Ethnomed*. 2010;6(1):1–8.
31. 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. *Journal of Food Nutrition Sciences*. 2017;5(6):217.
32. Ocho DL, Struik PC, Price LL, Kelbessa E, Kolo K. Assessing the levels of food shortage using the traffic light metaphor by analyzing the gathering and consumption of wild food plants, crop parts and crop residues in Konso, Ethiopia. *J Ethnobiol Ethnomed*. 2012;8(1):1–17.
33. Ojelel S, Mucunguzi P, Katuura E, Kakudidi EK, Namaganda M, Kalema J. Wild edible plants used by communities in and around selected forest reserves of Teso-Karamoja region, Uganda. *J Ethnobiol Ethnomed*. 2019;15(1):1–14.
34. Mutie FM, Rono PC, Kathambi V, Hu G-W, Wang Q-F. Conservation of Wild Food Plants and Their Potential for Combatting Food Insecurity in Kenya as Exemplified by the Drylands of Kitui County. *Plants*. 2020;9(8):1017.
35. Alemneh D. Ethnobotany of wild edible plants in Yilmana Densa and Quarit Districts of West Gojjam Zone, Northwest Ethiopia. *Ethnobotany Research Applications*. 2020;20:1–14.
36. Nyero A, Achaye I, Odongo W, GodwinAnywar, Malinga GM. Wild and semi-wild edible plants used by the communities of Acholi sub-region, Northern Uganda. *Ethnobotany Research Applications*. 2021;21(16):1–13.
37. Kidane L, Kejela A. Food security and environment conservation through sustainable use of wild and semi-wild edible plants: a case study in Berek Natural Forest, Oromia special zone, Ethiopia. *Agriculture Food Security*. 2021;10(1):1–16.
38. 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):1–15.
39. Lim TK, Feyyisa DH, Jiru DB. Management and Utilization of Wild Nutraceutical Plants. *Ethiopian Journal of Applied Science Technology*. 2016;7(1):83–97.
40. Berihun T, Molla E. Study on the diversity and use of wild edible plants in Bullen District Northwest Ethiopia. *Journal of Botany*. 2017;2017.
41. Tabuti J, Dhillion S, Lye K. The status of wild food plants in Bulamogi County. *Uganda International journal of food sciences nutrition*. 2004;55(6):485–98.
42. Maroyi A. Use of weeds as traditional vegetables in Shurugwi District, Zimbabwe. *J Ethnobiol Ethnomed*. 2013;9(1):1–10.
43. Regassa T, Kelbessa E, Asfaw Z. Ethnobotany of wild and semi-wild edible plants of Chelia District, West-Central Ethiopia. *Science Technology Arts Research Journal*. 2015;3(4):122–34.
44. Nyakoojo C, Tugume PJER, Applications. Traditional use of wild edible plants in the communities adjacent Mabira Central Forest Reserve. Uganda. 2020;20:1–14.
45. Maroyi A. The gathering and consumption of wild edible plants in Nhema communal area, Midlands province. Zimbabwe *J Ecology of food nutrition*. 2011;50(6):506–25.

46. Flyman M, Afolayan A. The suitability of wild vegetables for alleviating human dietary deficiencies. *J South African Journal of Botany*. 2006;72(4):492–7.
47. Ojelel S, Kakudidi aEK. Wild edible plant species utilized by a subsistence farming community in Obalanga sub-county, Amuria district, Uganda *Journal of Ethnobiology and Ethnomedicine* 2015;11(7).
48. Mekuanent Tebkew Y, Gebremariam T, Mucheye A, Alemu, Abich A, Fikir aD. Uses of wild edible plants in Quara district, northwest Ethiopia: implication for forest management. *Agric Food Secur*. 2018;7(12):1–14.
49. Kidane B, Van der Maesen L, van Andel T, Asfaw Z, Sosef M. Ethnobotany of wild and semi-wild edible fruit species used by Maale and Ari ethnic communities in southern Ethiopia. *Ethnobotany Research Applications*. 2014;12:455–71.
50. Fils PEB, Nana NA, Betti JL, Njimbam OF, Womeni ST, Martin E, et al. Ethnobotanical survey of wild edible plants used by Baka people in southeastern Cameroon. *J Journal of ethnobiology*. 2020;16(1):1–15.
51. Mpsiwakomu A, Nyomora A, Gimbi AJHJotOUoT. Diversity and utilization of wild edible plant species from the Uvinza miombo woodlands, Tanzania. *Huria: Journal of the Open University of Tanzania*. 2017;24(3):150 – 68.
52. Tinsae Bahru Z, Asfaw, Demissew S. Wild edible plants: sustainable use and management by indigenous communities in and the buffer area of awash national park. *ethiopia Ethiop J Sci*. 2013;36(2):93–108.
53. Marshall F. Agriculture and use of wild and weedy greens by the Piik ap Oom Okiek of Kenya. *Econ Bot*. 2001;55(1):32–46.
54. Ogoye-Ndegwa C. Traditional gathering of wild vegetables among the Luo of Western Kenya—a nutritional anthropology project1. *Ecol Food Nutr*. 2003;42:69–89.
55. Ogle BM, Grivetti LEJEoF. Legacy of the chameleon: Edible wild plants in the kingdom of Swaziland, Southern Africa. A cultural, ecological, nutritional study. Part IV—nutritional analysis and conclusions. *Ecology of Food Nutrition*. 1985;17(1):41–64.
56. Dejene T, Agamy MS, Agúndez D, Martin-Pinto P. Ethnobotanical survey of wild edible fruit tree species in lowland areas of Ethiopia. *Forests*. 2020;11(2):177.
57. Rampedi IT, Olivier J. Traditional beverages derived from wild food plant species in the Vhembe District, Limpopo Province in South Africa. *Ecology of food nutrition*. 2013;52(3):203–22.
58. Aworh OC. Promoting food security and enhancing Nigeria's small farmers' income through value-added processing of lesser-known and under-utilized indigenous fruits and vegetables. *Food Res Int*. 2015;76:986–91.
59. Bhatia H, Sharma YP, Manhas R, Kumar K. Traditionally used wild edible plants of district Udhampur, J&K, India. *J Ethnobiol Ethnomed*. 2018;14(1):1–13.
60. Dogan Y, Baslar S, Ay G, Mert HH. The use of wild edible plants in western and central Anatolia (Turkey). *Econ Bot*. 2004;58(4):684–90.
61. Godwin Anywar, Oryem-Origa H, Mugisha MK. Wild Plants Used as Nutraceuticals from Nebbi District, Uganda. *European Journal of Medicinal Plants*. 2014;4(6):641–60.
62. Acipa A, Kamatenesi-Mugisha M, Oryem-Origa H. Documentation and Nutritional profile of some selected food plants of Otwal and Ngai sun counties Oyam District, Northern Uganda. *J African Journal of Food, Agriculture, Nutrition Development*. 2013;13(2).
63. Anywar G, Oryem-Origa H, Mugisha MK. Wild plants used as nutraceuticals from Nebbi district, Uganda. *J European Journal of Medicinal Plants*. 2014:641–60.
64. Neudeck L, Avelino L, Bareetseng P, Ngwenya BN, Motsholapheko MJER. The contribution of edible wild plants to food security, dietary diversity and income of households in Shorobe Village, northern Botswana. *Ethnobotany Research Applications*. 2012;10:449–62.
65. Badimo D, Lepetu J, Teketay D. Utilization of edible wild plants and their contribution to household income in Gweta Village, central Botswana. *Afr J Food Sci Technol*. 2015;6(7):220–8.
66. Pawera L, Khomsan A, Zuhud EA, Hunter D, Ickowitz A, Polesny ZJF. Wild food plants and trends in their use: From knowledge and perceptions to drivers of change in West Sumatra. *Indonesia*. 2020;9(9):1240.
67. Seyoum Y, Teketay D, Shumi G, Wodafirash MJER. Edible wild fruit trees and shrubs and their socioeconomic significance in central Ethiopia. *Ethnobotany Research Applications*. 2015;14:183–97.
68. Termote C, Van Damme P, Dhed'a Djailo B. Eating from the wild: Turumbu indigenous knowledge on noncultivated edible plants, Tshopo District, DRCongo. *Ecology of food nutrition*. 2010;49(3):173–207.

Figures

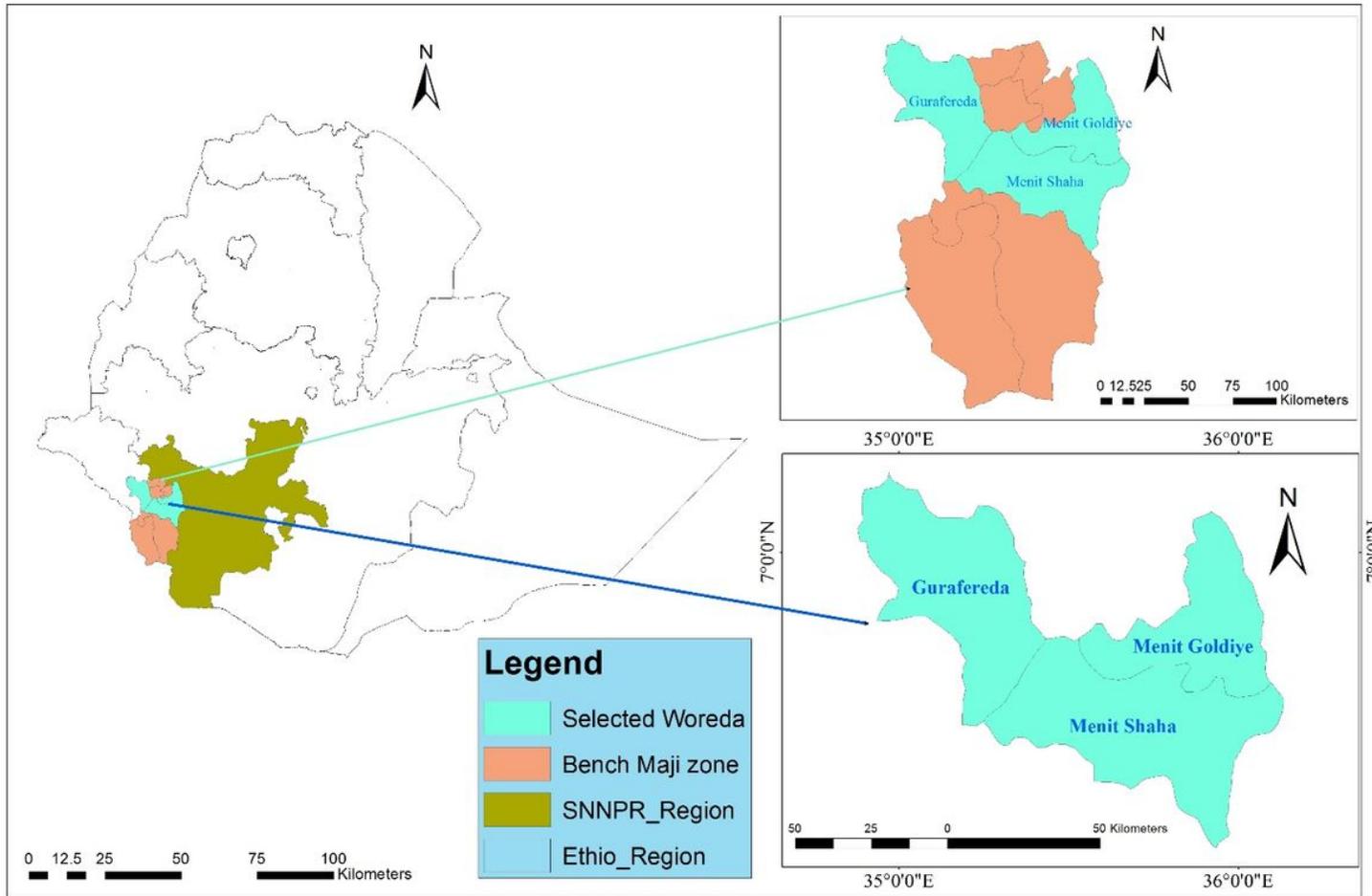


Figure 1

Map of districts in Ethiopia where the study was conducted

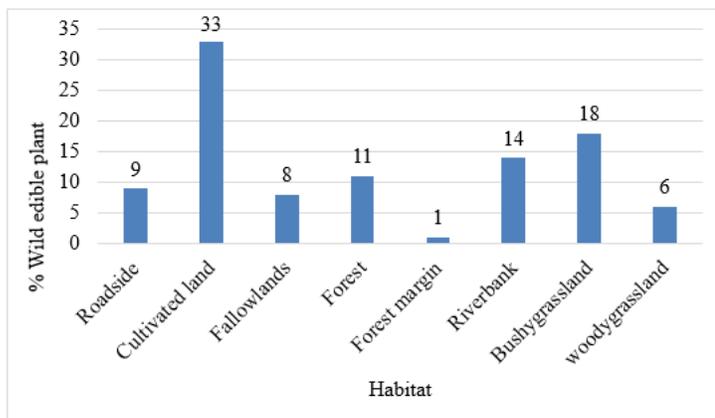


Figure 2

Wild edible plant habitat

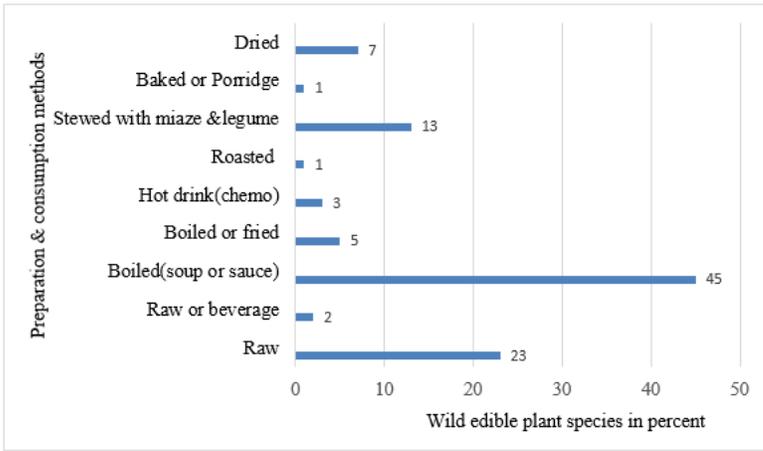


Figure 3

Preparation and consumption methods of wild edible plant species