Study of Use Patterns of Some Indispensable Wild Edible Plant Species Resources

MOKGAETJI GEORGINAH MOKGANYA * and MILINGONI PETER TSHISIKHAWE *

Posted Date: 30 January 2024

doi: 10.20944/preprints202401.2117.v1

Keywords: quantitative studies; indigenous knowledge; ethnobatanicals; edible flowers; domestication

Article

Study of Use Patterns of Some Indispensable Wild Edible Plant Species Resources

Mokgaetji Georginah Mokganya [1,*] and Milingoni Peter Tshisikhawe [2]

[1] Science Foundation Department, Faculty of Science, Engineering and Agriculture, University of Venda, Private Bag X5050, Thohoyandou 0950, South Africa; https/org.0000000172339183

[2] Biological Sciences Department, University of Venda, Faculty of Science, Engineering and Agriculture, University of Venda, Private Bag X5050, Thohoyandou 0950, South Africa; Tel.: +27-015-962-8929

* Correspondence: molotja@univen.ac.za

Abstract: Limited quantitative studies exist on wild edible plants of the Limpopo Province, South Africa. This has important implications for the livelihood sustainability of rural communities, retention of indigenous knowledge, domestication of such plants, and environmental conservation efforts. The current study focused on the use pattern of wild edible plant diversity from four municipalities in the Vhembe District Municipality. One hundred and sixty participants were interviewed to solicit information on the diversity of plants, growth forms, and their uses. Eighty-seven wild edible plants distributed amongst 34 plant families were documented. The botanical family Malvaceae was the most used, followed by the Cucurbitaceae. Plant parts such as the leaves and fruits were typically used. Due to seasonality, plant parts were normally preserved through a cook and dry, or collect and dry process. Flowers of other wild vegetables (viz. *Cleome gynandra, Cucurbita pepo,* and *Sonchus asper*) are edible. Noteworthy, the leaves of *Morus alba* var *alba* are used as a leafy vegetable. The results of this research will play a crucial role in the encouragement of continuous utilization of these plants and hence work towards shaping the creation of rural livelihood strategies. Furthermore, the outcomes of this research will enlighten the agricultural-reliant societies of the study area with the domestication of wild edible plants as a way of introducing new crop species.

Keywords: domestication; edible flowers; ethnobotanical; indigenous knowledge; Vhembe District Municipality

1. Introduction

The importance of wild plants relates to their potential usage. Various traditional societies utilise different plant parts for food provisioning [1–3], and medicinal purposes [4,5]. Measurement of the "importance" of wild edible plants is termed "quantitative ethnobotany", a crucial centralised concern to botanical studies [6]. Quantitative ethnobotany is explained as a field of study that came about as a response to the perceived subjectivity of descriptive approaches [7] used in plant diversity. Furthermore, quantitative ethnobotany must include studies that connect ethnobotanical information with floristic and phytosociological inventories. Subsequently, quantitative ethnobotany is defined as an area that includes studies that are designed to quantify local botanical knowledge using popular indices of relative or cultural importance [8,9].

Most importantly, quantification of the ethnobotanical knowledge is for the improvement of the livelihood of rural populations [10] and assisting with decision-making concerning plant use sustainability strategies [11]. Additionally, the understanding of patterns of wild edible plants use and their local cultural significance is important when setting priorities for the conservation and domestication of these plants [12]. It is also indispensable to evaluate the dependency and the households' economic value of wild edible plant species [13].

Most outstandingly to accomplish any proposed priorities, the so-called cultural domain studies must be considered. The cultural domain is denoted as a group of elements or items that are

 doi:10.20944/preprints202401.2117.v1

categorized following culturally determined rules [12]. For example, plants can be organized as "medicinal plants" and/or "edible food". Other researchers attest that many used indices tend to pull out specific uses cited by informants into what is termed "use categories" [14]. These use categories may include "construction", "food", "medicine", "technology", "firewood" and "others" [14]. Another significance of the use of cultural indices is to compare and test hypotheses concerning the "importance" of vegetation zones, plant families, or growth forms [15]. The significance of wild plants has been alluded to by many researchers [16,17]. Currently, global food supply and safety rely on insufficient agricultural products, whereas the agricultural sector is faced with a variety of challenges for maximum production. Although there are wild plants available for many different uses, less interest and attention are still afforded to their full utilisation. According to Sahoo et al. [17], neglected and underutilised wild plant resources remain the fundamental foundation of diversity in developing countries. Most disturbing, food insecurity is still one of the problematic issues troubling the world today [18].

Limited and superficial quantitative studies exist for wild edible plants in the Limpopo Province, South Africa. This has important implications for the livelihood sustainability of rural communities, preservation of indigenous knowledge, domestication of such plants, and environmental conservation efforts. The current study paid attention to the use patterns of wild edible plants in the Vhembe District Municipality in the Limpopo Province.

2. Materials and Methods

2.1. Sampling of Participants

Four remote villages from each of the four local municipalities, namely, Thulamela, Makhado, Musina, and Mutale were randomly selected between May 2018 and June 2020. Ten households were systematically sampled from each village by skipping ten households between samples. Ethnobotanical interviews were carried out with a total of 160 local people. Participants included 107 women and 53 men between the ages of 20 and 97. Furthermore, a total of 127 participants with more than six citations were selected and their documented information was considered for this research.

2.2. Study Area

The study was conducted in the Vhembe District Municipality of the Limpopo Province, South Africa. The district municipality covers about 2771 km^2 and has an average altitude of 400 m above sea level [19]. Vhembe District Municipality lies between 22°56′S and 30°28′E [20]. It is divided into four local municipalities namely Makhado, Mutale, Musina, and Thulamela (Figure 1). Local municipalities of the Vhembe District visited during this study receive rainfall ranging from 300 mm – 1000 mm [21] (Figure 1D).

 doi:10.20944/preprints202401.2117.v1

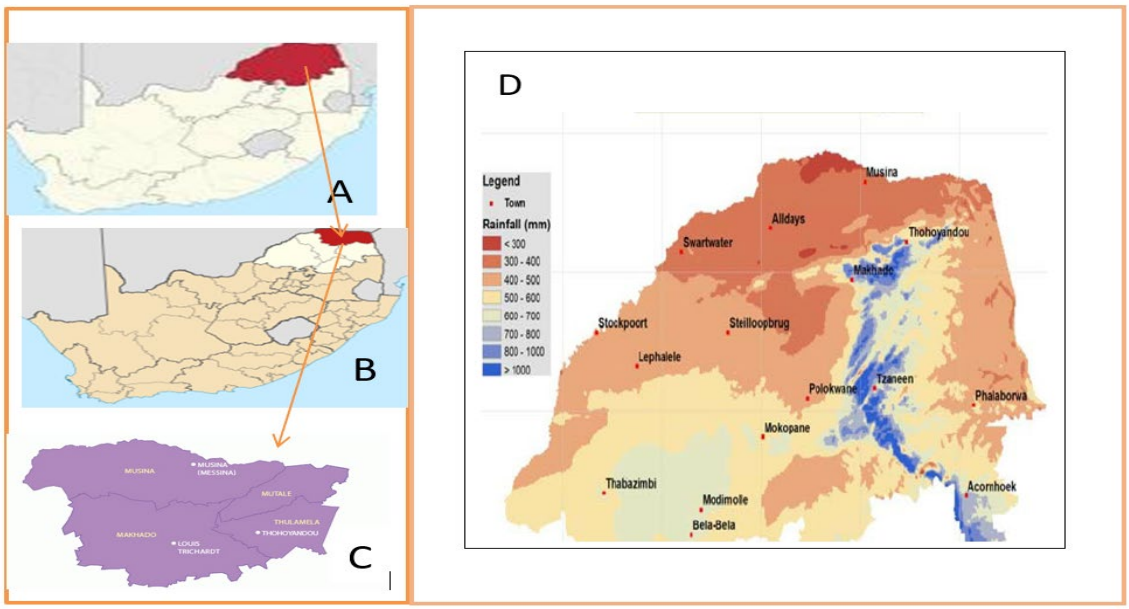

Figure 1. Maps A, B, and C showing the Limpopo Province from South Africa, Vhembe District Municipality, and its local municipalities [20]. Map D shows the mean annual rainfall of Limpopo Province [21].

2.3. General Vegetation Information

The nature of the climatic conditions in parts of Vhembe District Municipality supports a variety of vegetation types. The general vegetation of Vhembe district is classified as Mopani Bushveld. This vegetation type is characterized by *Colophospermum mopane* shrubs. In Makhado Local Municipality, there are two biomes namely: grassland and savanna [20]. Different vegetation types stretch through this municipality. Those vegetations include Granite Lowveld, Gravelotte Rocky Bushveld, Limpopo-Ridge Bushveld, Limpopo Sweet Bushveld, Makhado Sweet Bushveld, Musina Mopane Bushveld [22].

2.4. Data Collection and Analysis

For the sake of this study, the information collected from informants who managed to cite six and more wild edible plants was considered. Wild edible plant preferences of inhabitants of the four local municipalities of the Vhembe District were determined by checking the number of times plants and their different use categories were mentioned. Parameters considered in this case were plant growth forms (habits) and plant parts. Furthermore, to gain a better understanding of use patterns, the uses of different plant parts were divided into six categories (i.e., food [vegetables and fruits], medicine, construction, firewood, beverages, and others). The sixth category named 'others' includes ornamental, artifacts, and pastes. New uses of some plants were also recorded.

2.5. Market Surveys

Local markets around the three study areas, one in the Thohoyandou shopping complex, Lwamondo, and Levubu of the District were visited to capture a variety of wild edible plants sold and to record information on their market prices. Semi-structured interviews were conducted with vendors to capture information on the traded wild edible vegetables.

 doi:10.20944/preprints202401.2117.v1

2.6. Statistical Analysis

Free lists were analysed at the local municipality level where the relative frequency of citations and use values were determined using Microsoft Excel. Student-test for independent by variables test was performed at $p<0.05$ using STATISTICA 13.2.

2.7. Ethical Considerations

Permission to engage with members of the community was requested and obtained from the tribal authorities of the four local municipalities. Furthermore, prior informed consent was obtained from members of the Vhembe communities who were available and willing to participate in the study. The sampling of informants was based on their availability and willingness to participate in interviews.

3. Results and Discussion

3.1. Profile of Wild Edible Plants Utilised

Eighty-seven species distributed in 34 botanical families were documented (Table 1). Of the 34 families, eleven species of the family Malvaceae were mentioned, followed by the Cucurbitaceae (8 species), Rubiaceae and Solanaceae (5 species each), Amaranthaceae, Apocynaceae, Fabaceae, and Urticaceae (4 species each). Anonnaceae, Asteraceae, Brassicaceae, and Myrtaceae had three species each whereas Anacardiaceae, Convolvulaceae. Loganiaceae, Olacaceae, Passifloraceae, Phyllanthaceae, Sapotaceae and Zygophyllaceae had two species each. Botanical families with only one plant species were Araceae, Boraginaceae, Cactaceae, Crysobalanaceae, Ebenaceae, Eurphorbiaceae, Meliaceae, Pedaliaceae, Polygonoceae, Rhamnaceae, Rosaceae, Salicaceae, Ulmaceae and Vitaceae (Figure 2).

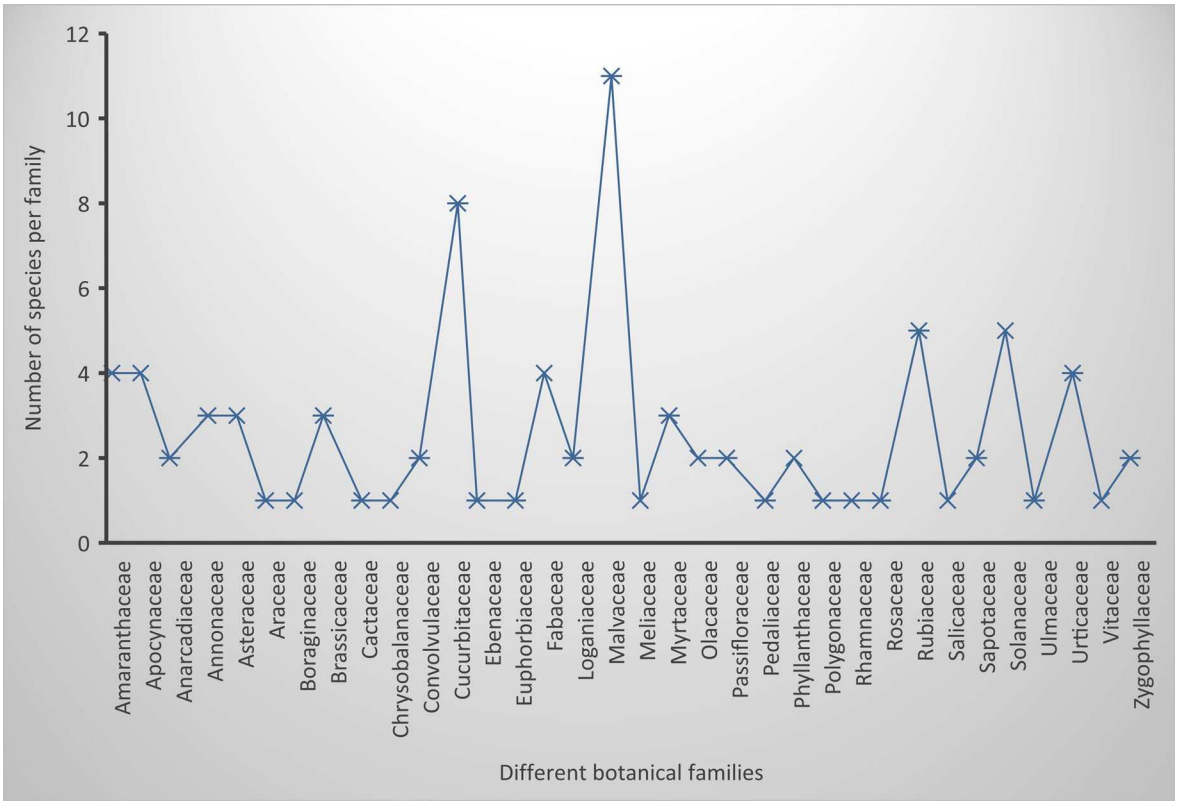

Figure 2. Number of species in different botanical families.

 doi:10.20944/preprints202401.2117.v1

Table 1. Wild edible plants mentioned by participants who listed six and more known plants.

Family	Number of Taxa Found	Examples
Amaranthaceae	4	*Amaranthus dubius* C. Mart ex Thell, *Amaranthus hydridus* L., *Amaranthus hydridus* L. subsp. *cruentus* (L.) Thell, *Achyranthes aspera* L. var. *aspera*
Anacardiaceae	2	*Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro, *Lannea discolor* (Sond.) Engl.
Annonaceae	3	*Annona senegalensis* Pers, *Artabotrys monteiroae* Oliv., *Artabotrys brachypetalus* Benth.
Apocynaceae	4	*Pentarrhium insipidum* E. Mey. *Landolphia kirkii* T. dyer, *Carissa bispinosa* (L.) Desf.ex Brenan, *Tabernaemontana elegens* Stapf.
Aracea	1	*Colocasia esculenta* (L.) Scott
Asteraceae	3	*Bidens bipinnata* L., *Bidens pilosa* L., *Sonchus asper* (L.) Hill subsp *asper*
Boraginaceae	1	*Ehertia rigida* (Thunb.) Druce subsp. *nervifolia* Retief and A.E van Wyk.
Brassicaceae	3	*Boscia albitrunca* (Burch.) Gilg & Gilg-Ben, *Cleome gynandra* L, *Cleome monophylla* L.
Cactaceae	1	*Opuntia ficus-indica* Mill
Chrysobalanaceae	1	*Parinari curatellifolia* Planch. Ex Benth
Convolvulaceae	2	*Ipomoea batatas* (L.) Lam., *Ipomoea obscura* (L.) Ker Gawl.
Cucurbitaceae	8	*Citrullus colocynthis* L., *Citrullus lanatus* (Thunb.) Matsum. & Nakai., *Cucumis africanus* L.f., *Cucurbita pepo* L., *Momordica charantia* L., *Momordica foetida* Schumach, *Momordica balsamina* L., *Lagenaria siceraria* (Molina) Standl.
Ebenaceae	1	*Diospyros mespiliformis* Hochst.ex A.DC.
Euphorbiaceae	1	*Tragia dioica* Sond
Fabaceae	4	*Pterocarpus angolensis* DC, *Vigna subterranea* (L.) Verdc., *Arachis hypogaea* L., *Vigna unguiculata* (L.) Walp
Loganiaceae	2	*Strychnos spinosa* Lam., *Strychnos pungens* Soler
Malvaceae	11	*Abelmoschus esculentus* (L.) Moench, *Adansonia digitata* L., *Corchorus olitorius* L. var. *olitorius, Corchorus tridens* L., *Grewia bicolor* Juss. var *bicolor, Grewia flavescens* Juss., *Grewia Hexamita* Burret, *Grewia microthyrsa* K. Schum. Ex Burret, *Grewia monticola* Sond., *Grewia occidentalis* L., *Grewia villosa* Willd
Meliaceae	1	*Trichilia dregeana* Sond
Myrtaceae	3	*Psidium guajava* L., *Syzygium cordatum* Hochst. *ex C.*Krauss subsp. *cordatum, Syzygium legatii* Burtt Davy and Greenway
Olacaceae	2	*Ximenia americana L.* var *microphylla* Welw. Ex Oliv., *Ximenia caffra* Sond. var. *caffra*
Passifloraceae	2	*Adenia gummifera* (Harv.) Engl., *Passiflora edulis* Sims
Pedaliaceae	1	*Dicerocaryum senecoiides* (Klotzsch) Abels
Family	**Number of taxa found**	**Examples**
Phyllanthaceae	*2*	*Bridelia Micrantha* (Hochst.) Baill, *Flueggea virosa* (Roxb. Ex Willd.) Voigt subsp. *virosa*
Polygonaceae	*1*	*Oxygonum dregeanum* Meisn
Rhamnaceae	*1*	*Ziziphus mucronata* Willd.subsp. *mucronata*
Rosaceae	*1*	*Rubus pinnatus* Willd

 doi:10.20944/preprints202401.2117.v1

Rubiaceae	*5*	*Afrocanthium mundianum* (Cham and Schltdl.) Lantz, *Cephalanthus natalensis* Oliv., *Hyperacanthus amoenus* (Sims) Bridson, *Ochna pulchra* Hook. F., *Vangueria infausta* Burch
Salicaceae	*1*	*Dovyalis caffra* (Hook.f. and Harv.) Warb
Sapotaceae	*2*	*Englerophytum mogalismontanum* (Sond) T.D.Penn, *Mimusops zeyheri* Sond.
Solanaceae	*5*	*Capsicum annuum* L. var *glabriusculum* (Dunal) Heiser and Pickersgill, *Lycopersicon esculentum* Mill, *Nicandra physalodes* (L.) Gaertn, *Solanum nigrum* L., *Solanum retroflexum* Dunal
Ulmaceae	*1*	*Trema orientalis* (L) Blume
Urticaceae	*4*	*Obetia tenax* (N.E. Br.) Friis, *Urtica dioica* L., *Pouzolzia mixta* Solms, *Pouzolzia parasitica* (Forssk.) Schweinf.
Vitaceae	*1*	*Rhoicissus tomentosa* (Lam.) Wild and R.B.Drumm
Zygophyllaceae	*2*	*Tribulus terrestris* L., *Tribulus zeyheri* Sond. subsp. *zeyheri*

The Malvaceae family consists of species that are popular for their mucilaginous substances [23]. Some of the Malvaceae species such as *Corchorus tridens* L. and *Abelmoschus esculentus* L. were mentioned by all participants of the current study. The unique reason for their consumption is due to their medicinal properties for constipation relief. Participants in this study highlighted the remarkable utilisation of fruits and leaves of *Abelmoschus esculentus* L. and *Corchorus tridens* L. respectively for the relief of constipation [4].

Cucurbitaceae is a large family of 800 species and 130 genera that have been used for their medicinal properties [24]. It was mentioned in the current study for the first time that leaves of *Momordica foetida* L. are sprinkled on food as a spice to relieve hangovers. Cucurbits are a good source of dietary fibers which provide healthy properties and help reduce levels of cholesterol [24]. Over and above, they show many biological activities such as antioxidant, antimicrobial, antidiabetic, anti-inflammatory, and anticancer [25]. The popularity of Cucurbitaceae has been attributed to the bitter taste that most of the plant species in this family possess, which is believed to provide medicinal value. The way in which plants taste, especially if bitter, may serve as a guide to potential pharmacological phytochemicals [26,27].

Further support for the role of taste in medicinal plant selection comes from the observation that species of Cucurbitaceae tend to be represented in traditional pharmacopeia [28]. These results agree with the results from the Vhembe which articulate the importance of taste towards plant species selection. Some species are used as potential traditional treatments for stomach and intestinal disorders. *Lagenaria siceraria* L. was mentioned to have medicinal properties against period pains. Noteworthy, the multiple roles of wild edible vegetables as both food and medicinal sources have been widely recognized by ethnic groups [29].

3.2. Growth Forms, Parts, and Use Categories of the Wild Edible Plant Species

Altogether, five different growth forms were mentioned (i.e., herbs, trees, shrubs, creepers, and climbers), tree plant species topped the other habits with an average frequency of citation of 291 followed by herbaceous species (229), climbers (68) creepers (46) and shrubs (19), (Figure 3). These findings are supported by studies of [30], also for the Vhembe area, and [31] for Ethiopia.

Most leafy parts (49%) of the wild edible taxa documented are utilised. Wild edible vegetables have played pivotal roles in daily lives as a relish diet for local inhabitants (Zhou et al. 2010). Additionally, leafy parts provide consumers with important nutrients such as vitamins and minerals needed for health maintenance [29]. Leafy parts were followed by fruits (47%), flowers (1%), tubers (1%), seeds (1%), and barks (1%). Roots and rhizoids are utilised by a few people in the Vhembe region (Figure 3). Most significantly, participants of the study area mentioned the use of flowers of Shashe (*Sonchus asper)*, Murudi (*Cleome gynandra)*, and Phuri (*Cucurbita pepo)* as edible parts (Figure 4).

 doi:10.20944/preprints202401.2117.v1

Other indispensable information of wild edible plants that were mentioned only once or twice is outlined in Table 2. A total of 32 plant species belonging to 20 different botanical families was documented.

Table 2. Wild edible plants listed once and twice during the survey and new uses of some plants.

Family	Scientific Name	New Uses
Amaranthaceae	*Hypoestes forskaolii* (Vahl) R. Br., *Alternanthera sessilis* (L.)	N/A
Anacardiaceae	*Searsia magalismontana* (Sond.) Mollett subsp. *Coddii* (R. and A. Fern.) Moffett.	N/A
Apocynaceae	*Cryptolepis obtuse* N. E.Br., *Telosma africana* (N. E. Br.) N.E.Br.	N/A
Celastraceae	*Elaedendron transvaalense* (Burtt Davy) R.H.Archer	N/A
Clusiaceae	*Garcinia livingstonei* T. Anderson	N/A
Commelinaceae	*Commelina benghalensis* L.	N/A
Convolvulaceae	*Ipomoea dichroa* Choisy	N/A
Cucurbitaceae	*Coccinia rehmannii* Cogn.	N/A
Ebenaceae	*Diospyros lycioides* Desf. Subsp. *lycioides, Euclea divinorum* Hiern.	N/A
Euphorbiaceae	*Erythrococca menyharthii* (Pax) Prain	N/A
Fabaceae	*Piliostigma thonningii* (Schumach.) Milne-Redh, *Senna petersiana* (Bolle) Lock	N/A
Icacinaceae	*Pyrenacantha kaurabassana* Baill	N/A
Lophiocarpaceae	*Lophiocarpus tenuissimus* Hook.F.	N/A
Malvaceae	*Corchorus asplenifolius* Burch, *Malva sylvestris* L., *Trimfetta annua* L.	N/A
Meliaceae	*Melia azedarach* L.	N/A
Moraceae	*Ficus sansibarica* Warb. Subsp. *sansibarica*, *Ficus sur* Forss, *Ficus sycomorus* L., *Morus alba* var *alba*, *Ficus burkei* (Miq.) Miq.	Leafy vegetable (*Morus alba* var. *alba*)
Proteaceae	*Macadamia integrifolia* Maiden and Betcher	N/A
Rhamnaceae	*Berchemia discolor* (Klotzsch) Hemsl, *Berchemia zeyheri* (Sond) Grubov.	N/A
Solanaceae	*Solanum campylancanthum* Hochst. ex A.Rich. subsp *panduriforme* (Drege ex Dunal) J. Samuels	Milk thickener
Verbenaceae	*Lantana rugosa* Thunb.	N/A

Furthermore, the different plant parts are categorized into six use categories with food (Vegetables and fruits) as the highest in the list. This was followed by the utilisation of some parts as medicine (30), construction (14), other (14), beverages (11), and firewood (8) (Figure 3). Leafy twigs for vegetables and fruits of wild edible plants are used abundantly for the preparation of different traditional cuisines as well as for the treatment of different ailments. The results of this study are consistent with Sutrisno et al. [3] because different plant parts are used as flavourants or condiments in many cuisines and as a traditional medicine to treat various ailments.

 doi:10.20944/preprints202401.2117.v1

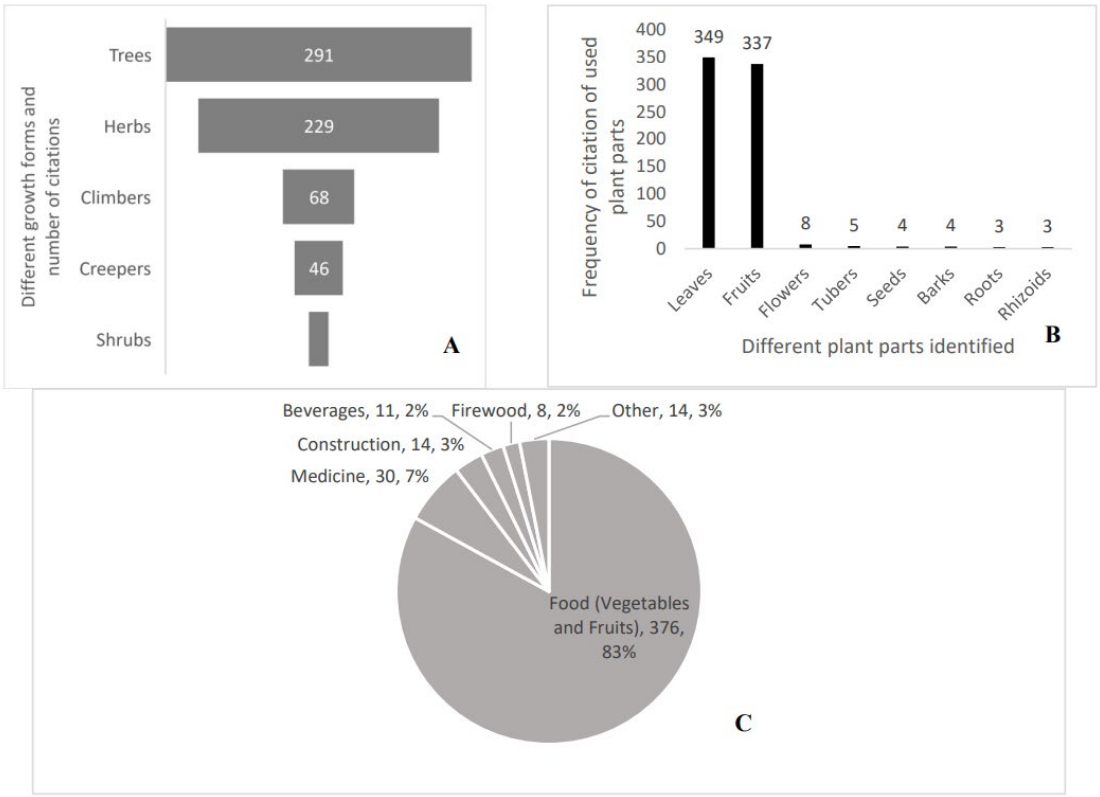

Figure 3. Different growth forms (A), parts (B), and use categories (C) of wild edible plants of the Vhembe District.

Figure 4. Edible flowers of *Sonchus asper* (A), *Cleome gynandra* (B), and *Cucurbita pepo* (C) respectively.

3.3. Preservation Ways of Wild Edible Plant Species

Preservation of vegetables for future use is practiced in the study area. The two preservation methods which are collect and dry and collect, cook and dry were used across the four local municipalities of the Vhembe District (Figure 5). However, the collect, cook, and dry method was highly preferred (Figure 5B). A general trend in the preservation methods throughout the district was noticed, and statistical results echoed these findings (Table 3).

 doi:10.20944/preprints202401.2117.v1

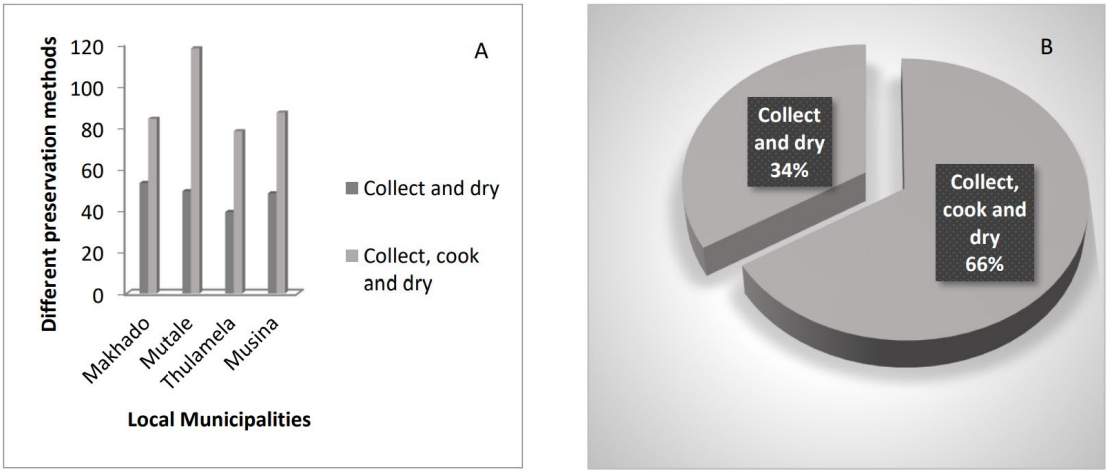

Figure 5. Different preservation methods practiced by informants of Makhado, Mutale, Thulamela, and Musina local municipalities.

Table 3. Statistical comparisons of mean values of the preservation methods employed by participants. Means are significantly different at $p < 0.05$. ns = not significant.

Local Municipalities	P Value	Statistical Differences
Thulamela vs Mutale	0.344042	ns
Thulamela vs Makhado	0.242238	ns
Thulamela vs Musina	0.423310	ns
Mutale vs Musina	0,479471	ns
Mutale vs Makhado	0.574554	ns
Musina vs Makhado	0.844042	ns

Leaves of plants such as Phuri (*Cucurbita pepo* L. subsp. *Pepo*), Munawa (*Vigna unguiculata* L.), and Murudi (*Cleome gynandra* L.) are collected, cooked, placed on corrugated iron and sun-dried (Figure 6). This method allows the community to prevent food unavailability during dry seasons. The principal method of extending the shelf-life of indigenous vegetables through sun drying fresh or boiling in water before sun drying was articulated by other reports [32]. In addition to the utilization of corrugated iron as a podium for sun-drying vegetables, sacs of mielie meal are being used (Figure 6). It was also communicated that further drying processes for vegetables can be done on the reed's baskets called "*Luselo*" in the Tshivenda language (Figure 6).

The same sun-drying method is not limited to vegetables, some fruits from wild edible fruit plants such as *Lannea discolor* (Munie), *Vangueria infausta* (Muzwilu), *Diospyros mesipiliformis* (Musuma) and *Grewia villosa* (Muphunzu) are preserved through sun drying. On the other hand, fruits of *Hexalobus monopetalus* (Muhuhuma) can be ground to a powder called *Mugumo* which can be used even when the fruits are out of season.

 doi:10.20944/preprints202401.2117.v1

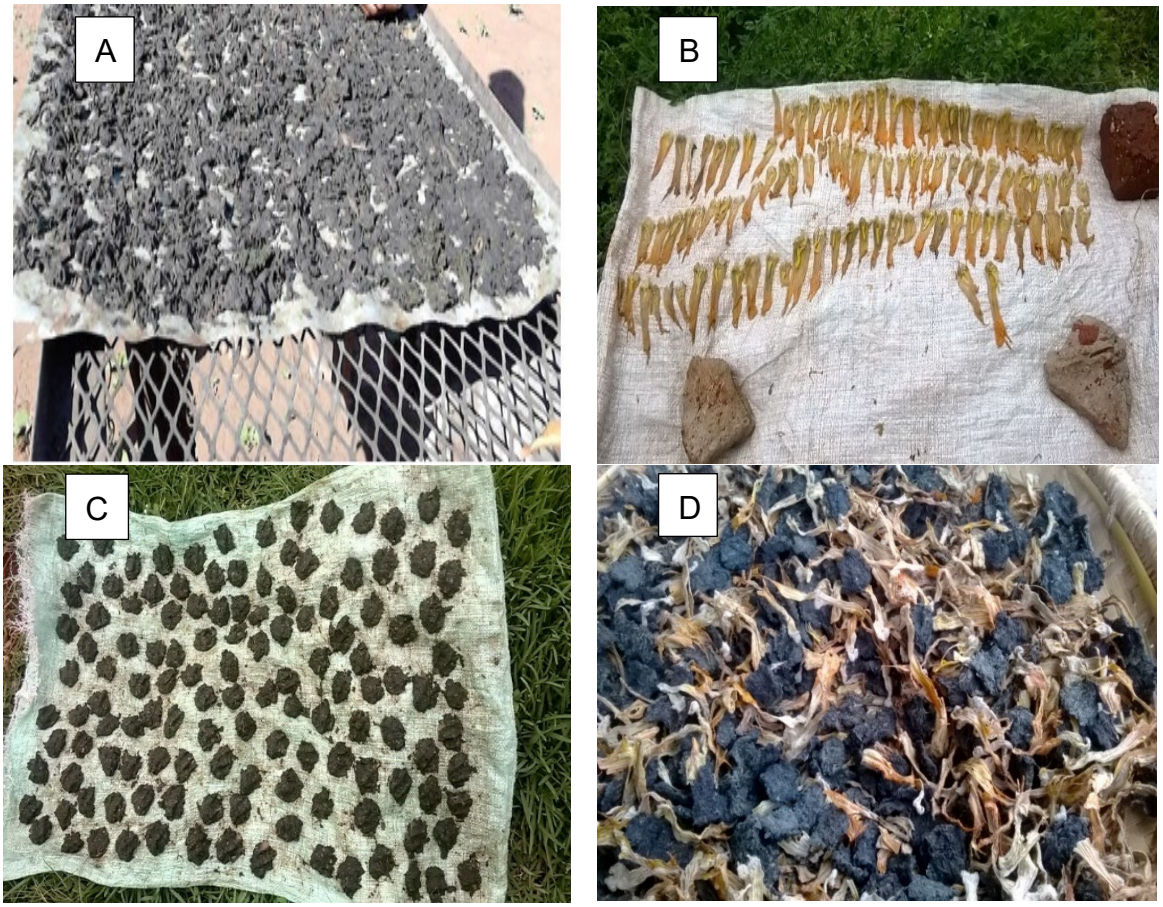

Figure 6. Cooked leaves of *Vigna unguiculata* L. on the corrugated iron (A), flowers of *Cucurbita pepo* (B), cooked leaves of *Cleome gynandra*(C), and cooked leaves and flowers of *Cucurbita pepo* (D) for sun drying.

3.4. Socio-Economic Importance of Wild Edible Plants

3.4.1. Local Markets Survey

It is paramount to explore and understand the socioeconomic profile of the participants as a directive of influence on food preferences and dietary diversity. Biographical information of the participants attests that the majority are unemployed therefore for them to survive and attain nutritional needs they opt for wild edible trading and consumption. The monetary contribution to households' livelihoods of interviewed vendors comes from government grants [33] and income from wild edible plant trading. A total of 14 plant species belonging to 8 taxonomic families were found at the visited local markets for commercialization purposes (Table 4). Commercialization of wild edible plants is gaining popularity because of some wild edible vegetables such as *Cucurbita pepo* L., *Sonchus asper* (L.) Hill subsp asper, *Ipomoea batatas, Citrullus lanatus, Psidium guajava* L., and *Solanum retroflexum* Dunal are also sold in grocery supermarkets. This notion provides hope that these plants can be sold in famous stores and more of them in grocery supermarkets as noticed from the findings of the research conducted by Sahoo et al. [17].

 doi:10.20944/preprints202401.2117.v1

Table 4. Taxonomic diversity of wild edible plants sold in local markets.

Botanical Families	Plant Names	Availability	Growth Forms	Edible Parts	Sold Plant Parts and Their Prices
Amaranthaceae	*Amaranthus dubius* C. Mart ex Thell,	Uncultivated, grows with other cultivated food crops.	Herb	Leaves	Leaves at R10 per 1Kg
Asteraceae	*Bidens pilosa* L.	Uncultivated, grows with other cultivated food crops.	Herb	Leaves	Leaves at R10 per 1Kg
Asteraceae	*Sonchus asper* (L.) Hill subsp asper	Uncultivated, grows with other cultivated food crops.	Herb	Leaves and flowers	Leaves at R10 per 1Kg
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Cultivated	Creeper	Leaves and fruits	Fruits at R70 Per 5Kg bucket
Cucurbitaceae	*Citrullus lanatus* (Thunb.) Matsum. & Nakai	Cultivated	Creeper	Leaves, seeds and fruits	Fruits at R60 for large and R35 for medium to small
Cucurbitaceae	*Cucurbita pepo* L.	Cultivated	Creeper	Leaves, fruits, seeds and flowers	Leaves at R5 per bunch of ten leaves
Cucurbitaceae	*Momordica charantia* L.	Cultivated	Herb	Leaves	Leaves at R10 per 1 Kg
Malvaceae	*Abelmoschus esculentus* (L.) Moench	Cultivated	Shrub	Leaves and fruits	Fruits at R10 per packet of approximately 250g
Malvaceae	*Adansonia digitata* L.	Uncultivated, grows with other cultivated food crops.	Tree	Leaves and fruits	Fruits at R50 for a packet of 7 large sizes
Malvaceae	*Corchorus tridens* L.	Uncultivated, grows with other cultivated food crops.	Herb	Leaves	Leaves at R10 per 1 Kg
Myrtaceae	*Psidium guajava* L.	Cultivated	Tree	Fruits	Fruits at R50 Per 5Kg bucket
Solanaceae	*Capsicum annuum* L. var *glabriusculum* (Dunal) Heiser	Cultivated	Shrub	Fruits	
Solanaceae	*Solanum retroflexum* Dunal	Uncultivated, grows with other cultivated food crops.	Herb	Leaves	Leaves at R10 per 1 Kg
Urticaceae	*Urtica dioica* L.,	Uncultivated, grows with other cultivated food crops.	Herb	Leaves	Leaves at R10 per 1 Kg

Most importantly, vendors attested to the significant and huge contribution of wild edible plants trading towards the vendors' household income [34]. For some, the commercialisation of wild edible plants enhanced monetary contribution to household income to the insufficient government grant provisions. Wild edible plants' selling income assists with other households' needs such as purchasing electricity and protein-rich foodstuff to supplement the wild edible plants' consumption. On the other hand, Sahoo et al. [17] articulated a noticeable business regarding the trading of vegetables and fruits of wild edible plants. Noteworthy, income generated from trading these plants can make a tremendous change for family monthly payments.

4. Conclusions

The findings of this study add value to the literature that the independency of wild edible plants clearly contributes to the improvement of the livelihoods of local communities. During this study, wild edible reliance in the enhancement of the livelihoods of the local communities of the Vhembe region was observed. However, in the context of the botanical families' preferences, different attributes of plant species of Malvaceae become crucial to the well-being of individual local community members. Wild edible plants have been used in different ways over many generations and played pivotal roles in the provision of ethnomedicines as well as becoming a source of community reliance by maintaining food availability to rural households.

This study uncovered the use of flowers of *Cleome gynandra*, *Cucurbita pepo,* and *Sonchus asper* as edible parts that can be blended with leaves and fruits for local cuisines preparations. Despite the consumption of berries from *Morus alba* var *alba*, leaves can be boiled to serve as a relish to local communities. Therefore, there is a need for the development of wild edible cultivation strategies and contextualization of the relevant educational programme in achieving and promoting knowledge about income generation from wild edible trading. Local households' income received through government grants is insufficient towards covering most of the local community households' needs; however, wild edible plant cultivation education to locals which may result in good supplies for big supermarkets is a way forward to the enhancement of local communities' income generation.

Author Contributions: Conceptualization, M.G. and M.P.; methodology, M.G. and M.P.

software, M.G.; validation, M.G. and M.P.; investigation, M.G.; resources, M.P. and M.G.; data curation, M.G. and M.P.; writing—original draft preparation, M.G.; writing—review and editing, M.P. and M.G.; funding acquisition, M.P. and M.G. All authors have read and agreed to the published version of the manuscript.

Funding: This project was funded by the Staff Capacity Development grant of the University of Venda, grant no. D052.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: All data supporting this manuscript have been made available. All data generated or analysed during this study are included in this article.

Acknowledgments: The authors are very thankful to all participants of the current study. Dedication and unconditional assistance provided by all research assistants are highly acknowledged.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Elfrida E, Mubarak A, Suwardi AB. The fruit plant species diversity in the home gardens and their contribution to the livelihood of communities in rural area. Biodiversitas **2020,** 21 (8): 3670-3675. https://doi.10.13057/biodiv/d210833.
2. Suwardi AB, Navia ZI, Harmawan T, Nuraini, Syamsuardi, Mukhtar E. Ethnobotany, nutritional composition and sensory evaluation of Garcinia from Aceh, Indonesia. IOP Conf Ser Mater Sei Eng. **2020,** 725 (1): 012064.
3. Sutrisno IH, Suwardi AB, Navia ZI, Baihaqi, Fadhilah MA. Documentation of the traditional Alas food in Southeast Aceh District, Indonesia. Biodiversitas. **2021,** 22 (8): 3243-3249.
4. Mokganya MG, Tshisikhawe MP. Medicinal uses of selected wild edible vegetables consumed by Vhavenda of the Vhembe District Municipality, South Africa. *S. Afr. J. Bot*. **2019**, 122: 184-188.
5. Suwardi AB, Mardudi, Navia ZI, Baihaqi, Muntaha. Documentation of medicinal plants used by Aneuk Jamee tribe in Kota Bahagia Subdistrict, South Aceh, Indonesia. Biodiversitas. **2021,** 22 (1): 2085-4722.
6. Hoffman B, Gallaher T. Importance indices in ethnobotany. Ethnobot. Res. Appl. **2007,** 5: 201-218.
7. Phillips OL, Gentry AH, Reynel C, Wilkin P, Galvez-Durand C. Quantitative Ethnobatany and Amazonian conservation. Conserv. Biol. **1994**, 8: 225-248.
8. Monteiro JM, Albuquerque UP, Lins-Neto EMF, Araujo EL, Amarim C. Use patterns and knowledge of medicinal species among two rural communities in Brazil's semi-arid northeastern region. J. Ethnopharmacol. **2006,** 105: 173-186.

9. Reyes-Garcia V, Marti N, McDade T, Tanner S, Vadez V. Concepts and methods in studies measuring individual's ethnobotanical knowledge. J. Ethnobiol. **2007**, 27: 108-203.
10. Shackleton SE, Shackleton CM, Netshiluvhi TR, Geach BS, Balance A, Fairbanks DHK. Use patterns and value of savanna resources in three rural villages in South Africa. Econ. Bot. **2002,** 56: 130-146.
11. Albuquerque UP. Ethnobotanica aplicada para a conservacao da bio-diversidade. In: Albuquerque, U. P. and Lucena, R. F. P. (Eds). Metodos e techicas na Pesquisa Etnobotanica, Recife Ed. Livro Rapido, NUPEEA, **2004,** pp. 139-159.
12. Ghorbani AG, Langenberger, Sauerborn J. A comparison of the wild food plant use knowledge of ethnic minorities in Naban River Watershed National Nature Reserve, Yunnan, SW China. J. Ethnobiol. Ethnomedicine **2012**, 8: 17.
13. Harisha RP, Siddappa SR, Ravikanth G. Dependency and economic benefits of the use of wild food plants among tribal communities in Malai Madeshawara Hills wildlife sanctuary, Southern India. Future of Food: J. Sci. Food Agric. **2021**, 9(2).
14. Gausset Q. Ranking local tree needs and priorities through an interdisciplinary action research approach. *J. Transdiscipl. Environ. Stud* **2004**, 3.
15. Albuquerque UP, Andrade LHC, de Silva ACO. Use of plant resources in a seasonal dry forest (Northeastern Brazil). Acta Bot Brasilica **2005**, 19: 27-38.
16. Dansi A, Vodouh R, Azokpota P, Yedomonhan H, Assogba P, Adjatin A, Loko YL, Dossou-Aminon I, Akpagana K. Diversity of the neglected and underutilised crop species of importance in Benin. Sci. World J. **2012,** 19: 2
17. Sahoo G, Swamy S, Rout S, Wani A, Mishra A. Exploitation of wild leafy vegetables and under-utilized fruits: consequences for food and nutritional security. Ann. Romanian Soc. Cell Biol. **2021**, 25(6): 5656-5668.
18. Ebert AW. Potential of underutilised traditional vegetables and legume crops to contribute to food and nutritional security, income and more sustainable production systems. Sustainability **2014,** 6: 319-335.
19. Lombard Z, Dalton DL, Venter PA, Williams RC and Bornman L. Association of HLA-DR, -DQ and Vitamin D receptor alleles and haplotypes with tuberculosis in the Venda of South Africa. *Hum. Immunol*. **2006,** 67: 643-654.
20. Limpopo State of the Environment Report (LSOER), **2004.** State of the environment report, viewed from http://www.environment.gov.za/soer/reports/limpopo.html
21. Mpandeli S, Nesambvuni E, Maponya P. Adapting to the impacts of drought by smallholder farmers in Sekhukhune District in Limpopo Province, South Africa. *J. Agric. Sci. Technol*. **2015,** 7. 10.5539/jas.v7n2pxx.
22. Mucina L, Rutherford M. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. **2006,** pp 482.
23. Das U, Islam MS. A review study on different plants in Malvaceae family and their medicinal uses. Am. J. Biomed. Sci. **2019,** 3:94-97.
24. Rolkin A, Olas B. Vegetables from the Cucurbitaceae family and their products: Positive effect on human health. Nutr. **2020,** (78). http://doi.org/10.1016.j.nut.2020.110788.
25. Bortolotti MD, Mercatelli, Polito L. *Momordica charantia*, a nutraceutical approach for inflammatory related diseases. *Front Pharmacol* **2019,** 10: 486.
26. Johns T. With Bitter Herbs They Shall Eat It: Chemical Ecology and the Origins of Human Diet and Medicine **1990**. University of Arizona Press, Tucson.
27. Brett JA. Medicinal plant selection criteria among the Tzeltal Maya of Highland Chiapas, Mexico. Ph.D. Dissertation. Department of Anthropology. San Francisco, University of California **1994.**
28. Moerman DE, Pemberton RW, Kiefer D, Berlin B. A comparative analysis of five medicinal floras. J. Ethnobiol. **1999,** 19(1):49-67.
29. Zhou X, Huang F, Hao L, Zhao J, Mao H, Zhong J, and Ken S. The socio-economic importance of wild vegetable resources and their conservation: a case study from China. Kew Bull. **2010,** 65(4): 577-582. http//www.jstor.com/stable/23044624.
30. Magwede K, Van Wyk BE, and Van Wyk AE. An inventory of Vhavenḓa useful plants. *S. Afr. J. Bot*. **2018,** 122: 57-89.
31. Teklehaymanot T, Giday M. Ethnobotanical study of wild edible plants of Kara and Kwego semi-pastoralist people in Lower Omo River Valey, Debub Omo Zone, SNNPR, Ethiopia. J. Ethnobiol. Ethnomedicine **2010,** 6: 23.
32. Legwaila GM, Mojeremane W, Madisa ME, Mmolotsi RM, Rampart M. Potential of traditional food plants in rural household food security in Botswana. J. *Hortic. For*. **2011,** 3(6):171-177.

 doi:10.20944/preprints202401.2117.v1

33. Puri RK. The uniqueness of every day: Herders and invasive species in India. In Barnes, J. and M. Dove, eds., Climate Cultures: Anthropological Perspectives on Climate Change. Agrarian Studies Series. **2015,** Ch 10: 249-72, New Haven: Yale University Press.
34. Joshi N, Siwakoti M, Kehlenbeck K. Wild vegetables species in Makawanpur District, Central Nepal: developing a priority-setting approach for domestication to improve food security. Econ. Bot. **2015**, 69(2): 161-70.