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Artabotrys brachypetalus Benth.: Evaluation of its traditional uses, phytochemistry, and pharmacological properties

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Background: *Artabotrys brachypetalus* is best known for its edible fruits, but today, it is a well-known medicinal plant. However, there are several uses of the species, some of them known since prehistoric times.

Aim: This study compiles the existing information of the traditional uses, phytochemistry and pharmacological properties, and future potential applications of *A. brachypetalus*.

Setting: This review provides an overview of uses and ethnopharmacological properties of *A. brachypetalus*.

Method: Multiple searches on existing literature were carried out on the traditional, medicinal, phytochemistry, and pharmacological properties of *A. brachypetalus* in online databases such as Scopus, PubMed, Google Scholar, JSTOR, and Science Direct as well as using pre-electronic literature sources obtained from the university library.

Results: This study showed that *A. brachypetalus* is a multipurpose species used as a food plant, source of fibre, firewood, timber, and herbal medicine. *Artabotrys brachypetalus* serves as a medicinal plant in five countries to treat human and animal diseases, accounting for 55.6% of the countries where the species is naturally found. The phytochemical evaluation of the plant revealed that it contains alkaloids, cyclohexane carboxylic acid, dicarboxylic acid, fatty acids, flavonoids, phenolics, sesquiterpenes, and sugars. The pharmacological assessments showed that the phytochemical compounds isolated from the species and crude extracts demonstrated antifungal, antidiabetic, antiplasmodial, and larvicidal activities.

Conclusion: Further research should focus on elucidation of pharmacological, phytochemical, toxicological, *in vitro*, *in vivo* and clinical research of the species.

Contribution: This study contributes to the existing knowledge about *A. brachypetalus* that could be useful in bio-prospecting for new health-promoting products required in the primary healthcare delivery system.

Keywords: Annonaceae; *Artabotrys brachypetalus*; indigenous pharmacopeia; traditional medicine; tropical Africa.

Introduction

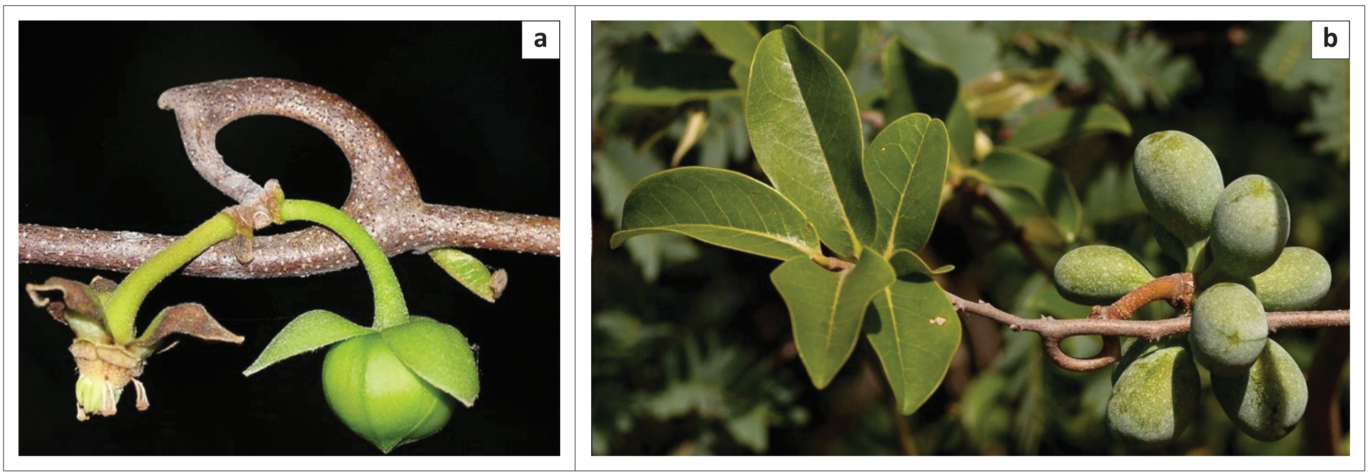
Large hook-berry (*Artabotrys brachypetalus* Benth.) (Figure 1) is a multipurpose climber, shrub, or multistemmed and low spreading tree. As a multipurpose plant species, almost all of its different parts are used as sources of the ecosystem services and goods that offer support to human well-being and survival. *Artabotrys brachypetalus* is a member of the family Annonaceae, commonly known as the custard-apple family, with some of its species widely used as food and medicinal plants. *Artabotrys* R.Br. is one of the largest genera of the Annonaceae family consisting of approximately 100 species distributed in several tropical forests of Africa, Asia, New Guinea, and Australia (Photikwan et al. 2021). Other *Artabotrys* species categorised as multipurpose species widely used as food sources, traditional medicines, fodder, construction materials and as ornamental plants include *A. hexapetalus* (L.f.) Bhandari, *A. monteiroae* Oliv., and *A. suaveolens* (Blume) Blume (Tan & Wiart 2014). In Southern Africa, *A. brachypetalus* and *A. monteiroae* are regarded as valuable sources of traditional medicines and are therefore included in the monograph 'Medicinal and magical plants of southern Africa: An annotated checklist' (Arnold et al. 2002). Previous research by Botha, Ed Witkowski and Shackleton (2007) revealed that the roots of *A. brachypetalus* are sold in informal herbal medicine markets in the Limpopo and Mpumalanga provinces of South Africa as sources of traditional medicines. Similarly, a mixture of the roots of

A. brachypetalus with those of *Celosia* spp. (Amaranthaceae), *Ficus platyphylla* Delile (Moraceae), *Maclura africana* (Bureau) Corner (Moraceae), and *Senna petersiana* (Bolle) Lock (Fabaceae) are traded in informal herbal medicine markets in Mozambique as postnatal medication (Krog, Falcão & Olsen 2006).

The genus name *Artabotrys* is derived from two Greek words '*artane*' meaning 'that by which something is hung up' and '*botrys*' meaning 'a cluster of grapes' (Palmer & Pitman 1972). This is in reference to clusters of suspended fruits and specialised inflorescence hooks (Figure 1), which help the taxon to twine and cling to branches and twigs of neighbouring trees or other plants. The recurved inflorescence hooks are borne on lateral branches of *Artabotrys* species, forming linear series and becoming swollen and woody after clinging to other tree species or objects. The specific name '*brachypetalus*' means 'short-petalled' (Palmer & Pitman 1972), relating to the short petals of the flowers of the species. *Artabotrys brachypetalus* is a deciduous, woody climber, shrub, or multistemmed and low spreading tree growing up to 10 m in height (Palmer & Pitman 1972). The species uses curling and hooked flower stalks to climb, twining around the branches and twigs of neighbouring trees or other plants. The bark of *A. brachypetalus* is grey in colour and rough in larger specimens. Young branches are covered with rusty-brown hairs and become smooth with age. Leaves are alternate, shortly petiolate, ovate to elliptic, leathery, bluish green or glossy bright green in colour, the tips are blunt or round or sometimes shortly pointed. The base of the leaves is round or slightly hairy above, and more or less hairy below. The flowers are yellow, cream to greenish in colour, solitary, cup-shaped on conspicuously twisted, hooked, and crooked woody stalks, which twine around any branches they touch, often embedding themselves in the tissue of other trees (Schmidt, Lotter & McCleland 2017). The fruits are clustered together (Figure 1), smooth, purple to black in colour, and edible. Fruit-like woody galls are often present and conspicuous and sometimes confused with the true fruits. *Artabotrys brachypetalus* has been recorded in bushveld, rocky outcrops, woodland, fringing forest, riverine fringe thickets, along streams in sandy to alluvial soils in hot, dry, and low-altitude areas up to 1400 m above sea level (Germishuizen & Meyer 2003). The species naturally occurs in Botswana, the Democratic Republic of Congo (DRC), Zimbabwe, Malawi, Mozambique, Tanzania, Namibia, Zambia, and South Africa (Figure 2) (Germishuizen & Meyer 2003; Herman & Retief 1997). The current review of *A. brachypetalus* compiles information on its chemical, traditional uses, phytochemical and pharmacological properties, and future potential applications of the species. This is a comprehensive scientific review aimed at providing baseline data and additional information that can enhance future research, cultivation, and use of this plant species.

Methods

Literature search on traditional and medicinal uses, pharmacological and phytochemical properties of *A. brachypetalus* was conducted using online databases such as Scopus, JSTOR, Google Scholar, PubMed, and Science Direct. Besides this, pre-electronic sources such as journal articles, books, book chapters, dissertation, theses, and other scientific publications obtained from the University library were used. Keywords used during literature search included 'biological activities of *Artabotrys brachypetalus*', 'pharmacological properties of *Artabotrys brachypetalus*', 'ethnobotany of *Artabotrys brachypetalus*', 'medicinal uses of *Artabotrys brachypetalus*', 'phytochemistry of *Artabotrys brachypetalus*,' and 'traditional uses of *Artabotrys brachypetalus*'. Literature sources included in this study are those that evaluated the biological activities, medicinal uses, ethnobotany, phytochemistry, traditional uses, or pharmacological activities of *A. brachypetalus*. Literature sources excluded from this study are those publications that are partially accessed, that is, accessed as abstracts only, and also published or unpublished ethnopharmacological surveys lacking information on biological activities, medicinal uses, ethnobotany, phytochemistry, traditional uses, or pharmacological activities of *A. brachypetalus*.



Source: Photos courtesy of BT Wursten

FIGURE 1: *Artabotrys brachypetalus*: (a) A branch with flowers and (b) branch with leaves and fruits.

Review findings

Traditional uses of *Artabotrys brachypetalus*

Throughout human history, plant resources have been used as food, construction materials, traditional medicines, fodder, and various cultural applications. *Artabotrys brachypetalus* is widely used as a source of fibre and timber, and is suitable for a wide range of purposes where durability, strength, stability, and a good appearance are desired. In Zimbabwe, the wood of *A. brachypetalus* is used to make music instruments and household utensils (Grundy et al. 1993; Tan & Wiart 2014). In the Limpopo province in South Africa, *A. brachypetalus* is regarded as a source of strong fibre used for construction (Mabogo 1990). In Mozambique and South Africa, *A. brachypetalus* is harvested from the wild as a source of firewood (Kityo 2004; Leshabana & Tshisikhawe 2019; Mokganya 2019). Although *A. brachypetalus* is considered as a species of conservation concern in rural Mozambique (Bruschi et al. 2014), the taxon does not seem to be in immediate danger in other countries where it is widespread, recorded in a wide range of habitats, and characterised by a large population size (Raimondo et al. 2009). But from a sustainability perspective, there is a need to preserve the genetic diversity of *A. brachypetalus* and monitor its population given the continuing habitat decline and fragmented species population in Mozambique.

In traditional medicine, the different parts of *A. brachypetalus* have medicinal value and are also used for ritual and magical purposes (Table 1 and Table 2). The medicinal use categories include the use of the species against human and animal ailments and diseases (Tables 1). The medicinal uses of *A. brachypetalus* have been recorded in five countries (Figure 2), representing 55.6% of the countries where *A. brachypetalus* is

TABLE 1: Medicinal uses of *Artabotrys brachypetalus*.

Disease or ailment	Country	Parts used	References
Abdominal pains	Mozambique, South Africa and Zimbabwe	Root infusion taken orally	Gelfand et al. 1985; Mabogo 1990; Sitoe & Van Wyk 2024; Tan & Wiart 2014
Antenatal	Mozambique	Root maceration taken orally	Bruschi et al. 2011
Antidote for food poisoning and snake bite	Mozambique	Root infusion taken orally	Bruschi et al. 2011; Sitoe & Van Wyk 2024; Tan & Wiart 2014
Aphrodisiac	South Africa	Root decoction taken orally	Mabogo 1990; Mataha 2021; Tan & Wiart 2014
Asthma	Mozambique	Root decoction taken orally	Sitoe & Van Wyk 2024; Tan & Wiart 2014
Bilharzia	Tanzania and South Africa	Root infusion taken orally	Githens 1949; Mataha 2021; Sitoe & Van Wyk 2024
Bleeding nose	South Africa	Bark smoke inhaled	Mataha 2021
Chest pains	South Africa	Root decoction taken orally	Mataha 2021
Convulsions	Zimbabwe	Root infusion taken orally and body washed with infusion	Chingwaru et al. 2019; Gelfand et al. 1985; Masondo et al. 2019; Sitoe & Van Wyk 2024; Sobiecki 2002; Stafford et al. 2008; Tan & Wiart 2014
Cough	Mozambique	Root decoction taken orally	Sitoe & Van Wyk 2024; Tan & Wiart 2014
Female infertility	Mozambique	Root maceration taken orally	Bruschi et al. 2011; Sitoe & Van Wyk 2024; Tan & Wiart 2014
Fever	Mozambique	Not specified	Sitoe & Van Wyk 2024
General weakness	Mozambique	Root maceration taken orally	Bruschi et al. 2011; Sitoe & Van Wyk 2024; Tan & Wiart 2014
Gonorrhoea	Tanzania	Root bark decoction	Gelfand et al. 1985; Githens 1949; Sitoe & Van Wyk 2024; Tan & Wiart 2014; Watt & Breyer-Brandwijk 1962
Headache	Mozambique	Not specified	Sitoe & Van Wyk 2024
Helminthiasis	Mozambique	Root decoction taken orally	Bruschi et al. 2011; Barbosa et al. 2020; Sitoe & Van Wyk 2024; Tan & Wiart 2014
Impotence	South Africa	Root decoction taken orally	Mabogo 1990; Sitoe & Van Wyk 2024
Infertility	South Africa and Zimbabwe	Root infusion taken orally	Arnold & Gulumian 1984; Gelfand et al. 1985; Mabogo 1990; Tan & Wiart 2014
Influenza	South Africa	Root decoction taken orally	Mataha 2021
Joint pains	Mozambique	Not specified	Sitoe & Van Wyk 2024
Magical and ritual purposes	South Africa	Roots and seeds	Mabogo 1990; Magwede et al. 2019
Malaria	South Africa	Leaf and twig decoction taken orally	Clarkson et al. 2004
Moon sickness	Mozambique	Not specified	Sitoe & Van Wyk 2024
Pelvic pains	South Africa	Root infusion taken orally	Mabogo 1990; Tan & Wiart 2014
Postnatal	South Africa	Root infusion taken orally	Mataha 2021
Skin infections	Zambia	Leaf maceration applied topically	Chinsembu 2016
Stomach complaints	Mozambique and South Africa	Root maceration taken orally	Bandeira et al. 2001; Bruschi et al. 2011; Mabogo 1990; Sitoe & Van Wyk 2024; Tan & Wiart 2014
To drive away bad spirits	Zimbabwe	Body washed with root infusion	Gelfand et al. 1985
Toothache	South Africa	Root infusion used to rinse the mouth	Mataha 2021
Venereal diseases	Mozambique	Root maceration taken orally	Bruschi et al. 2011; Sitoe & Van Wyk 2024; Tan & Wiart 2014
Ethnoveterinary medicine (stomach problems in cows)	South Africa	Roots	Mokganya 2019

Note: Please see the full reference list of the article, Maroyi, A., 2024, 'Artabotrys brachypetalus Benth.: Evaluation of its traditional uses, phytochemistry, and pharmacological properties', *Journal of Medicinal Plants for Economic Development* 8(1), a249. https://doi.org/10.4102/jomped.v8i1.249, for more information.

TABLE 2: Use of *Artabotrys brachypetalus* roots in combination with other species as traditional medicine.

Disease or ailment	Country	Parts and other plant species used	References
Diabetes	South Africa	Roots mixed with those of *Capparis tomentosa* Lam. and *Securidaca longipedunculata* Fresen. and stem bark of *Erythrina lysistemon* Hutch.	Amoo et al. 2022; Mudau et al. 2022
Impotence	South Africa	Roots mixed with those of *Garcinia livingstonei* T.Anderson and *S. longipedunculata* and sorghum (*Sorghum bicolor* (L.) Moench) beer	Arnold & Gulumian 1984; Mabogo 1990; Tan & Wiart 2014
Impotence	Mozambique	Roots mixed with those of *Ozoroa obovata* (Oliv.) R. & A. Fern. var. *obovata*, *Tabernaemontana elegans* Stapf and *Flueggea virosa* (Roxb. ex Willd.) Royle	Tajuddeen et al. 2021
Infertility	South Africa	Roots mixed with those of *Antidesma venosum* E.Mey. ex Tul., *Dichrostachys cinerea* (L.) Wight & Arn. subsp. *africana* Brenan & Brummitt and *Zantedeschia aethiopica* (L.) Spreng.	Arnold & Gulumian 1984; Mabogo 1990; Maroyi 2020; Tan & Wiart 2014
Infertility	South Africa	Roots mixed with those of *C. tomentosa*, *Cassytha filiformis* L., *Maerua cafra* (DC.) Pax, *Osyris lanceolata* Hochst. & Steud., *Phyllogeiton discolor* (Klotzsch) Herzog, *Sphedamnocarpus pruriens* (A.Juss.) Szyszył subsp. *galphimiifolius* (A.Juss.) P.D.De Villiers & D.J.Botha	Arnold & Gulumian 1984; Mabogo 1990; Tan & Wiart 2014
Panacea	Mozambique	Roots mixed with those of *Cissampelos hirta* Klotzsch, *Maclura africana* (Bureau) Corner, *O. obovata* var. *obovata*, *T. elegans*, *Ximenia caffra* Sond. and *Zanthoxylum humile* (E.A.Bruce) P.G.Waterman	Sitoe & Van Wyk 2024; Tajuddeen et al. 2021
Postnatal	Mozambique	Roots mixed with those of *Celosia* spp. and *Ficus platyphylla* Delile, *M. africana* and *Senna petersiana* (Bolle) Lock	Krog et al. 2006

Note: Please see the full reference list of the article, Maroyi, A., 2024, 'Artabotrys brachypetalus Benth.: Evaluation of its traditional uses, phytochemistry, and pharmacological properties', *Journal of Medicinal Plants for Economic Development* 8(1), a249. https://doi.org/10.4102/jomped.v8i1.249, for more information.

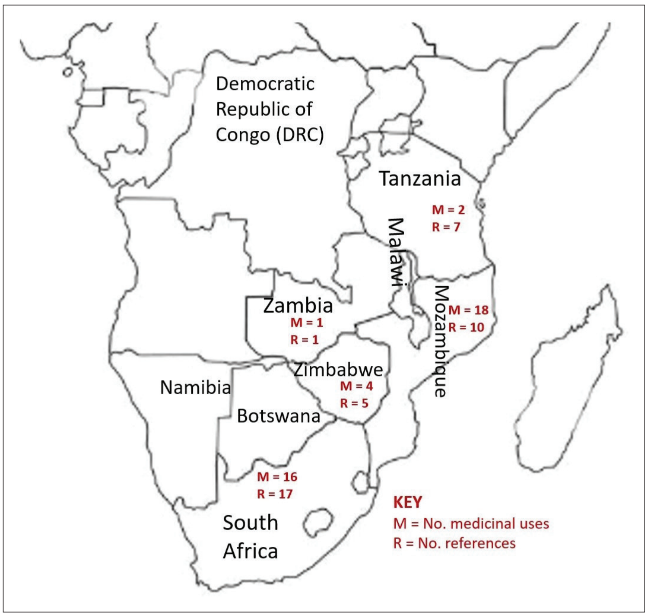


FIGURE 2: Distribution of *Artabotrys brachypetalus* in tropical Africa showing medicinal use reports and number of literature sources documenting medicinal uses.

indigenous. Most of the ethnobotanical data on medicinal applications of *A. brachypetalus* have been reported in Mozambique and South Africa (Figure 2). The rural, peri-urban, and marginalised areas of Mozambique heavily rely on medicinal plants for their primary healthcare needs (Barbosa et al. 2020; Bruschi et al. 2011; Sitoe & Van Wyk 2024), using about 10.0% of the total country flora, that is, 550 species as a source of traditional medicines (Bandeira, Gaspar & Pagula 2001). Similarly, at least 4000 species of southern Africa's total flora of about 30 000 species are used as sources of traditional medicines (Van Wyk & Gericke 2018). In South Africa, traditional medicines are an important aspect of the daily lives of several people in the country and an important part of their cultural heritage (Van Wyk, Oudshoorn & Gericke 2013).

In southern Africa, the indigenous people and rural households consume the fruits of *A. brachypetalus* as a source of daily calorie intake in Mozambique (Palmer & Pitman 1972; Schmidt et al. 2017), South Africa (Bruschi et al. 2014; Mabogo 1990; Magwede, VanWyk & Van Wyk 2019; Mokganya 2019; Mokganya et al. 2018; Nemapare, Gadaga & Mugadza 2023; Welcome & Van Wyk 2019) and Zimbabwe (Peters, O'Brien & Drummond 1992). The fruits of *A. brachypetalus* are regarded as pleasant-tasting and widely used as a fruit snack in Mozambique, and as part of the local recipe used to make an intoxicating drink (Palmer & Pitman 1972; Schmidt et al. 2017). In the Limpopo province in South Africa, the roots of *A. brachypetalus* are used as infant food (Mabogo 1990). Similarly, in Mozambique, roots of *A. brachypetalus* are mixed with those of *Celosia* spp., *F. platyphylla*, *M. africana,* and *S. petersiana* and are believed to improve the health of babies (Krog et al. 2006). Utilisation of the leaves and twigs among local communities has not been explicitly highlighted in the literature, but *A. brachypetalus* is reported to be used as fodder for goats in Mozambique (Marble 2012; Tan & Wiart 2014).

The roots of *A. brachypetalus* are used in different combinations with other medicinal plants in Mozambique and South Africa to treat diabetes (Amoo, Mudau & Olowoyo 2022; Mudau et al. 2022), impotence (Arnold & Gulumian 1984; Mabogo 1990; Tan & Wiart 2014; Tajuddeen et al. 2021), infertility (Arnold & Gulumian 1984; Mabogo 1990; Maroyi 2020; Tan & Wiart 2014), postnatal (Krog et al. 2006), and as panacea (Sitoe & Van Wyk 2024; Tajuddeen et al. 2021). The use of medicinal plant combinations to treat various ailments or diseases has been practiced for centuries (Ramulondi, De Wet & Van Vuuren 2019) in the belief that the efficacy of such herbal concoctions may be enhanced (Van Vuuren & Viljoen 2011). *Artabotrys brachypetalus* is widely used in combination with other medicinal species such as *Antidesma venosum* E.Mey. ex Tul., *Capparis tomentosa* Lam., *Cassytha filiformis* L., *Cissampelos hirta* Klotzsch, *Dichrostachys cinerea* (L.) Wight & Arn. subsp. *africana* Brenan & Brummitt, *Erythrina lysistemon* Hutch., *F. platyphylla* Delile, *F. virosa* (Roxb. ex Willd.) Royle, *Garcinia livingstonei* T. Anderson, *M. africana* (Bureau) Corner, *Maerua cafra* (DC.) Pax, *Osyris lanceolata* Hochst. & Steud., *Ozoroa obovata* (Oliv.) R. & A. Fern. var. *obovata, Phyllogeiton discolor* (Klotzsch) Herzog, *Securidaca longipedunculata* Fresen., *S. petersiana* (Bolle) Lock, *Sorghum bicolor* (L.)

Moench, *Sphedamnocarpus pruriens* (A.Juss.) Szyszył subsp. *galphimiifolius* (A.Juss.) P.D.De Villiers & D.J.Botha, *Tabernaemontana elegans* Stapf, *Ximenia caffra* Sond., *Zantedeschia aethiopica* (L.) Spreng., and *Zanthoxylum humile* (E.A.Bruce) P.G.Waterman (Table 2).

Analyses of the nutritional value of *A. brachypetalus* (Table 3) show that the fruits are a better source of energy, minerals such as copper, calcium, iron, phosphorus, magnesium, potassium, sodium, zinc, and some classic nutrients such as fats, carbohydrates, fibre, and protein as compared to a commercial fruit crop, mango, *Mangifera indica* L. Furthermore, *A. brachypetalus* has been reported to contain alkaloids, cyclohexane carboxylic acid, dicarboxylic acid, fatty acids, flavonoids, phenolics, sesquiterpenes, and sugars (Table 4). Some of these bioactive compounds or ingredients have been shown to be effective in some various mixtures or on their own. Perhaps more research is required as some of these bioactive compounds may be responsible for the pharmacological activities demonstrated by the species, which include antifungal, antidiabetic, antiplasmodial, and larvicidal activities.

Odebode et al. (2006) assessed the antifungal activities of the phytochemical compound schefflone, a mixture of acetogenin and 3,5-dimethoxy carvacrol isolated from the roots and stem bark of *A. brachypetalus* against *Fusarium solani, Botryodiplodia theobromae, Aspergillus flavus,* and *Aspergillus niger* using an in vitro bioassay. The compound showed activities against all tested pathogens with the minimum inhibitory concentration (MIC) values of 200.0 ppm and 250.0 ppm in mycelia dry weight and radial growth measurements, respectively. Recently, Siqueira (2022) assessed the antifungal activities of hexane, dichloromethane, ethyl acetate, nbutanol and hydromethanol of *A. brachypetalus* leaves, roots, and twigs against *Candida albicans, Candida krusei, Candida glabrata, Candida parapsilosis,* and *Candida tropicalis* using microdilution assay with amphotericin B as positive control. The dichloromethane, ethyl acetate, nbutanol, and hydromethanol of the roots exhibited activities against *C. albicans, C. tropicalis,* and *C. glabrata* with MIC and minimum fungicide concentrations (MFC) ranging from 23.43 μg/mL to 1500.00 μg/mL.

TABLE 3: Nutritional composition of *Artabotrys brachypetalus* (Wehmeyer 1986) and *Mangifera indica* L. (Maldonado-Celis et al. 2019) fruits.

Nutritional composition	Values	*Mangifera indica* L.
Ash (g/100 g)	0.8–8.0	0.34–0.52
Calcium (mg/100 g)	22.0	7.0–21.0
Carbohydrates (g/100 g)	10.4	16.2–17.2
Copper (mg/100 g)	0.27	0.04–0.32
Energy (kJ/100 g)	213.0	62.1–190.0
Fat (g/100 g)	0.5	0.3–0.53
Fibre (g/100 g)	5.2	0.9–1.1
Iron (mg/100 g)	0.67	0.09–0.9
Magnesium (mg/100 g)	28.4	8.0–38.0
Moisture (%)	82.3–94.0	78.9–82.8
Phosphorus (mg/100 g)	65.1	10.0–23.0
Potassium (mg/100 g)	250.0	120.0–617.0
Protein (g/100 g)	0.5	0.36–0.40
Sodium (mg/100 g)	3.53	0–4.0
Vitamin C (mg/100 g)	12.6	13.2–92.8
Zinc (mg/100 g)	0.27	0–0.15

TABLE 4: Phytochemical composition of *Artabotrys brachypetalus.*

Phytochemical composition	Chemical formula	References
Alkaloid		
Anonaine	$C_{17}H_{15}NO_2$	Sagen et al. 2003; Siqueira 2022
Armepavine	$C_{19}H_{23}NO_3$	Sagen et al. 2003; Siqueira 2022
Asimilobine	$C_{17}H_{17}NO_2$	Sagen et al. 2003; Siqueira 2022
Columbamine	$C_{20}H_{19}NO_4$	Siqueira 2022
Dehydroanonaine	$C_{17}H_{13}NO_2$	Siqueira 2022
Dehydrodiscretamine	$C_{19}H_{17}NO_4$	Siqueira 2022
Discretine	$C_{20}H_{23}NO_4$	Sagen et al. 2003; Siqueira 2022
Feruloyloctopamine	$C_{18}H_{19}NO_5$	Siqueira 2022
Heliamin	$C_{11}H_{15}NO_2$	Siqueira 2022
Isomoschatoline	$C_{18}H_{13}NO_4$	Siqueira 2022
Laurotetanine	$C_{19}H_{21}NO_4$	Sagen et al. 2003; Siqueira 2022
Lotusine	$C_{19}H_{24}NO_3$	Siqueira 2022
NCaffeoyltyramine I	$C_{17}H_{16}NO_4$	Siqueira 2022
Ncisgrossamide	$C_{36}H_{37}N_2O_8$	Siqueira 2022
NFeruloyltyramine	$C_{18}H_{21}NO_5$	Siqueira 2022
Nformylreticuline	$C_{19}H_{21}NO_5$	Siqueira 2022
(+)-N-methylcoclaurine	$C_{18}H_{21}NO_3$	Sagen et al. 2003
Norcoclaurine	$C_{16}H_{17}NO_3$	Siqueira 2022
Norjuziphine	$C_{17}H_{19}NO_3$	Sagen et al. 2003; Siqueira 2022
Nornuciferina	$C_{18}H_{19}NO_2$	Siqueira 2022
Norushinsunine	$C_{17}H_{15}NO_3$	Siqueira 2022
N-trans-Caffeoyltryramine	$C_{17}H_{17}NO_4$	Siqueira 2022
N-trans-Feruloyltyramine I & II	$C_{18}H_{19}NO_4$	Siqueira 2022
Ntransgrossamide	$C_{36}H_{37}N_2O_8$	Siqueira 2022
Omethylcoclaurine	$C_{18}H_{21}NO_3$	Siqueira 2022
Oxoxylopine	$C_{18}H_{11}NO_4$	Siqueira 2022
Pessoine	$C_{18}H_{19}NO_4$	Siqueira 2022
Reticuline	$C_{19}H_{23}NO_4$	Siqueira 2022
Salsolinol	$C_{10}H_{13}NO_2$	Siqueira 2022
Stepharine	$C_{18}H_{19}NO_3$	Siqueira 2022
Tetrahydropalmatine	$C_{21}H_{25}NO_4$	Siqueira 2022
Thalifendine	$C_{19}H_{15}NO_4$	Siqueira 2022
Thebaine	$C_{19}H_{21}NO_3$	Siqueira 2022
Xylopine	$C_{18}H_{17}NO_3$	Siqueira 2022
Cyclohexanecarboxylic acid		
Quinic acid	$C_7H_{12}O_6$	Siqueira 2022
Dicarboxylic acid		
Malic acid	$C_4H_6O_5$	Siqueira 2022
Fatty acids		
Hydroxy-octadecatrienoic acid	$C_{18}H_{30}O_3$	Siqueira 2022
Linolenic acid 13-hydroperoxide	$C_{18}H_{30}O_4$	Siqueira 2022
Octadecatrienoic acid	$C_{18}H_{30}O_2$	Siqueira 2022
Stearidonic acid	$C_{18}H_{28}O_2$	Siqueira 2022
Trihydroxyoctadecedienoic acid 1	$C_{18}H_{34}O_5$	Siqueira 2022
Trihydroxyoctadecedienoic acid 1I	$C_{18}H_{34}O_3$	Siqueira 2022
Flavonoids		
(Epi)catechin	$C_{15}H_{14}O_6$	Siqueira 2022
Taxifolin	$C_{15}H_{12}O_7$	Siqueira 2022
Phenolics		
3(2Hydroxy4-methoxyphenyl) propanoic acid hexose	$C_{16}H_{22}O_9$	Siqueira 2022
Pterostilbene	$C_{16}H_{16}O_3$	Siqueira 2022
Sesquiterpene		
Prespatane	$C_{15}H_{24}$	Siqueira 2022
Sugar		
Fructose or glucose	$C_6H_{12}O_6$	Siqueira 2022

Note: Please see the full reference list of the article, Maroyi, A., 2024, 'Artabotrys brachypetalus Benth.: Evaluation of its traditional uses, phytochemistry, and pharmacological properties', *Journal of Medicinal Plants for Economic Development* 8(1), a249. https://doi.org/10.4102/jomped.v8i1.249, for more information.

Clarkson et al. (2004) assessed the antiplasmodial activities of dichloromethane and methanol (1:1) and aqueous extracts of *A. brachypetalus* twigs and leaves against *Plasmodium falciparum* using parasite lactate dehydrogenase (pLDH) assay. Both aqueous and dichloromethane and methanol (1:1) extracts exhibited weak activities with half maximal inhibitory concentration (IC_{50}) values >100.0 µg/mL (Clarkson et al. 2004). Similarly, Maharaj et al. (2006) evaluated the larvicidal activities of aqueous, methanol, dichloromethane, dichloromethane, and methanol (1:1) extracts of *A. brachypetalus* leaves against the third instar larvae of *Anopheles arabiensis* using Temephos (Mostop; Agrivo) as a positive control. The extract showed weak activities against *Anopheles arabiensis* showing mortality between 20.0% and 39.0%, demonstrating limited toxicity (Maharaj et al. 2006). Amoo et al. (2022) assessed the antidiabetic activities of acetone and petroleum ether extracts of *A. brachypetalus* roots and leaves using an α-glucosidase assay with acarbose as the positive control. The petroleum ether extracts of both the leaves and roots exhibited α-glucosidase inhibitory activities with IC_{50} values of 14.0 µg/mL and 30.0 µg/mL, respectively, which were much lower than IC_{50} value of 980.0 µg/mL exhibited by the positive control (Amoo et al. 2022), suggesting some antidiabetic potential. These reported biological activities are considered preliminary as rationale for using *A. brachypetalus* against abdominal pains, antenatal and postnatal, antidote, aphrodisiac, bilharzia, convulsions, headache, helminthiasis, impotence and infertility therefore remains unknown. Thus, the phytochemical compounds isolated from *A. brachypetalus* and the crude extracts should be subjected to detailed ethnopharmacological and toxicological studies aimed at correlating the medicinal uses of the species with its pharmacological and phytochemical properties.

Conclusion

This review highlighted the use of *A. brachypetalus* as a food plant and an important source of traditional medicines. Several phytochemical compounds isolated from *A. brachypetalus* and its associated by-products means that the species is a potential candidate for treating several diseases and ailments. Therefore, better screening methods, *in vitro* and *in vivo* validation of biological activities, and toxicological investigations are required in order to fully explore the plant's potential. It is also surprising that there are no ethnopharmacological studies examining the combinational effects of *A. brachypetalus* extracts with other medicinal plant species. Although the field of synergistic combinational therapeutic research is still in its infancy, more studies are required to test *A. brachypetalus* extracts in combination with extracts of plant species such as *A. venosum, C. tomentosa, C. filiformis, C. hirta, D. cinerea* subsp. *africana, E. lysistemon, F. platyphylla, F. virosa, G. livingstonei, M. africana, M. cafra, O. lanceolata, O. obovata* var. *obovata, P. discolor, S. longipedunculata, S. petersiana, S. bicolor, S. pruriens* subsp. *galphimiifolius, T. elegans, X. caffra, Z. aethiopica*, and *Z. humile*.

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Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Author's contributions

A.M. is the sole author of this research article.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

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