



## Ethnomedicinal profile of *Kigelia pinnata* DC- A bird's eye view

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### Abstract

Plant species from the Bignoniaceae family play a central role in traditional medicine systems and *Kigelia Africana* (Lam.) Benth syn. *Kigelia pinnata* DC. is no exception. The preparation and use of *K. pinnata* DC. plant parts in traditional medicine differs across and within communities.

Reported ethnomedicinal uses of *K. pinnata* DC. from available 59 Floras (online + central library of ITRA), 31 books related to medicinal plants and 29 research articles on ethnomedicine were reviewed. Name and place of the reporting tribe, vernacular names, parts used along with their therapeutic indications, with specific method of administration, if any, through either external (E) or internal (I), as well as economic use were also noted.

*K. pinnata* DC. has been reported for its therapeutic uses in 2 states of India and other 19 countries. Its fruit, seed, stem bark, leaf, root, seed and combination of different parts are used in 76 different disease conditions. Fruits have maximum applications in 48 disease conditions, followed by stem bark in 33, leaf in 15, and root in 10, seed in 7 and combination in 37 disease conditions. Different parts are also used in economically to produce dye, fuel, match boxes, etc. Leaves, young shoots & unripe fruits flowers and bark are used as a vegetable also.

This review confirms the therapeutic value of *K. pinnata* DC. and will serve as a basis of information for future project in order to evaluate the potentials of *Kigelia pinnata* DC. as an important medicinal plant in improving human health status.

**Keywords:** ethnomedicine, bignoniaceae, *Kigelia pinnata*, sausage tree

### Introduction

Ethnobotany, an area of human ecology, defines the interface between people and their forests, and offers clues needed for rural development based on sustainable yields of forest products.<sup>[1]</sup> Plant species in the Bignoniaceae family play a central role in traditional medicine systems<sup>[2]</sup> and *Kigelia Africana* (Lam.) Benth syn. *Kigelia pinnata* DC. is no exception. Distribution of Bignoniaceae is throughout the tropics of the whole world, largely in tropical America, a few in the warm temperate zones of both hemispheres; genera about 105; species about 550.<sup>[3]</sup>

Despite the differences in preparation and application, there is still a lot of overlap in claims i.e. similar uses in different regions or countries. *Kigelia pinnata* DC. is the only species in the genus *Kigelia* which has been introduced into India.<sup>[4]</sup> The generic name *Kigelia* comes from the Mozambican name for sausage tree, "kigeli-keia". *Kigelia Africana* (Lam.) Benth is native to Africa, thus the derivation of the species name "africana". The common name 'Sausage tree' is derived from the cylindrical shape of the fruit.<sup>[5]</sup>

### Plant description:<sup>[6, 7, 8]</sup>

*Kigelia pinnata* DC. is a medium sized spreading tree of rapid growth with short trunk and long distorted branches, cultivated in many parts of India as an ornamental and roadside tree. The bark of the tree is greyish brown, rough; leaves imparipinnate, leaflets 7-9, elliptic, oblong or obovate, entire or serrate, 3-6 inch long; flowers deep chocolate-red in long pendulous panicles; fruit gourd-like, up to 18 inch long\*5 inch hanging by diameter, a rope like peduncle up to 7 feet long, seeds many, embedded in pulp. The mature fruits can be found on trees throughout the year. Due to the unusual fruits and large attractive flowers, *K.*

*pinnata* DC. is considered a striking ornamental plant, and the fruits are used as florists' materials. The thick stem is an attractive feature plant of for bonsai. The tree is sometimes planted as a boundary marker but usually at roadsides and for shade. Due to its occurrence along watercourses, it is suitable for erosion control and riverbank stabilization.

### Vernacular and local names:<sup>[9, 10, 11, 12, 13, 14, 15]</sup>

English- Sausage Tree, Cucumber Tree, Fetish tree; Hindi- Balamkheera, Jhar fanoos (folk); Afrikaans: Worsboom; Karnataka (Kannada): Aanethoradu Kaayi, Mara Sowthae; Telugu: Kijili, Naagamalle; Kerala (Malayalam): Shiva Kundalam; Andhra Pradesh and Telangana (Telugu): Enuga, thondamu, Kijili, Naagamalle; Uttar Pradesh and Uttaranchal: Bahraich; Madhya Pradesh: Jharfanoos; Rajasthan: Kadu; Trade name- Common Sausage tree, Etua tree

### Materials and methods

Information on all reported ethno-medicinal uses of the *Kigelia pinnata* DC. from available books related to ethno botany/ethno-medicine, floras and magazines available in the Central library of ITRA, Jamnagar and various published articles (open access) available online from Google Scholar, PubMed, Science Direct and J-Gate. Floras of different states of India (BSI-available online) and books pertaining to information of interest were also screened. The collected data of the plant is presented in tabular form according to its part used, regions of reporting, vernacular names, names of tribes, therapeutic indications, dosage form and method of administration etc.

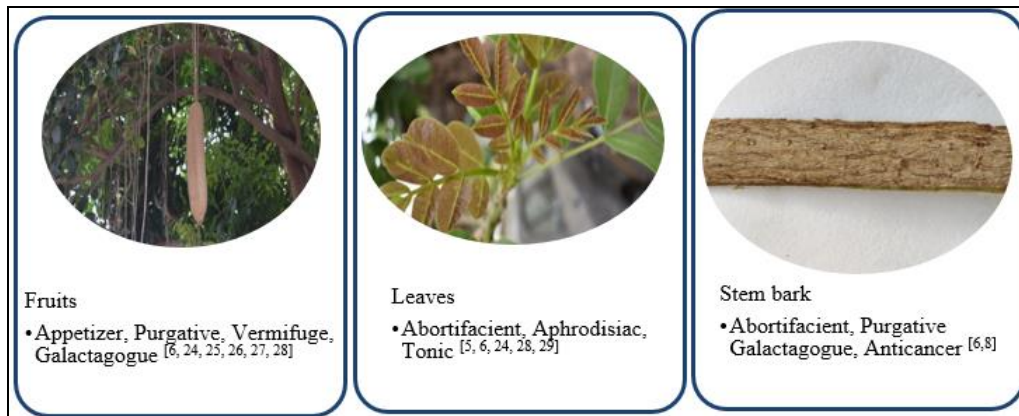
**Results and Discussions**

**Area of reporting**

*K. pinnata* DC. is a native plant of tropical Africa so the medicinal uses of *K. pinnata* DC. are majority found in African countries like Tanzania, Kenya, Ethiopia, Zambia, Malawi (Countries in East Africa), Botswana, Namibia (Country in Southern Africa), Ivory Coast, Ghana, Benin (Country in West Africa), Cameroon (Country in Central Africa), Fundong (Town in Cameroon), Nsukka, Northern South Western -Nigeria, Zimbabwe (Country in Africa), Chobe, Zambez, Zambezi (River region south-central Africa), Northwest Region, Philippines (country in Southeast Asia). *K. pinnata* DC. is being used as medicine in some places of India, especially in Kurukshetra (Hariyana), Aurangabad (Tables No. 1 to 19).

**Area of reporting as a garden plant**

Throughout India this tree is planted as a boundary marker and planted along roadsides and in garden as an avenue tree and for shade. Rarely found in the forests. Reported area: Uttarakhand (Chakrata and Dehradun), Uttar Pradesh (Saharanpur)<sup>[16]</sup>, Gujarat (Jamnagar, Gandhinagar)<sup>[17,18]</sup>, Agra (Paliwal Park)<sup>[19]</sup>, Maharashtra State (Buldhana)<sup>[20]</sup>, Bihar (National Park -Hazaribagh)<sup>[21]</sup>, Chhattisgarh (Bilaspur, Durg, Rajnandgaon and Raipur)<sup>[13]</sup>, Madhya Pradesh (Indore), Rajasthan (Tonk District)<sup>[14]</sup>, Tamilnadu, Kerala (Thiruvananthapuram)<sup>[22]</sup>, Haryana (Faridabad)<sup>[23]</sup> In the present review it is observed that fruits, leaves and Stem bark have total 9 Medicinal and therapeutic properties. (Figure No. 1)

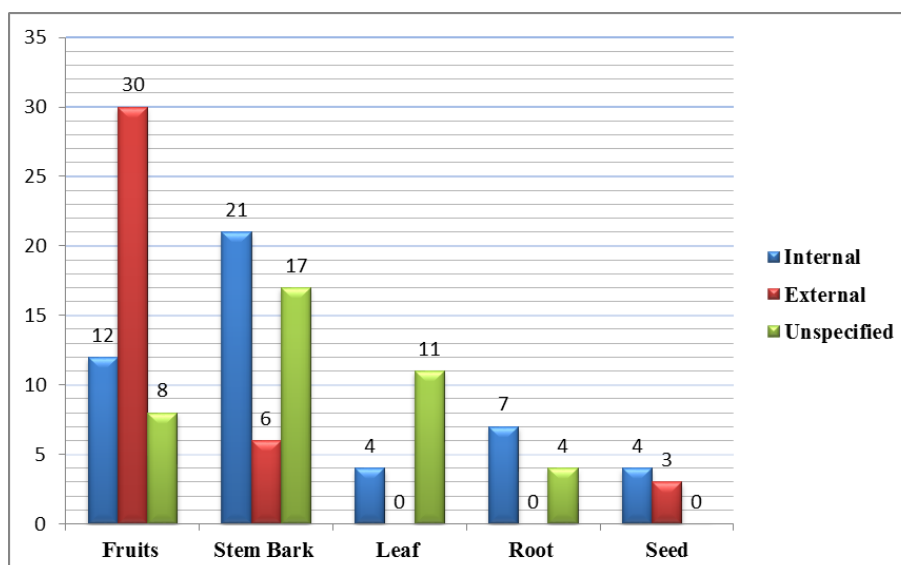


**Fig 1:** Part wise Medicinal and therapeutic properties of *K. pinnata* DC.

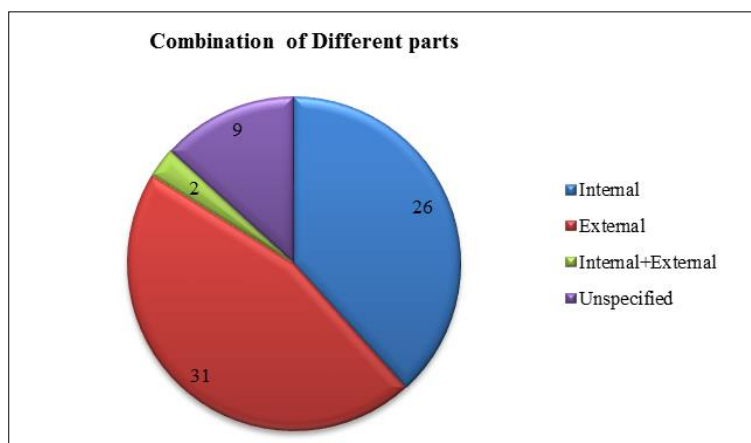
**Therapeutic uses**

After careful screening of all the available information, it is found that various parts of *K. pinnata* DC. are used (singular or in combination) in approximately 76 different disease conditions. (Indications occurring in both internal and external applications are considered only once. Disease conditions involving same organ system have been merged into one indication while counting.) Fruits are the most frequently used plant part in 50 disease conditions [Internal-12 (Table No.1), External-30 (Table No.2), Unspecified-08 (Table No.3)], followed by the Stem Bark in 44 [(Internal-21 (Table No.4), External-6 (Table No.5), Unspecified-17

(Table No.6)], Leaf 15 [(Internal-4 (Table No.7), Unspecified -11(Table No.8)], Root -11 [(Internal-7 (Table No.9), Unspecified-4 (Table No.10)] and Seed-7 [(Internal-4 (Table No.11), External-3 (Table No.12)] in traditional medicine preparations (Figure No.2). The combination of two or more than two plant parts is used in 68 [(Internal 26 (Table No.13), External 31 (Table No.14), Internal + External 2 (Table No.15), Unspecified- 9 (Table No.16))] diseases conditions (Figure No.3). Flowers are quite infamous and rarely used as medicine, because they are seasonal.



**Fig 2:** Individual Plants Parts uses of *K. pinnata* DC.in number of diseases



**Fig 3:** Different parts of *K. pinnata* DC. used as a Combination

**Table 1:** Ethno-medicinal use of Fruits of *K. pinnata* DC.- Internal

Area/Country	Dosage form	Disease	Ref
Tanzania	Boiled	Anemia- especially in pregnant women	[6,8]
Botswana	Boiled with milk	Sexually transmitted diseases	
Ivory Coast	Infusion	Rheumatism, back pains	[6, 26]
Africa	Pickled in vinegar	Constipation, kidney stone	[28]
	Powdered mixed with palm oil	Dizziness	[6]
Africa & northern Nigeria	-	Dysentery	[24, 25, 26, 27]
Africa- Pandoro	-	Fibroid	[30]
Kenya, Embu community	-	Cold, flu, inflammation, dysentery	[6]

**Table 2:** Ethno-medicinal uses of Fruits of *K. pinnata* DC. – External

Type of Fruit	Area/Country	Disease	Ref
Unripe Fruit	Central Africa	Wounds, Rheumatism, Hemorrhage,	[6, 8]
	South Africa and Zimbabwe	Freckles	
Paste/ Creams/ cosmetic preparation from	Zambezi Valley- Tonga-women	Ulcers and	[6]
	India	Rheumatic pain, syphilitic sores and venereal diseases	[31]
Mature Fruit Paste / Ointment of	Kurukshetra	Leprosy	[23]
	South Western Nigeria (Yoruba tribe)	Gynecological problems, sores and wounds both for humans as well as animals and for a wide variety of skin afflictions, ranging from Psoriasis, eczema, ulcers, acne, skin cancer and fungal infections, rheumatism, snakebites, syphilis and chronic abdominal pain	[6, 32, 33]
	West Africa (Togo tribe)	Cancer, skin cancer, Solar keratosis, malignant melanoma, Rubbed to enlarge breasts or penises- fecundity, fertility and improved milk flow	[26, 34, 35, 36]
	Africa	Ulcers and for syphilis, rheumatism and venereal diseases, Leprosy, skin cancer, reducing breast metastasis, fungal infections, boils, acne, Dermatitis, Wounds, abscesses, psoriasis, eczema, toothache, antidote for snakebite, post-partum hemorrhage, Ringworm, tape-worm, worm infestations, convulsions	[6, 7, 23, 25, 37, 38, 39, 40.]
cut in half and slightly roasted		Rheumatism	[9]

**Table 3:** Ethno-medicinal uses of Fruits of *K. pinnata* DC. unspecified method of use

Area/Country	Disease	Ref
South Africa- West Africa	Malaria, diabetes, pneumonia, hemorrhoids, lumbago, febrile jaundice, menorrhagia, diarrhea	[6, 24, 32, 34, 41]

**Table 4:** Ethno-medicinal uses of Stem bark of *K. pinnata* DC. – Internal

Tribes/ areas	Dosage form	Preparation	Therapeutic claims	Ref
Africa	Decoction	-	Pneumonia	[10, 26]
		-	Rheumatism, regularizing menstrual flow, epilepsy dysentery, Headaches	[6, 8]
Fundong, Northwest Region, Cameroon		-	Filariasis and cataract	[6, 8, 42]

Northern Nigeria		-	Spleen infection, gonorrhoea, syphilis, ulcers, toothache	[24, 26, 35]
Togo		Decoction of 100 g stem bark of <i>Kigelia africana</i> and 25 g fruits of <i>Xylopia aethiopica</i> Three tablespoons of this mixture are drunk three times daily during two months.	Cancer	[25]
Africa		Leaves of <i>Irvingia gabonensis</i>	Spleen infection	[6]
South Africa		Add <i>Searsia nebulosa</i> stem bark and make decoction	Dysmenorrhoea	
South Africa and Cameroon	Decoction / powdered	mixed in porridge	Infertility	[6, 8]
Tanzania, and Nigeria	Infusion	-	Hyperpyrexia and gonorrhoea	
West Africa	Extracts	-	Melanoma and renal carcinoma	[34]
		Aqueous	Backache, stomach pains and dysentery	[6]
Nsukka, Nigeria	Paste	Ground in a mortar and macerated with palm wine	Venereal diseases	
Africa		Macerate in water	Dysentery, sexually-transmitted diseases (STDs) such as syphilis	[26]

**Table 5:** Ethno-medicinal uses of Stem Bark of *K. pinnata* DC. – External

Tribes/ areas	Dosage form	Therapeutic claims	Ref
Africa	Paste mixed with palm oil and salt	Expelling retained placenta	[6]
	Extract- mainly it appears to soften the skin before the administration of other plant-based remedies	Snakebite	[26]
-	Leaves of <i>Cassia occidentalis</i> and potash	Gonorrhoea and syphilis	[6]
-	-	Wound healing, skin diseases	[36]

**Table 6:** Ethno-medicinal uses of Stem Bark of *K. pinnata* DC.- Unspecified method of use

Tribes/ areas	Dosage form	Therapeutic claims	Ref
West Africa	Water macerate	Sores, Convulsions, wounds, Rheumatism, stomach ailments, kidney ailments	[6, 26, 41]
Zambia	-	Gonorrhoea, syphilis	[6]
Ghana	-	Dysentery, Rheumatism	
Nigeria	-	Inflammation, dysentery	
South Africa and Ethiopia	-	Rheumatism, dysentery, venereal diseases, gynecological conditions, hemorrhages, epilepsy, wounds, sores, abscesses, diarrhea, edema	[5, 6, 7, 8, 21, 23, 27, 28, 29, 32, 37, 38, 39, 40]

**Table 7:** Ethno-medicinal uses of Leaves of *K. pinnata* DC. – Internal

Tribes/ areas	Dosage form	Therapeutic claims	Ref
Benin, Ivory Coast, and South Africa	Decoction	Jaundice	[6, 8]
Africa	Ash mixed with honey	High blood pressure	
West Africa	Extract	Backbone, Malaria	[35]

**Table 8:** Ethno-medicinal uses of Leaves of *K. pinnata* DC. - Unspecified method of use

Area/Country	Disease	Ref
West Africa	Gastrointestinal, Stomach and kidney ailments, antidote for snakebites, rheumatism, wounds, ulcers, retained placenta, venereal diseases and diarrhea	[6, 26, 41]
Nigeria	Impotence	[6]

**Table 9:** Ethno-medicinal uses of Root of *K. pinnata* DC. –Internal

Tribes/ areas	Dosage form	Therapeutic claims	Ref
South Africa and Ethiopia	Hot root macerate	Gynecological complaints, constipation, tapeworm infections	[6, 8, 26]
Nigeria	Decoction	Ante and postnatal disorders, fibroid, conception, Gastrointestinal problems	[6, 8]

**Table 10:** Ethno-medicinal uses of Root of *K. pinnata* DC. Unspecified method of use

Area/Country	Disease	Ref
South Africa and Ethiopia	Uterus cancer, Venereal diseases, Hemorrhoids, Rheumatism	[6, 8, 27]

**Table 11:** Ethno-medicinal uses of Seeds of *K. pinnata* DC. – Internal

Tribes/ areas	Dosage form	Therapeutic claims	Ref
Kenya	Roasted seeds mixed with beer	Enlargement of sexual organs	[6, 8]
South Africa	Roasted seeds	Pneumonia, malaria, diabetes	

**Table 12:** Ethno-medicinal uses of Seeds of *K. pinnata* DC. – External

Tribes/ areas	Dosage form	Therapeutic claims	Ref
South Africa	Roasted seeds- applied on the affected area of the body	Fungal infection, Eczema, waist pain	[6, 8]

**Table 13:** Ethno-medicinal uses of Combination of different parts of *K. pinnata* DC.-Internal

Useful part	Dosage form	Therapeutic claims	Area/Country	Ref.
Fruits and Stem Bark	Decoction (chopped stem bark and Fruits are boiled in 2 L of water for 1 h, cooled before straining, and taken orally half a cup thrice a day)	Blood cleansing and pelvic pains during pregnancy, Worm infections in children	South Africa and Namibia	[6, 8, 34]
	Extracts	Dysentery, hemorrhoids, constipation, wounds, ulcers, boils, abscesses, rheumatism, syphilis and gonorrhoea	Africa	[6]
	Ground and boiled in water	stomach ailments		[10]
Fruits and Roots	Decoction	Post-parturition hemorrhage, Stomach problems in children		[6]
Fruits, Root and Stem bark	Peeled and cooked to make a concoction/ Decoction	Post-parturition hemorrhage	South Africa and Namibia	[8, 24]
		high blood pressure, stomach ache, yellow fever	Aurangabad	[43]
Leaf and Root	Decoction with Hypoxis hemerocallidea & Senecio serratuloides	Sexually transmitted infections and sores	Africa	[6,8]
Leaf and Stem bark	Decoction	Malaria, Eczema and herpes		[6]
Root and Stem bark	Infusion	Pneumonia, Ulcers, toothache, tapeworms and gynecological complaints	West Africa	[6, 34, 35]
Fruits and flowers	mixed with alcohol or water	Fertility treatment among women and men of childbearing age	Nigeria	[6]

**Table 14:** Ethno-medicinal uses of Combination of different parts of *K. pinnata* DC.-External

Useful part	Dosage form	Therapeutic claims	Area/Country	Ref.
Stem Bark and leaves	Decoction	wounds, sores and cuts antidotes for snakebite	South Africa	[24]
	crushed together, boiled in water till concentrate	Eczema and herpes, bladder trouble /kidney disease (as an enema)	Namibia and South Africa	[8]
Stem bark, leaves and Fruits	Bark has been macerated and preparations containing the leaves and Fruits applied locally	Fungal infestations such as ringworm, mycosis and athlete's foot	Africa	[25]
Fruits, roots and leaves	Ointment	Dermatitis, constipation, gynecological disorders, hemorrhoids, psoriasis, eczema, diarrhea, malaria, rheumatism, retained placenta, dressing for wounds and dizziness	West Africa	[6]

**Table 15:** Ethno-medicinal uses of Combination of different parts of *K. pinnata* DC.-Internal and External both

Useful part	Dosage form	Therapeutic claims		Ref
Fruits and Stem bark	ground and boiled in water	orally or as an enema children's stomach ailments	Northern Nigeria	[24]
Root and Stem bark	Boiled	Piles	South Africa	

**Table 16:** Ethno-medicinal uses of Combination of different parts of *K. pinnata* DC.- unspecified method of use

Useful part	Therapeutic claims	Area/Country	Ref.
Leaves and twigs	Constipation, gynecological disorders, hemorrhoids, lumbago, dysentery, wounds kidney disorders, snakebite and rheumatism	West Africa	[6, 34]

Different plant parts of *K. pinnata* DC. is also used as a food (Table No. 16) and Domestic uses. (Table No. 17)

**Table 17:** Ethno-medicinal uses of different parts of *K. pinnata* DC. - as a Food

Area/Country	Useful part	Use	Ref
-	Flowers and leaves	Eaten by game and livestock	[24]
Africa	Seeds- Roasted seeds in hot ashes	Eaten- in times of scarcity	[6, 7, 24, 38]
	Fruit	Eaten by several species of mammals, including baboons, bush pigs, savannah elephants, giraffes, hippopotami, monkeys and porcupines	[33]
	Fruits - Young	Snails rolled into balls and allowed to dry -eaten with a cup of tea every day	[6]
Tanzania	Fruit – Ripe	wild animals such as squirrels humans as a food, except in famine situations	[26]
-	Leaves	As a Vegetable	[41]
-	Young shoots & unripe fruits Flowers and bark		[15]

**Table 18:** Ethno-medicinal uses of different parts of *K. pinnata* DC. as a Domestic uses

Useful part	Tribes/ areas	Use	Ref.
--	Tanzania	Making of childrens' dolls	[26]
--	Malawi	Fire for cooking pots	

Bark and fruits	-	mordant in dyeing & tanning	[44]
Branches		Weapon bows	[6]
Flowers	-	Apiculture- a source of bee forage	[24]
Fruit	Chobe and Zambez	Black dye	
Fruit - dry	Africa	Preparation of active carbon	[7]
Fruit - extract	Tanzania	Flavor beer and to increase its potency = due to the production of amyl alcohol (pentanol) during the fermentation	[26]
Fruit pulp	--	To produce Black dye	[6]
Fruits - boiled	--	To produce Red dye	[41]
Fruits -Slices of mature baked fruit	West Africa	Fermentation and enhance the flavor of traditional African beer/ local honey beer	[6, 24, 34]
Leaves	--	Vegetables	[41]
Leaves and ground wood	Southwest of the Central African Republic- Gbaya Tribes	Soaked with water and pressed through a sieve were mixed with <i>Strophanthus gratus</i> seeds. The concentrated syrup is then used as a hunting poison	[25]
Plant	--	Sun block creams, after sun lotions and cosmetics	[41]
Roots - boiled	--	To produce yellow dye	
Roots and stem bark	Chobe and Zambez	Tannin can be extracted	[24]
Seeds- Thin light seeds	-	as stuffing material for hats	[44]
Smaller branches	--	Hollowed to administer enemas to children	[6]
Wood	-	Produces a good-quality timber	[24]
	Chobe and Zambez	dugout canoes	
		dugout canoes, planks and fenceposts-making boxes, drums, stools, yokes, tool handles, mortars and large bowls	[6]
	--	Fuel	[6, 44]
	Philippines	match boxes	[15]
Heartwood	-	Drums, utensils and cutlery	[24]
Sapwood	-	Planking, yokes, fruit boxes and shelving	
Wood and fruits	--	Mousetraps, dolls and various items of crockery and cutlery	[6]

## Conclusion

*Kigelia pinnata* DC. is a multipurpose medicinal plant with many attributes and considerable potentials. Present ethnobotanical review highlights the multiple uses of five different parts of *K. pinnata* DC. to combat 76 diseases conditions. This review confirms the therapeutic values of *Kigelia pinnata* DC. and it is hoped that this report will serve as a basis of information for future project in order to evaluate its potentials as an important medicinal plant in improving human health status.

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## Conflict of Interest

None

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