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Research Article

Proximate and Vitamin C Contents of Selected Wild Edible Plants in Kebridehar District, Korahie Zone, Somali Region, Ethiopia

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Abstract

Wild edible plants provide a natural food supply that can reduce hunger and malnutrition. Although wild edible plants are widely used in Ethiopia, little research has been done on their nutritional makeup. The study's goal was to assess the vitamin C content and proximate composition of four wild edible plants that were chosen from the Kebridehar district in the Khorahie zone of the Somale region of Ethiopia. Vitamin C and the proximate composition parameters (moisture, ash, crude fat, crude fiber, crude protein, carbohydrate, and energy) were determined using the methods of the Association of Official Analytical Chemists. The descriptive statistical analysis was conducted using programs like Microsoft Excel and SPSS. The study found that the average moisture, ash, crude fat, crude fiber, crude protein, carbohydrate, and total energy contents of Moringa stenopetala leaf samples were 7.2, 11.83, 20.00, 26.00, 17.50, 17.47, and 319.8 (in terms of g/100g). Commiphora rostrata leaves had the highest carbohydrate content (32.00 g/100 g), followed by Ziziphus Mauritia leaves (29.98 g/100 g), according to the nutritional analysis results. Ziziphus mauritiana, Commiphora rostrata, Cibirhiza spiculata, and Moringa stenopetala showed highly significant differences. In general, the study area revealed that multiple comparisons by post hoc test revealed a $p \leq 0.05$, indicating a significant difference. The study's findings imply that eating these nutrient-dense wild edible plants may contribute a significant quantity of vitamin C and other nutrients to the human diet. The results of this study suggest that the local population needs assistance through education and awareness-raising on the sustainable management and utilization of plant resources.

Keywords

Nutritional Value, Proximate Composition, Vitamin C, Wild Edible Plants

1. Introduction

The food situation is a significant issue in the majority of emerging tropical nations because of the fast population increase, lack of arable land, high cost of existing staples, and limitations on food imports [1]. As a result, there is a high rate of famine and malnutrition among the populace [2]. The impoverished often gather various plants from natural areas and wild edible plants for sustenance in order to meet their subsistence needs [3].

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The consumption of such edible species for nutrition and diet are considered fundamental and central chunk of the values and traditions of the local folks throughout the globe [4]. Wild edible plants play a significant role in many people' diets throughout most of Ethiopia [5]. One of the most crucial survival tactics during climate shocks that cause food shortages in Ethiopia seems to be the collection and consumption of wild edible plant species [6]. In Ethiopia, intensive use of wild edible plant species is a traditional sign of acute food crisis [6]. Given that they contain a respectable quantity of fiber, lipids, proteins, carbs, minerals, and vitamins, wild edible plants are widely recognized for their essential nutritional role [7].

The diversity of wild plants contributes to the dietary diversity of home food supply and permits family diets to be varied [8]. When there is a food crisis, rural people typically rely on wild resources, especially wild edible plants, to meet their food demands. Families living in poverty and insecure about their access to food have relied on wild edible plants for a long time [9].

They are utilized to supplement staple foods, compensate for seasonal food shortages, and supply emergency food during famine, and they are crucial for household nutrition and food security in some rural locations [10]. Nutritional studies on a few wild food plants show that, in many situations, the nutritional value of wild plants is on par with or even better than that of domesticated versions [11]. The usage of such edible species for nutrition and food is regarded as a vital and important part of the values and traditions all over the world [8].

Ethiopia's geography, climatic conditions, biological diversity, and societal diversity have resulted in a variety of traditional knowledge and wild edible plant species that are crucial for food [12] and nutrition security as well as having a superior potential for income generation and ecological benefits [13]. In order to achieve nutritional needs, particularly in low-income areas, Ethiopia, one of the nation’s experiencing food insecurity, depends on wild edible plants in addition to farmed grains [8]. Previous studies revealed that only 8% of Ethiopia's over 7,000 higher plants are edible [14]. Approximately 413 distinct types of wild food plants are consumed in Ethiopia, according to [15].

Compared to generally food-sufficient areas of the country, ingestion of wild plants appears to be more prevalent there [16]. As a result, many Ethiopian rural residents rely on wild plants for subsistence during times of food scarcity [17]. Wild edible plant food and nutritional value have not been thoroughly studied in Ethiopia [18]. In Kebridehar District, research that primarily examines the nutritional qualities of wild food plants is still not given enough consideration. As a result, the current study's evaluates the nutritional value of four wild edible plants, *Ziziphus mauritiana, Commiphora rostrata, Cibirhiza spiculata, and Moringa stenopetala.* The main objective of the study was to assess their nutritional value of moisture, ash, fat, fibre, protein, carbohydrate, total energy and vitamin C from four wild food plants that were chosen.

2. Materials and Methods

2.1. Description of the Study Area

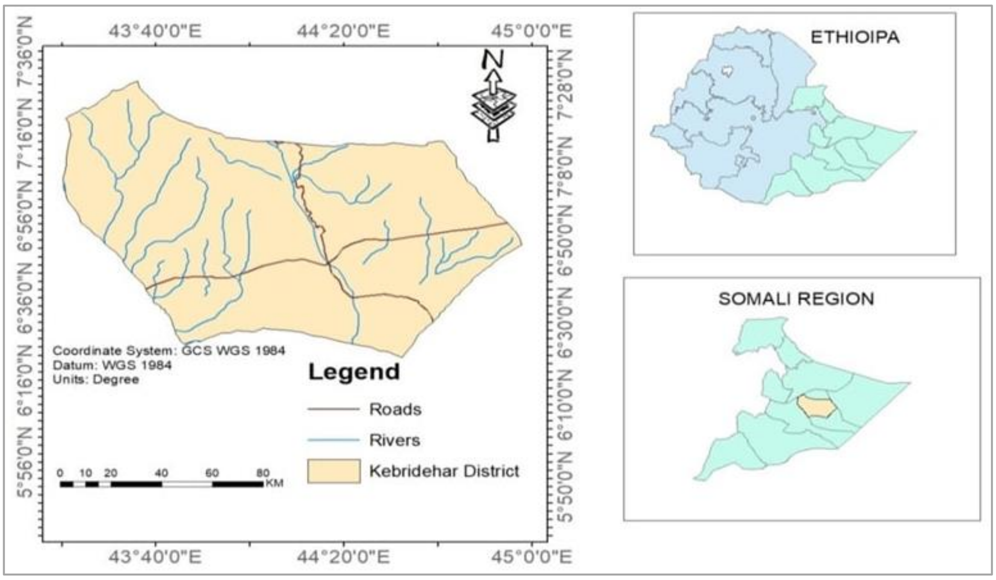

Figure 1. *Map of the study area.*

The study was conducted in eastern Ethiopia's Kebridehar District and Somalie Region. Kebridehar district has a total population of 136,142 people, of which 77,685 are men and 58,457 are women [19]. There are 50,361 (36.99%) pastoralists in addition to 29,241 (21.48%) urban residents of the population. The research area is among the most drought-prone and food-insecure districts in the region, according to [20]. Geographically, the Kebridehar district was found between 6°28' 68''-N Latitude and 43°53' 00''-E Longitude (Figure 1). With a mean annual temperature ranging between 20.75°C and 31.25°C, a sizable portion of the district has high temperatures and little precipitation. The districts' yearly rainfall ranges from 295 mm to 595.6 mm. The altitude of the district ranges from 588 to 1042 meters above sea level and is dominated by lowlands.

2.2. Plant Species Selected for Analysis of Nutritional Value

The edible portions of the top four Wild Edible plants (WEPs) found in the study region [6]—the leaves of *Commiphora rostrata*, the roots of *Cibirhiza spiculata*, the fruits of *Ziziphus mauritiana*, and the leaves of *Moringa stenopetala* were taken into account for the nutritional value analysis. Six key informants in the study region participated in preference-ranking exercises, and the findings were used to determine the community preference values. Out of the 30 wild edible plants that were identified using ethnobotanical data gathered from 80 local informants, these were scored higher. With the aid of taxonomy experts and the taxonomic key found in Ethiopian flora publications, the identification of voucher specimens of the plant samples under study was confirmed.

2.3. Gathering Plant Samples to Assess Nutritional Values

According to [6] healthy and fresh four wild edible plant species were collected in the study area. Wild edible plant components were gathered in Kebridehar district during February and March 2022. The chosen wild edible plants totaling one kilogram were gathered, washed with tap water to eliminate the dust, dried at room temperature, and subsequently taken to the Food Science Center and Nutrition among the Haramaya University laboratory area in a polyethylene bag April to May 2022. To obtain fine flour, the wild edible plant bits were sieved using a 2 mm sieve [21]. When it was time to conduct the examination, the powder was carefully collected, immediately packed in polyethylene bags, and stored in a dark, cool environment [22].

2.4. Proximate Composition of Wild Edible Plants

The proximate analyses were carried out in triplicate, and the proximate components were identified according to the methods specified by the Association of Official Analytical Chemists (AOAC) [23].

2.4.1. Content of Moisture

An oven was used to measure each sample's moisture content in accordance with the AOAC [23] guidelines. After being cleaned and emptied, a crucible and its porcelain lids were dried for an hour at 105°C in a drying oven, chilled for about half an hour in a desiccator, and then weighed. Each sample was weighed in triplicate, totaling 5.0 g. For five hours, the crucible and its contents were dried at 105°C in a drying oven. After drying and cooling for 30 minutes in a desiccator, the samples were weighed once more until their weight remained constant. The percentage moisture content was then calculated using the procedure below:

$$\%\ \text{Moisture content} = \frac{(\text{W2}-\text{W3})\times 100}{W2-W1}$$

In this instance, W1 stands for the weight of the crucible while it is empty, W2 for the sample and crucible, and W3 for the sample and crucible when it is dry.

2.4.2. Contents of Ash

The official AOAC technique was used to calculate the total amount of ash [24]. Two grams of each sample were placed in porcelain crucibles, weighed, and burned at 550°C for 30 minutes in a muffle furnace. The ashed samples were taken out and allowed to cool in a desiccator before being weighed. The following formula was used to get the percentage ash content:

$$\%\ \text{Ash content} = \frac{(\text{W3}-\text{W1})\ \times 100}{W2-W1}$$

The weight of the crucible is denoted by W1, the weight of the sample plus the crucible by W2, and the weight of the ash plus the crucible by W3.

2.4.3. Crude Fat

Using a Soxhlet apparatus (Model: EX5/83 BS2071), fats were extracted from 10 g of samples using 100 ml of petroleum ether (boiling range of 60–80°C) for 8 hours. After the solvent was extinguished, the remaining crude fat was calculated using the formula below [25].

Also, the cake was taken out of the extractor and let dry for 24 hours at room temperature. After weighing the dry cake, the percentage composition of the crude fat was calculated using the procedure below [25].

$$\%\text{crude fat} = \frac{(\text{we.of exteraction cup with extract} - \text{we.of empty exteraction cup}) * 100}{\text{weight of the sample}}$$

2.4.4. Crude Fiber

In a dry 500 ml digestion flask, two grams of an air-dried fat-free sample (cake from extraction) was added. A Buchner funnel was used to filter the material after it had been digested for 30 minutes in 200 ml of boiling 1.25% H_2SO_4. The residue was then thoroughly cleaned with hot water until a white residue was left behind. The digest was filtered through a Buchner funnel after the residue was transferred to a second flask containing 200 ml of hot 1.25% NaOH solution for 30 minutes. The residue was then continuously rinsed in hot water until a white residue was visible. The residue was placed in a crucible, dried overnight at 110°C in a hot air oven, cooled in desiccators, and weighed again. The dried material was then heated to 550°C for 30 minutes in a muffle furnace, allowed to cool in a desiccator, and weighed [24, 25].

$$\%\ \text{Crude Fiber} = \frac{\text{loss in wt.on ignition}\times 100}{\text{Wt.of sample}}$$

Loss in weight on ignition =w1-w2, w1= Crucible weight after drying; w2= Crucible weight after ashing.

2.4.5. Crude Protein

The micro-Kjeldahl method, as outlined by the [26], was used to ascertain the sample's crude protein concentration. Two catalyst tablets, Kjtabs VCM (cod. A00000274) from VELP Scientific, Italy, that were prepared with a mixture of 3.5 g K_2SO_4 and 0.1 g $CuSO_4.5H_2O$ and 13 ml of concentrated sulphuric acid were added, and the flask was then placed into the Kjeldahl digestion unit at 420°C for 1 hour until a colorless digest solution was obtained. After being allowed to cool at room temperature, the flask was moved to the distillation apparatus.

The digested solution was combined with 40 ml of a 40% sodium hydroxide solution, and the mixes were then heated. A conical flask with 25 ml of 4% boric acid solution and a drop of indicator (methyl red + bromocresol green) was used to capture the evolved ammonia. When a pink hue appeared, the distillate was titrated against standard solutions of 0.2N hydrochloric acid. As before, a blank was also run. The total amounts of nitrogen and protein were calculated using the following formulas:

$$\%\ \text{Nitrogen} = \frac{(V2-V1)\times N\times 0.14\times 100}{\text{Wt.of the sample (mg)}}$$

$$\%\ \text{Crude Protein} = \%\ \text{Nitrogen} \times 6.25$$

Where V1 is the volume (ml) of hydrochloric acid solution used for the blank test titration.

V2 is the volume (ml) of hydrochloric acid solution needed for the sample test titration.

N = hydrochloric acid normality

Nitrogen's molecular weight is 0.14, and its protein conversion factor is 6.25.

2.4.6. Carbohydrate Content

Carbohydrate content (nitrogen free extract) of the selected wild edible plants was determined by difference using the following formula:

% Carbohydrates = 100 – (Moisture % + Crude Fat % + Crude Protein % + Ash % + Crude Fiber %).

2.4.7. The Total Energy

The total energy value of wild edible plants was determined by using the following formula [27].

[(% CHO × 4) + (% CP × 4) + (% CF × 9)] is the total energy (kcal).

Where CP denotes crude protein, CF denotes crude fat, and CHO denotes carbohydrates.

2.5. Assessment of the Amount of Vitamin C (Ascorbic Acid)

The vitamin C content of the wild edible plants was calculated using Official Method 962.09 [25]. To measure the absorbance of the test, blank, and reference samples, a spectrophotometer (model evolution 220 UV-Vis) was used at 515 nm. WEPs' vitamin C content was ascertained as follows:

$$\text{Vitamin C (mg/100 g)} = \frac{(As-Ab)}{Astd-Abstd}\times 10$$

Where as is the absorbance of the sample, Ab is the absorbance of the blank, Astd is the absorbance of the standard concentration (mL), Abstd is the absorbance of the blank for the standard, and 10 is the dilution factor.

2.6. Statistical Analysis

The result of nutritional value was carried out using SPSS (version 20). Three duplicates of each nutritional result were obtained, and the results were presented as mean ± standard error. Using a one-way analysis of variance (ANOVA), multiple comparison of Tukey, and the mean significance differences of the proximal composition among wild edible plant were examined. The least significant difference (LSD) test with a $P \leq 0.05$ was used to determine whether variations between wild edible plants in the mean proximal were significant.

3. Results and Discussion

3.1. The Approximate Proportion of Edible Wild Plants

Nutritional value is the most important factor when evaluating a crop as a food source. A dry matter basis was used to calculate the proximate composition of the wild edible plants, which included moisture, ash, crude fat, crude fiber, crude protein, carbohydrate, and total energy (Table 1). Two species' leaves, one of the four species' fruits, and the root of the other species were among the four wild edible plants whose proximate components were examined. The maximum moisture content among the edible plants was found in the fruit of *Ziziphus mauritiana* (10.50 g/100 g) and the root of *Cibirhiza spiculata* (9.53 g/100 g) on a dry weight (DW) basis. With 8.47 g/100 g and 7.20 g/100 g, respectively, the leaves of *Commiphora rostrata* and *Moringa stenopetala* had the lowest moisture content. The moisture level of the flour made from *Cordeauxia edulis* (9.93–11.00 g/100 g) is comparable to that of the wild edible plants in the research area [28]. The variations in drying levels, growing regions, and species items may be the cause of their disparate moisture contents. The moisture content of any food component determines its shelf life and durability [6]. As a result, the high moisture content of *Cibirhiza spiculata* roots and *Ziziphus mauritiana* fruits indicated that both plants' edible portions had a short shelf life. *Moringa stenopetala* and the majority of other wild edible plants in the study area have been found to have low moisture levels, which suggest a longer shelf life and less microbial contamination. The outcomes were consistent with prior research showing that wild edible plants with low moisture content had a longer shelf life and less microbial contamination [6, 29]. Compared to earlier research on *Moringa stenopetala* (7.92 g/100 g) in the Arbaminch Zuria and Konso areas, the study area's moisture content (7.2 g/100 g) was lower [30]. The moisture content of *Ziziphus mauritiana* (10.50 g/ 100 g) was higher than previously studied in Bojudge village, Nigeria [31].

Table 1. *Selected wild edible plant proximate contents (g/100 g DW).*

Scientific name	**Plant parts**	**Mo**	**Ash**	**CF**	**CFr**	**CP**	**CH**	**TE**
Ziziphus mauritiana Lam.	Fruit	10.50±0.46	12.74±0.67	19.40±0.15	19.57±0.32	7.84±0.10	29.98±0.45	326.66±1.62
Commiphora rostrata Engl.	Leaves	8.47±0.31	6.73±0.21	19.40±0.20	19.27±0.25	14.10±0.10	32.00±0.82	358.67±1.62
Cibirhiza spiculata Thulin & Goyder	Root	9.53±0.25	9.40±0.36	21.87±0.25	20.50±0.30	11.31±0.16	27.39±0.68	351.60±1.30
Moringa stenopetala (Bak. f.) Cuf.	Leav es	7.2±0.20	11.83±0. 76	20.00±0. 20	26.00±0. 50	17.50±0. 30	17.47±0. 47	319.87±1 .33

NB: Moisture (MO), Crude ash (CA), Crude Fat (CF), Crude fiber (CFr), Crude protein (CP), Carbohydrate (CH), and Total energy (TE) are described in (g/100 g). Means of three independent composite sample analyses (on a DW basis) ± SE are used to get the values. $p < 0.05$

The total ash content of the four wild edible plants ranges from 6.73 g/100 g to 12.74 g/100 g; the fruit of *Ziziphus mauritiana* has the highest ash content, while the leaves of *Commiphora rostrata* have the lowest. A high ash value in *Ziziphus mauritiana* signifies that the plant is a rich source of minerals, as ash content is a measure of mineral composition [6]. The ash value of *Moringa stenopetala* (11.83 g/ 100 g) in the study sites was lower than that of the other study site, Sikela (14.9 g/ 100 g) in Arbaminch Zuria and Konso [30]. This variation may be due to different agro ecological areas, sample preparation method, and soil varieties. In the present study of ash value *Ziziphus mauritiana* (12.74 g/ 100 g) was higher than previously studied in Bojudge village, Nigeria [31]. The variation may be due to different weather conditions and sample preparation.

The investigated wild edible plants had crude fat contents ranging from 19.40 g for *Commiphora rostrata* and *Ziziphus mauritiana* to 21.87 g for *Cibirhiza spiculata*. The fat concentration was significantly higher than that of Lasta's wild edible plants, all of which had fat contents below 9.84 g/100 g [6]. *Cibirhiza spiculata* roots have a fat content of 21.87 g/100 g in DW. It has been suggested that the ideal fat caloric energy for a healthy lifestyle is 1-2 g/100 g [6, 32].

The study area revealed that high amount of fat content recorded this variation may be due to species type, ways of preparation, and soil type plant they grow. Thus, it might offer more support for the traditional application of *Commiphora rostrata* in the treatment of obesity. The current study of *Moringa stenopetala* fat value was conducted at a higher level (20.00 g/ 100 g) than previously published studies at Korea Soonchunhyang University [33]. The crude fat concentration in the current study of *Ziziphus mauritiana* was lower (19.40 g/ 100 g) than in previously published studies, which found (27.40 g/ 100 g) in Bojudge village, Nigeria [31]. This variation may be due to the weather condition, sample preparation, and management of the condition.

Moringa stenopetala leaves had the highest value at 26.00 g/100 g, followed by *Cibirhiza spiculata* leaves, which had 20.50 g/100 g. The crude fiber content of the wild edible plant species under study ranged from 19.27 to 26.00 g/100 g in a

DW. Dietary fiber reduces the incidence of colon cancer and encourages the formation of beneficial gut flora species [6]. Wild edible plants with high fiber content, such as *Ziziphus mauritiana*, *Cibirhiza spiculata*, and *Moringa stenopetala*, may promote peristaltic movement, aid in digestion, and ward off constipation. Consuming a lot of fiber may help lower the risk of developing certain diseases linked to metabolic disorders [29]. *Moringa stenopetala* (26.00 g/100 g) a good source of fiber and could cover the recommended daily intake (25 g/38 g) for women and men [34, 35]. Dietary fiber promotes the growth of healthy gut flora in humans and reduces the incidence of colon cancer [8]. The fiber content of *Ziziphus mauritiana* (19.57 g/ 100 g) was higher than previously studied *Ziziphus mauritiana* (11.04 g/ 100 g) in Bojudge village, Nigeria [31]. This variation may be due to different agro ecological conditions and management methods. Crude fiber of *Moringa stenopetala* (26.00 g/ 100 g) was higher than the other previous studies in Arbaminch Zuria and Konso [30]. This can be because of one-of-a-kind environmental conditions, and soil varieties of plant they grow.

Ziziphus mauritiana has the lowest protein content (7.84 g/100 g), whereas *Moringa stenopetala* (17.50 g/100 g) and *Commiphora rostrata* (14.10 g/100 g) have the most. In Tach Gaint District, Northwestern Ethiopia, similar findings were documented [8]. The protein content of wild edible plants varied between 17.47 g/100 g for *Erucastrum abyssinicum* and 9.53 g/100 g for *Rumex abyssinicus*, respectively. The wild edible plants with the greatest protein levels are essential sources of protein for those who consume them in the areas where they are grown, according to data on protein content. In places where youngsters consume the least amount of protein, such as sections of the Somalie region, *Moringa stenopetala* and *Commiphora rostrata* plants may help increase protein intake [36]. The findings indicated that compared to cultivated vegetable crops including *Brassica oleracea* (1.1–2.7 g/100 g), *Brassica carinata* (2.5–2.8 g/100 g), and *Allium sativum* (1–4.5 g/100 g), the wild edible fruits under study had comparatively higher protein levels [6]. A plant commodity which contains more than 12% of protein is considered a good source of protein and subsequently be stated as protein-rich food [28]. The protein content of 12 legumes ranged from 17.38 to 41.59% [37]. Numerous publications have addressed various facets of seed protein reserves, particularly those found in cereals and legumes. The symbiotic nitrogen fixation by rhizobia and mycorrhizae in leguminous plant root nodules is said to be the source of legumes' high protein content and quality. These microorganisms produce ammonia from aerial nitrogen, a building block of amino acids, which may increase protein production and introduce nitrogen into agricultural systems. Additionally, rhizobia symbiotic nitrogen supplies leftover soil nitrogen to crops that are not legumes. Due to this fact leguminous crops have been used in crop rotations for thousands of years [28]. In contrast to other published research that found *Ziziphus mauritiana* to have a protein value of 36.10 g/100 g in Bojudge village, Nigeria, the current study's result of 7.84 g/100 g was lower [31]. This variation may be due to a different weather condition, and sample preparation methods. *Commiphora rostrata* leaves had the highest proportion of carbs (32.00 g/100 g), followed by *Ziziphus mauritiana* fruits (29.98 g/100 g). *Moringa stenopetala* had the lowest percentage (17.47 g/100 g). Therefore, *Ziziphus mauritiana* fruits and *Commiphora rostrata* leaves are possible sources of carbs. The study area's wild edible plant carbohydrate content is higher than that of *Amaranthus graecizans* (1.43 g/100 g) and *Rumex abyssinicus* (1.27 g/100 g) [8] and lower than that of Bokh, Somali Regional State, where it ranges from 64.64 g/100 g to 66.20 g/100 g in *Cordeauxia edulis* [31]. The carbohydrate value of the present study, *Ziziphus mauritiana* (29.98 g/ 100 g), was higher than previously reported values of (21.26 g/ 100 g) in Bojudge village, Nigeria [31].

According to the study's findings, *Commiphora rostrata* leaves had the greatest estimated energy content (358.67 Kcal/100 g), followed by *Cibirhiza spiculata* roots (351.60 Kcal/100 g). The estimated energy in *Cordeauxia edulis* seeds consumed as food in Bokh Somali Regional state was less than the previously published value (406.44 Kcal/100 g) by [31]. The energy content of the wild edible plants that were tested corroborated claims in [38] that meals with an energy density much higher than 1 kcal/g, and even 2 kcal/g, may help assure optimum energy intake and prevent wasting in children during periods of food stress. Overall, the findings showed how crucial these wild edible plants are to the Kebridehar people's energy and nutrient intake. This implies that wild edible plants may help ensure the security of food and nutrition [6].

3.2. Proximate Composition of Selected Wild Edible Plants Statistically Significant

At $p \leq 0.05$, the difference in the proximate composition of the wild edible plants is statistically significant. *Ziziphus mauritiana*, *Commiphora rostrata*, *Cibirhiza spiculata,* and *Moringa stenopetala* showed highly significant differences. The carbohydrate value between *Moringa stenopetala* with *Commiphora rostrata, Cibirhiza spiculata, and Ziziphus mauritiana* and *Commiphora rostrata* with *Cibirhiza spiculata, Ziziphus mauritiana,* and *Cibirhiza spiculata* with *Ziziphus mauritiana* was computed with a significance difference of $p \leq 0.05$ (Table 2). The total energy value of $P \leq 0.05$ was used to calculate the significance difference between *Moringa stenopetala* and *Commiphora rostrata*, *Cibirhiza spiculata*, and *Ziziphus mauritiana*, and *Commiphora rostrata* with *Cibirhiza spiculata*, *Ziziphus mauritiana*, and *Cibirhiza spiculata* with *Ziziphus mauritiana*. In general, the study area revealed that multiple comparisons by post hoc test revealed a $p \leq 0.05$, indicating a significant difference, so a significant difference was accepted (Table 2).

Table 2. Multiple comparison of one way AONA in Ziziphus mauritiana, Commiphora rostrata, Cibirhiza spiculata and Moringa stenopetala species P ≤ 0.05.

Variable	(i) species	(j) species	Std. Error	Sig.
Moisture	*Moringa stenopetala*	*Commiphora rostrate*	0.26	0.005
		Cibirhiza spiculata	0.26	0.000
		Ziziphus mauritiana	0.26	0.000
	Commiphora rostrate	*Cibirhiza spiculata*	0.26	0.000
		Ziziphus mauritiana	0.26	0.000
Fiber	*Moringa stenopetala*	*Commiphora rostrate*	0.29	0.000
		Cibirhiza spiculata	0.29	0.000
		Ziziphus mauritiana	0.29	0.000
	Commiphora rostrate	*Cibirhiza spiculata*	0.29	0.012
	Cibirhiza spiculata	*Ziziphus mauritiana*	0.29	0.049
Ash	*Moringa stenopetala*	*Commiphora rostrate*	0.44	0.000
		Cibirhiza spiculata	0.44	0.003
	Commiphora rostrate	*Cibirhiza spiculata*	0.44	0.002
		Ziziphus mauritiana	0.44	0.000
	Cibirhiza spiculata	*Ziziphus mauritiana*	0.44	0.000
Fat	*Moringa stenopetala*	*Commiphora rostrate*	0.167	0.029
		Cibirhiza spiculata	0.167	0.000
		Ziziphus mauritiana	0.167	0.05
	Commiphora rostrate	*Cibirhiza spiculata*	0.167	0.000
	Cibirhiza spiculata	*Ziziphus mauritiana*	0.167	0.000
Protein	*Moringa stenopetala*	*Commiphora rostrate*	0.15	0.000
		Cibirhiza spiculata	0.15	0.000
		Ziziphus mauritiana	0.15	0.000
	Commiphora rostrate	*Cibirhiza spiculata*	0.15	0.000
		Ziziphus mauritiana	0.15	0.000
	Cibirhiza spiculata	*Ziziphus mauritiana*	0.15	0.000
Carbohydrate	*Moringa stenopetala*	*Commiphora rostrate*	0.5	0.00
		Cibirhiza spiculata	0.5	0.00
		Ziziphus mauritiana	0.5	0.00
	Commiphora rostrate	*Cibirhiza spiculata*	0.5	0.00
		Ziziphus mauritiana	0.5	0.017
	Cibirhiza spiculata	*Ziziphus mauritiana*	0.5	0.004
Energy	*Moringa stenopetala*	*Commiphora rostrate*	1.51	0.000
		Cibirhiza spiculata	1.51	0.000
		Ziziphus mauritiana	1.51	0.01
	Commiphora rostrate	*Cibirhiza spiculata*	1.51	0.007
		Ziziphus mauritiana	1.51	0.000

Variable	(i) species	(j) species	Std. Error	Sig.
	Cibirhiza spiculata	*Ziziphus mauritiana*	1.51	0.000

3.3. Vitamin C (Ascorbic Acid) Composition

Vitamin C contents of four WEPs in the studied area (Table 3). According to the findings, *Ziziphus mauritiana* fruit had the lowest vitamin C content (1.1 mg/100 g DW), while *Commiphora rostrata* leaves had the greatest value at 5.0 mg/100 g DW, followed by *Moringa stenopetala* leaves at 4.2 mg/100 g DW (Table 3).

Table 3. *Vitamin C (Ascorbic acid) contents selected wild edible plants (mg/100 g).*

Scientific name	Plant Part	Vitamin C
Ziziphus mauritiana Lam.	Fruit	1.1±0.15
Commiphora rostrata Engl.	Leaves	5.0±0.06
Cibirhiza spiculata Thulin & Goyder	Root	1.9±0.02
Moringa stenopetala (Bak. f.) Cuf.	Leaves	4.2±0.32

Note that the values are the average of three separate composite sample analyses (based on DW) ± SE.

This finding contradicts with findings from Lasta District, Northeastern Ethiopia [6] that was reported for *Erucastrum abyssinicum* 70.42 mg/100g and *Amaranthus hybridus* 33.09 mg/100g and equivalent to the amounts of vitamin C in wild edible plants gathered from Assam, India's Bodos (11.39–79.06 mg/100 g) [39]. Wild edible plants that are abundant in vitamin C have the potential to prevent vitamin C deficiency and its related clinical symptoms, according to the Bodos people of India [39]. Overall, this study shows that lower vitamin C content which found in selected wild edible plants.

4. Conclusion and Recommendation

According to the current study's findings, humans might get all the nutrients they need from wild edible plants. Wild edible plants are affordable and easily accessible to rural populations. The present study showed that wild edible plants are a valuable source of food. To sum up, wild edible plants are rich in nutrients and can be used as additional food in places like the Somali region's Kebridehar District where there is a food crisis. *Ziziphus mauritiana* diets benefit greatly from the high nutritional value and excellent moisture content of wild foods. With the provision of technical assistance as well as resources, local people should be inspired and motivated to cultivate wild food plants in their backyard gardens. The local population needs assistance through education and awareness-raising on the sustainable management and utilization of plant resources.

Abbreviations

ANOVA	Analysis of variance
AOAC	Association of Official Analytical Chemists
CA	Crude ash
CF	Crude fat
CFr	Crude fiber
CH	Carbohydrate
CP	Crude protein
DW	Dry Weight
LSD	Least Significant Difference
SE	Standard Error
SPSS	Statistical Package for the Social Sciences
TE	Total Energy
WEPs	Wild Edible Plants

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Author Contributions

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Data Availability Statement

The text contains the dataset that was utilized to support the study's conclusions.

Conflicts of Interest

The authors declare no conflicts of interest.

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