

Traditional knowledge of wild edible fruits in southern Africa: A comparative use patterns in Namibia and Zimbabwe

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Received 4 October 2016, revised 26 October 2016

A large proportion of resource poor rural households in southern African communal areas are dependent on wild edible fruits to meet part of their daily nutritional needs. For many people and ethnic groups, the use of wild edible fruits is a source of cultural identity, reflecting a deep and important body of knowledge about the environment, survival, harvesting, preservation and other forms of management. This study was aimed at documenting the role of wild edible fruits in the livelihoods of people in Namibia and Zimbabwe. Sixty five and 83 randomly selected participants were interviewed in Namibia and Zimbabwe respectively, between October 2011 and January 2013. Sixty fruit plants were recorded in both countries. Higher species numbers (50) were recorded in Zimbabwe compared to 19 species in Namibia. Apart from fruit production, five other major use categories were identified in this study, which included herbal medicines, timber, firewood, fruit juice and plant products sold to generate income. It is vital that more research is conducted on potentially important wild edible fruit plants as millions of people throughout the world make extensive use of this category of plant resources to fulfill their livelihood needs.

Keywords: Cultural identity, Indigenous knowledge, Livelihood needs, Namibia, Wild edible fruits, Zimbabwe

IPC Int. Cl.⁸: A61K, A01G 17/00, A23N 12/00, A23N 1/00, A47J 19/00, A23L 21/10, A23L 2/02, A01D 46/00, A47G 19/26, A47J 39/02

Millions of people throughout the world make extensive use of indigenous wild edible fruits to fulfill their livelihood needs and often have considerable knowledge on their uses. Indigenous edible fruits play important role in food and nutritional security in southern Africa, particularly among marginalized groups¹. The diversity of indigenous edible fruits offer variety in household diet, also serve as supplementary source of food, seasonal food and as emergency food supply during times of famine when normal food supply mechanisms are disrupted. Ethnic groups in southern Africa have a long history of wild edible fruits gathering and appropriately preserving them, and consuming them during times of food scarcity². According to Akinnifesi¹, households in southern Africa obtain substantial incomes from indigenous fruits by supplying local markets, with women and children being the main beneficiaries, although men dominate transport business and the wholesale market. In Zimbabwe, fruits of *Adansonia digitata* L., *Azanza*

garckeana (F. Hoffm.) Exell & Hillc., *Berchemia discolor* (Klotzsch) Hemsl., *Parinari curatellifolia* Planch. ex Benth., *Sclerocarya birrea* (A. Rich.) Hochst, *Strychnos cocculoides* Baker, *Strychnos spinosa* Lam., *Uapaca kirkiana* Müll. Arg., *Vangueria infausta* Burch., *Vitex payos* (Lour.) Merr. and *Ziziphus mauritiana* Lam. are sold on local markets or by roadside vendors^{2,3}. In Namibia, the fruits of a Namib desert endemic spiny cucurbit, *Acanthosicyos horridus* Welw. ex Hook f. are sold to Walvisbay traders (Namibia) who export them to Cape Town in South Africa, where they are eaten raw or used in bakeries as confectionery³. Some of the indigenous fruit trees are multipurpose species which are recognized as commercially, medicinally and culturally important in the Southern African Development Community (SADC). The World Agroforestry Centre identified *A. digitata*, *P. curatellifolia*, *S. birrea*, *S. cocculoides*, *Syzygium cordatum* Hochst. ex Krauss, *U. kirkiana*, *V. infausta*, *Vitex* spp. and *Z. mauritiana* as some of the plant species that should be integrated in the domestication process in farming systems in the

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SADC countries to support nutritional, health and income security of local communities¹.

For many people and ethnic groups, the use of wild edible fruits is a source of cultural identity, reflecting a deep and important body of knowledge about the environment, survival and sustainable living known widely as traditional ecological knowledge (TEK)⁴. Berkes⁵ defined TEK as a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings with one another and with their environment. TEK systems, therefore, incorporate means of communicating and transmitting environmental knowledge including information on the harvesting, processing and sustainable use of edible plants, their seasons and cycles of production, their habitats and their use by other species⁴. It is a common practice in Zimbabwe for households to include indigenous fruit trees on agricultural land. For example, during woodland clearing prior to cultivation or settlement, important fruit trees such as *A. digitata*, *A. garckeana*, *B. discolor*, *P. curatellifolia*, *S. birrea*, *S. cocculoides*, *U. kirkiana*, *V. infausta*, *V. payos* and *Z. mauritiana* are customarily left uncut and scattered around homesteads and crop fields^{2,6-8}.

Shortage of food and poor nutrition are seen as two major problems facing Namibia^{9,10} and Zimbabwe². Some households in Namibia⁹ and Zimbabwe^{2,6-8} supplement staple food with indigenous fruits collected from the wild. Some of these species serve subsistence needs, others have important gap filling or safety net functions and a few provide regular and important cash income. Information on the role of wild edible fruit plants in the livelihoods of rural communities in Namibia and Zimbabwe is scanty. The current investigation is aimed at addressing this gap by seeking to explore the livelihoods of the rural communities, with the specific aim of documenting the role that wild edible fruit plants play in the livelihoods of households in Namibia and Zimbabwe.

Methodology

Study area

The study was conducted in ten constituencies of the Oshikoto region (Engodi, Genius, Okankolo, Olukonda, Omuntele, Omuthiya, Onayena, Oniipa, Onyaanya and Tsumeb) in Namibia, and seven villages (Chikato, Donga, Gamwa, Gundura, Hanke, Tongogara and Zvamatenga) in the Midlands Province, Zimbabwe (Fig. 1 & Table 1). The study

sites were selected based on similar environmental and physical factors in terms of vegetation, cultivated crops, average annual temperature, rainfall and elevation (Table 1). The majority of people in the Midlands Province, Zimbabwe are dependent on non-timber forest products (NTFPs) for firewood, herbal medicines, leafy vegetables and edible fruits collected from the wild². Rural communities in northern Namibia are agro-pastoralists⁹, depending on land-based activities such as subsistence arable and livestock farming and also extensive collection of natural resources such as firewood, medicine, timber and wild fruits from the surrounding communal lands⁹.

Data collection

Field surveys were carried out between October 2011 and January 2013 in Namibia and Zimbabwe. Sixty five randomly selected participants were interviewed between 23 and 29 October 2011 in Eenhana and Okongo constituencies in Ohangwena region and Oniipa and Onayena constituencies in Oshikoto, Namibia. Similarly, 83 randomly selected participants were interviewed in Chikato, Donga, Gamwa, Gundura, Hanke, Tongogara and Zvamatenga villages, Midlands Province, Zimbabwe between December 2012 and January 2013. Prior informed consent was required from each participant prior to the interview process. Participatory rural appraisal (PRA) methods were used to systematically collect data on utilization of wild edible fruit plants (plant species and part(s) used, use(s), preparation and

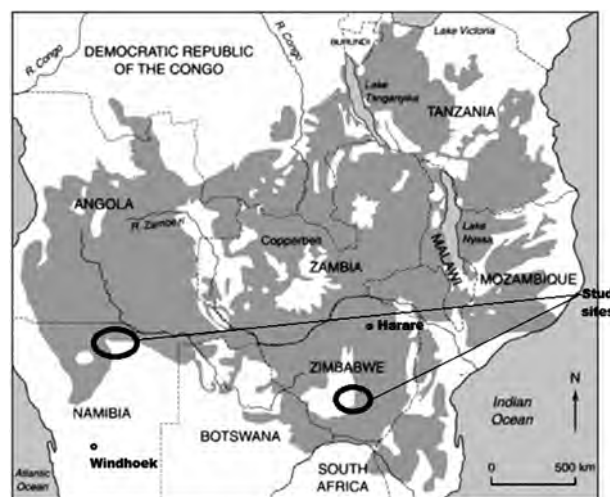


Fig. 1—Map of southern Africa illustrating distribution of miombo woodlands and geographical position of the study sites in Namibia and Zimbabwe, map modified from¹².

Table 1—Summary of characteristics of the two major ethnic groups interviewed in Namibia and Zimbabwe; as well as environmental characteristics of the study sites^{2,6-9,11,12}

	Namibia N = 65	Zimbabwe (N=83)
Main ethnic group	<i>San, Owambo, Damara>Nama, and Ova Herero</i>	<i>Karanga</i> is a dialectical group of the <i>Shona</i> people, the largest ethnic group in Zimbabwe
Location	Eenhana and Okongo constituencies in Ohangwena region and Oniipa and Onayena constituencies in Oshikoto	Chikato, Donga, Gamwa, Gundura, Hanke, Tongogara and Zvamatenga villages, Midlands Province
Estimated population density	23.20 persons /km ²	28 persons /km ²
Altitude	1090-1110 m	1 200 m
Latitude	17°30'S-17°56'S	19°57'S-20°30'S
Longitude	16°12'E-17°43'E	30°00'E-30°58'E
Annual precipitation	480-600 mm	500-750 mm
Rainy season	Summer (December to April)	Summer (November-March)
Annual temperature	23-34°C	18-22°C
Vegetation	Mainly savannah, on the periphery of drier miombo woodland (Fig. 1)	Drier miombo woodland (Fig. 1)
Soil type	Dominated by loose, calcrete layers of ferralic arenosols formed from wind-blown sand which allow little water run-off	Soils are derived from granitic-gneissic rocks, giving rise to sandy soils, with low water-holding capacity, low fertility, low pH and deficiencies in nitrogen, phosphorus and sulphur

harvesting frequency) and local name(s) of the plant species in question.

Specimens of wild edible fruit plants were collected and initially identified by participants with their vernacular names. Plants collected in Zimbabwe were verified at the National Herbarium and Botanic Garden, Harare (SRGH), while those collected in Namibia were identified at the National Botanical Research Institute (NBRI), Windhoek.

Results and discussion

Plant diversity

A total of 60 fruit plants were recorded in both Namibia and Zimbabwe (Table 2). Higher species numbers (50 species, 83.3 % of the total) were recorded in Zimbabwe compared to Namibia (19 species, 31.7 % of the total) (Tables 2&3). Higher plant family numbers and genera were also recorded in Zimbabwe than Namibia (Tables 2&3). All utilized plant species in Namibia were indigenous species, when compared with 92.0 % indigenous species recorded in Zimbabwe (Table 3). The exotic species with edible fruits recorded in Zimbabwe included *O. ficus-indica* (prickly pear), *L. camara* (lantana), *P. angulata* (cutleaf ground cherry) and *S. nigrum* (black nightshade) (Table 2). *Opuntia ficus-indica* and *L. camara* were also used as hedge plants while *S. nigrum* was also recorded as a leafy vegetable (Table 2). Maroyi¹³ classified *P. angulata* as naturalized in Zimbabwe, while *L. camara* and *O. ficus-indica* were classified as invasive species. These are some of the invasive plant species that pose significant

threat to indigenous plant biodiversity by virtue of their aggressive qualities and having the capacity to invade natural habitats and overwhelm some of the plant species¹³.

The majority of utilized plant species in Namibia and Zimbabwe (47, 78.3 %) are from 14 families (Fig. 2). The most dominant families were: Anacardiaceae and Moraceae (6 species each), Phyllanthaceae (5 species), Ebenaceae, Loganaceae and Malvaceae (4 species each) and Rubiaceae (3 species). Species belonging to Apocyanaceae, Cactaceae, Chrysobalanaceae, Flacourtiaceae, Lamiaceae, Meliaceae, Moraceae, Phyllanthaceae, Sapotaceae, Solanaceae, Verbenaceae and Vitaceae families were utilized in Zimbabwe only (Table 2). The genera with the highest number of utilized species were *Ficus* with six species, *Grewia* with five species, *Strychnos* with four species, *Searsia* with three species and *Ampelocissus*, *Bridelia*, *Carissa*, *Diospyros*, *Carissa*, *Euclea*, *Lannea* and *Ximenia* with two species each (Table 2). Anacardiaceae, Ebenaceae, Fabaceae *sensulato*, Loganiaceae, Malvaceae, Moraceae, Phyllanthaceae and Rubiaceae have the highest and diversity of species used probably because these are large families in both Namibia Zimbabwe, characterized by at least 20 species each¹⁴. Genus *Ficus* is arguably one of the most important genera in the world with more than 800 species of trees, shrubs, hemi-epiphytes, climbers and creepers¹⁵. The genus *Ficus* is also an important source of food for humans and other fruit eating animals in the tropics and subtropics worldwide¹⁵.

Table 2—Wild edible fruit species recorded in Namibia and Zimbabwe. Species marked with asterisk (*) have been recorded in both Namibia and Zimbabwe—(Contd.)

Namibia				Zimbabwe	
Family and species name	Vernacular name	Edible fruits	Other uses	Vernacular name	Other uses
Anacardiaceae					
<i>Lannea discolor</i> (Sond.) Engl.	-	√	-	Mugan'acha	Dye; herbal medicine; timber
<i>Lannea edulis</i> (Sond.) Engl.	-	√	-	Mutsambatsi	Herbal medicine
* <i>S. birrea</i>	Omugongo	√	Edible seed kernel; fermented juice distilled into beverage/beer; oil; plant products sold to generate income	Mupfura	Aesthetic value; edible seed kernel; fermented juice distilled into beverage/beer; firewood; fodder; food additive; herbal medicine; jam; oil; ornamental; plant products sold to generate income; timber
Searsia					
<i>Searsia longipes</i> (Engl.) Moffett	-	√	-	Mufokosiana	Herbal medicine; timber
<i>Searsia pyroides</i> (Burch.) Moffett	-	√	-	Mufokosiana	Herbal medicine; timber
<i>Searsia tenuinervis</i> (Engl.)-Moffett	-	√	-	Mufokosiana	Herbal medicine; timber
Annonaceae					
* <i>Annona stenophylla</i> Engl. & Diels	Omutyaalale	√	-	Muroro	Dye; herbal medicine; timber
Apocynaceae					
<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	-	√	-	Muruguru	Firewood; herbal medicine
<i>Carissa edulis</i> (Forssk.) Vahl	-	√	-	Muruguru	Firewood; herbal medicine
Arecaceae					
<i>Hyphaene petersiana</i> Klotzsch ex Mart.	Omulunga	√	Ethnoveterinary medicine; fermented juice distilled into beverage/beer; plant products sold to generate income; weaving a wide range of craftwork	-	-
Cactaceae					
<i>Opuntia ficus-indica</i> (L.) Mill.	-	√	-	Mudhorofia	Hedge
Capparaceae					
<i>Boscia albitrunca</i> (Burch.) Gilg & Benedict	Omunkunzi	√	Food additive; herbal medicine	-	-
Celastraceae					
<i>Salacia luebbertii</i> Loes.	Okandongon dongo	√	Herbal medicine; plant products sold to generate income	-	-
Chrysobalanaceae					
<i>P. curatellifolia</i>	-	√	-	Muchakata	Edible seed kernel; fermented juice distilled into beverage/beer; dye; firewood; herbal medicine; timber
Ebenaceae					
<i>Diospyros lycioides</i> Desf.	-	√	-	Musumadombo	Firewood; herbal medicine; timber; toothbrush
* <i>Diospyros mespiliformis</i> Hochst. ex A. DC.	Omwandi	√	Food additive	Musuma	Firewood; herbal medicine; timber; toothbrush
<i>Euclea crispa</i> (Thunb.) Gürke-	-	√	-	Muvhinji	Firewood; herbal medicine; toothbrush
<i>Euclea divinorum</i> Hiern	-	√	-	Mushangura	Dye; firewood; herbal medicine; timber; toothbrush

(Contd..)

Table 2—Wild edible fruit species recorded in Namibia and Zimbabwe. Species marked with asterisk (*) have been recorded in both Namibia and Zimbabwe

Namibia			Zimbabwe		
Euphorbiaceae					
<i>Schinziophyton rautanenii</i> (Schinz) Radcl.-Sm.	Omunkete	√	Edible seed kernel; fermented juice distilled into beverage/beer; food additive; oil; plant products sold to generate income	-	-
Fabaceae sensu lato					
<i>Dialium englerianum</i> Henriq.	Omufimba	√	Plant products sold to generate income	-	-
<i>Bauhinia thonningii</i> Schum.	-	√	-	Musekesa	Dye; fibre; firewood; herbal medicine; timber
<i>Guibourtia coleosperma</i> (Benth.) Leonard	Omushii	√	Food additive	-	-
Flacourtiaceae					
<i>Flacourtia indica</i> (Burm. f.) Merr.	-	√	-	Munhunguru	Firewood; herbal medicine; timber
Lamiaceae					
<i>Hoslundia opposita</i> Vahl	-	√	-	Hwahwahweshiri	Herbal medicine
<i>V. payos</i>	-	√	-	Mutsvubu	Firewood; timber
Loganiaceae					
* <i>S. cocculoides</i>	-	√	-	Muzumwi	Firewood; herbal medicine; timber
<i>Strychnos madagascariensis</i> Poir.	-	√	-	Mukwakwa	Firewood; herbal medicine; timber
<i>Strychnos pungens</i> Soler.	Omupwaka	√	Fermented juice distilled into beverage/beer; plant products sold to generate income	-	-
* <i>S. spinosa</i>	Omuuni	√	Fermented juice distilled into beverage/beer; plant products sold to generate income	Mutamba	Firewood; herbal medicine; timber
Malvaceae					
<i>A. garckeana</i>	-	√	-	Mutohwe	Firewood; herbal medicine; timber
<i>Grewia avellana</i> Hiern	Omukopakopa	√	Ethnoveterinary medicine; fermented juice distilled into beverage/beer; plant products sold to generate income	-	-
<i>Grewia bicolor</i> Juss.	-	√	-	Mutewa	Herbal medicine; timber
* <i>Grewia flavescens</i> Juss.	Omushe	√	Ethnoveterinary medicine; fermented juice distilled into beverage/beer; plant products sold to generate income	Mubhubunu	Firewood; herbal medicine; timber
<i>Grewia monticola</i> Sond.	-	√	-	Mutewa	Herbal medicine; timber
<i>Grewia schinzii</i> K.Schum.	Omushe	√	Fermented juice distilled into beverage/beer; plant products sold to generate income	-	-
Meliaceae					
<i>Ekebergia benguelensis</i> Welw. ex C. DC.	-	√	-	Mudyavarungu	Firewood; herbal medicine; timber
Moraceae					

(Contd.)

Table 2—Wild edible fruit species recorded in Namibia and Zimbabwe. Species marked with asterisk (*) have been recorded in both Namibia and Zimbabwe

Namibia				Zimbabwe	
<i>Ficus ingens</i> (Miq.) Miq.	-	√	-	Mushavhi	Firewood; herbal medicine; timber
<i>Ficus natalensis</i> Hochst.	-	√	-	Mushavhi	Firewood; herbal medicine; timber
<i>Ficus salicifolia</i> Vahl	-	√	-	Mushavhi	Firewood; herbal medicine; timber
<i>Ficus sur</i> Forssk.	-	√	-	Muonde	Firewood; herbal medicine; timber
<i>Ficus sycomorus</i> L.	-	√	-	Muonde	Firewood; herbal medicine; timber
<i>Ficus thonningii</i> Blume	-	√	-	Mushavhi	Firewood
Phyllanthaceae					
<i>Antidesma venosum</i> E. Mey. ex Tul.	-	√	-	Murungamunyu	Dye
<i>Bridelia cathartica</i> Bertol	-	√	-	Mutsvoritsvoto	Firewood; herbal medicine
<i>Bridelia mollis</i> Hutch.	-	√	-	Mutuzvidzembwa	Firewood; herbal medicine
<i>Flueggea virosa</i> (Roxb.) ex Willd.	-	√	-	Mushagahuwe	Herbal medicine; timber
<i>U. kirkiana</i>	-	√	-	Muzhanje	Firewood; herbal medicine; timber
Rhamnaceae					
* <i>B. discolor</i>	Omuye	√	Fermented juice distilled into beverage/beer; plant products sold to generate income	Nyii	Firewood; herbal medicine; timber
* <i>Z. mucronata</i>	Omukekete	√	Ethnoveterinary medicine; fermented juice distilled into beverage/beer; herbal medicine	Muchecheni	Firewood; herbal medicine; timber
Rubiaceae					
<i>Vangueria ferruginea</i> (Welw.) ined.	Omumbu	√	Fermented juice distilled into beverage/beer; plant products sold to generate income	-	-
<i>V. infausta</i>	-	√	-	Mudzvirungombe	Herbal medicine; timber
<i>Vangueriopsis lanciflora</i> (Hiern) Robyns	-	√	-	Mutufu	Herbal medicine; timber
Sapotaceae					
<i>Mimusops zeyheri</i> Sond.	-	√	-	Muchechete	-
Solanaceae					
<i>Physalis angulata</i> L.	-	√	-	Muguzubheri	-
<i>Solanum nigrum</i> L.	-	√	-	Musungusungu	Traditional vegetable
Verbenaceae					
<i>Lantana camara</i> L.	-	√	-	Lantana	Hedge
Vitaceae					
<i>Ampelocissus africana</i> (Lour.) Merr.	-	√	-	Muzambiringa	Herbal medicine
<i>Ampelocissus obtusata</i> (Welw. ex Baker) Planch.	-	√	-	Muzambiringa	Herbal medicine
Ximeniaceae					
* <i>Ximenia americana</i> L.	Oshikukulu	√	Fermented juice distilled into beverage/beer; plant products sold to generate income	Mutengeni	Firewood; herbal medicine; timber
<i>Ximenia caffra</i> Sond.	-	√	-	Munhengeni	Firewood; herbal medicine; timber

Plant utilization in both Namibia and Zimbabwe

A total of nine species (15.0 % of total) were utilized in both Namibia and Zimbabwe (Table 2). More plant use categories were recorded in Zimbabwe than in Namibia, with all the nine species

characterized by at least four uses in Zimbabwe. For example, *S. birrea* alone had 11 uses, which included aesthetic value, edible seed kernel, fermented juice distilled into beverage or beer, firewood, fodder, food additive, herbal medicine, making jam, oil extraction,

Table 3—Summary of wild edible fruit species recorded in Namibia and Zimbabwe

		Namibia	Zimbabwe
Taxonomic rank	Family	13 (52.0%*)	21 (84.0%)
	Genera	15 (39.5%)	32 (84.2%)
	Species	19 (31.7%)	50 (83.3%)
Origin	Indigenous	19 (100%)	46 (92.0%)
	Exotic	0	4 (8%)

*percentage of total

ornamental, plant products sold to generate income (Table 2). In Namibia, *S. birrea* had four uses which included edible seed kernel, fermented juice distilled into beverage or beer, oil extraction and plant products sold to generate income (Table 2). In Namibia, *A. stenophylla* and *S. spinosa* provided edible fruits only while *D. mespiliformis* had a single additional use as a food additive. *Berchemia discolor*, *S. birrea*, *X. americana* and *Z. mucronata* had similar applications in both Namibia and Zimbabwe (Table 2). Apart from collected for its edible fruits, *S. birrea* fruits were also collected for their edible seed kernel and fruit juice fermented into a beverage or beer in both countries. Oil was also extracted from seed kernels in both countries. *Sclerocarya birrea* products, mainly fruits in the case of Namibia and Zimbabwe, and wood carvings in Zimbabwe were sold to generate income (Table 2). Our results corroborate research findings by Maroyi⁷ that *S. birrea* is an important NTFP that provides rural communities with diverse benefits required for daily household livelihood needs. *Berchemia discolor*, *X. americana* and *Z. mucronata* were used as sources of traditional medicines in both countries (Table 2). Results of this study showed that households in Zimbabwe are more dependent on plant resources for their livelihoods or as a survival strategy than their counterparts in Namibia. The present study builds on similar research done in Namibia and Zimbabwe¹¹ as well as Turkey¹⁶⁻¹⁹ on utilization of plant resources as food plants as well as herbal medicines. Results from these studies^{11,16-19} revealed similarity in plant usage regardless of cultural differences, and also highlighted the importance of plant resources to livelihood strategies of many households.

Other plant use categories

Apart from used as edible fruits, the documented plants have 19 other applications which included herbal medicine, timber, firewood, fruit juice/beer and plant products sold to generate income. Herbal medicine was a major plant use category in

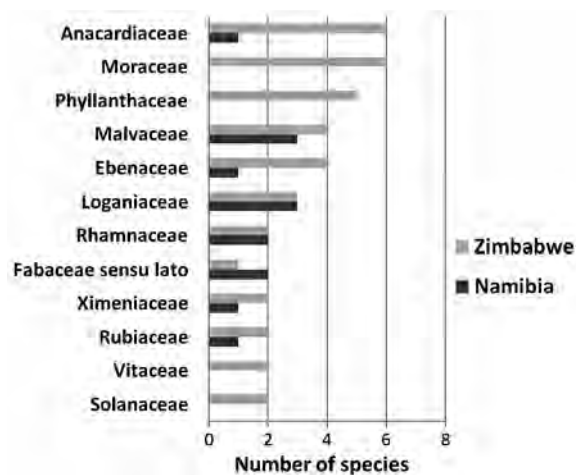


Fig. 2—Families with the highest number of utilized plants in Namibia and Zimbabwe

Zimbabwe, contributing 68.3 %, followed by timber (53.3 %) and firewood (50.0 %). In Namibia, plant products were sold to generate income (21.7 %), followed by fruit juice/beer (20.0 %) and ethnoveterinary medicine, and food additive at 8.3 % each. Additional use categories recorded in Zimbabwe only included use of wild edible fruit plant species or plant parts for aesthetic value (1.7 %), dye (10 %), fibre (1.7 %), firewood (50 %), fodder (1.7 %), hedge (3.3 %), jam (1.7 %), leafy vegetable (1.7 %), ornamental, rope, timber (53.3 %) and toothbrush (6.7 %). Use of plants or plant parts for making crafts (1.7 %) and as ethnoveterinary medicine were recorded in Namibia only.

Conclusion

This study demonstrated that wild edible fruit plants provide rural communities with a wide range of goods and ecosystem services which are important to their welfare. The present study also documented the multiple roles of wild edible fruit plants in Namibia and Zimbabwe. Among these important uses are utilization of such species as food sources, herbal medicines, timber, firewood and as important sources of household income. Therefore, it is vital that more research is conducted on potentially important wild edible fruits as millions of people throughout the world make extensive use of this category of plant resources to fulfill their livelihood needs and often have considerable knowledge on their uses.

Acknowledgement

Authors are grateful to the traditional healers of Oshikoto region, Namibia and Nhema communal area, Zimbabwe for sharing their knowledge on medicinal

plants. The authors would like to thank National Research Foundation (NRF) of South Africa, Govan Mbeki Research and Development Centre (GMRDC), University of Fort Hare and the Research and Publication Office of the UNAM Pro-Vice Chancellor for Academic Affairs and Research (PVC-AAR) of the University of Namibia, resolution number URPC/2011/413 for financial support.

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