

## Ethnobotanical Study of Wild Edible Plants in Bule Hora Woreda, Southern Ethiopia

*Baressa Anbessa*

Department of Biology, Faculty of Natural and Computational Sciences,  
Bule Hora University, Bule Hora, Ethiopia

---

**Abstract:** *Background:* The people of the world as well as most rural communities in our country depend on wild edible plants during food scarcity. Therefore, this study aimed to document the wild edible plants and associated indigenous knowledge of the people in the Bule Hora Woreda, Borena Zone, Oromia National Regional State and Southern Ethiopia. *Methods:* The ethno botanical data was collected by semi-structured interview, group discussion, market survey and field survey from May 2013 to January, 2014. Later the data was analyzed through descriptive statistical methods and cluster analysis by using the software such as Microsoft Excel, SPSS and PAST-Paleontological Statistics. *Results:* A total of 29 wild edible plant species belongs to 27 genera and 22 families recorded in the area. The growth forms of these plants were dominated by shrubs (37.93%) and trees (27.59%), followed by tree/shrub forms (13.79%), herbaceous forms (13.79%) and climbers (6.90%). Fruits were mostly edible plant parts followed by tubers, young shoots, roots and gum. Some wild edible plants used for various purposes in addition to their consumption. About 83% of the wild edible plants in the area have no side effects although the dangerous spines and over dosage account about (17%). From the reported wild edible plants, only few plants sold as a food in the local markets. The main threats for wild edible plants in the area are over grazing, deforestation for agricultural practices and cutting for construction and home furniture.

**Key words:** Ethno botany • Wild edible plants • Indigenous knowledge • Bule Hora Woreda

---

### INTRODUCTION

People of the world use the wild plant resources from the very beginning in ancient time to fulfill their needs [1]. The use of wild plant resource still continued in different parts of the world. Because, the wild plants play a crucial role for daily requirement of human beings such as medicine, food, spices, fence and shelter construction, timber production, etc. [2]. In addition to all these uses, wild edible plants contribute a lot for human diet; especially in poor rural communities during the period of food crisis. People of developing countries use the wild plants as a food in addition to the cultivated plants [3, 4]. Therefore, wild plants play an important role in complement staple foods to provide a balanced diet by supplying trace elements, vitamins and minerals and may do so again in the future [5, 6].

Wild edible plants are neither cultivated nor domesticated, but are available from their wild natural habitat and used as sources of food [5, 7]. On the other hand, domesticated plants are genetically modified

species that completely depend on humans for survival [5] and commonly used as a food worldwide. That is, some wild edible plants genetically modified and domesticated as new cultivated varieties to be managed by human beings [8]. However, some plants seem to be the intermediate between wild and domesticated.

In our context, Ethiopia is one of the developing countries which depend on wild edible plants and their traditional knowledge to fulfill nutritional needs in addition to domesticated cultivars especially in the rural area during the period of food scarcity [9-11]. For instance, the populations of Ethiopia are familiar with the traditional knowledge of using wild edible plants for various purposes. These include utilization of wild edible plant resources for different human requirements such as food security, medicinal value, fuel wood production, charcoal production, timber production, house construction, etc. However, misuse of the wild plant resource cause extinction of the useful wild edible plants. As a result, the wild plant resources require considerable conservation for sustainable usage in the future.

In Ethiopia wild edible plants are facing threats in their natural habitats from various human activities such as fuel wood collection, harvesting for timber and walling or poles, etc. [9]. These practices adversely affect wild edible plants in the country and lead to the reducing of economically crucial food plants [11]. Since traditional knowledge on wild edible plants is being eroded through acculturation and the loss of plant biodiversity along with indigenous people and their cultural background, promoting research on wild food plants is crucial in order to safeguard this information for future societies [7].

However, majority of the ethno botanical studies in the country concerned with the traditional knowledge of medicinal plants instead of wild edible plants [12-19]. That is, only few ethnobotanical studies conducted concerning wild edible plants in the country. Particularly, in the Borana Zone the ethno botanical studies of wild edible plants have not carried out although the people in the Borana Zone also adapted to eat wild edible plants [20]. Thus, the current study was investigated to solve the major problems associated with the knowledge of the local people to use wild edible plants. The study aimed to document the wild edible plants and the associated indigenous knowledge of the people of Bule Hora Woreda, in Borana Zone, Southern Ethiopia.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in the Bule Hora woreda, Borena zone, Oromia National Regional State, Southern Ethiopia. The study area is composed of about 48 kebeles. Out of these, three kebeles were selected purposefully as representative study sites based on their location, climatic condition and distance from each other. The study sites (kebeles) were Didole Hara, Kilenso Mokonisa and Ropi Magada with weather conditions of semi-arid (Qola), mid highland (Weinadega) and highland (Dega) respectively (Figure 1).

The indigenous people of the study area (called Guji and Borana) are from the Oromo ethnic groups. The study area is semi-arid, with mean annual bimodal rainfall ranging between 400 mm and 500 mm [21] with the main rainy season expected between March and May and the short rain occurs between October and November [22]. The vegetation of the study area is typical of lowlands in some kebeles and also shows characteristics of highlands in the other areas.

**Methods of Data Collection:** The ethnobotanical data was collected by semi-structured interview, group discussion, market survey and field survey [23]. Some of the wild

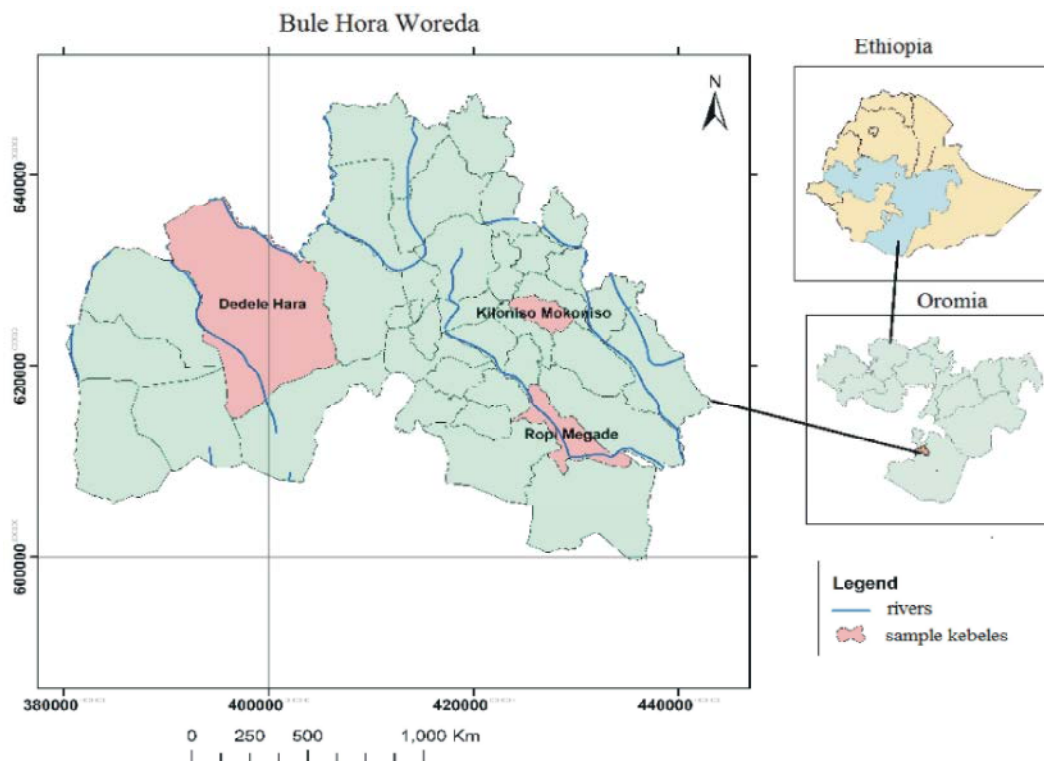


Fig. 1: Map of the study area

edible plants were identified in the field. The collection of voucher specimens was also involved in the data collection. The data collection was carried out from May 2013 to January, 2014. The collected voucher specimens were later identified to species level at National Herbarium of Addis Ababa University. The field survey and semi-structured interview was used as a major tools for the collection of ethnobotanical information from the local people. The interview was carried out individually for each informant. It was conducted in the Afaan Oromo language. A total of 75 respondents (25 from each kebele) of different age, sex, religion, occupation and educational level were interviewed and data was compiled for further analysis.

**Materials:** Materials such as Notebook with hard cover, Pen or pencil, Altimeter, GPS (Global Positioning System), Plastic bags, Flimsy, Blotters, Ventilators, Presser (flat wooden frames), Straps, Ethanol (70%), Digger, Sectors/pruning scissors, other supportive materials were used during data collection.

**Methods of Data Analysis:** A descriptive statistical method was used to summarize and analyse the ethnobotanical data. The illustrative tables and graphs were also used to summarize the data in precise form using the software programs such as Microsoft Excel and Statistical Packages for Social Sciences (SPSS). The similarity in wild edible plants among the study sites was assessed by cluster analysis using the computer program PAST –Palaeontological STatistics, version 1.56 [24]. That is, the cluster analysis was performed to show similarity between the wild edible plants among the study sites.

## RESULTS

### **Taxonomic Diversity of Wild Edible Plants in the Study Area:**

A total of 29 wild edible plant species recorded under 27 genera and 22 families (Table 1). Among the 22 wild edible plant families Anacardiaceae was the most abundant wild edible plant family in the study area followed by Fabaceae, Moraceae, Myrtaceae, Rutaceae and Verbenaceae families.

**Habits of Wild Edible Plants in the Area:** The current finding revealed that the growth habits of wild edible plants of the study area were dominated by shrubs (37.93%) and trees (27.59%) followed by tree or shrub growth forms (13.79%), herbaceous forms (13.79%) and climbers (6.90%) (Figure 2).

**Plant Parts Used as a Food:** The current study revealed that fruits (79.31%) were mostly edible plant parts, tubers and fruits (3.45%), young shoots (6.90), young shoots and fruits (3.45%), roots (3.45%) and gums (3.45%) were the remaining edible parts (Figure 3).

**Modes of Consumption:** In the study area, the local people reported that about 89.66% of wild edible plants consumed raw outdoor. However, about 3.45% can be consumed raw or fermented, about 3.45% can be consumed raw or boiled and the rest 3.45% of wild edible plants in the area are found to be eaten cooked (Figure 4). According to the report of this finding, majority of the wild edible plants in the area consumed raw except *Amaranthus caudatus* L., *Dioscorea bulbifera* L. and *Premna schimperii* Engl., in which the edible parts can be cooked, boiled and fermented respectively for intake. No need of cooking, boiling or roasting of edible parts for consumption in majority of wild edible plants of the area.

### **Side Effects of Wild Edible Plants in the Area:**

The current study revealed that majority of wild edible plants (83%) in the area has no side effects on the human health. That means many wild edible plants in the area are not pathogenic or not diseases causing. However, few wild edible plants show negative effects due to over dosage (7%) and dangerous needles they possess (10%) (Figure 5). For example, the excessive consumption of the *Pappea capensis* Eckl and *Zeyh* fruits causes the burning of mouth parts, the excess intake of *Rhus natalensis* Krauss. fruits causes constipation (difficulty in emptying the bowels, associated with hardened faeces) and *Carissa spinarum* L., *Capparis tomentosa* Lam. and *Acacia seyal* Del. were reported for their dangerous spines during harvesting.

### **Wild Edible Plants Similarity among the Study Sites:**

The wild edible plants in the Ropi Magada and Kilenso Mokonisa were more similar relative to those in the Didole Hara area (Figure 6).

**Marketability of Wild Edible Plants:** The wild edible plants in the study area are almost not sold in the local market except few plants as a food (Table 2). That is, only *Syzygium guineense* (Willd.) DC. and *Syzygium guineense* var. (Wild.) DC. had been sold in the past during the shortage of food in the area. But these wild edible plants do not sell in the market now a day.

Table 1: List of wild edible plants reported in the study area

Scientific name	Local name	Family	Habit	Edible parts
<i>Lenea rivae</i> (Chiov.) Sacl.	Handaraku	Anacardiaceae	Tree	Fruit
<i>Carissa spinarum</i> L.	Agansa	Apocynaceae	Shrub	Fruit
<i>Opuntia ficus-indica</i> (L.) Miller.	Adaamii	Cactaceae	shrub	Fruit
<i>Syzygium guineense</i> (Willd.) DC.	Awajo	Myrtaceae	Tree	Fruit
<i>Balanites aegyptiaca</i> (L.) Del.	Baddana	Balantiaceae	Tree/Shrub	Fruit
<i>Syzygium guineense</i> var. (Willd.) DC.	Baddesa	Myrtaceae	Tree	Fruit
<i>Dioscorea bulbifera</i> L.	Barodaa	Dioscoreaceae	Climber	Tuber, fruit
<i>Pappea capensis</i> Eckl and Zeyh	Biiqqaa	Sapindaceae	Tree	Fruit
<i>Rhus natalensis</i> Krauss.	Daboobessa	Anacardiaceae	Shrub	Fruit
<i>Rumex abyssinicus</i> Jacq.	Dhaangagoo	Polygonaceae	Herb	Young shoot
<i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. Ex G. Don) Cif.	Ejersa	Oleaceae	Tree	Fruit
<i>Capparis tomentosa</i> Lam.	Gora	Capparidaceae	Shrub	Fruit
<i>Teclea simplicifolia</i> (Engl.) Verdoorn	Hadheesa	Rutaceae	Shrub	Fruit
<i>Flacourtia indica</i> (Burm. f.) Merr.	Hagalaa	Flacourtiaceae	Shrub	Fruit
<i>Grewia evolute</i> Juss.	Harooressa	Tiliaceae	Shrub	Fruit
<i>Ficus sur</i> Forssk.	Harruu	Moraceae	Tree	Fruit
<i>Physalis peruviana</i> L.	Hawuxii	Solanaceae	Herb	Fruit
<i>Sclerocarya birrea</i> (A. Rich.) Hochst subsp.	Hudhaa	Anacardiaceae	Tree/Shrub	Fruit
<i>Euclea divinorum</i> Hiern	Mi'eessaa	Ebenaceae	Tree/Shrub	Fruit
<i>Ficus glumosa</i> Del.	Qilxuu	Moraceae	Tree	Fruit
<i>Tamarindus indica</i> L.	Roqaa	Fabaceae	Shrub	Fruit
<i>Momordica foetida</i> Schumach.	Suruphaa	Cucurbitaceae	Climber	Fruit
<i>Cordia africana</i> Lam.	Waddesa	Boraginaceae	Tree	Fruit
<i>Premna schimperi</i> Engl.	Xaxessa	Verbenaceae	Shrub	Young shoot, fruit
<i>Clausena anisata</i> (Willd.) Benth.	Xirdhoo	Rutaceae	Shrub	Fruit
<i>Commiphora africana</i> (A. Rich.) Engl.	Hammesa	Burseraceae	Shrub	Root bark
<i>Lantana camara</i> L.	Dubaroo	Verbenaceae	Shrub	Fruit
<i>Acacia seyal</i> Del.	Waccuu	Fabaceae	Tree	Gum
<i>Amaranthus caudatus</i> L.	Raafuu	Amaranthaceae	Herb	Young shoot

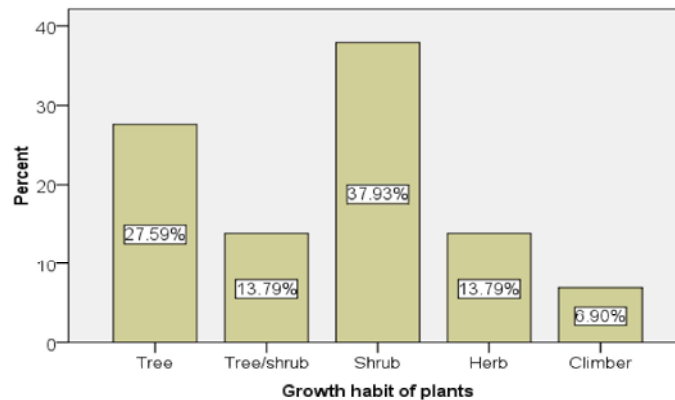


Fig. 2: The growth forms of wild edible plants in the area

However, the wild edible plant called *Tamarindus indica* L. is sold still in the local market even though there is no food scarcity in the study area. In addition, other wild edible plants such as *Olea europaea* subsp. *cuspidata* (Wall. Ex G. Don) Cif. and *Cordia africana* Lam. were sold for other purposes. For example, *Olea europaea* subsp. *cuspidata* (Wall. Ex G. Don) Cif. was sold for its attractive smoke while *Cordia africana* Lam. was sold for timber production.

**Threats to and Conservation Status of Wild Edible Plants:** The main threats for wild edible plants in the area include over grazing by domestic animals, deforestation for agricultural practices and settlement and cutting for construction purposes and preparation of home furniture. Especially *Momordica foetida* Schumach. and *Physalis peruviana* L. grow near the home garden in coffee and cultivated plants and act as weeds. Thus farmers remove or cut these plants from their farm land (Figure 7).

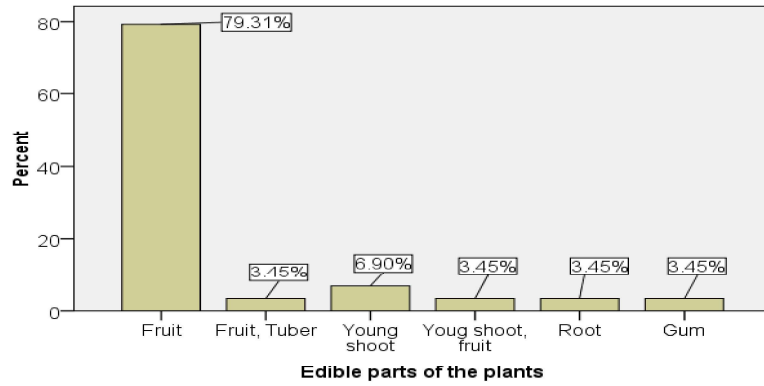


Fig. 3: percentage of edible plant parts in the area

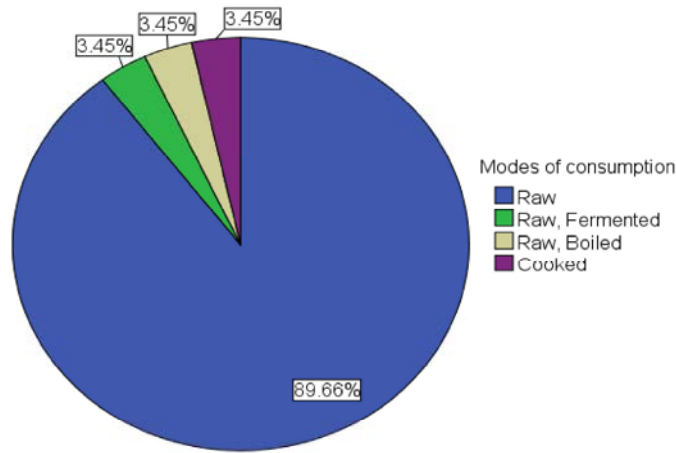


Fig. 4: Modes wild edible plants consumption in the area

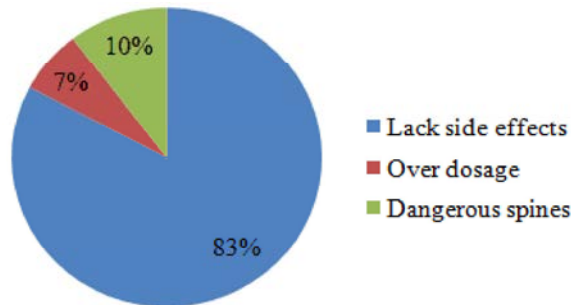


Fig. 5: Percentage of side effects of wild edible plants

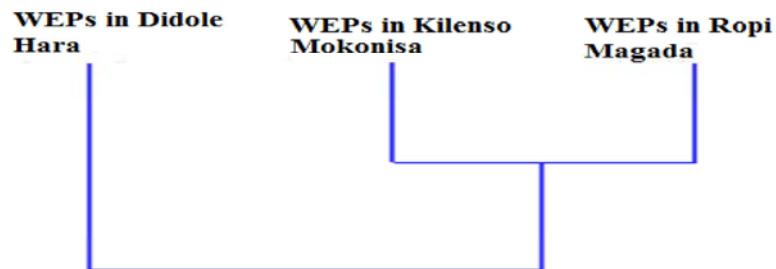


Fig. 6: The cluster analysis showing the similarities between wild edible plants among the study sites

Table 2: Frequency table for marketability of wild edible plants in the area

		Frequency	Percent	Valid Percent
Valid	Not sold	26	89.7	89.7
	Sold in the past	2	6.9	6.9
	Sold recently	1	3.4	3.4
	Total	29	100.0	100.0

In addition, *Syzygium guineense* var. (Wild.) DC. was harvested for construction and *Cordia africana* Lam. was harvested for production of timber.

In the study area, the local people reported that some trees conserved in the natural forest or agro-forestry system. For example, *Syzygium guineense* var. (Wild.) DC. conserved in natural forest while *Cordia africana* Lam. conserved in agro-forestry near the home garden. In addition some plants like *Momordica foetida* Schumach. and *Physalis peruviana* L. grow with the living fences near the home garden.



Fig. 7: Dried *Momordica foetida* Schumach. cut by farmers from coffee plant

### DISCUSSION

The reported wild edible plants in the area were eaten to combat against food scarcity and also taken as extra foods in addition to the cultivated plants. Similarly, eating wild edible plants was common throughout the country [7, 9, 11, 25-28]. This indicates the widely use of wild edible plants in the country to fight against food scarcity especially during the famine season.

Majority of wild food plants in the area were eaten as extra food instead of serving as regular meal. This indicates the uses of wild food plants as optional food during sufficient access of cultivated plants are available in the area. Likewise, the optional consumption of wild edible plants was happen in different parts of the world [29]. Although many wild edible plants got little emphasize by the local people, some are crucial a lot for their nutritional contents. Because, some wild edible plants are rich in essential amino acids, carbohydrate and minerals like calcium, Copper, Iron, Magnesium, Zinc, etc. [30].

The growth habits of wild edible plants of the study area were dominated by shrubs and trees. Likewise, the study conducted by [25] reported the abundance of wild edible trees and shrubs in the Debub Omo Zone, Southern Ethiopia. This implies the abundance of tree and shrub wild edible plants in different parts of the country relative to the other growth forms.

In the study area fruits, young shoots, tubers, roots and gum were found to be eaten by the local people. Among these edible parts, fruits account about 79.31% while the rest other parts cover about 20.69%. The other studies conducted by [7, 11] also reported that fruits were the dominant edible parts in the country. However, edible leaves were not reported in the study area. But leaves were important edible parts in the other parts of the world [2, 9, 11, 28, 31-33]. This might be correlated with the variation in the traditional knowledge of the local people in different areas. The people in some area adapted to eat fruits than the other parts while others adapted to eat leaves or stems than any other plant parts.

In the study area the edible parts of most wild edible plants consumed directly without any process except few. The outdoor consumption of wild edible plants mostly carried out by children and cattle rearing individuals. Similarly, the outdoor consumption of wild edible plants has been reported in agricultural fields, during cattle keeping and travelling [29, 32]. However, few plant parts were consumed by extracting the edible oil, by traditional fermentation of edible parts for drink and boiled for intake. Likewise, fermentation of edible fruits was also reported by Mengistu and Herbert [10] in the country. This indicates the ethnobotanical knowledge similarity of the local people to use wild edible plants in different parts of the world. Therefore, indigenous knowledge of wild food utilization is not restricted to only one place or country; instead it interrelated with the traditional knowledge in various parts of the world. This indigenous knowledge passes from the parents to the young generations traditionally.

The additional roles of wild edible plants include serving as raw materials for house construction, charcoal production, preparing of beehives, medicinal value, providing pleasant smoke, preparing ax holder, providing shade, timber production and food for cattle. For instance, *Syzygium guineense* var. (Wild.) DC. serve as raw material for house construction, used as a fuel and its natural hole serve as a shelter for honey bees, *Pappea capensis* Eckl and Zeyh, *Teclea simplicifolia* (Engl.) Verdoorn, *Psidium gujava* L. and *Euclea divinorum* Hiern serve as medicinal value for human being as well as for domestic animals,

*Rhus natalensis* Krauss. and *Ficus sur* Forssk. used for preparing of beehives, *Olea europaea* subsp. *cuspidata* (Wall. Ex G. Don) Cif. provide attractive smoke. In addition to the above functions, the wild edible plants may contribute many purposes beside their use for consumption. Likewise, the study conducted by Kebu [9] reported the use of wild edible plants for various purposes in addition to consumption. Moreover, some of the wild edible plant parts used as a food source were also ingested as a remedy [25]. For example, *Saba comorensis* (Boj.) Pichon, *Moringa stenopetala* (Bak. f.) Cuf., *Ximenia Americana* L. and *Grewia bicolor* Juss. were also ingested for medicinal value. The use of wild edible plants for various purposes might increase the harvesting of plants for different functions. This may lead to the extinction of the wild edible plants in the area. Because, more targeted plants become rare in the local area [20]. As a result, wise use of these plants required for sustainable usage in the future.

The wild edible plants of the study area have only the over dosage and dangerous spines side effects. These indicate little bit risks of consuming wild edible plants in the area. Therefore, the wild edible plants in the area can be eaten by the local community without fear of side effects except few. However, according to the study conducted by [32] eye irritation, which in the worst case may lead to blindness during harvesting of *Opuntia ficus-indica*, skin and mouth irritation by *Amorphophallus gombocianus*, reversible joint paralysis due to consumption of *Justicia ladanoides* Lam. were the major adverse effects mentioned.

The wild edible plants in Ropi Magada and Kilenso Mokonisa kebeles are more or less similar while those in Didole Hara kebele are relatively different. This might be correlated with the similarity of climatic condition and altitudes between the Ropi Magada and Kilenso Mokonisa than that of the Didole Hara. The wild edible plants which adapted to the semi-arid climate and high land areas found in Ropi Magada and Kilenso Mokonisa kebeles. But the wild edible plants which adapted to the arid climate and low land areas found in the Didole Hara kebele. Similarly, the study conducted by [11] also revealed various distributions of wild edible plants in semi-low land, low land and high land areas.

Few wild edible plants such as *Syzygium guineense* (Willd.) DC. and *Syzygium guineense* var. (Willd.) DC. were sold in the local market during the food scarcity whereas *Tamarindus indica* L. is sold still in the local market although there is no food scarcity in the study area. Some authors [32] revealed the increasing of selling

wild edible plants during food scarcity rather than the other time. The marketability of wild edible plants was also revealed by the other studies [2, 4, 11, 26, 28, 31, 34, 35]. This indicates the contribution of wild edible plants in generating of income in addition to their use for consumption.

The other wild edible plants such as *Olea europaea* subsp. *cuspidata* (Wall. Ex G. Don) Cif. and *Cordia africana* Lam. were sold for other purposes. For example, *Olea europaea* subsp. *cuspidata* (Wall. Ex G. Don) Cif. Was sold for its attractive smoke while *Cordia africana* Lam. sold for timber production. Similarly, the study conducted by [20] reported that the gum from *Acacia Senegal* is collected and sold in local markets. This indicates the selling of wild edible plants in the local markets for various functions in addition to their nutritional value.

The threats such as over grazing by domestic animals, deforestation for agricultural practices and settlement and cutting for construction and preparation of home furniture were reported in the area. Likewise, the study conducted by [7, 9, 11, 25, 27, 32] reported the agricultural expansions, overgrazing, deforestation, fuel wood collection and urbanization as the major threats of wild edible plants in the country. This might cause the depletion of wild edible plants throughout the country. Therefore, the awareness of the local community plays a great role to proceed these crucial wild edible plants and their indigenous knowledge for the future generations.

The local people reported some conservation strategies of wild edible plants in the natural forest, in agro-forestry system and near the home garden. Similarly, the study conducted by [28] reported the conservation of wild edible plants in agro-forestry and living fences. This indicates the similarity in the indigenous knowledge of the local people to conserve the wild edible plants in different parts of the country.

## CONCLUSION

A total of 29 wild edible plant species belongs to 27 genera and 22 families recorded in the Bule Hora Woreda. These wild edible plants especially consumed during the food scarcity and sometimes consumed as extra food in addition to the cultivated plants. Moreover, the local communities have the indigenous knowledge to use the wild edible plants in the area. Accordingly, almost all wild edible plants in the study area were consumed outdoor except *Amaranthus caudatus* L., *Dioscorea bulbifera* L. and *Premna schimperi* Engl., in which their

edible parts cooked, boiled and fermented respectively for consumption. The outdoor consumption of wild edible plants mostly carried out by children and cattle rearing individuals.

In addition to the use for consumption, wild edible plants in the study area used for various purposes. These includes the use for house construction, charcoal production, preparing of beehives, medicinal value, providing pleasant smoke, preparing ax holder, providing shade, timber production and food for cattle. However, these multipurpose use of wild edible plants leads to the depletion and extinction of wild edible plants in the area. Additionally, threats such as over grazing, deforestation for agricultural practices and settlements also affect the wild edible plants in the area. Therefore, it is better to educate and create awareness in the local communities toward the conservation of these crucial plants for sustainable usage in the future.

The current study revealed that the main side effects of wild edible plants are over dosage and the effect of dangerous spines. Thus, it is better to reduce the effect of over dosage problem by managing the amount of intake. Moreover, carefully harvesting is also advisable to reduce the effect of dangerous spines.

Investigating the nutritional value of the reported wild edible plants will be important to conserve the most nutritionally valuable wild edible plants in the home garden. This may leads to the formal domestication of the most nutritionally valuable wild edible plants in the study area. Furthermore, conservation of nutrient full plants in the natural habitat is important to minimize extinction of crucial wild edible plants.

The current finding reported various threats of wild edible plants. Thus, the local community should develop conservation strategies and reduce deforestation practices. In addition, the practical domestication of wild edible plants required from the local community for sustainable use in the area. This is very important especially to arrive some wild edible plants which were found under threatened condition before the occurrence of extinction.

The wild edible plants of study area consumed during the food scarcity as well as extra foods in addition to the cultivated plants. Local communities have their indigenous knowledge to use these plants. Therefore, these plants require wisely harvesting, proper conservation and management practices for sustainable usage in the future.

## REFERENCES

1. Uprety, Y., R.C. Poudel, K.K. Shrestha, S. Rajbhandary, N.N. Tiwari, U.B. Shrestha and H. Asselin, 2012. Diversity of use and local knowledge of wild edible plant resources in Nepal, *Journal of Ethnobiology and Ethnomedicine*, 8: 16.
2. Acharya, K.P. and R. Acharya, 2010. Eating from the Wild: Indigenous Knowledge on Wild Edible Plants in Parroha VDC of Rupandehi District, Central Nepal, *International Journal of Social Forestry (IJSF)*, 3(1): 28-48.
3. Jadhav, V.D., S.D. Mahadkar and S.R. Valvi, 2011. Documentation and Ethnobotanical Survey of Wild Edible Plants from Kolhapur District, *Recent Research in Science and Technology*, 3(12): 58-63.
4. Dogan, Y., I. Ugulu and N. Durkan, 2013. Wild Edible Plants Sold in the Local Markets of Izmir, Turkey Pak. *J. Bot.*, 45(S1): 177-184.
5. Tardío, J., M. Pardo-De-Santayana and R. Morales, 2006. Ethno botanical review of wild edible plants in Spain, *Botanical Journal of the Linnean Society*, 152: 27-71.
6. Pardo-de-Santayana, M., J. Tardío, E. Blanco, A.M. Carvalho, J.J. Lastra, E.S. Miguel and R. Morales, 2007. Traditional knowledge of wild edible plants used in the northwest of the Iberian Peninsula (Spain and Portugal): a comparative study, *Journal of Ethnobiology and Ethnomedicine*, 3: 27.
7. Lulekal Ermias, Zemede Asfaw, Ensermu Kelbessa and P.V. Damme, 2011. Wild edible plants in Ethiopia: a review on their potential to combat food insecurity *Afrika focus.*, 24 (2): 71-121.
8. Ali-Shtayeh, M.S., R.M. Jamous, J.H. Al-Shafie, W.A. Elgharabah, F.A. Kherfan, K.H. Qarariah, I.S. Khdaif, I.M. Soos, A.A. Musleh, B.A. Isa, H.M. Herzallah, R.B. Khlaif, S.M. Aiash, G.M. Swaiti, M.A. Abuzahra, M.M. Haj-Ali, N.A. Saifi, H.K. Azem and H.A. Nasrallah, 2008. Traditional knowledge of wild edible plants used in Palestine (Northern West Bank): A comparative study, *Journal of Ethnobiology and Ethnomedicine*, 4: 13.
9. Balemie Kebu and Fassil Kebebew, 2006. Ethnobotanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia, *Journal of Ethnobiology and Ethnomedicine*, 2: 53.



10. Tiruneh Mengistu and Herbert Hager, 2009. Exploiting locally available resources for food and nutritional security enhancement: wild fruits diversity, potential and state of exploitation in the Amhara region of Ethiopia. Springer Science + Business Media B.V. & International Society for Plant Pathology.
11. Assefa Assegid and Tesfaye Abebe, 2011. Wild edible trees and shrubs in the semi-arid lowlands of Southern Ethiopia, *Journal of Science and Development*, 1(1).
12. Bekele Endashaw, 2007. Study on Actual Situation of Medicinal Plants in Ethiopia. Japan Association for International Collaboration of Agriculture and Forestry, pp: 36-50.
13. Haile Yineger and Delenasaw Yewhalaw, 2007. Traditional Medicinal Plant Knowledge and Use by Local Healers in Sekoru District, Jimma Zone, Southwestern Ethiopia. Licensee BioMed Central Ltd. Jimma, Ethiopia, pp: 3-24.
14. Lulekal Ermias, Ensermu Kelbessa, Tamrat Bekele and Haile Yineger, 2008. An Ethnobotanical Study of Medicinal Plants in Mana Angetu District, Southeastern Ethiopia, *Journal of Ethnobiology and Ethnomedicine*, 4: 10.
15. Fisseha Mesfin, Sebsebe Demissew and Tilahun Teklehaymanot, 2009. An Ethnobotanical Study of Medicinal Plants in Wonago Wereda, SNNPR, Ethiopia. Aklilu Lemma Institute of Pathobiology, *Journal of Ethnobiology and Ethnomedicine*, 5: 28.
16. Awas Tesfaye and Sebsebe Demissew, 2009. Ethnobotanical Study of Medicinal Plants in Kafficho People, Southwestern Ethiopia. In: Proceedings of the 16<sup>th</sup> International Conference of Ethiopian Studies. Trondheim, pp: 711-718.
17. Yirga Gidey, 2010. Assessment of Indigenous Knowledge of Medicinal Plants in Central Zone of Tigray, Northern Ethiopia, *African Journal of Plant Science*, 4(1): 006-011.
18. Yirga Gidey, 2010. Ethnobotanical Study of Medicinal Plants in and Around Alamata, Southern Tigray, Northern Ethiopia. Maxwell Scientific Organization, *Current Research Journal of Biological Sciences*, 2(5): 338-344.
19. Birhane Emiru, Ermias Aynekulu, Wolde Mekuria and Degitu Endale, 2011. Management, Use and Ecology of Medicinal Plants in the Degraded Drylands of Tigray, Northern Ethiopia, *Journal of Horticulture and Forestry*, 3(2): 32-41.
20. Gemedo-Dalle, T., B. L. Maass and J. Isselstein, 2005. Plant Biodiversity and Ethnobotany of Borana Pastoralists in Southern Oromia, Ethiopia. The New York Botanic Garden Press, *Economic Botany*, 59(1): 43-65.
21. Oromiya Livelihood Zone Report, 2008. Borana-Guji Cattle Pastoral (BGP) Livelihood Zone. Oromiya Region, Ethiopia, pp: 1-19.
22. Angassa Ayana, Gufu Oba, A.C. Treydte and R.B. Weladji, 2010. Role of Traditional Enclosures on the Diversity of Herbaceous Vegetation in a Semi-arid Rangeland, Southern Ethiopia, *Livestock Research for Rural Development*, 22(9).
23. Cotton, C.M., 1996. *Ethnobotany Principles and Applications*, John Wiley and Sons Ltd, Chichester, New York, pp: 92-130.
24. Ryan, P.D., D.A.T. Harper and J.S. Whalley, 1995. *PALSTAT: user's manual and case histories: statistics for palaeontologists and palaeobiologists*. Chapman & Hall, London.
25. Teklehaymanot Tilahun and Mirutse Giday, 2010. Ethnobotanical study of wild edible plants of Kara and Kwegu semi-pastoralist people in Lower Omo River Valley, Debub Omo Zone, SNNPR, Ethiopia, *Journal of Ethnobiology and Ethnomedicine*, 6: 23.
26. Hunde Debela, J.T. Njoka, Zemedede Asfaw and M.M. Nyangito, 2011. Seasonal availability and consumption of wild edible plants in semiarid Ethiopia: Implications to food security and climate change adaptation, *Journal of Horticulture and Forestry*, 3(5): 138-149.
27. Chekole Getnet, 2011. An Ethnobotanical Study of Plants Used in Traditional Medicine and as Wild Foods in and around Tara Gedam and Amba Remnant Forests in Libo Kemkem Wereda, South Gonder Zone, Amhara Region, Ethiopia. MSc. Thesis, Addis Ababa University, Ethiopia.
28. Hunde Debela, J.T. Njoka, Zemedede Asfaw and M.M. Nyangito, 2012. Comparative Analysis of Indigenous Knowledge on Use and Management of Wild Edible Plants: The case of Central East Shewa of Ethiopia, *Ethnobotany Research & Applications*, 10: 287-304.
29. Pieroni, A., S. Nebel, R.F. Santoro and M. Heinrich, 2005. Food for two seasons: Culinary uses of non-cultivated local vegetables and mushrooms in a south Italian village, *International Journal of Food Sciences and Nutrition*, 56(4): 245-272.

30. Getachew Addis, Zemedu Asfaw, V. Singh, Z. Woldu, J.J. Baidu-Forsen and S. Bhattacharya, 2013. Dietary Values of Wild and Semi-Wild Edible Plants in Southern Ethiopia, 13(2): 7485-7503.
31. Neudeck, L., L. Avelino, P. Baretseng, B.N. Ngwenya, D. Teketay and M.R. Motsholapheko, 2012. The Contribution of Edible Wild Plants to Food Security, Dietary Diversity and Income of Households in Shorobe Village, Northern Botswana, *Ethnobotany Research & Applications*, 10: 449-462.
32. Addis Getachew, Zemedu Asfaw and Zerihun Woldu, 2013. Ethnobotany of Wild and Semi-wild Edible Plants of Konso Ethnic Community, South Ethiopia, *Ethnobotany Research & Applications*, 11: 121-141.
33. Nedelcheva, A., 2013. An ethno botanical study of wild edible plants in Bulgaria, *EurAsian Journal of Biosciences*, 7: 77-94.
34. Sawian, J.T., S. Jeeva, F.G. Lyndem, B.P. Mishra and R.C. Laloo, 2007. Wild edible plants of Meghalaya, North-east India. *Natural Product Radiance*, 6(5): 410-426.
35. Al-Qura'n, S.A., 2010. Ethno botanical and Ecological Studies of Wild Edible Plants in Jordan, *Libyan Agriculture Research Center Journal International*, 1(4): 231-243.