

Nutritional, medicinal and phytochemical properties of *Hyphaene petersiana* Klotzsch ex Mart. (Arecaceae family): A narrative review

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Abstract

Hyphaene petersiana is one of the most famous palms in tropical Africa, playing a prominent role as a multipurpose plant species in the region. This study explores the nutritional, medicinal and phytochemical properties of *H. petersiana*. This study is based on literature from scientific databases such as SpringerLink, PubMed, Scopus, Web of Science, Google Scholar, ScienceDirect, and SciELO, as well as pre-electronic sources such as books, book chapters, and other scientific publications from the university library. This research showed that the fruit flesh of *H. petersiana* is a good source of energy, classic nutrients, and minerals. The crude extracts of *H. petersiana* are used for charm and for ritual purposes, and as traditional medicine against toothache, cough, gastrointestinal problems, and sexually transmitted infections. *Hyphaene petersiana* is an important plant species in tropical Africa, providing food resources, construction materials, manufacture of utensils, crafts, fodder, income, ecosystem goods and services. Beyond food provision and health, *H. petersiana* is also an important component of Indigenous cultures in tropical Africa, playing a key role in the transmission of Indigenous and traditional ecological knowledge and traditions associated with provisioning, regulating, cultural, and supporting services. Results of the current study add valuable literature on the importance of *H. petersiana* to local livelihood needs and social-ecological resilience.

Keywords: Arecaceae family, ecosystem goods and services; *Hyphaene petersiana*, livelihood needs, materia medica, traditional ecological knowledge.

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Introduction

Hyphaene petersiana Klotzsch ex Mart. (Figure 1) is one of the most famous palms in tropical Africa, as well as in other regions of the world where it is cultivated as an ornamental plant. For centuries, *H. petersiana* has played a prominent role as a multipurpose plant species in the region, through provisioning, regulating, cultural, and supporting services (Gruca et al., 2014, 2015; Mudzengi et al., 2017; Mogotsi et al., 2019; Sileshi et al., 2023; Tselaesele et al., 2023; Dowo and De Garine-Wichatitsky, 2024). But in tropical Africa and other marginal environments of developing agricultural economies, many plant species collected from the wild are consumed, domesticated, and managed in home gardens, providing numerous ecosystem goods and services (Hamilton et al., 2003; Bidak et al., 2015; Maroyi, 2022; Shrestha et al., 2025). Such plant species which also include *H. petersiana* are characterized by socio-economic potentials such as provision of essential material and non-material contributions such as food, household income, fodder, poverty alleviation services, medicines, firewood, meeting important livelihood needs, materials for construction and crafts, cultural and spiritual practices (Terry, 1987, 1994; Teshirogi et al., 2017; Shopo et al., 2022a; Namukwambi et al., 2023; Sher et al., 2023; Molmou et al., 2025; Mpofu et al., 2025; Makhubele et al., 2026). Literature studies show that *H. petersiana* and related species are pivotal for ecosystem functioning, carbon sequestration, and rural livelihoods, and these species can be used as models in local communities seeking a balance between biodiversity conservation, carbon sequestration, and socio-economic development (Mugari and Masundire, 2022; Chinomona et al., 2024; Makonda et al., 2026). It is in this context that utilization of *H. petersiana* represents not

only a livelihood strategy but also a historical form of interaction between local communities and their surrounding environment. This practice involves economic, social, and cultural dimensions that sustain traditional ecological knowledge associated with surrounding biodiversity, local ways of life, and identities (Lima et al., 2026). Therefore, *H. petersiana* emerges as an intriguing subject of study, given the cultural, essential material, food, and medicinal significance of the species (Van Wyk and Gericke, 2018; Mogotsi et al., 2019; Mugari et al., 2024). Almost every part of *H. petersiana*, that is, wood, leaves, roots and/or fruits, is used by men or eaten by mammals and livestock (Palmer and Pitman, 1972; Schmidt et al., 2017; Mogotsi et al., 2019). The fruits of *H. petersiana* are fermented into an alcoholic drink which is explored commercially (Van Wyk, 2011). Fruits of *H. petersiana*, alcoholic drinks made from the fruits, as well as various crafts made from the species provide income to local communities in tropical Africa; therefore, various products of the species are extensively traded in informal local markets in the region, that is, in cities, towns and rural areas (Mmopelwa et al., 2009; Neudeck et al., 2012; Badimo et al., 2015; Nko et al., 2025). There is a growing body of evidence indicating that the collection and use of wild plant resources play an important role in the livelihoods of local communities in low-income countries and marginalized communities (Gomes et al., 2020; Ghanbari et al., 2022; Ocho et al., 2026). The literature also points out that poorly managed practices involving wild plant species can lead to over-exploitation of such species or environmental degradation (Nepstad et al., 2008; Lima et al., 2026). It is therefore, within this context, that the current study was undertaken aimed at reviewing the nutritional, medicinal, and phytochemical properties of *H. petersiana*.

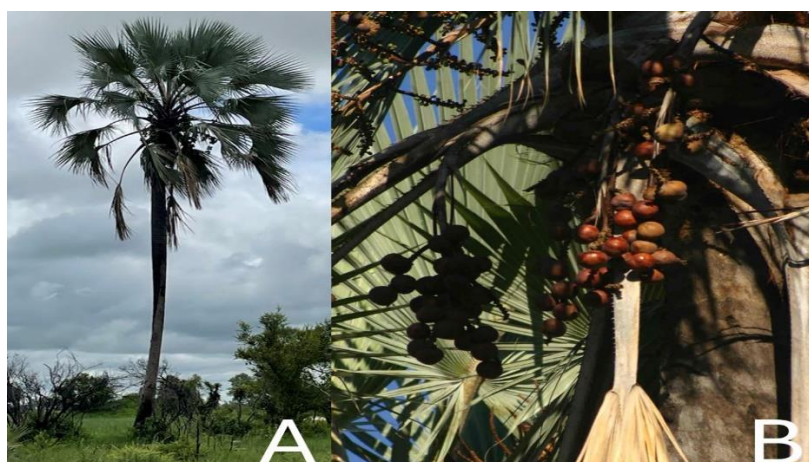


Figure 1: *Hyphaene petersiana*: A: Entire plant showing general habit, and B: branch showing leaves and fruits of the species (photos: A = B Rode, B = B Wursten)

Materials and methods

This review critically examined the nutritional, medicinal and phytochemical properties of *H. petersiana*. Comprehensive data were systematically compiled in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Figure 2). The literature studies documenting nutritional, medicinal and phytochemical properties of *H. petersiana* were conducted from November 2025 to July 2026 through databases such as ScienceDirect (<https://www.sciencedirect.com/search>), PubMed (<https://pubmed.ncbi.nlm.nih.gov/>), Google Scholar (<https://scholar.google.com/>), Scopus (<http://www.scopus.com/>), Web of Science (<https://www.webofknowledge.com/>), SpringerLink (<https://link.springer.com/>) and SciELO (<https://search.scielo.org/>). The pre-electronic sources, which included books, book chapters, journal articles, dissertations, and theses obtained from the University library, were also used. The search strategy involved using keywords: “*Hyphaene petersiana*”, English common names “dum palm”, “dum palm”, “fan palm”, “ilala palm”, “lola palm”, “makalani palm”, “makola palm”, “mokola palm”, “mulala palm”, “northern ilala palm”, “northern lala palm”, “real fan palm”, “southern ilala palm”, “vegetable ivory” and “vegetable ivory palm”. An additional search was also conducted using the keywords “nutritional properties of

Hyphaene petersiana”, “ethnobotany of *Hyphaene petersiana*”, “medicinal uses of *Hyphaene petersiana*”, “phytochemistry of *Hyphaene petersiana*” and “traditional uses of *Hyphaene petersiana*”. The selection process was designed to include a wide range of scientific publications focusing on the nutritional, medicinal uses, and phytochemical properties of *H. petersiana*. The search covered publications from 1955 to 2026, a long period to capture literature on the nutritional, medicinal, and phytochemical properties of *H. petersiana*. Literature sources excluded from this review are those articles that are partially accessed, that is, accessed as abstracts only, and also published or unpublished ethnobotanical, nutritional, or phytochemical studies lacking information on medicinal uses, nutritional and phytochemical properties of *H. petersiana*.

Quantitative ethnobotanical data analysis involved computing the frequency of citation (FC) to determine the local significance of *H. petersiana* use categories. The frequency of citation of a use category was calculated as the frequency of mentioning *H. petersiana* use categories by different studies. Therefore, FC for each use category was calculated as follows:

Frequency of citation (FC) (use category) = (Number of times *H. petersiana* use was mentioned) / (total number of times *H. petersiana* was mentioned in reviewed studies) × 100.

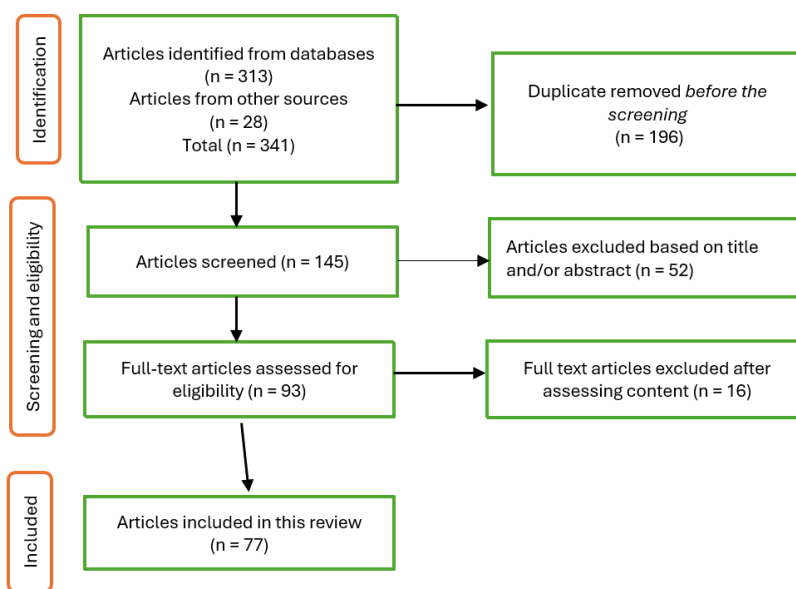


Figure 2: Flow diagram showing identification and screening of articles used in this review

Results and discussion

Taxonomy and description of *Hyphaene petersiana*

Hyphaene petersiana belongs to the Arecaceae family, which is commonly known as the palm family as its members are often referred to as palms or palm trees (Palmer and Pitman, 1972; Palgrave, 2002; Van Wyk and Van Wyk, 2013; Schmidt et al., 2017). Species belonging to the Arecaceae family are perennial monocotyledonous flowering plants which are mainly evergreen climbers, shrubs or tree-like, stemless, rarely scandent or acaulescent, dioecious, monoecious or polygamous plants (Van Wyk, 2008; Baker and Dransfield, 2016). Family Arecaceae consists of approximately 2600 species distributed in 181 genera (Baker et al., 2009; Baker and Dransfield, 2016; Christenhusz and Byng, 2016), with the majority of these species being cosmopolitan, concentrated primarily in moist equatorial, tropical, and subtropical regions, but with outliers in semi-arid and temperate regions (Leistner, 2000). The majority of the members of the Arecaceae family are distinguished by their large, compound, evergreen leaves, which are known as fronds, arranged at the top of an unbranched stem, except for the *Hyphaene* species, which are sometimes branched (Baker and Dransfield, 2016). Some species belonging to this family are widely cultivated in warm areas as ornamental plants and have major economic importance as sources of oils, food, fibres, building materials and utensils (Mogotsi et al., 2019).

The genus *Hyphaene* Gaertn. comprises eight species distributed in dry regions of continental Africa, Madagascar, Arabia, Mascarene Islands and western India (Stauffer et al., 2018; Christe et al., 2026). The genus name *Hyphaene* is derived from the Greek words “*hyphaino*” or “*hyphainein*” meaning to “weave” or “entwine”, in reference to the fibres of the fruits or from the leaves which are associated with several species of the genus *Hyphaene* (Palmer and Pitman, 1972; Quattrocchi, 2012). The species name “*petersiana*” is in honour of Prof Wilhelm Karl Hartwich (or Hartwig) Peters (22 April 1815 – 20 April 1883), a German zoologist, botanist and explorer who collected the type specimen of the species in Mozambique in the early 19th century (Schmidt et al., 2017; Hyde et al., 2026). Common English names of *H. petersiana* are “doum palm”, “dum palm”, “fan palm”, “ilala palm”, “lola palm”, “makalani palm”, “makola palm”, “mokola palm”, “mulala palm”, “northern ilala palm”, “northern lala palm”, “real fan palm”, “southern ilala palm”, “vegetable ivory” and “vegetable ivory palm” (Palmer and Pitman, 1972; Palgrave, 2002; Quattrocchi, 2012; Van Wyk and Van Wyk, 2013; Van Wyk and Gericke, 2018; Hyde et al., 2026). The hard white kernels of *H. petersiana* seeds closely resemble those of the commercial “vegetable ivory” of South America, that is, *Phytelephas* spp., and hence the

common names “vegetable ivory” or “vegetable ivory palm” (Palgrave, 2002; Quattrocchi, 2012). Synonyms of *H. petersiana* include *Chamaeriphes benguelensis* (Welw. ex H.Wendl.) Kuntze, *C. ventricosa* (J.Kirk) Kuntze, *Hyphaene aurantiaca* Dammer, *H. benguelensis* Welw. ex H.Wendl., *H. benguelensis* Welw. ex H.Wendl. var. *plagiocarpa* (Dammer) Furtado, *H. benguelensis* Welw. ex H.Wendl. var. *ventricosa* (J.Kirk) Furtado, *H. bussei* Dammer, *H. goetzei* Dammer, *H. multiformis* Becc. subsp. *plagiosperma* Dammer ex Becc., *H. obovata* Furtado, *H. ovata* Furtado, *H. plagiocarpa* Dammer, *H. ventricosa* J.Kirk, *H. ventricosa* J.Kirk subsp. *ambolandensis* Becc., *H. ventricosa* J.Kirk subsp. *anisopleura* Becc., *H. ventricosa* J.Kirk subsp. *aurantiaca* (Dammer) Becc., *H. ventricosa* J.Kirk subsp. *benguelensis* (Welw. ex H.Wendl.) Becc., *H. ventricosa* J.Kirk subsp. *bussei* (Dammer) Becc., *H. ventricosa* J.Kirk subsp. *goetzei* (Dammer) Becc., *H. ventricosa* J.Kirk subsp. *petersiana* (Klotzsch ex Mart.) Becc., *H. ventricosa* J.Kirk subsp. *plagiocarpa* (Dammer) Becc., *H. ventricosa* J.Kirk subsp. *russisiensis* Becc. and *H. ventricosa* J.Kirk subsp. *useguensis* Becc. (Dransfield and Martins, 2012; Quattrocchi, 2012; POWO, 2026). Research by Führding-Potschkat et al. (2026) showed that species characterized by a high number of synonyms is probably a result of reclassification and taxonomical interest in the taxon and/or a clear indication of how taxonomical knowledge about the plant group has evolved throughout its geographical range. *Hyphaene petersiana* is a tall, erect, solitary and single-stemmed tree (Figure 1), reaching a height of 20 metres with leaves crowded on top of the stem (Wild et al., 1972; Van Wyk and Van Wyk, 2013). The stem is often suckering and forming clumps, occasionally with a bulge near the middle or in the upper parts. The trunk of *H. petersiana* is almost always unbranched, patterned with horizontal scars of the fallen leaves, and the male and female sexes borne on different trees. The leaves are fan-shaped, greyish-green in colour, with long petioles characterized by recurved black thorns, and leaflets with asymmetric base. *Hyphaene petersiana* flowers from September to October, and fruiting can take place at any time of the year. The flowers are in drooping clusters, and male flowers are in short spikes and are short-lived. Female trees have large sprays of flowers, bear small, single-seeded, more or less globose fruits, ripening from green through orange to glossy dark brown. Fully grown fruits can remain on the tree for more than two years (Mogotsi et al., 2019). The epicarp is very smooth and polished with only slight dimpling, reddish-brown in colour. When ripe the epicarp parts easily from the aromatic, yellow-orange flesh of the fibrous mesocarp (Mogotsi et al., 2019). The seeds are flat at the base, nearly round in horizontal section, with the apex slightly peaked at the embryo. The hard white kernel of the seed is surrounded by

a fibrous outer husk. Inside the seed, there is a small quantity of sweet liquid similar to coconut milk.

Hyphaene petersiana has been recorded in Angola, Botswana, Burundi, the Democratic Republic of Congo (DRC), Malawi, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Zambia and Zimbabwe (White, 1962; Drummond, 1975; Roodt, 1998; Setshogo and Venter, 2003; Mapaura and Timberlake, 2004; Setshogo, 2005; Figueiredo and Smith, 2008; Van Wyk, 2008; Mannheimer and Curtis, 2009; Dransfield and Martins, 2012; Burrows et al., 2018; Mutete et al., 2019; Ntore et al., 2024) (Figure 3). *Hyphaene petersiana* has been recorded in sodic-saline alluvial and alkaline dry soils, from sandy to clayey, with a high water table in bushveld, along swamps, pans, floodplains and

rivers, savanna and secondary vegetation, often forming extensive stands at an altitude ranging from 275 m to 1300 m above sea level (Germishuizen and Meyer, 2003; Mogotsi et al., 2019). Fruits fall directly below the parent tree and are dispersed by seasonal flood water or by elephants and baboons (Palgrave, 2002; Richard et al., 2009). *Hyphaene petersiana* is closely related to *H. coriacea* Gaertn., and in Mozambique, South Africa, and Tanzania, where both species have been recorded, it is difficult to distinguish the two species as they are identical in the appearance of the stems and leaves, particularly when young. The main differences between the two species are in fruit characteristics, with *H. coriacea* having pear-shaped fruits while *H. petersiana* has rounded fruits (Palgrave, 2002).



Figure 3: Distribution of *Hyphaene petersiana* in tropical Africa (drawn by the author using the MapChart programme)

Traditional uses of *Hyphaene petersiana*

Forty-nine uses and values of *H. petersiana* are reported in the literature throughout the distributional range of the species in tropical Africa (Table 1). Dominant activities or uses of the species include collection of its fruits, palm wine, spirit or beverage production, basket, broom, mat, rope, twine or curio production (Table 1), and these contribute significantly to the rural economy in tropical Africa (Mogotsi et al., 2019). The high use of *H. petersiana* for these activities are likely related to the local commercial importance of the species, as various components of the species are traded in informal markets (Table 1) throughout the distributional range of the species. The different *H. petersiana* products which are sold in local and regional markets provide an important source of income to several households in tropical Africa (Cunningham, 1990a,b; Foote et al., 2003). The leaves, kernels, petioles, trunk, whole plant and fibre of *H. petersiana* (Figure 4) are widely used throughout the distributional range of the species. Tapping of sap from *H. petersiana* to make palm wine is an important subsistence activity in southern Africa. The use of *H. petersiana* for wine production has been recorded in Botswana (Chhabra et al., 1990; Heath and Heath, 2009), Malawi (Williamson, 1975), Namibia (Konstant et al., 1995; Sullivan et al., 1995; Hailwa, 1998), South Africa (Van Wyk

and Gericke, 2018), Tanzania (Ruffo et al., 2002; Kokwaro, 2009), Zambia (Fanshawe, 1967) and Zimbabwe (Wild et al., 1972; Sola, 1998; Foote et al., 2003; Sola et al., 2006; Ganduri et al., 2014), representing 58.3% of the countries where the species is indigenous. *Hyphaene petersiana* is said to produce an annual yield of about 68.0 litres of sap (Palmer and Pitman, 1972). The collected sap is fermented by naturally occurring yeast (Nash and Bornman, 1973), which produces an alcoholic beverage commonly referred to as ilala palm wine. In Namibia and South Africa, the fruits of *H. petersiana* are also used to produce an alcoholic beverage (Hailwa, 1998; Van Wyk, 2011; Cheikhoussef and Embashu, 2013; Van Wyk and Gericke, 2018; Nyambe et al., 2019). *Hyphaene petersiana* can be categorized as a multipurpose plant species as the species is associated with the provision of numerous ecosystem goods and services, see Table 1. The seeds are used as a source of vegetable ivory and other ornaments. The leaves of the species are also used as fodder for both game and livestock. The fruits of *H. petersiana* are a favourite food for the elephants, with these animals bumping the trees to dislodge the fruits, which are swallowed whole, the flesh digested and the seed excreted (Mogotsi et al., 2019). The species is also an important component of bushveld, savanna and secondary vegetation in tropical Africa.

Table 1: Uses and values of *Hyphaene petersiana* in tropical Africa

Product or use	Part	Traded	FC
Edible fruits	Fruit pulp	Yes	88.31
Palm wine	Sap	Yes	81.82
Baskets	Fibre, young leaves and trunk	Yes	55.84
Brooms	Leaves	Yes	54.55
Rope or twine	Fibre, young leaves and mature leaves	Yes	50.65
Mats	Fibre and young leaves	Yes	46.75
Curios	Kernel	Yes	36.36
Spirit and/or beverage	Pericarp and sap	Yes	32.47
Crafts	Leaves and seeds	Yes	27.27
Browse and/or fodder	Immature fruits, sucker shoots and young leaves	Yes	22.08
Ceremonial and ritual ornaments	Kernels	-	22.08
Fish traps	Leaves and petioles	-	16.88
Food and water troughs	Trunk	-	15.58
Furniture	Leaves	Yes	14.29
Shade	Leaves	-	12.99
Vegetable	Young stems	-	11.69
Bracelet or necklace	Leaves and kernels	Yes	10.39
Hats	Leaves	Yes	9.09
Wallets	Leaves	Yes	9.09
Beams and/or roofing	Leaves and trunk	-	9.09
Charcoal and/or cooking fuel	Fruits, Leaves, petioles, seeds and trunk	-	9.09
Dye or tannin	Young leaves	-	9.09
Nuts	Kernels	Yes	7.79
Windbreak	Whole plant	-	7.79
Construction (hut walls)	Leaves, petioles, stems and trunk	-	7.79
Fence	Leaves, petioles and stems	-	6.49
Barrier, boundary or support	Whole plant	-	6.49
Trinkets	Kernels	-	5.19
Bows	Leaf stalk	-	5.19
Leaves for sale	Leaves	Yes	5.19
Poles	Petioles	-	5.19
Bowls	Young leaves	Yes	3.9
Plates	Young leaves	Yes	3.9
Drums	Trunk	Yes	3.9
Seed oil	Seeds	-	3.9
Skirts used during girls puberty rites	Fibre and leaves	-	3.9
Stirring spoons	Petioles	Yes	3.9
Stools	Trunk	-	3.9
Balancing poles which carry calabashes	Petioles	-	2.6
Box lids	Kernels	-	2.6
Brooches	Kernels	-	2.6
Buttons	Kernels	-	2.6
Dental floss or tooth cleaner	Leaves	-	1.3
Dolls	Kernel	-	1.3
Goblet tops	Kernels	-	1.3
Heads of walking stick	Kernels	-	1.3
Marquetry wood	Heartwood	-	1.3
Sieve or strainer	Leaves	-	1.3
Soil erosion	Whole plant	-	1.3

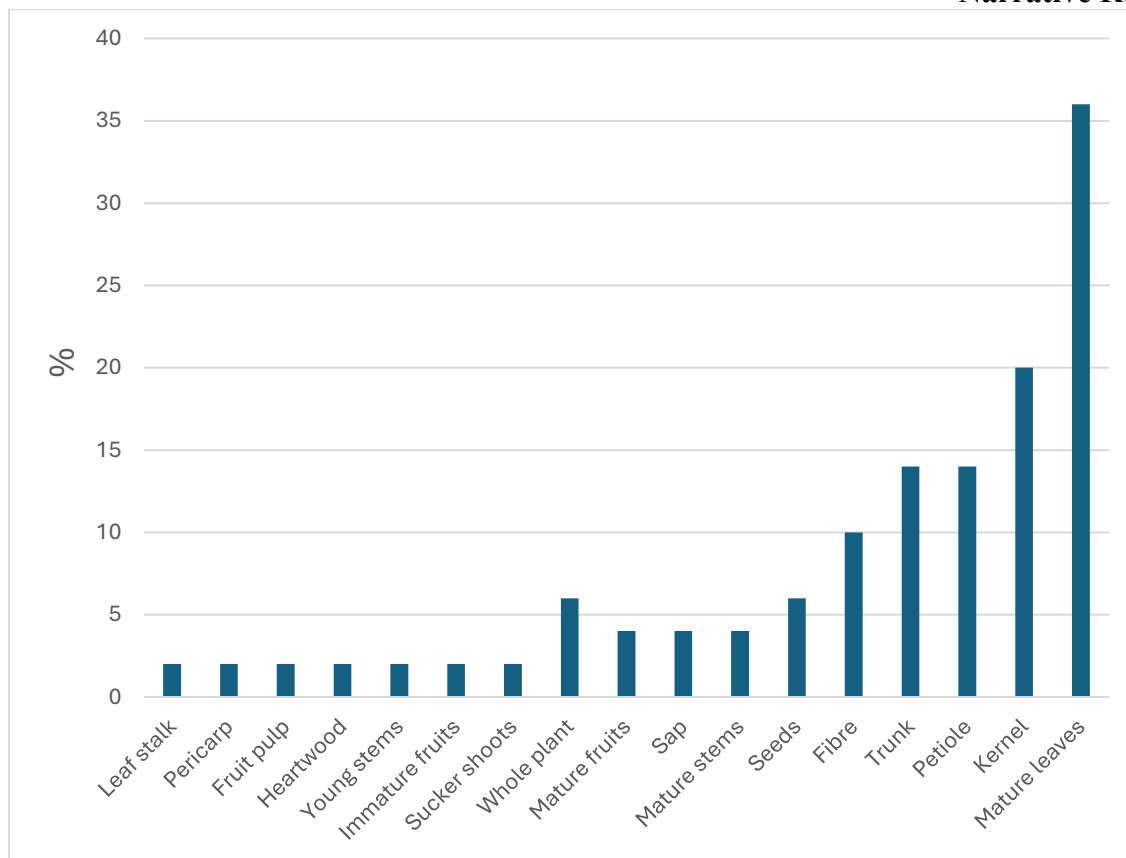


Figure 4: Plant parts of *Hyphaene petersiana* used in East and southern Africa

Nutritional and phytochemical properties of *Hyphaene petersiana*

Tapping of sap from *H. petersiana* to produce palm wine is traditionally an important subsistence activity, with the alcoholic beverage considered to have important nutritional value (Heard, 1955; Nash and Bornman, 1973; Cunningham, 1985; Wehmeyer, 1986; Cunningham and Wehmeyer, 1988). This activity is practised year round and plays an important role in local livelihoods and poverty alleviation in tropical Africa (Cunningham, 1990a,b; Nyambe et al., 2019). Research by Foote et al. (2003) revealed that during drought periods when crops fail, *H. petersiana* provides an alternative food and cash income to several households in southern Zimbabwe. The fruits of *H. petersiana* have high concentrations of essential minerals (Table 2), and consumption of such fruits is recommended especially in poor settings (Nyambe et al., 2019). The alcohol content of wine produced from *H. petersiana* fruits has variable alcohol content ranging from 0.8% to 55.3% (Heard, 1955; Sadza, 2018).

In terms of mineral content, the fruits of *H. petersiana*, and to some extent, palm wine produced from the species are excellent sources of essential minerals such as calcium, copper, iron, magnesium, phosphorus, potassium, sodium and zinc (Table 2). Reference is also made to the recommended dietary allowance (RDA), representing the average daily intake of essential nutrients that are needed to meet the nutrient requirements of a health person (Table 2). A wide variety of nutrients associated with fruits and wine produced from *H. petersiana* (Table 2) implies that this species could be an important source of health-promoting nutrients and therefore, serve as a good supplement for nutrients such as carbohydrates, crude fibre, fats, proteins, and vitamin C to complement the stipulated requirements for the RDA values. Some fatty acids such as lauric acid, linoleic acid, myristic acid, oleic acid, palmitic acid and stearic acid (Table 3) have been identified from the seed oil of *H. petersiana* (Mitei et al., 2008). Similarly, Mitei et al. (2009) characterized the phytosterols, vitamin E compounds, tocopherols and tocotrienols of the seed oil of *H. petersiana* (Table 3).

Table 2: Nutritional composition of fruits and wine produced from *Hyphaene petersiana*

Nutritional component	Value	Recommended dietary allowance (RDA)	Reference
Alcohol (% v/v)	0.8	–	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nantanga et al., 2018; Sadza, 2018
Ash (g/100g)	55.3	–	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Calcium (mg/100g)	9	–	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Carbohydrates (g/100g)	103	1000-1300	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Carotene (mg/100g)	69.5	130	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Energy value (Kj/100g)	0.06	–	Wehmeyer, 1986
Fat (g/100g)	1265	10042	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nantanga et al., 2018
Fibre (g/100g)	0.4	20 - 35	Wehmeyer, 1986; Nyambe et al., 2019
Iron (mg/100g)	9.6	25 - 30	Wehmeyer, 1986
Magnesium (mg/100g)	2.04	8 - 15	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Sadza, 2018; Nyambe et al., 2019
Manganese (mg/100g)	197	310 - 320	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Moisture (g/100g)	0.04	2.3	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Nicotinic acid (mg/100g)	6.6	2.3	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Oxalate (mg/g)	4.6	16-35	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Sadza, 2018
Phosphorus (mg/100g)	0.02	–	Nyambe et al., 2019
Phytate (mg/g)	156	1250	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Potassium (mg/100g)	0.12	–	Nyambe et al., 2019
Protein (g/100g)	2560	4700	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Riboflavin (mg/100g)	4.9	34	Heard, 1955; Campbell, 1969; Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Saponin (mg/g)	0.1	0.3 – 1.6	Heard, 1955; Campbell, 1969; Wehmeyer, 1986; Cunningham and Wehmeyer, 1988
Selenium (mg/g)	2.46	–	Nyambe et al., 2019
Sodium (mg/100g)	0.01	–	Nyambe et al., 2019
Sulphur (mg/kg)	11.65	2300	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019
Tannin (mg/g)	2.93	14	Nyambe et al., 2019
Vitamin C (mg/100g)	0.1	–	Nyambe et al., 2019
Zinc (mg/100g)	19.7	46	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988
	0.56	8 - 11	Wehmeyer, 1986; Cunningham and Wehmeyer, 1988; Nyambe et al., 2019

Table 3: Phytochemical composition of *Hyphaene petersiana* fruits and seed oil

Phytochemical compound	Reference
Acetaldehyde	Nantanga et al., 2018
Acetic acid	Sadza, 2018
Iso-Amyl acetate	Nantanga et al., 2018
Amyl alcohols	Nantanga et al., 2018
Iso-Butanol	Nantanga et al., 2018
Campesterol	Mitei et al., 2009
Cholesterol	Mitei et al., 2009
Citrostadienol	Mitei et al., 2009
Cycloartenol	Mitei et al., 2009
Diacetyl	Nantanga et al., 2018
Ethyl acetate	Nantanga et al., 2018
Lactic acid	Sadza, 2018
Lauric acid	Mitei et al., 2008
Linoleic acid	Mitei et al., 2008
Methylene cycloartanol	Mitei et al., 2009
Myristic acid	Mitei et al., 2008
Oleic acid	Mitei et al., 2008
Palmitic acid	Mitei et al., 2008
2,3-Pentanedione	Nantanga et al., 2018
n-Propanol	Nantanga et al., 2018
Sitosterol (%)	Mitei et al., 2009
Sitostanol or Δ^5 avenasterol	Mitei et al., 2009
Stearic acid	Mitei et al., 2008
Stigmastanol	Mitei et al., 2009
Stigmasterol	Mitei et al., 2009
α -Tocopherol	Mitei et al., 2009
α - and β -tocotrienol	Mitei et al., 2009

Medicinal uses of *Hyphaene petersiana*

Several researchers listed medicinal uses of *H. petersiana* in Zimbabwe, Angola, South Africa, Zambia, Botswana, Tanzania and Namibia (Table 4), representing 54.5% of the countries where the species is indigenous. Herbal medicines prepared from the roots, leaves, fruits, kernels, fruit pulp, sap and seeds of *H. petersiana* are used for treating and

managing 18 human and animal ailments and diseases in East and Southern Africa. The main ailments and diseases treated by *H. petersiana* that have been recorded in at least two countries include its use as charm and ritual purposes, and traditional medicine against toothache, cough, gastrointestinal problems, and sexually transmitted infections (Table 4).

Table 4: Medicinal uses of *Hyphaene petersiana*

Medicinal use	Part used	Country	Reference
Charm (protection from lightning), religious ceremonies and rituals	Leaves	Namibia and Zimbabwe	Gelfand et al., 1985; Rodin, 1985; Gruca et al., 2014; Shopo et al., 2022a; Nyasvisvo et al., 2024
Constipation	Leaf or root decoction taken orally	Zimbabwe	Shopo et al., 2022b
Cough	Fruit, kernel, leaf, root or seed decoction or infusion taken orally	Angola, Botswana, Namibia, Zambia and Zimbabwe	Heath and Heath, 2009; Cheikhyyoussef and Embashu, 2013; Gruca et al., 2015; Leakey et al., 2022; Chinsembu, 2016; Shopo et al., 2022b; Sileshi et al., 2023; Solazzo et al., 2024
Ethnoveterinary medicine (lung disease in dogs)	Kernels	Namibia	Cheikhyyoussef and Embashu, 2013; Gruca et al., 2015
Gastrointestinal problems (diarrhoea, stomachache and stomach pain)	Fruit pulp, leaf or root decoction or infusion taken orally	Tanzania and Zimbabwe	Ruffo et al., 2002; Quattrocchi, 2012; Shopo et al., 2022b
Intestinal worms	Fruit pulp decoction or infusion taken orally	Tanzania	Ruffo et al., 2002; Kokwaro, 2009; Gruca et al., 2015; Quattrocchi, 2012
Kidney problems	Root decoction or infusion taken orally	Botswana	Heath and Heath, 2009
Malaria	Fruit decoction or infusion taken orally	Zambia	Chinsembu, 2016
Mosquito repellent	Sprinkling residues from boiled crushed leaves on windows, openings and surfaces	Zimbabwe	Nyasvisvo et al., 2024
Sexually transmitted infections	Leaf, roots or sap decoction or infusion taken orally	Zambia and Zimbabwe	Chinsembu, 2016; Shopo et al., 2022b
Snake bite antidote	Leaf or root decoction or maceration applied topically	Zimbabwe	Shopo et al., 2022b
Skin rash	Sap decoction or maceration applied topically	Zambia	Chinsembu, 2016
Toothache	Leaf or root decoction or infusion applied topically	Botswana and Zimbabwe	Heath and Heath, 2009; Neelo et al., 2015; Shopo et al., 2022b
Tuberculosis	Seeds decoction or maceration applied topically	Zambia	Chinsembu, 2016
Wounds	Leaf decoction or maceration applied topically	Namibia	Cheikhyyoussef and Embashu, 2013; Gruca et al., 2015; Leakey et al., 2022

Conclusion

Palm wine produced from *H. petersiana* is among the most widely consumed alcoholic beverages in tropical Africa. It is therefore important that sustainable management of *H. petersiana* is considered because of the economic and nutritional value associated with various products derived from the species. Increased commercialisation combined with harmful harvesting techniques has led to concerns about overexploitation of *H. petersiana*. *Hyphaene petersiana* has considerable potential as the species can be harvested sustainably and deliver significant development benefits to poor and marginalized rural communities. Future research should also evaluate the nutritional, phytochemical, pharmacological, and toxicological properties of different plant parts of the species, which are considered to be valuable sources of food and medicines.

Limitations

The current study is a systematic review which relies on a suite of literature sources. Therefore, the study is characterized by literature selection bias, exclusion of some literature sources, language restrictions, and reliance on the quality of past primary studies. Access and identification of literature sources focusing on nutritional, medicinal, and phytochemical properties of *H. petersiana* were a major challenge. Information provided in this study is based on available scientific sources identified through a systematic literature review, which is often susceptible to publication, analysis, and interpretation bias. In order to minimize these forms of bias and subjective decisions, credible literature sources associated with quality ethnobotanical studies and experimental techniques focusing on nutritional, medicinal, and phytochemical evaluations of the species were selected and used in this study.

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Author contributions

I am solely responsible for the conception and design of the research work, data collection, analysis, interpretation of the data, and writing of the manuscript.

Registration and protocol

The review was not registered, and a protocol was not prepared.

Competing interests

The author declares that there is no conflict of interest associated with this research.

List of abbreviations

DRC - Democratic Republic of Congo

FC - frequency of citation

POWO - Plants of the World Online

PRISMA - preferred reporting items for systematic reviews and meta-analyses

RDA - recommended dietary allowance

Availability of data, code, and other materials

All data generated or analyzed during this study are included in this article.

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