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SEPASAL is a database and enquiry service about useful "wild" and semi-domesticated plants of tropical and subtropical drylands, developed and maintained at the Royal Botanic Gardens, Kew. "Useful" includes plants which humans eat, use as medicine, feed to animals, make things from, use as fuel, and many other uses.

Since 2004, there has been a Namibian SEPASAL team, based at the National Botanical Research Institute of the Ministry of Agriculture which has been updating the information on Namibian species from Namibian and southern African literature and unpublished sources. By August 2007, over 700 Namibian species had been updated.

Work on updating species information, and adding new species to the database, is ongoing. It may be worth visiting the web site and querying the database to obtain the latest information for this species.

## Internet SEPASAL

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 *Display help*In names list include:  synonyms  vernacular names and display: 10  names per page*Your query found 1 taxon***Adansonia digitata L. [1362]**

Family: BOMBACACEAE

**Synonyms**

Adansonia integrifolia Raf.  
 Adansonia somalensis Chiov.  
 Adansonia sphaerocarpa A.Chev.  
 Adansonia sulcata A.Chev.  
 Adansonia baobab Gaertn.

**Vernacular names**

(Ethiopia)	bamba [2180], dema [2180], dima [2180], dumma [2180], hemmer [2180]
(India)	gorakh imli [5902], vilayati imli [5902]
(Malawi)	mbuye [2180], mlambe [2180], mlonje [2180]
(Sudan)	homeira [2180], humar [2180], tebeldi [2180]
(Zambia)	mbuyu [2180], mkulukumba [2180], mubuyu [2180], mulambe [2180], muyu [2180]
(Zimbabwe)	mubuyu [2180], muuyu [2180], muwu [2180], umkhomo [2180]
Afrikaans	kremetart [6286], kremetartboom [6286]
Afrikaans (Namibia)	dorsboom [5121], kremetart [5087], kremetartboom [1304] [2838] [5083] [5098] [5121]
Afrikaans (South Africa)	kremetart [2618]
Afrikaans (Southern Africa)	kremetart [3045] [5082] [5097], kremetartboom [1171]
Amharic (Ethiopia)	bamba [6286]
Arabic	tebeldi [2838], buhibab [6286], gangoleis (fruit) [6286], hamao-hamaraya [6286]
Arabic (Chad)	hamao [2838], hamaraya [2838], hamar [6286]
Arabic (Egypt)	habhab [6286]
Arabic (Mauritania)	teidoum [6286]
Arabic (Sudan)	homeira [6286], humr [6286], tebeldi [6286]
Arusha (Tanzania)	masera [5054], mesera [2774] [5054]
Bajuni (Kenya)	murru [2241], muvu [5693]
Bambara (Mali)	sira [6286]
Barakwengo-Bushmen (Namibia)	om [5087]
Barakwengo-Bushmen (Namibia) [fruit]	tjollo [5087]
Bariba	chon mu [2838], chonbu [2838], sona [2838]

Baule (Ivory Coast)	fromdo [6286]
Bawle	fromdo [2838]
Bondei (Tanzania)	mbuyu [5054]
Boni (Kenya)	jah [5693]
Central Ndebele (Zimbabwe)	umkhomo [2506]
Central Shona (Zimbabwe)	muuyu [2506]
Chagga (Tanzania)	mkuu [5054]
Chichewa (Malawi)	mlambe [6286], mnambe [6286]
Chonyi (Kenya)	muyu [2719]
Chonyi (Kenya) [fruit]	mauyu [2719]
Creole (West Indies)	mapou zombi [6286]
Dierma	konian [6286]
Digo (Kenya)	mbuyu [2719] [5693]
Digo (Tanzania)	mbuyu [5054]
Dinka (Sudan)	dungwol [6286]
Dirla fogny (Senegal)	boubakakou [6286]
Dogon (Mali)	oro [2838]
Ehwe	dudo [2838]
Embu (Kenya)	muramba [2719]
English	baobab [549] [1382] [2180] [2774] [2838] [6286], cream of tartar tree [549], monkey-bread tree [549] [2838] [6286], sour gourd [549], Indian cork tree [2838], lalu [2838], Senegal calabash [2838], the upside down tree [1331], upside-down tree [2180] [6286], cream of tartar [2890], Ethiopian sour gourd [6286], Senegal calabash (fruit) [6286], monkey bread (seed pulp) [6286]
English (Botswana)	Africa's upside-down tree [5093], baobab [5092] [5093]
English (Kenya)	baobab [2241] [2719] [5693]
English (Mali)	lalo (powdered leaves) [6286]
English (Namibia)	baobab [1304] [5083] [5087] [5098] [5118] [5121], cream of tartar tree [1304] [5087], lemonade tree [5087], Cape breadfruit [1304]
English (South Africa)	baobab [2618]
English (Southern Africa)	baobab [1171] [3045] [5082] [5097]
English (Tanzania)	baobab [5054]
English (Zimbabwe)	baobab [2506] [5082], cream of tartar tree [2506] [6286]
English [fruits]	monkey bread [2180] [2838], monkey fruit [2838]
Eunda (Namibia)	umukwa [5087]
Falor	ba [2838]
Fon (Benin)	kpassa [2838], zizon [2838]
French	arbre aux calebasses [549] [6286], baobab [549] [2838] [6286], calabaceira [549], calebassier du Senegal [549] [2180] [2838] [6286], arbre de mille ans [2838] [6286], pain de singe [2180], pain de singe (fruit) [6286]
French [fruits]	pain de singe [549]
Fulani	boki [2838], bokki [2838]
Fulani (Nigeria, N.)	boki [6286], bokki [6286]
Gciriku (Namibia)	liuyu [5087], livuyu [5087] [5098]

German (Namibia)	Affenbrotbaum [ <a href="#">5083</a> ] [ <a href="#">5087</a> ] [ <a href="#">5098</a> ] [ <a href="#">5121</a> ]
Giriama (Kenya)	mbuyu [ <a href="#">2719</a> ], muuyu [ <a href="#">2719</a> ]
Gogo (Tanzania)	mpela [ <a href="#">2774</a> ] [ <a href="#">5054</a> ]
Gorowa (Tanzania)	dakaumo [ <a href="#">2774</a> ] [ <a href="#">5054</a> ]
Gujarati	sumpura [ <a href="#">6286</a> ]
Hausa	kuka [ <a href="#">2838</a> ]
Hausa (Niger)	kouka [ <a href="#">6286</a> ], kuka [ <a href="#">6286</a> ]
Hausa (Nigeria)	kouka [ <a href="#">6286</a> ], kuka [ <a href="#">6286</a> ]
Hehe (Tanzania)	mkondo [ <a href="#">2774</a> ] [ <a href="#">5054</a> ]
Heikum Bushmen (Namibia)	lums [ <a href="#">5083</a> ]
Herero (Namibia)	omazu [ <a href="#">5083</a> ] [ <a href="#">5087</a> ], omukwa [ <a href="#">5083</a> ] [ <a href="#">5087</a> ], omumbuyu [ <a href="#">5083</a> ] [ <a href="#">5087</a> ], omuzu [ <a href="#">5083</a> ] [ <a href="#">5087</a> ] [ <a href="#">5091</a> ] [ <a href="#">5098</a> ]
Himba (Namibia)	mukwa [ <a href="#">5087</a> ], omutu [ <a href="#">5087</a> ], omuzu [ <a href="#">5087</a> ] [ <a href="#">5098</a> ]
Hindi (India)	gorakh-imli [ <a href="#">6286</a> ], hathi-khatiyā [ <a href="#">6286</a> ]
Iraqw (Tanzania)	gendaryandi [ <a href="#">2774</a> ] [ <a href="#">5054</a> ]
Jul'hoan (Namibia)	#'om [ <a href="#">5083</a> ], #m [ <a href="#">5083</a> ]
Kamba (Kenya)	muamba [ <a href="#">2719</a> ], mwaamba [ <a href="#">2719</a> ], mauyu [ <a href="#">2719</a> ], mwamba [ <a href="#">2180</a> ] [ <a href="#">2241</a> ]
Kamba (Kenya) [fruit]	mauyu [ <a href="#">2719</a> ]
Kambe (Kenya)	muyu [ <a href="#">2719</a> ]
Khoekhoekowab (Namibia)	llaurib [ <a href="#">5083</a> ]
Kung Bushmen (Namibia)	om [ <a href="#">5087</a> ] [ <a href="#">5098</a> ]
Kwaluudhi (Namibia)	omukwa [ <a href="#">5087</a> ]
Kwambi (Namibia)	omukwa [ <a href="#">5087</a> ]
Kwangali (Namibia)	euyu [ <a href="#">5087</a> ] [ <a href="#">5098</a> ]
Kwanyama (Namibia)	omukwa [ <a href="#">1304</a> ] [ <a href="#">5087</a> ] [ <a href="#">5098</a> ]
Kwanyama (Namibia) [fruit]	ekwa [ <a href="#">1304</a> ]
Kwanyama (Namibia) [fruits]	omokwa [ <a href="#">1304</a> ]
Kwanyama (Namibia) [plural]	omikwa [ <a href="#">1304</a> ]
Kxoe (Namibia)	#'om [ <a href="#">5083</a> ], tjollo [ <a href="#">5083</a> ]
Lozi (Namibia)	mibuyu [ <a href="#">5083</a> ], mubuyu [ <a href="#">5083</a> ] [ <a href="#">5087</a> ]
Luguru (Tanzania)	mpela [ <a href="#">2774</a> ] [ <a href="#">5054</a> ]
Maa (Kenya)	olmesera [ <a href="#">2719</a> ]
Maasai (Kenya)	olimisera [ <a href="#">2180</a> ] [ <a href="#">2241</a> ]
Maasai (Tanzania)	olmesera [ <a href="#">5054</a> ], ol mesera [ <a href="#">2774</a> ]
Malakote (Kenya)	mubuyu [ <a href="#">2719</a> ]
Malinke	sira [ <a href="#">2838</a> ]
Manding	sito [ <a href="#">2838</a> ]
Mandinka (Mali)	sira [ <a href="#">6286</a> ], sito [ <a href="#">6286</a> ]
Manyika (southern Africa)	mubuyu [ <a href="#">1171</a> ]

Mbalantu (Namibia)	omukwa [5087]
Mbeere (Kenya)	muramba [2719]
Mbugwe	muwiye [2774] [5054], mwiwiye [5054], mwuwiye [5054]
Mbukushu (Namibia)	divuyu [5087] [5098] [5118]
Meru (Kenya)	muramba [2180] [2719] [5693], murambu [2241]
Mina	dido [2838]
More (Burkina Faso)	toayga [6286], trega [6286], twega [6286]
Mossi (West Tropical Africa)	toeya [2838]
Mozambique	chimuho [5480], imbomdeiro [5480], mulapa [5480], muramba [5480]
Nago	otche [2838]
Ndebele (Southern Africa)	umkomo [1171]
Ndebele (Zimbabwe)	umkhomo [6286]
Ndonga (Namibia)	omukwa [5087] [5098]
Ngandjera (Namibia)	omudhu [5087], omukwa [5087]
Nkolonkadhi (Namibia)	omukwa [5087]
Nkonde (Malawi)	mbuye [6286]
Nkumbi (Angola)	mukwa [5087]
Nohe	boh [2838]
Norekau Bushmen (Namibia)	lum [5083] [5087]
Northern Sotho (Southern Africa)	motsoo [5097]
Nyamwezi (Tanzania)	mpela [5054]
Nyasa	mabuyu [5054], malembe [5054]
Orma (Kenya)	yak [2719]
Oshikwanyama (Namibia)	ekwa [5083], omikwa [5083], omokwa [5083], omudhu [5083], omukua [5083], omukwa [5083], umukwa [5083]
Oshindonga (Namibia)	omudhu [5083], omukwa [5083] [5376], umukwa [5083]
Pare (Tanzania)	mramba [2774] [5054]
Peulh (Mali)	babbe [6286], boki [6286], olohi [6286]
Pila Pila	tobro [2838]
Portuguese	baobab [549], cabacevre [6286]
Rangi (Tanzania)	mwiwi [2774] [5054]
Rukwangali (Namibia)	euyu [5083], uyu [5121]
Rumanyo (Namibia)	liuyu [5083], livuyu [5083], uyu [5121]
Sambaa (Tanzania)	tebwe [5054]
Samburu (Kenya)	lamai [2719]
Sandawe (Tanzania)	gele [2774] [5054]
Sangu	mkondo [2774] [5054]
Sanya (Kenya)	yaka [2719]
SeTswana (Botswana)	dovuyu [5093], ibozu [5093], mbuyu [5093], moana [5092] [5093], mobuyu [5093], mowana [5092] [5093]

Senufo	ngigne [2838]
Senufo (Burkina Faso)	ngigne [6286]
Senufo (Ivory Coast)	ngigne [6286]
Senufo (Mali)	ngigne [6286]
Serer (Senegal)	bak [2838] [6286]
Setswana (Namibia)	moana [5083]
Shambyu (Namibia)	livuyu [5087]
Shona (Southern Africa)	mauyu [1171], muuyu [1171]
Shona (southern Africa) [seeds]	tsongoro [1171]
Silozi (Namibia)	mubuyu [5121]
Somali	yag [2180]
Somali (Kenya)	yak [2719], jag [2719]
Somali (Somalia)	yag [6286]
Somba	turubu [2838]
Sonhrai (Sudan, Sahara)	ko [2838], komian [2838]
Sonrai (Mali)	ko [6286], konian [6286]
Sudan	dungwol [2180]
Sukuma (Tanzania)	mwandu [2774] [5054], ng'wandu [5054], ngwandu [2774] [5054], mwanda [2774]
Swahili (Kenya)	mbuyu [2180] [2241] [2719] [5693], muuyu [2719]
Swahili (Tanzania)	mbuyu [2774] [5054], mkuu hafungwa [5054], mkuu hapingwa [5054], muuyu [5054], matunta ya mbuyu [2180]
Taita (Kenya)	mlamba [2719], mbale [2719], mulamba [5693]
Tamil (India)	anaipuliya-marum [6286], papparappuli [6286]
Telegu (India)	Brahma-mlinka [6286], seemasinta [6286]
Temne (Sierra Leone)	an-derebai [549]
Tharaka (Kenya)	muramba [2719], muguna-kirindi [2719]
Thimbukushu (Namibia)	divuyu [5083] [5121]
Tigre (Ethiopia)	dumma [6286], hemmer [6286]
Tjimba (Namibia)	mukwa [5087], omuzu [5087]
Toucouleur	boki [2838], bokki [2838]
Tsonga (South Africa)	mowu [5139], muwu [5139], shimuwu [2618], ximowu [5139], ximuwu [5139]
Tsonga (Southern Africa)	shimuwu [1171]
Tswana (South Africa)	movana [2618]
Tswana (Southern Africa)	mowana [1171]
Unspecified language	baillou [2838], mapou [2838], mkulukumba [6286], mlambe [6286], muyu [6286]
Venda (South Africa)	muvhuyu [2618]
Venda (Southern Africa)	muvuhuyu [1171]
Wolof	ghouis [2838], goul [2838]

Wolof (Senegal)	boui [6286], goui [6286], gouis [6286], lalo [6286]
Wolof (Senegal) [powdered leaves]	lalo [5903]
Yao (Malawi)	mlonje [6286]
Zulu (South Africa)	isimuhu [6286], umshimulu [6286]
Zulu (Southern Africa)	isimuhu [1171], umshimulu [1171]
[dried-up, powdered leaves]	lalo [2180] [2838], lalu [2838]
[pulp]	lemmos earth [2838]
[tree]	abavi [2838], abavo [2838]

## Distribution

Plant origin	Continent	Region	Botanical country		
Native	Africa	East Tropical Africa	Kenya [1362] [6286], Tanzania [1362] [2774] [6286]		
		Macaronesia	Cape Verde [2838] [6286]		
		Northeast Tropical Africa	Chad [6286], Ethiopia [2180], Somalia [2719] [6286], Sudan [2180] [5219] [6286]		
		South Tropical Africa	Angola [2838] [6286], Malawi [5701] [6286], Mozambique [5480] [5701] [6286], Zambia [5481] [5701] [6286], Zimbabwe [5419] [5701] [6286]		
		Southern Africa	Botswana [5104] [5150] [5700] [5701], Caprivi Strip [5121], Namibia [2180] [5104] [5150] [6286], Natal [2838], Transvaal [2180] [5104] [5150]		
		West Tropical Africa	Benin [2838] [6286], Burkina [6286], Ghana [2838] [6286], Guinea [6286], Ivory Coast [6286], Mali [6286], Mauritania [6286], Niger [6286], Nigeria [6286], Senegal [2838] [6286], Sierra Leone [6286], The Gambia [6286], Togo [2838] [6286]		
		West-Central Tropical Africa	Cameroon [6286], Congo [2838] [6286], Principe		
		Asia-Temperate	Arabian Peninsula	Oman	
		Introduced	Africa	Northern Africa	Egypt [6286]
				West-Central Tropical Africa	Central African Republic [1331] [6286], Gabon

		[6286], Sao Tome [6286], Zaire [6286]
	Western Indian Ocean	Madagascar [5054] [6286], Mauritius
Asia-Temperate	Arabian Peninsula	North Yemen, South Yemen
Asia-Tropical	Indian Subcontinent	Andhra Pradesh [1604], Gujarat [1604], Karnataka [1604], Maharashtra [1604], Rajasthan [1604] [5902], Tamil Nadu [1604], Uttar Pradesh [1604] [5902], West Bengal [1604]
	Malesia	Jawa, Philippines
Northern America	Southeastern U.S.A.	Florida
Pacific	North-Central Pacific	Hawaii
	Southwestern Pacific	New Caledonia
Southern America	Caribbean	Cuba, Haiti, Jamaica [2672]
	Northern South America	Guyana

**ISO countries:** Malaysia , South Africa [5104] [6286]

## Descriptors

Category	Descriptors and states
DESCRIPTION	Fast Growth Rate [2241] [2838] [5092] [5097] [5902]; Deciduous [2180] [2719] [2774] [5054] [5121] [5693]; Erect; Can be Pollarded [5892]; Moderate Growth Rate [2774] [5097] [5693]; Terrestrial; Hermaphrodite [2838]; Slow Growth Rate [2719] [2838] [5092]; Tree [2180] [2719] [2774] [5054] [5104] [5693] [5902] [5903]; Perennial [5104]; Fragrant - inflorescences [2838]; Foetid/Unpleasant - leaves [5082]; Foetid/Unpleasant - inflorescences [1171] [5054] [5693]; Plant Height 3-25 m [2180] [5104]; d.b.h. <= 1490 cm [5155]; Age at First Fruiting >= 8 years [2180]
CLIMATE	Not Frost Tolerant [2618] [5092] [5155]; Tropical Summer Rains [5054] [5693]; Subtropical, Hot and Arid [2180] [5082]; Annual Rainfall 100-1100 mm [2180] [2838]
SOILS	Deep [2774] [5693]; Non-Saline; Laterites [2180] [6286]; Well Drained [1382] [2180] [2774] [5054] [5092] [5097] [5693]; High Water-Table [2774] [5693]; Shallow [2180]; Acid [2838]; Boulders/Rocky [2180] [2719] [5097] [5121] [5155] [6286]; Neutral; Gravels/Stony [2838] [6286]; Alluvial Soils [5092] [5155] [6286]; Poorly Drained [6286]; Alkaline [2838]; Sandy [2180] [5121] [5155] [6286]; Sands [2838] [6286]; Dry [5092] [5693]; Sandy Loams [2719] [5121]; Loams [6286]; Clays [2838] [5121] [6286]
HABITAT	Coastal Regions [2719] [2774] [2838] [5054] [5693] [5902] [6286]; Lowland [2241] [2506] [2719] [5082] [6286]; Littoral Zones [2838]; Plateaux [6286]; Forest [2838]; Non-Coastal Regions; Plains/Flats/Pans [6286]; Woodland [5054] [5082] [5092] [5097] [5118] [5121]; Montane [6286]; Shrubland/Bushland/Scrub [2719] [5054] [6286]; Wooded Grassland [2838] [5054] [5902] [6286]; Hillsides/Slopes [2180] [5121] [5155]; Wooded Shrubland [2838]; Watercourses [5054]; Estuaries [6286]; Anthropogenic Landscapes [6286]; Floodplains [5092] [5121]; Plains [2838] [5121] [5155] [6286]; Altitude 0-1500 m a.s.l. [2180] [2719] [2774] [2838] [5054] [6286]
PHYSIOLOGY	Susceptible to Insect Pests [6286]; Fire Resistant/Regenerates After Fire [2180] [2774] [5693] [6286]; Drought Tolerant [5155] [6286]
WOOD PROPERTIES	Very Soft [1340] [5092] [5155]; Low Density [2180] [5092] [5155] [5693] [5892]; Wood Resistant to Termites [2774]; Soft [2180] [5092] [5693]; Non-Durable [549]; Wood Susceptible to Wood Staining Fungi [549] [5892]



PRODUCTION AND VALUE	Potential Food Uses [2795]; Traded Locally [2719] [5054] [5092]; 'Semi-Domesticated' Plants Utilised [5054]; Commercial Value [2719] [5092]; Potential Material Uses [5902]; Traded Globally Between Continents [549] [1340] [5892] [5902]; Recommended for Cultivation [5902]
CONSTRAINTS	Susceptible to Viral Diseases [6286]; Host to Crop Diseases [6286]; Susceptible to Fungal Diseases [6286]; Susceptible to Invertebrate Pests [2241]
SOURCES OF PLANTING MATERIAL	RBG Kew Seed Bank; Other Seed Sources [2241]
FURTHER DATA SOURCES	Botanical Illustration [1171] [2506] [2618] [3045] [5082] [5092] [5093] [5097] [5121] [5450] [5463]; Additional References [1140] [1147] [5370] [5405] [5412] [5429] [5618] [5755] [5776] [5811] [5812] [5813] [5814] [5815] [5816] [5915] [5970] [5972] [5973] [5974] [5975] [5976] [5977] [5978] [5979] [5980] [5981] [5982] [5983] [5984] [5985] [5986]; Included in PROTA BASE [5450]; Regional Distribution Map [2618] [3045] [5082] [5097] [5450] [5463]; Databases [5123] [5327]; Habit Illustration/Photograph [2618] [2795] [3045] [5082] [5092] [5093] [5097] [5121] [5450]; PROTA 2 - Vegetables [5463]; Use Related Illustration/Photograph [1340] [2795]; Grid Map [5093] [5121] [5123]
SEPASAL DATASHEET STATUS	All Data Transferred from SEPASAL Paper Files; Nomenclature Checked
CHEMICAL ANALYSES	Unspecified Alkaloids - bark [549] [1340] [5092] [5098] [5892]; Vitamins - leaves [5098]; Unspecified Carbohydrates - leaves [5892] [5903]; Unspecified Lipids - leaves [5903]; Unspecified Analyses - infructescences [1340]; Unspecified Organic Acids - infructescences [2618] [5092] [5098] [5155]; Unspecified Lipids - seeds [549] [1340] [2180] [2506] [5118] [5155]; Unspecified Alkaloids - seeds [2838] [5092] [6286]; Poisonous Compounds - latex [5092] [5093]; Antinutritional Factors - leaves [2180]; Vitamin A (carotene) - leaves [1382] [2180] [5903]; Unspecified Sugars - leaves [5097] [5892]; Amino-Acids - leaves [5903]; Tannins - leaves [2506] [5092] [5093] [5892] [5903]; Unspecified Sugars - infructescences [2180]; Amino-Acids - infructescences [1340]; Antinutritional Factors - seeds [6286]; Amino-Acids - seeds [2180]; Tannins - seeds [6286]; Antinutritional Factors - 'roots' [5892]; Tannins - unspecified parts; Nutritional Analyses - leaves [549] [1340] [5097] [5098]; Nutritional Analyses - infructescences [1340] [2618] [5092] [5155]; Vitamin B complex - infructescences [549]; Flavonols - infructescences [2618]; Nutritional Analyses - seeds [1340]; Proteins - leaves [2180] [5903]; Proteins - seeds [549] [1382] [2180] [5092]; Vitamin B1 (thiamine) - leaves [5903]; Vitamin B1 (thiamine) - infructescences [2180]; Triterpenoids (unspecified) - infructescences [2618]; Vitamin B1 (thiamine) - seeds [549] [2180]; Vitamin B2/Vitamin G (riboflavin) - leaves [5903]; Vitamin C (ascorbic acid) - leaves [549] [1382] [2180] [5097] [5892] [5903]; Vitamin C (ascorbic acid) - infructescences [549] [1331] [1340] [1382] [2180] [2241] [2506] [2795] [2838] [5082] [5092] [5098] [5118] [5155] [5892]

## Uses

Major use	Use group	Specific uses
FOOD	Entire Plant	potable water [1340] [2506] [2838] [5092] [5155] [5892]
	Seedlings/Germinated Seeds	root/tuber vegetables, famine food [2719]; vegetables [1340] [2180] [2506] [5092]
	Stems	wood, condiments/relishes/chutneys [5092]; wood, potable water [2514]; leafy stems/branches [1340]
	Bark	stem bark, potable water [2506]; starches [2180]
	Leaves	young leaves, green vegetables [549] [1171] [1331] [2506] [2719] [3045] [5097] [5892]; green vegetables [2241] [2838] [5092] [5155] [5903] [6286]; vegetables [1171] [1340] [5054] [5098] [5118]; raw [5098]; condiments/relishes/chutneys [549] [1340] [5903]; soups [1340] [5155] [5903] [6286]; young leaves, soups [549] [5892]; young leaves, vegetables, soups

		[2180]; soups, weaning food [5903]; young leaves, vegetables, condiments/relishes/chutneys, famine food [2890]; vegetable dishes [5054]; young leaves, porridges [6286]
	Inflorescences	flowers [2514] [5054]; flowers, raw [2180] [2789]; flowers, beverages [2789]; flowers, vegetable dishes [5054]
	Infructescences	fruits, dessert fruits; porridges; fruit pulp, raw [1304] [2241] [2514] [2719] [2838] [5693]; fruit pulp, juices [2719]; fruit pulp, porridges [1171] [2506] [5054]; fruit pulp, beverages [1171] [1331] [1340] [2180] [2774] [2795] [2838] [3045] [5054] [5092] [5097] [5098] [5155] [6286]; fruit pulp, snack food [5054]; fruit pulp [1331] [1340] [5091] [5101] [5139] [5693]; fruit pulp, soups [1340] [5892]; fruit pulp, famine food [549]; fruit pulp, non-alcoholic beverages [549] [2506] [5101]; fruit pulp, children's snack food [549]; fruit pulp, milk substitutes [549]; fruit pulp, raw, snack food [2180]; fruits, famine food [2180]; fruits [2774] [5376]; fruits, beverages [5892]; fruit pulp, alcoholic beverages [5155]; fruit pulp, raw [6286]; fruit pulp, cereal/starch based preparations [6286]; fruit pulp, beers [6286]; fruit pulp, dairy/dairy-like preparations [6286]
	Seeds	cereal/starch based preparations; raw [2180] [5892]; confectionery [2719]; vegetable dishes [5054]; coffee substitutes [1171] [1331] [1382] [2180] [2506] [3045] [5092] [5097] [5098] [5101] [5892] [6286]; soups [1340] [2180] [5092] [5155]; kernels, raw [549] [2514]; kernels, soups [1340]; seed oil, ceremonial food [2180] [5892]; kernels [5892]; entire seeds, cakes [1304] [2506]; entire seeds, raw [1304]; entire seeds, porridges [1171]; nuts [2795]; snack food [6286]; porridges [6286]; other seed parts [6286]
	'Roots'	tubers/tubercles, root/tuber vegetables, famine food [2719]; bulbs/corms, porridges [2506] [5092]; other 'root' parts, porridges [5092] [5155]; roots, root/tuber vegetables [549] [5097]; roots, root/tuber vegetables, famine food [2180] [5892]; roots [2180] [2506] [2514]; roots, potable water [5097]
	Exudates	gum, famine food [5092]
FOOD ADDITIVES	Stems	wood, salt [549] [1340]
	Leaves	herbs; condiments/relishes/chutneys [5092]; wines, fermenting agents [1331] [5092]; flavourings [549] [2838]; young leaves, flavourings [2180]; young leaves, thickening agents [2180]; soups [5903]; porridges, flavourings [5903]; porridges, thickening agents [5903]
	Inflorescences	flowers, beverages, flavourings [2180]
	Infructescences	rennet substitutes/milk curdlers; raising agents; fruit pulp, bread, fermenting agents [1340] [5092]; fruit pulp, dairy/dairy-like preparations [1340]; fruit pulp, flavourings [549]; fruit pulp, porridges, flavourings [1171] [2180] [5118]; fruit pulp, fish dishes, preservatives [549] [2180] [5892]; fruit pulp, rennet substitutes/milk curdlers [1171] [1280] [2180] [2838] [5892]; fruit pulp, flavourings [2180]; fruits, raising agents [5892]; fruit pulp, dairy/dairy-like preparations, adulterants [5892]; fruit pulp, raising agents [2506]; fruit pulp, cereal/starch based preparations, other additive types [6286]; fruit pulp, beers, fermenting agents [6286]
	Seeds	porridges [2180]; soups, flavourings [5892]; vegetable dishes, flavourings [2506]; non-alcoholic beverages, sweeteners (non-

		sugar) [2506]; soups, thickening agents [6286]; flavourings [6286]
ANIMAL FOOD	Exudates	dairy/dairy-like preparations [5092]
	Unspecified Parts	forage [5054]; fodder [5054]
	Bark	game mammals, browse; game mammals, drought season [5092]; game mammals [5155]
	Fertile Plant Parts	fruits, fodder [5693]; flowers, browse [5092]; fruits, primates [2514] [2838] [5092] [5155]; fruit pulp [549]; fruits, game mammals [2838]; fruit pulp, pigs [1331]; seeds, pigs [1331]; seed cake, cattle [2180]; fruits, fodder [2774]; seeds, mammals, fodder, dry season [5097]; entire immature fruits, primates [5155]; seeds, primates [2774]; seeds, fodder, dry season [1331]; fruit pulp, fodder, dry season [1331]; fruit pulp, mammals, fodder, dry season [5097]; fruit pulp, primates [1340] [2838]; flowers, cattle [5097]; flowers, game mammals [5097]
	Aerial Parts	stems, bovines, browse; stems, Equidae, browse; stems, caprines, browse; trunks, game mammals, browse [2719]; leafy stems/branches, game mammals, browse [2719]; leaves, fodder [5693]; fallen leaves, mammals [2719]; fallen leaves, browse [5092]; wood, game mammals, drought season [5092]; wood, game mammals [549] [1340] [5097]; leaves, fodder [549]; leaves, horses, fodder [549]; leaves, cattle [1331]; leaves, forage, wet season [2180]; trunks, game mammals [2774]; leaves, browse [5892]; fallen leaves, game mammals, wet season [5097]; fallen leaves, cattle, wet season [5097]; wood, donkeys [1340]; leaves, mammals [2838]; leaves, mammals, browse [549] [5892]; live plant in situ, game mammals [2241]; live plant in situ, game mammals [2241]; game mammals, fodder, wet season [5097]
	Other Parts	
BEE PLANTS		
[2774] [5054] [5693]		
INVERTEBRATE		
FOOD		leaves, edible insects/caterpillars/larvae [1171]
MATERIALS	Unspecified Materials	fruits, soap [549] [5892]; seeds, soap [549] [2838] [5892]; fruits, fishing floats; fruits, latex coagulants [5892]; plates/bowls [5693]; fishing floats [5693]; trays [5693]; containers/holders [549] [1331] [5693]; bark, sandals [549]; infructescences, soap [549] [2180] [5892]; fruit pulp, latex coagulants [549]; outbuildings [1331]; other products [2774]; match sticks [5902]; fruit pulp, birdlime [2719] [2890]; pollen, adhesives [2180] [5892]; fruits, snuff boxes [1340]; infructescences, snuff boxes [549] [1331] [5092] [5892]; trunks, containers/holders [2180] [2241] [2838] [5693] [5892]; bark, soap [549] [5892]; other infructescence parts, earrings [5054]; bark, roofs [2719]; other infructescence parts, smoker's equipment [5054]; infructescences, fishing floats [2180] [5892]; live plant in situ, grain stores [5082] [5092] [5734]; fruits, containers/holders [1340]; other bark parts, cleansers [1340] [5092]; trunks, buildings [549] [2506] [2719] [5054] [5092] [5892]; infructescences, containers/holders [549] [1331] [2180] [2719] [5092] [5892] [6286]; infructescences, traps/snares [2719]; fruit pulp, cleansers [5892]; trunks, stables [5892]; fruit pulp, coagulants [2838]; bark, mats [5093]; bark,

	temporary shelters [2719]; flowers, toys/games [2672]; live plant in situ, houses [2506] [5082] [5092]
Fibres	bark, fishing lines; 'roots', fishing lines; wood, paper [549] [1340] [2241] [2838] [5092]; bark, cord/string/twine [1331] [1340] [2838] [5902]; bark, cord/string/twine, ropes [2241]; 'roots', cord/string/twine, ropes; bark, cord/string/twine, fishing lines; bark, traps/snares [1340] [2241]; bark, cord/string/twine, strings (for musical instruments) [2241]; 'roots', netting, fishing nets; bark, woven material [1340] [3045]; bark, woven material, clothing [2241]; bark, basketry (from fibre), baskets [2241]; 'roots', matting; bark, pulp; trunks, cord/string/twine [2719]; trunks, basketry (from fibre), baskets [2719]; trunks, ropes [2719]; bark [1340] [5054] [5092]; ropes [5054] [5693]; baskets [5054]; carpets/rugs [5054]; cord/string/twine, strings (for musical instruments) [5054]; clothes [5054]; hats [5054] [5693] [5892]; traps/snares [5054] [5693]; brushes/brooms [5054]; cloth [5693]; musical instruments; strings (for musical instruments) [5693]; fishing floats [5693]; plates/bowls; bark, thread/yarn, fishing nets [5092]; bark, thread/yarn, sacks [5092]; bark, thread/yarn, clothing [5092]; bark, thread/yarn, strings (for musical instruments) [5092]; bark, thread/yarn, traps/snares [5092]; bark, ropes [1331] [1340] [2506] [2774] [5082] [5091]; bark, mats [1340] [2795] [3045] [5082] [5155]; inner bark, ropes [549] [1340] [2180] [2890] [5097] [5155] [5892] [5902] [6286]; inner bark, cord/string/twine [549] [5101] [5892] [5902]; inner bark, strings (for musical instruments) [549] [2180] [5892] [5902]; inner bark, basketry (from fibre), baskets [549] [5097] [5892]; inner bark, netting [549] [5892]; inner bark, fishing lines [549] [5097] [5892]; inner bark, harnesses [549] [2890] [5892]; bark, cloth, clothing [549]; bark, sacking [549] [1340]; bark, packing/stuffing/filling [549]; bark, cloth, fishing nets [549]; sandals [549]; bark, cloth [2838]; bark, cord/string/twine, musical instruments [2838]; inner bark, woven material [2180]; cord/string/twine [2774]; root bark, cord/string/twine, fishing nets [5892]; root bark, cord/string/twine, mats [5892]; root bark, cord/string/twine, sacks [5892]; inner bark, cloth [5155] [5892]; inner bark, traps/snares [5892]; pulp, other products [5892] [5902]; bark, clothing [5902]; bark, bags [2795] [5902]; bark, other products [5902]; inner bark, other products [1340] [5902]; inner bark [2890]; bark, hats [2795]; inner bark, sacking [1340]; inner bark, paper [1340] [5902]; bark, paper [5902]; inner bark, harnesses/tack [5902]; bark, printed material [5902]; inner bark, printed material [5902]; pulp [5892] [5902]; paper [5892] [5902]; bark, strings (for musical instruments) [1331]
Wood	other products [549] [2241] [5092]; trunks, canoes [5054]; canoes [2180]; wood, other products [1340]; wood, wood board [1340]; wood, carved wood [5693]; wood, fishing floats [549] [2180] [5092] [5892]; wood, trays [549] [2180] [5892]; wood, dugout canoes [549] [2180] [2241] [5892]; wood, plates/bowls [549] [2180] [2838] [5892]
Gums/Resins	gums [2774] [5693]; resins [2774] [5693]
Tannins/Dyestuffs	'roots', dyes, red [549] [1331] [2180] [5092] [5892] [6286]; bark, tannins [549] [5892]; bark, dyes, red [5054]; dyes [5693]; 'roots', dyes [2774]; bark, dyes [6286]
Lipids	seeds, oils, soap [5054]; seeds, oils [2180] [6286]; seed oil,

		cosmetics [6286]
FUELS	Unspecified Fuels	fruits [549] [2180] [5892] [6286]
	Fuelwood	
	Charcoal	wood [549]
	Tinder	defoliated stems/branches, fire starters [5101]
SOCIAL USES	Smoking Materials/Drugs	fruits, smoking materials [549] [5892]
	'Religious' Uses	sacred plant [1331] [1340] [2719]; live plant in situ, ritual/religion/magic [549] [1331] [1340] [1604] [5902]; seeds, ritual/religion/magic [2506] [5092] [5093]; bark, ritual/religion/magic [1304] [2506] [5082]; fruits, ritual/religion/magic [1340]
	Miscellaneous Social Uses	flowers [2672]
VERTEBRATE POISONS	Unspecified Vertebrates	latex, heart, arrows/spears [5092]
	Mammals	bark, death, arrows/spears [5892]
NON-VERTEBRATE POISONS	Unspecified Non-Vertebrates	fruits, medicines [549]
	Arthropoda	fruits; fruit pulp, Diptera (flies), repellent, livestock pest control [5092]; fruit pulp, Insecta, repellent, livestock pest control [549] [1331] [2180] [2838] [5092] [5892]; fruit pulp, Diptera (flies), repellent, livestock pest control [1331]
MEDICINES	Unspecified Medicinal Disorders	leaves, humans, liniment; bark, humans [5693] [6286]; roots, humans [549] [5693]; leaves, humans [2180]; fruits, humans [549]; stem bark, humans, internal applications [6286]; seed oil, humans [6286]
	Abnormalities	young leaves, humans, oedemas, poultices [6286]
	Blood System Disorders	bark, humans, anaemia [5054]; leaves, humans, blood [549]; bark, humans, blood, sickle cell anaemia, oral ingestion [5901]
	Circulatory System Disorders	leaves, humans, blood pressure, hypotension [549] [5892]
	Digestive System Disorders	seeds, humans, teeth [549] [5892]; seeds, humans, gums [549] [5892]; bark, humans, intestine, diarrhoea [2618] [5054]; leaves, humans, intestine, diarrhoea [549] [2618] [5054] [5092] [5093] [5892]; bark, humans, teeth, mouth washes [549] [5892]; leaves, humans, colic, oral ingestion [549]; fruit pulp, humans, intestine, diarrhoea, oral ingestion [1340] [2795]
	Endocrine System Disorders	bark, humans, diabetes insipidus [5054]; bark, humans, diabetes mellitus [5054]
	Genitourinary System Disorders	leaves, humans, kidneys [549] [5892]; leaves, humans, menstruation, amenorrhoea; bark, humans, menstruation [5054]; leaves, humans, diuretic [5054]; leaves, humans, bladder [549] [5892]; leaves, humans, urinary tract, oral ingestion [549]; infructescences, humans, menstruation, amenorrhoea [549] [5892]; leaves, humans, male infertility [5903]; leaves, humans, female infertility [5903]; bark, humans, urinary tract [2618]; leaves, humans, urinary tract [2618]
	Ill-defined Symptoms	roots, malaise/fatigue [5054]; leaves, humans, malaise/fatigue [549] [5892]
	Infections/Infestations	fruits, humans, measles; fruits, humans, fever [5892]; fruits, humans, digestive system [1340] [5155]; leaves, humans, filariasis [5054]; fruit pulp, humans, fever, oral ingestion [1340] [2506] [2719] [2795]; leaves, humans, fever [549]

	[5054]; leaves, humans, helminth worm infections [5054]; bark, humans, fever, vapour baths [2719]; bark, humans, fever [549] [1340] [2618] [2795] [5092] [5892] [6286]; bark, humans, malaria [549] [2506] [5155] [6286]; bark, humans, periodic fever [549] [5892]; leaves, humans, guinea worm infection [549] [5892]; leaves, humans, digestive system [549]; leaves, humans, digestive system, baths [549]; leaves, humans, digestive system, oral ingestion [549]; leaves, humans, fever, oral ingestion [549]; fruit pulp, humans, fever [549] [2180]; fruit pulp, humans, digestive system [549] [2180] [2838] [5892]; fruit pulp, humans, smallpox, eye drops [549] [2180] [5892]; fruit pulp, humans, measles, eye drops [549] [2180] [5892]; leaves, humans, malaria [2795]; fruit pulp, humans, malaria [2795]; leaves, humans, malaria, prophylactic [1340]; leaves, humans, fever, prophylactic [1340] [5892]; fruit pulp, humans, digestive system, oral ingestion [2506]; seeds, humans, digestive system [1340] [5098]; fruits, humans, colds, oral ingestion [5098]; fruits, humans, fever, oral ingestion [5098]; humans, malaria [1340]; leaves, humans, fever, prophylactic, teas [2838]; seeds, humans, fever, oral ingestion [5082]; bark, humans, periodic fever, internal applications [6286]; bark, humans, fever, external applications [6286]
Inflammation	leaves, humans, bladder; leaves, humans, inflammation [549] [2618] [5892]; leaves, humans, eyes, inflammation, oral ingestion [549]; bark, humans, inflammation [2618]
Injuries	leaves, humans, wounds [5054] [5903]; leaves, humans, wounds, oral ingestion [549]; leaves, humans, wounds, external applications [5098]; fruit pulp, humans, lungs, haemorrhages, oral ingestion [2618] [5098]
Mental Disorders	leaves, humans, sedative, oral ingestion [549]
Metabolic System Disorders	leaves, humans, sweating, antiperspirant [549] [1340] [5892] [5903]; bark, humans, sweating, diaphoretic [549] [2618] [5892]; leaves, humans, sweating, diaphoretic [549] [1340] [2506] [2618] [5892]; bark, humans, temperature regulation, refrigerant [6286]; leaves, humans, sweating, antiperspirant [6286]
Muscular-Skeletal System Disorders	leaves, humans, back, oral ingestion [549]
Neoplasms	leaves, humans, unspecified neoplasms, oral ingestion [549]
Nervous System Disorders	leaves, humans, stimulant
Nutritional Disorders	'roots', humans, tonic [549] [2180] [5892]; bark, humans, rickets, baths [549] [5892]; leaves, humans, tonic [549]; fruit pulp, humans, appetite stimulant [549]; leaves, horses, tonic, oral ingestion [1331]; seeds, humans, vitamin C deficiency, oral ingestion [5082]
Pain	bark, humans, teeth [1382]; leaves, humans, stomach, anodyne [5054]; leaves, humans, back, anodyne, oral ingestion [549]; bark, humans, teeth, anodyne, mouth washes [549] [5892]
Poisonings	leaves, humans, antihistaminic [549] [5892]; bark, humans, antidote [549] [5054] [5155] [5892]; fruits, humans, antidote [5892]; leaves, humans, insect stings [549]; bark, scorpion stings [5054]; leaves, humans, bites and stings [549] [5892]; seeds, humans, antidote [2180] [2838] [5092] [5892]; bark, humans, other poisoning disorders/effects, antidote [1340] [5155]; stems, humans, other poisoning disorders/effects,

		antidote [1340] [5155]; leafy stems/branches, humans, antidote [5155]; fruit pulp, humans, antidote [5892]
Pregnancy/Birth/Puerperium Disorders		fruit pulp, humans, lactation stimulant, oral ingestion [2795]
Respiratory System Disorders		leaves, humans, coughs; leaves, humans, asthma [549] [5054] [5892]; bark, humans, coughs [5054]; leaves, humans, expectorant [1340] [5054] [5892]; leaves, humans, oral ingestion [549]; fruit pulp, humans [2795]; seeds, humans, hiccoughs [1340]; leaves, humans, coughs, oral ingestion [5098]; leaves, humans, asthma, oral ingestion [5098]
Sensory System Disorders		fruits, humans, eyes, eye drops; leaves, humans, ears [5054]; leaves, humans, eyes [5054]; fruit pulp, humans, eyes [2838]; leaves, humans, ears, oral ingestion [549]; leaves, humans, eyes, oral ingestion [549]
Skin/Subcutaneous Cellular Tissue Disorders		exudates, humans, sores, dressings; leaves, humans, astringent [1340] [2506] [5054] [5892]; bark, humans, sores [549] [2180]; leaves, humans, emollient [2838]; 'roots', humans, skin, baths [5892]; bark, humans, sores, external applications [5892]; leaves, humans, sores, poultices [5892]; fruit pulp, humans, astringent [2890]; gum, humans, sores, external applications [5892]; 'roots', humans, baths [6286]
ENVIRONMENTAL USES	Unspecified Environmental Uses	mulches [5693]
	Shade/Shelter	towns [2672]
	Indicators	
	Soil Improvers	entire plant ex situ, fertilisers [549]; infructescences, fertilisers [2180]; entire plant ex situ [2719]
	Ornamentals	live plant in situ [2719]; live plant in situ, roads/streets/highways [5054]; live plant in situ, potted plants [5097]; live plant in situ, gardens [1604]
	Boundaries/Barriers/Supports	plant/agricultural supports [2719] [2890]

## Picture

None recorded

## Notes

## NOMENCLATURE/TAXONOMY

### *Name derivation:*

'Adansonia' is in honour of Michael Adanson, an early describer of the baobab. 'digitata' is derived from the Latin word 'digitus', meaning 'finger' and referring to the digital composition of the leaflets [5092] .

### *Name derivation:*

'Adansonia' is named after the French surgeon Michel Adanson (1727-1806), and 'digitata' means 'hand-shaped', referring to the shape of the leaf [5097] .

## VERNACULAR NAMES

'Lalo' is a term used to denote medical preparations based on the dried leaf [549] .

The name 'upside down tree' describes the species unusual appearance and legends about the tree being planted upside down by the devil [1331] .

See Watt and Breyer-Brandwijk (1962) for a listing of east and southern African vernacular names [1340] .

The earliest European name for the seed pods is that of the French travellers in Senegal, calebasse du Senegal. The

Pods, or more correctly the mealy fruit pulp within them, are the monkey bread or pain de singe (French) [549]. The name baobab is derived from the Egyptian name 'Bu hobab' given by Cairo merchants who traded in exotic products during the 16th century [5092].

Giess and Snyman (1986) list two vernacular names which cannot be listed here because of the special characters [5101].

The Hausa name for the wood, 'fanko', means 'good for nothing' [549].

## DISTRIBUTION

### *Africa:*

Hot, dry areas at low altitudes, throughout central Africa [2506].

### *India:*

Stray specimens of baobab are found throughout the hotter parts of India from Haryana, Uttar Pradesh and Rajasthan in the north to the southernmost states and coastal regions like Rameswaram [5902].

### *Namibia:*

Kaokoland, Owamboland, Kavango, Caprivi and Grootfontein district [5098].

### *Namibia:*

Scattered localities across northern Namibia. Uncommon overall. Occasionally locally common or abundant in the Cuvelai and northwest [5121].

### *Africa:*

Occurs in most countries south of the Sahara, but in South Africa it is restricted to the Northern Province and Mpumalanga [5097].

### *South Africa:*

Restricted to frost free areas in the northern part of the country [2618].

### *Africa:*

The range extends from northern Transvaal and Namibia to Ethiopia, Sudan and the southern fringes of the Sahara [2180].

### *Africa:*

Widespread in Tanzania and generally in tropical Africa south of the Sahara and also in Madagascar [5054].

### *Botswana:*

Widely dispersed but rare throughout Moremi and the Delta [5092].

### *Mozambique:*

Manica, Maputo, Nampula, Niassa, Sofala and Tete provinces [5480].

### *Zambia:*

Widespread. All provinces except Copperbelt, Luapula and Southern [5481].

### *Zimbabwe:*

Widespread [5419].

### *Africa:*

Somalia to southern Africa [2719].

### *Kenya:*

A common plant in coastal regions, but which also grows further inland, e.g. Taveta, Kibwezi, southeastern Makueni, dry parts of Kitui, Meru National Park and at Torosei in Kajiado [2719].

### *Namibia:*

Widespread on northern highlands [5091].

### *Africa:*

Tropical Africa south of Sahara [5693].

## ORIGIN/DOMESTICATION

It is possible that the original area of distribution might have been a coastal one, as suggested by the abundance of the species in coastal areas of Senegal, especially in the Cape Verde Peninsula. It is also present in coastal regions of Ghana, Benin and in the lower Congo. Further south, in Angola, from 6.30-13.0 degrees of latitude south, it is clustered in groves or dense thickets in coastal sectors. Still further south, it follows the base of the escarpment of the African Plateau down to the 16th parallel. It is also common in the southern river galleries of the Kubango and Kunene. Even in East Africa, it is common in the coastal plains of Kenya, but also in the dry country of the interior up to 1200 m of elevation. It is present throughout the coastal regions of Mozambique down to Natal, where it reaches the southern limit of its distribution. One might thus consider the baobab is a species of the old Australian



flora which could have been introduced into Africa by man through maritime communications and which would have been later disseminated to the heart of the continent [2838] .

Part of the distribution in Africa can be understood when it is postulated that Arab traders moved baobab. This would explain its occurrence in Yemen and Oman, also on the island of Zanzibar and the introduction to Madagascar. Baobab was widely introduced into India and Sri Lanka and probably resulted from Moslem traders, and Moslem control of large areas, centuries ago. Wickens, 1982 records that baobab cannot be identified in any ancient Sanskrit writings. In a number of areas of introduction, baobab can naturalise e.g. in Mauritius in the past. This is also true of some of the African coastal areas of introduction. The Portuguese and French traders, as well as Moslem traders, also introduced baobab to other areas. Hence it is found also in Reunion, Malaysia, Indonesia (Java), China-Taiwan, Philippines, Guyana, New Caledonia, Cuba, Haiti, Dominica Republic, Martinique, USA (Hawaii, Puerto Rico, Virgin Islands and Florida), Jamaica, Montserrat, Netherlands Antilles, Dominica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, and Barbados. The basis for many of these introductions was the oddity of the plant shape and its use as an ornamental [6286] .

Centuries ago *Adansonia digitata* L., the African baobab tree, was introduced in India, and by now, very large size (60ft. in girth) grotesque trees can be seen either as plant curios in some botanical gardens or as objects of worship [5902] .

In the botanic garden at Calcutta are many trees, the largest has an irregular, short, sub-conical trunk which is 18 feet in circumference from 4 to 5 feet above ground [5902] .

It is native to the tropical savannas of Africa, where it is acclaimed as the 'most useful' tree [5902] .

The fruit was known to the ancient Egyptians and must have been brought there from further south, presumably for some specific purpose. Certainly the fruits were to be found in the Cairo markets in the late 16th century, where they were described by Alpino, 1592. They were regarded as a substitute for terra lemnia, being used for medicinal purposes, and as such imported into Europe [5892] .

## **RARITY/CONSERVATION**

Baobab trees near habitation are 'protected' and therefore nurtured. They tend to receive more water than those trees scattered in the savannah. It has already been mentioned that the Dogon people of Mali used to transplant wild seedlings to areas arranged for showering so that adequate wet conditions were provided until trees were large enough to transplant to other protected sites. The Forestry Department of Mali is experimenting to grow baobab in irrigated conditions as a market garden plant for leaf production. This means that relatively small trees can be used for intensive leaf production [6286] .

It is widely grown and protected because of its usefulness [2838] .

### *India:*

Certain places in Madhya Pradesh, particularly Mandu, have perhaps the largest number of *Adansonia* concentrated at one place [5902] .

### *Southern and Central Africa:*

Protected throughout southern and central Africa [2506] .

### *Tanzania:*

Common within its area of distribution [5054] .

### *Namibia:*

Generally protected by local communities for its medicinal uses and place in folklore. It is indirectly threatened by fire and elephant, in areas where elephant occur. The apparent lack of young plants recorded by the Tree Atlas may be a concern, but young trees may have been overlooked. Protected by forestry legislation [5121] .

### *Tanzania:*

Collected from the wild and often protected by local people in homesteads and farms [5054] .

### *Kenya:*

Many trees exhibit gnarled vertical striations, scars where the inner bark has been cut and removed for the preparation of fibres. However this is a dying custom for the products (cattle tethers, ropes and carrying bindings used by women) have seen the substitution of introduced sisal (*Agave americana*) in the material culture since European occupation of Kenya in the colonial era [2890] .

### *Botswana:*

Protected on State Lands under Botswana's Forest Act (Forest Chapter 38:04, 1968) [5093] .

### *Southern Africa:*

The discovery, in Madagascar in 1916, that the timber is suitable as pulp for the manufacture of paper almost led to the annihilation of the species in southern Africa. It was only the intervention of botanical institutions demanding their protection that prevented this [5092] .

*South Africa:*

Protected [5097] .

*South Africa:*

Has enjoyed total protection in Bantu Territories since 1967 [5155] .

*South Africa:*

Was exploited from 1916 for the manufacture of paper but protected from 1942 after wholesale devastation of the species [5155] .

*Kenya:*

Locally very common [2719] .

## DESCRIPTION

*Fruits:*

Voluminous capsule of an ovoid or ellipsoid shape, reaching 35 cm in length and 17 cm in diameter. Within the hard, velvet-surfaced, green to yellowish wrapper, one finds numerous black seeds, like small horse-beans, wrapped in a white to yellowish, farinaceous, acid-tasting pulp. When the fruit is dry, the envelope becomes brittle and the pulp takes on a chalky consistency [2838] .

*Bark:*

Smooth, glossy grey with sometimes bluish or reddish reflection. The external layer is soft and spongy; the internal layer is very fibrous, with red and white discolouration. When wounded, it produces an insoluble gum which has no commercial value [2838] .

*Flowers:*

The large flowers, 20 cm in diameter, hang from stalks up to 25 cm long. Each bears 5 thick, tough, tomentose sepals and 5 large, white, recurved petals, joined in a corolla tube bordered with a mass of white stamens with incurved filaments and pale orange to brown anthers. Stamens of *Adansonia* are epipetalous. A long, thick, twisted, style, terminated in a flattened, lobate stigma, protrudes from the corolla tube. The flower has a sweet fragrance when in full bloom, which seems to attract insects [2838] .

*Leaves:*

Digitate and arranged alternately. They appear after flowering and fall a little after the end of rainy season. They are divided into 6-7 obovate, acuminate, sessile leaflets, about 14 cm long and 5 cm wide. The leaflets are entire or denticulate, often with a sinuous margin, pubescent or glabrescent on the underside and of a dark green colour on the upper side [2838] .

*Roots:*

The tree is anchored by a few large, strong roots [2838] .

*Trunk:*

Bloated trunk, shaped like a huge bottle, up 3 m in diameter and often hollow. Fairly thin canopy, with short thick and tortuous branches. The tree is deprived of leaves for about 6 months during the dry season and then takes on a gaunt skeletal appearance [2838] .

*Seeds:*

Have a thick, hard coat and are seldom visibly damaged [2241] .

*Girth:*

In large specimens, the girth is about 28 m [5082] .

*Habit:*

With massive, spreading branches [5902] .

*Bark:*

Pinkish grey, reddish brown or coppery, smooth, heavily folded [5082] .

*DBH:*

In large specimens, the girth is about 28 m. This equates to dbh of 892 cm [5082] .

*Trunk:*

Disproportionately thick [5902] .

*Flowers:*

Buds start to open in the late afternoon, the sepals and petals curling backwards to expose the stamen, the flowers fully open soon after sunset, still open next morning but the sepals and petals gradually straightening out to cover the stamens, the flowers wilting and falling within 24 hours of opening [5082] .

*Girth:*

Has huge girth - Dr. Livingstone camped under one which was 25 m in girth [1331] .

*Fruits:*

Ovoid, 12 cm or longer, with a hard, woody shell, covered with yellowish grey, velvety hairs, indehiscent [5082] .

*Height:*

10-15 m [5082] .

*Height:*

3-18 m [5104] .

*Height:*

In Namibia, usually over 8 m, and > 20 m near the Kunene river [5121] .

*Leaf fall:*

Bare from July to September, with young leaves appearing in October [5121] .

*Leaves:*

Pungent when crushed [5082] .

*Lifeform:*

A comparatively short but grotesquely fat tree [5082] .

*Fruits:*

Hairy, yellow brown, very big capsules hang on long stalks on the bare tree. About 100 seeds lie in white-pink dry pulp [2774] [5054] [5693] .

*Bark:*

Greyish with a purplish tinge, smooth or rough and wrinkled like an elephant's skin [2180] .

*Flowers:*

Large, 12-15 cm diameter, with white petals and violet stamens [2180] .

*Girth:*

The trunk may reach a girth of 20 m [5693] .

*Leaves:*

Mature leaves with up to 9 leaflets [2774] [5054] [5082] [5693] .

*Seeds:*

The shell is recorded in a Dakar sample as 55.46% of the whole. The kernel is edible, but decortication limits its usefulness [549] .

*Girth:*

The trunk may reach up to 12 m girth [5097] .

*Leaf fall:*

Bare for up to 9 months [2774] [5054] [5693] .

*Fruits:*

Hang singly on long stalks. They have an ovoid, woody shell 20-30 cm long and up to 10 cm in diameter, which is covered on the outside with greenish-brown felted hair. This shell contains numerous hard, brownish seeds which are round or ovoid, up to 15 mm long and which are embedded in a yellowish-white, floury acidic pulp [2180] .

*Height:*

Up to 25 m [2180] [2838] [5155] .

*Seeds:*

Have a relatively thick shell which is not readily separated from the kernel [549] [5892] .

*Trunk:*

The trunk is sometimes hollow [2774] [5054] [5092] [5693] .

*Girth:*

The trunk may reach a girth of 8 m [5054] [5693] .

*Leaves:*

Palmate, with long stalks and 5-9 elliptic leaflets. They are usually crowded at the end of the branches [2180] .

*Lifeform:*

A massive, grotesque tree [2180] [2719] .

*Trunk:*

It has a thick, angular, widespreading branches and a short, stout trunk which attains 10-14 m or more in girth; often becomed deeply fluted. The form of the trunk varies. In young trees it is conical; in mature trees it may be cylindrical, bottle shaped, or tapering with branching near the base [2180] .

*Trunk:*

Sometimes hollow [5054] [5092] [5693] .

*Bark:*

Smooth, grey, to 10 cm thick, the spongy wood holding much water [2774] [5693] .

*Flowers:*

Open at night; the unpleasant smelling nectar attracts pollinating fruit bats [2774] .

*Habit:*

Has a disproportionately large trunk and twisted branching [2719] .

*Height:*

Often 20 m [2774] [5097] .

*Trunk:*

Soft, fibrous with a smooth grey surface [2719] .

*Leaves:*

Digitate, leaflets to 13 cm long [2719] .

*DBH:*

The average stem diameter of a large baobab is about 5 m but specimens with a diameter of up to 9 m are not uncommon. One of the largest baobabs in Southern Africa has a circumference of 46.8 m. This equates to c. 1490 cm dbh [5092] [5155] .

*Flowers:*

Large, white [2719] [2774] [5054] [5082] [5693] .

*Fruits:*

25 cm long, with shiny, yellowish green or rusty soft hairs and a hard, oval or round shell, often grooved longitudinally [2719] .

*Flowers:*

Unpleasant smelling nectar [5054] [5693] .

*Seeds:*

Hard, embedded in a cream or white pulp [2719] .

*Height:*

Up to 20 m [1304] [5054] [5693] .

*Leaves:*

Seedlings have simple leaves [5082] [5092] [5693] .

*Odour:*

The flowers smell of carrion [1171] .

The stiff bare branches resemble roots (upside down tree) [2774] [5054] [5693] .

*Roots:*

On poor, shallow soil thick roots radiate from the stem and are still visible above the ground as much as 10 m from the tree [5155] .

*Stem:*

The development of hollow trees is caused by a dying-off of the heartwood. Healing of the inner wall is so complete that it often appears as if the tree has been hollow all its life [5155] .

*Leaf fall:*

In Kenya it has leaves in November-December [2719] .

*Variation:*

Up to 3 types of the tree are recognized by farmers through taste (some sweeter than others), and size and shape of tree or its fruits as well as season of flowering [2719] .

## FOOD

In some cases, seeds are dehulled by boiling, rubbing by hand, then sun-drying the kernels before grinding [6286] . There is a marked seasonality in use of leaves. Nordeide et al., 1996 surveyed two villages and a town neighbourhood to compare rural and urban use of wild foods in southern Mali. Out of over 100 rural households, 26% used baobab leaves in the rainy season, and 56% in the dry season, and out of over 150 urban households, 6% used baobab leaves in the rainy season and 13% in the dry season. Use of fruits was much lower and ranged from 0.5-6% of households, with roughly a two-fold increased use in the dry season [6286] .

## FOOD - ENTIRE PLANT

*Potable water:*

Trees with hollow trunks (caused by the dying off the heartwood and the complete healing of the inner surface) afford the collection and storage of water for long periods. These reservoirs are tapped by drilling a hole and inserting a wooden plug [2506] [5092] .

*Potable water:*

The tree flourishes in extremely dry surroundings and stores a great quantity of water. It has been used as a source of

water in dry regions such as the Kalahari Desert (Mogg 195) and in Kordofan (Anon 1917). A hole is drilled in the side of the bole and a bung inserted (Mogg 1950). From this opening, water may be withdrawn at will. A good reservoir tree may hold up to 1000 gallons (Anon 1917) [[1340](#)] .

## FOOD - SEEDLINGS/GERMINATED SEEDS

Shoots from germinating seeds are eaten [[549](#)] [[2180](#)] [[2514](#)] [[2774](#)] [[5892](#)] .

*Vegetables:*

The shoots of germinating seeds are used as asparagus [[1340](#)] [[2506](#)] [[5092](#)] .

The roots of germinating seeds and seedlings are eaten [[549](#)] [[2180](#)] [[2719](#)] [[5892](#)] .

*Vegetables:*

Young plants are boiled and eaten as a vegetable [[2180](#)] .

## FOOD - STEMS

*Wood, condiments:*

The ash from burnt wood serves as a worthy substitute for table salt [[5092](#)] .

## FOOD - BARK

*Stem bark, potable water:*

Pieces of the fibrous bark can be cut and chewed to provide a little moisture [[2506](#)] .

Eaten in Senegal [[1340](#)] [[5892](#)] .

A starch deposit between the bark fibres is sometimes eaten (Senegal) [[2180](#)] .

## FOOD - LEAVES

*Green vegetables:*

Widely used in cooking, either fresh or dried, and it has been estimated that several tens of thousands of tons are thus consumed every year. In Niger and Nigeria there are true baobab orchards around villages, where housewives collect leaves [[2838](#)] .

*Green vegetables:*

In Malawi leaves are boiled with potash (Williamson, 1975). In Zimbabwe, they provide fresh vegetables that are substituted for the commercially grown leafy vegetables such as cabbages and lettuce (Dovie et al., in press), but they do not appear to be used in Madagascar, and not used for food purposes in India [[6286](#)] .

*Leaves, green vegetables, soups:*

In Mali, use of leaves in sauce is usually in association with seeds of *Parkia biglobosa*, onion, okra, pepper, ginger, sometimes meat, but more often fish. The sauce is used with a thick porridge made from millet, sorghum or maize, but also couscous and rice. In other areas leaves are used for soup e.g. miyan kuka of the Hausa in northern Nigeria and ground leaves are boiled in salt water [[6286](#)] .

*Green vegetables:*

Fresh leaves make a delicious vegetable [[2241](#)] .

*Young leaves, green vegetables, porridges:*

Young leaves are widely cooked as spinach, and frequently dried, often powdered and used for sauces over porridges, thick gruels of grains, or boiled rice [[6286](#)] .

*Young leaves, green vegetables:*

Young fresh leaves are cut into pieces and cooked in a sauce. Sometimes they are dried and powdered and used for cooking [[6286](#)] .

*Condiments:*

In West Africa the dried leaf is used as a condiment and seasoning [[1340](#)] .

*Green vegetables:*

Eaten freshly cooked [[5903](#)] .

*Young leaves, green vegetables:*

Young leaves can be cooked and are a good substitute for spinach [[1331](#)] [[2506](#)] [[5097](#)] .

*Condiments:*

The most common use of the leaves is to dry and powder them into an article known throughout much of West Africa as 'lalo'. 'Lalo' is a term applied to other similar ingredients used as condiment [[549](#)] .

### *Relishes:*

The Coumantche tribe in Nigeria use the leaves in preparing a sauce known as 'tipinti' which contains other condiments such as salt and pepper [5903] .

### *Soups, weaning food:*

It is worth noting that in Ghana, the soup prepared with the leaves is used as weaning food [5903] .

### *Soups:*

The amount of baobab leaves used in preparation of 'kuka' soups varies depending on the taste of the person preparing the soups and the size of the family. Simmons (1976) carried out a survey analyses of 831 preparations in 3 Zaria villages and showed that baobab leaves constitute between 2% and 3% wet weight of the 'kuka' soup [5903] .

### *Green vegetables:*

When fresh, the leaves are eaten as a spinach [5092] .

In Northern Nigeria the Hausa-speaking farmers and the Fulani cattle owners make free use of the leaf (Nicol 1959) [1340] .

In Senegal leaves of a glabrous form are preferred, tomentose forms being considered unsuitable. In Mali the leaves of a variety called 'molodo' (bambara) are not eaten, and in Zaria, north Nigeria, two forms, 'jar kuka' and 'maiwa' (Hausa), are recognized, but the distinctions are not stated. In north Nigeria the first leaves are said to be unfit for use until they have been washed by the rains [549] .

### *Soups:*

In Northern Nigeria the Hausa-speaking farmers and the Fulani cattle owners use the fresh or dried leaf to make soup which is poured over porridge (Nicol 1959) [1340] [5903] .

### *Young leaves, soups:*

Used to make soups and sauces [549] .

### *Young leaves, vegetables, relishes, famine food:*

Young leaves in times of famine are used as vegetable relish when they appear at the start of the rainy season [2890] .

### *Young leaves, green vegetables, soups:*

The leaves, especially the young leaves, are popular as a spinach or dried and powdered and made into soups or sauces [5097] [5892] .

### *Vegetable dishes:*

The flowers and leaves are collected, chopped and boiled, sometimes pounded groundnuts are added and served with a staple [5054] .

### *Young leaves, vegetables, soups:*

Commonly used as a vegetable in soups, in fresh, dried or powdered form [2180] .

### *Young leaves, green vegetables:*

Used as a vegetable (Giriama, Mbeere). Normally mixed with more coarse vegetables like cassava leaves (Giriama) [2719] .

### *Vegetables:*

In Southern Rhodesia (Zimbabwe) the leaf is apparently eaten by the African as a vegetable (Pardy 1953) [1340] .

### *Vegetables:*

Leaves are eaten cooked [5118] .

## **FOOD - INFLORESCENCES**

### *Flowers, vegetable dishes:*

The leaves and flowers are collected, chopped and boiled, sometimes pounded groundnuts added, and served with a staple [5054] .

## **FOOD - INFRUCTESCENCES**

### *Fruit pulp, raw:*

The fruit pulp is pleasant to eat when fresh, and is much appreciated by man. It is refreshing and acidulous, very rich in ascorbic acid (up to 373 mg of vitamin C per 100 g) [2838] .

### *Fruit pulp:*

The vitamin C content is tenfold that of oranges [1382] .

### *Fruit pulp, cereal based preparations:*

The dry pulp is used to add to gruels on cooling after cooking- a good way of preserving the vitamin contents

[6286] .

*Fruit pulp, non-alcoholic beverages:*

Ground to make a refreshing drink with a pleasing wine-gum flavour [6286] .

*Fruit pulp, raw:*

The pulp, surrounding the seeds inside the hard fruit coat, is loaded with vitamin C and tastes refreshing [2241] .

*Fruit pulp, non-alcoholic beverages:*

The white pith is mixed with water to make a refreshing cream of tartar drink, or mixed with milk to make a milk drink [2506] .

*Fruit pulp, beverages:*

A refreshing, cooling and very nutritious drink can be made from the fruit pulp [1331] .

*Fruit pulp, cereal/starch based preparations:*

The white fruit pulp can be used as a "sago" [1331] .

*Fruit pulp, beverages:*

Mixed with water it makes a slightly acid but very refreshing drink [3045] [5092] .

*Fruit pulp, soups:*

In Northern Nigeria the Hausa-speaking farmers and the Fulani cattle owners use a white fluid, obtained by kneading the pulp in water and sieving it, to thin thick sorghum dough to a thin gruel (Nicol 1959) [1340] .

*Fruit pulp:*

The Tsonga people of Gazankulu, South Africa eat the dry pulp of the fruit [5139] .

*Fruit pulp, children's snack food:*

The white, mealy substance surrounding the seeds is chewed by children [549] .

*Fruit pulp, famine food:*

Eaten in times of dearth [549] .

*Fruit pulp, milk substitutes:*

When the white, mealy substance surrounding the seeds is soaked in water it produces a milky solution which is taken as a milk-substitute [549] .

*Fruit pulp, non-alcoholic beverages:*

It can easily be made into a gruel with water, with millet, or milk (which it curdles), and provides a refreshing drink [549] .

*Fruit pulp, soups, beverages:*

The acid pith, which is rich in ascorbic acid may be ground and made into a gruel or prepared as a refreshing drink [5892] .

*Fruit pulp, beverages:*

The filtered juice of the fruit pulp, with some sugar added, can be drunk hot or cold. The sweetened juice is sometimes frozen in small polythene packets and used as an iced lollipop where refrigeration is available [5054] .

*Fruit pulp, porridges:*

The fruit pulp is soaked in water, pounded, filtered and cooked with porridge (Gogo) [5054] .

*Fruit pulp, snack food:*

The fruit pulp, which is obtained after breaking the hard shell, is eaten as a snack by herdsmen and many people in Tanzania [5054] .

*Fruit pulp, beverages:*

The floury pulp is mixed with water and sugar to make a refreshing, acid-tasting drink [2180] .

*Fruit pulp, raw, snack food:*

The floury pulp is eaten raw as a snack [2180] .

*Fruits, famine food:*

The fruit is available during the dry season and forms an important addition to the diet at this time [2180] .

*Fruit pulp, porridges:*

In Zimbabwe the powdery substance surrounding the seeds is mixed with water and cooked with one of the cereals to form a thin porridge, sometimes sweetened with honey [1171] [2506] .

*Fruit pulp:*

Fruit pulp is pounded and seeds removed. The powder is stirred into water and eaten as a pulp [5101] .

*Fruit pulp:*

The large fruits are cracked open and the pith surrounding the seeds is eaten [5091] .

*Fruits:*

One of the most important fruit trees in northern Namibia [5376] .

*Fruit pulp, raw, juices, starch-based preparations:*

The dry, cream coloured pulp is eaten raw or is dissolved in water, stirred to a milky state (milk may be added),

seeds sieved off and the juice used as sauce (mboga) or added to porridge. Coconut juice is normally added (Giriama) [2719] .

*Fruit pulp, beverages:*

Seed pulp drunk [2774] .

## FOOD - SEEDS

*Coffee substitutes:*

Used as a substitute for coffee when roasted [6286] .

*Entire seeds:*

The oil-containing seeds are sometimes grilled and eaten [2838] .

*Other seed parts:*

Seed pulp is edible [6286] .

*Porridges:*

Frequently, baobab seeds are ground with peanuts and water and sugar added to make a sauce used with porridge [6286] .

*Snack food:*

Roasted and eaten as snacks [6286] .

*Entire seeds, cakes:*

Ground seeds, shaped into small cakes with the addition of a little water, are dried and stored as reserve food or used when travelling [2506] .

*Entire seeds:*

The roasted seeds are often eaten in place of groundnuts [1331] .

*Kernels:*

The kernel is edible, but the difficulties of decortication limits its usefulness [5892] .

*Coffee substitutes:*

Roasted seeds are used as a coffee substitute [1331] [2180] [5092] .

*Kernels, soups:*

In Northern Nigeria the seed kernel is made into a cake used for flavouring soup (Nicol 1959) [1340] .

*Raw:*

The seeds may be eaten fresh or dry, either sucked [5892] .

*Soups:*

The seeds can be ground and shaped into cakes to be stored and used in soup at a later stage [5092] .

*Seed oil, ceremonial food:*

An oil obtained by distillation of the seeds is used in Senegal on gala occasions [2180] [5892] .

*Entire seeds:*

In some parts of Africa the seeds are prepared for eating by boiling for a long time, fermenting and drying.

Alternatively, they are fried, pounded with hot water into a dough, left to ferment for 2 days, shaped into small balls and dried (katong balls, Ghana) [1171] [2180] .

*Entire seeds, cakes:*

Seeds dried, ground into flour for making cakes [1304] .

*Entire seeds, porridges:*

The !Khu San grind the whole, roasted seed into a meal to make a thick porridge [1171] .

*Entire seeds, vegetable dishes:*

Seeds are cooked and eaten whole or roasted, pounded and added to vegetables, like sunflower seed [5054] .

Roasted seeds are ground to a paste. In Senegal, water and sugar are added to this paste which is eaten with steamed millet [2180] .

*Entire seeds:*

Seeds are roasted like groundnuts (Kitui, Tharaka) [2719] .

*Entire seeds, confectionery:*

The pulp coated seeds (mabuyu) are coloured, sugar-coated and sold as sweets in coastal towns (Swahili) [2719] .

*Entire seeds:*

Roasted and eaten as nuts [2795] .

*Entire seeds, soups:*

In Mashonaland District a thick gruel is made from the seed itself (Alvord 1929) [1340] .

## FOOD - 'ROOTS'



*Bulbs/corms, porridges:*

The bulbs which form at the root ends are dried and ground to make meal for porridge [2506] .

Root of very young baobabs eaten [2514] .

*Roots, root vegetables:*

The roots may be cooked and eaten as food [549] [5097] .

*Roots, root vegetables, famine food:*

In West Africa, the roots are reputed to be cooked and eaten, presumably in times of famine [2180] [5892] .

*Roots:*

Young roots edible [2180] .

*Tubers, root vegetables, famine food:*

Soft tuber-like root tips are cooked and eaten in times of famine [2719] .

*Roots, potable water:*

The roots can be tapped for water [5097] .

## **FOOD ADDITIVES - UNSPECIFIED AERIAL PARTS**

*Fruits, raising agents:*

The acid pith, which is rich in ascorbic acid (Carr, 1958), is used as a substitute for cream of tartar for baking [5892] .

## **FOOD ADDITIVES - STEMS**

*Wood, salt:*

Burnt to yield vegetable salt [549] .

*Wood, salt:*

In the Luangwa valley of Tanganyika (Tanzania), salt is difficult to obtain and so ash from burning baobab wood is used as a substitute (de Villiers 1951) [1340] .

## **FOOD ADDITIVES - LEAVES**

*Flavourings:*

In Senegal, leaves are harvested in February-March. Dried and ground they are used for seasoning couscous [2838] .

*Condiments:*

Fresh leaves used as a condiment [5092] .

*Fermenting agents, wines:*

Baobab leaves hasten fermentation in wine making [1331] [5092] .

*Flavourings, thickening agents, cereal/starch-based preparations:*

In Senegal the Wolofs gather the leaves and use them in powdered form (lalo) to season their couscous and to make it more glutinous [5903] .

*Soups:*

Leaves are dried and added to soups (Hausa-miya kuka) [5903] .

*Flavourings:*

The most common use of the leaves is to dry and powder them into an article known throughout much of West Africa as 'lalo'. 'Lalo' is a term applied to the similar ingredients used as seasoning [549] .

*Young leaves, flavourings:*

The powder, known as "lalo" in west Africa is mixed with staple foods as a seasoner [2180] .

*Young leaves, thickening agents:*

The powder, known as "lalo" in west Africa, is used to reduce evaporation and to thicken stews [2180] .

## **FOOD ADDITIVES - INFRUCTESCENCES**

*Fruit pulp, milk curdlers:*

Nomads, particularly Fulanis, use it to curdle milk [2838] .

*Fruit pulp, dairy preparations:*

The cattle-owning Fulani and the Hausa of northern Nigeria use the fruit pulp emulsion to mix with milk as a drink [6286] .

*Fruit pulp, fermenting agents, beers:*

Added to aid fermentation of sugar cane for beer making in Tanzania [6286] .

*Fruit pulp, other additive types, cereal based preparations:*

When the fruit is ripe, the pulp is removed from the fibres and seeds by kneading in cold water; the resulting emulsion is sieved. This is then added to thick grain preparations to make thinner gruels [6286] .

*Fruit pulp:*

Yields the well known "cream of tartar" [1331] .

*Fruit pulp, raising agents:*

The white pith is used as a baking powder substitute [2506] .

*Fruit pulp, dairy preparations:*

In Northern Nigeria the Fulani use a white fluid, obtained by kneading the pulp in water and sieving it, for the dilution of milk (Nicol 1959) [1340] .

*Fruit pulp, fermenting agent, bread:*

During World War I, the fruit pulp was used as a substitute for yeast in the making of bread (Mogg 1950) [1340] [5092] .

*Fruit pulp, flavourings:*

It is important in diet as a seasoning [549] .

*Fruit pulp, preservatives, fish dishes:*

The pulp burns with a smoke which can be used for preserving and drying fish [549] .

*Fruit pulp, adulterants, dairy preparations:*

An emulsion of the pith is used by the Fulani herdsmen to adulterate milk, a popular drink with the Kaura farmers whom the Fulani supply [5892] .

*Fruit pulp, milk curdlers:*

Used to curdle milk [5892] .

*Fruit pulp, preservatives, fish dishes:*

The pulp is used for smoking fish [5892] .

*Fruit pulp, flavourings, porridges:*

It is used as a seasoning for porridges [2180] .

*Fruit pulp, milk curdlers, flavourings:*

Pastoral tribes use it to curdle and flavour milk [2180] .

*Fruit pulp, preservatives, fish dishes:*

Used in smoking fish [2180] .

*Fruit pulp, flavourings, porridges:*

Pulp is eaten together with milk mixed with mealie meal porridge [5118] .

## FOOD ADDITIVES - SEEDS

*Flavourings:*

Fermented and used as a flavouring agent [6286] .

*Flavourings, vegetable dishes:*

The seeds are scraped, ground to a paste, and added as flavouring to the boiled leaves [2506] .

*Thickening agents, soups:*

Used as a thickening agent in soups [6286] .

*Entire seeds, sweeteners, non-alcoholic beverages:*

Mixed with the white pulp, the pounded seeds make a sweet 'milk' when boiled and flavoured with honey [2506] .

*Flavourings, soups:*

Seeds are ground and used to flavour soups [5892] .

*Entire seeds, porridges:*

Seeds ground into a paste which is added to cereal porridge, together with crushed groundnuts [2180] .

*Entire seeds, soups, savoury preparations:*

Seeds eaten fresh or may be dried, ground to a flour and added to soups and stews [2180] .

## FOOD ADDITIVES - EXUDATES

*Dairy preparations:*

The fluid extracted from the trunk is used as a dilutant for milk [5092] .

## ANIMAL FOOD - BARK

*Game mammals:*

Because of its moisture content, the bark is favoured by elephants [5092] .

## **ANIMAL FOOD - FERTILE PLANT PARTS**

*Fruits, game mammals, primates:*

The fruit is appreciated by monkeys, elephants and many other animals [2838] .

*Fruit pulp, seeds, dry season, fodder:*

Seeds crushed and mixed with the pulp and meal make a nutritious feed, particularly at the end of the dry season [1331] .

*Fruit pulp, primates:*

Greatly relished by baboons, which destroy large numbers of the fruits, tearing open the woody shells to gain access to the contents (Codd 1951) [1340] .

*Fruits, primates:*

Baboons and monkeys relish the fruit [5092] .

*Fruits, primates:*

Eaten by baboons [2514] [5155] .

*Fruit pulp:*

The white, mealy substance surrounding the seeds is chewed by animals [549] .

*Seed cake, cattle, fodder:*

The residual cake, after oil extraction, is rich in protein and can be used as cattle feed [2180] .

*Entire immature fruits, primates:*

Baboons pick the fruits when they are still soft and green [5155] .

*Flowers, cattle, game mammals:*

Various game species, and cattle, relish the fallen flowers [5097] .

*Fruit pulp, seeds, mammals, fodder, dry season:*

The pulp and seeds have a high nutritional value and are recommended for feeding to stock late in the dry season when grazing is poor [5097] .

*Seeds, primates:*

Seeds are eaten by monkeys [2774] .

## **ANIMAL FOOD - AERIAL PARTS**

*Leaves, mammals:*

The green leaves are not very much sought after by livestock [2838] .

*Leaves, cattle:*

Dry leaves can be eaten by cattle [1331] .

*Leaves, forage, wet season:*

Provide a valuable source of forage at the beginning of the rains [2180] .

*Leaves, mammals, browse:*

Browsed by stock [549] [5892] .

*Leaves, horses, fodder:*

Fed to horses. In Nigeria the leaves are the most usual ingredient of a horse food (chusar doki, Hausa) which, given in large quantities, is said to keep a horse in good condition on a journey [549] .

*Wood, game mammals, donkeys:*

Wild buck and the donkey are said to chew the wood to get the juice (de Villiers 1951) [1340] .

*Live plant in situ, game mammals:*

Elephants find the whole plant palatable until it is 3 years old [2241] .

*Fallen leaves, cattle, wet season:*

At the end of the rainy season cattle eat the fallen leaves [5097] .

*Wood, game mammals, drought season:*

Elephants cause severe damage, especially during times of drought, when large portions of inner trunk wood are chiselled out [5092] .

*Game mammals, fodder, wet season:*

During the rainy season when the trees are in leaf, it is a good fodder tree, especially for game (elephant, kudu, nyala and impala) [5097] .

*Wood, game mammals:*

Wild animals are said to chew the wood perhaps to obtain the salt from the sap [549] .

*Trunks, game mammals:*

Very much liked by elephants who eat the spongy tissues of the bole and can damage or destroy trees [2774] .

*Leafy stems, trunks, game mammals, browse:*

The shoot and trunk are eaten by elephants, the trunk is also a source of water [2719] .

*Fallen leaves, mammals:*

Eaten by livestock [2719] .

*Wood, game mammals:*

Elephants sometimes destroy vast numbers of baobab trees by tearing off pieces of the stem for moisture. The only way to save these trees is to restrict the number of elephants in the area [5097] .

## BEE PLANTS

Bee forage [2774] .

## INVERTEBRATE FOOD

*Edible caterpillars, leaves:*

The leaves are eaten by large caterpillars, which are a valuable source of food [1171] [2506] .

## MATERIALS

*Wood properties:*

The wood is very soft, white, spongy and burns with difficulty [2838] .

*Fibre properties:*

Produces exceedingly strong fibre [5902] .

*Fibre properties:*

The fibres of the bark are very strong and of high quality [5902] .

*Wood properties:*

The wood is pale yellow in colour, soft and very light [5902] .

*Fibre properties:*

Inner bark gives a strong, long lasting fibre [2180] .

*Fibre properties:*

Fibre from the inner bark is particularly strong and durable [549] .

*Fibre properties:*

It lacks tenacity and fineness for spinning, and loses strength on drying [549] .

*Wood properties:*

Wood soft and light [2180] .

*Wood properties:*

Wood is soft [5092] [5693] .

*Wood properties:*

The wood is light, 53 lb/cu ft. wet, c. 13 lb/cu ft. air dried. It is spongy and easily attacked by fungi, if left in water it disintegrates in about 2 months, producing long fibres that could be used for packing. The wood is not easy to cut, the spongy tissues make the axes bounce off rather than cut. It makes poor firewood and charcoal, and is not suitable for cutting into planks [5892] .

*Wood properties:*

It is not good for cutting into planks [549] .

*Wood properties:*

Wood light and spongy. It is not durable and is easily attacked by fungi with the result that local uses are rare. Furthermore the shape of the tree does not make felling easy; an axe is more likely to bounce off the wood than to cut into it and in clearing trees for the Kariba Dam tractor-drawn wire-hawsers were used [549] .

*Wood properties:*

The timber is very soft, spongy, fibrous and light, weighing about 890 kg/cub m when wet and 320 kg/cub m when air-dry. It consists of almost independent, concentric, vascular cylinders so that in cross-cuts the timber is inclined to disintegrate along fine cracks following the annual rings. Timber is undifferentiated and light yellowy-brown before being polished and pale brown afterwards. Moisture content of green wood is between 315% and 416% with a volume decrease of 40% while drying; the linear shrinkage across the grain is about 15% [5092] [5155] .

## MATERIALS - UNSPECIFIED MATERIALS

### *Latex coagulants, fruit pulp:*

Used as coagulant for rubber [2838] .

### *HOLDERS, TRUNKS:*

In the Sudan, the trunk of very large baobabs is hollowed for using as a food store or water-tank (it holds up to 5000 litres) [2838] .

### *Containers, infructescences:*

The hard fruit shells are used in the manufacture of pots for food and drink [6286] .

### *Soap, seeds:*

The seed hull, and the seed itself when burnt, is used for making soap, by mixing the ashes with rancid palm-oil [2838] .

### *Containers/holders, trunks:*

The large swollen trunk is often hollowed out and used for water storage [2241] .

### *Match sticks:*

It is a good tree for the match industry, but in India it is not sufficiently abundant to make it worthwhile to collect it for the purpose [5902] .

### *Containers:*

One contains a whole lavatory complete with flushing water [1331] .

### *Snuff boxes, containers, fruits, epicarp:*

Seed pods can be used to hold liquids, made into curios or snuff boxes [1331] .

### *Buildings, trunks:*

In East Africa the trunk may be hollowed out to provide shelters and form storage rooms. Livingstone in his explorations in Mozambique recorded use as dwellings [549] .

### *Containers/holders, trunks:*

Hollow trees provide reservoirs of fresh water which are used by nomads, particularly in the Sudan. Water storage capacities range from 200-4000 gallons [2180] .

### *Adhesives, pollen:*

The only recorded economic use of the flower is the mixing of the pollen with water to make glue [2180] [5892] .

### *Buildings, stables, trunks:*

At Gran Galarques in Senegal a hollow tree with a carved entrance was used as a meeting place, another tree in Nigeria was used as a prison. Elsewhere in West Africa hollowed trees have been used as stables. In East Africa the trunks may be hollowed out to provide shelter and storage rooms, but their more varied use occurs in southern Africa. In Rhodesia a hollow tree on the Birchenough Bridge road is used as a bus shelter, accomodating 30-40 persons. Another tree near Umtali is used by the Roads Department for the storage of wheelbarrows and implements, and yet another tree in the Triangle Sugar Estates is fitted with crude ladders for use as a watchtower for cane or veld fires. A famous tree in the Caprivi Strip, at the home of Major Trollope, Administrator is used as a water closet, complete with a flush toilet. Near Leydsdorp in the Transvaal the hollow trunk of a baobab serves as a cool room for a tin shack beneath the canopy of the tree that is used as a bar. An opening in the top of the trunk creates a cooling draught. Yet another hollow tree in the Transvaal is used as a dairy, (Guy, 1971) who also reports of another tree in Botswana being used as a dwelling [5892] .

### *Cleansers, fruit pulp:*

In East Africa an extract from the pulp is used as a hair wash [5892] .

### *Containers/holders, snuff boxes, infructescences, epicarp:*

The whole husk can be used as a dipper or to hold liquids and is sometimes fashioned into snuff boxes [549] .

### *Holders, trunks:*

The hollowed trunk has been recorded as used as tombs, and a place where a body denied burial may be suspended between earth and sky for mummification [549] .

### *Soap, infructescences:*

Fruit husk burned as domestic fuel. The residual ash used in making soap [2180] .

### *Containers/holders, snuff boxes, fishing floats, infructescences, epicarp:*

Ibn Battuta, 1929 noted that the husks of the fruit may be used as dishes; they may be fashioned into vessels or snuff boxes (Burkil in ed) or used as fishing floats (Watt, 1889) [5892] .

### *Latex coagulants, fruit pulp:*

It has been used as a coagulant for Ceara latex in East Africa [549] .

### *Buildings, trunks:*

One large baobab was used by the German colonial administration as a lock-up cell for prisoners in Kondoa,

Tanzania [5054] .

*Earrings, fruits, epicarp:*

Fruit cases used for making earrings [5054] .

*Other bark parts, cleansers:*

Juice extracted from the fresh bark is inserted into the wound of an animal killed by poisoned arrow, to ensure that the meat is cleansed (de Wildeman 1946) [1340] [5092] .

*Containers/holders, trunks:*

Hollow trunks of living trees may be put to a variety of purposes. By far the most common is for storage of water, a practice first recorded by the Arab traveller Ibn Battuta, 1299 from naturally hollowed trees in Mali during the early 14th century. The hollowed trunk may be carved out in 3-4 days; a medium sized tree may hold 400 gallons, while a large tree could contain 2000 gallons, and the water therein remains sweet for several years if the hollow is kept well closed. The practise, however, is viewed with disfavour by medical officers as providing a breeding ground for mosquitoes. The opening to the hollow is preferably made just above the axil of a branch so that some water may run directly down the branch into the hollow. If possible the soil below the canopy is removed in order to form a small, shallow depression from which the rain water can be collected and then be taken by means of a bucket and a long rope to the opening in the trunk. In the Sudan Republic the trees are regarded as personal property that may be inherited or sold, and the ownership of the various trees is recorded in local government registers. The trees were often the only source of water available during the dry season for both villagers and long-distance travellers, although a large number of trees were deliberately destroyed during the time of Madhi in order to prevent the movement of people. Hollow trees filled with water in the North Frontier Province of Kenya were used by slave and ivory traders from Ethiopia in order to enable them to cross otherwise waterless country. Early records of European travellers in South Africa noted the use by the Bantu tribes of water stored in natural hollows. A chain-like avenue of trees across the Kalahari to southwest Africa was used for water storage, with a long established tradition of death should a traveller leave the bung out of a tree and waste water. The bushmen are reported to abstract water from hollow trunks by means of grass straws [5892] .

*Containers/holders, trunks:*

In West Africa the hollow trunks may be used as tombs and a place where a body denied burial may be suspended between earth and sky for mummification; people denied burial include poets, musicians, drummers and buffoons [5892] .

*Flowers, games:*

Boys in Jamaica use the flowers to play a game called "keep up". They compete to see who can bounce a flower up and down on their feet the most times [2672] .

*Latex coagulants, fruit pulp:*

A decoction of the fruit pulp is used to coagulate the latex of *Landolphia heudelotii* A.DC. [5892] .

*Sandals, bark:*

In north Nigeria flat pieces serve as the soles of sandals threaded with baobab fibres as toe thongs [549] .

*Soap, bark:*

A soap-lye can be made from the bark-ash [549] .

*Soap, fruits:*

Ash from burnt seed-pods is used to make soap [549] .

*Soap, infructescences:*

The husks are good for burning and a potash-rich vegetable salt may be obtained from this ash which is usable for making soap [549] .

*Fishing floats, containers, infructescences, epicarp:*

Split husks are used as containers and fishing floats [2180] .

*Smoker's equipment, other infructescence parts:*

Used for making ashtrays [5054] .

*Soap, seeds:*

When burnt seeds provide a potash rich salt used for soapmaking [549] [5892] .

*Birdlime, fruit pulp:*

The fruit powder, mixed with latex from various fig trees, is made into birdlime [2719] [2890] .

*Soap, bark, fruits:*

The ash from the bark and fruit boiled in oil is used as a soap [5892] .

*Soap, infructescences:*

The husks provide a potash rich ash suitable for soap making [5892] .

*Containers, snuff boxes, fruits, epicarp:*

In Southern Rhodesia (Zambia) the fruit shell is sometimes used as a snuff-box and for carrying liquids (Pardy 1953)

[1340] [5092] .

*Containers/holders:*

The tree living in very dry situations with its enormous trunk of spongy wood carries a great quantity of water. A good tree may hold as much as 1000 gallons, and girth may vary according to weather conditions. Man has undoubtedly planted trees to be able to tap the aqueous sap as well as for its other multifarious uses. Hollows may be carved out form a small hole which is then corked so that the liquid may collect and be readily drawn off, or even the whole tree hollowed out to form a tank though medical officers may view this with disfavour as furnishing mosquito breeding sites [549] .

*Buildings, trunks:*

During the early mining days in the Transvaal, a hollow baobab was turned into a bar. During World War II, a toilet was built in one hollow baobab in Caprivi. A specimen which is in the grounds of the Kasane Police Station was once used as a jail [5092] .

*Other products:*

Utensils [2774] .

*Buildings, trunks:*

Trunks damaged, e.g. by elephants, are used as shelter in shambas (Kamba, Giriama) and as a hiding place during war (Tharaka) [2719] .

*Temporary shelters, bark:*

Bark used for making temporary structures (Giriama) [2719] .

*Containers, infructescences:*

Fruit shells are used as containers and bowls [2719] .

## **MATERIALS - FIBRES**

*Cloth, bark:*

Used for making loin-cloths [2838] .

*Cords, musical instruments, bark:*

Used for making cords for musical instruments [2838] .

*Paper, wood:*

The wood makes good pulp for strong coarse paper [2241] .

*Paper, bark:*

Paper made from the bark, and so strong is the former that it has given rise to the saying in Bengal "secure as an elephant bound with a baobab rope" [5902] .

*Paper, harnesses/tack, inner bark:*

Source of paper material and used for horse-girths [5902] .

*Printed material, bark:*

Used for the manufacture of especially strong paper, which has been found eminently suitable for paper money [5902] .

*Printed material, inner bark:*

The paper required for currency purposes must necessarily conform to certain standards different from other grades. It should have the capacity to withstand folding, tear, durability, strength and printing quality. There is great dearth of suitable forest raw materials for this purpose in India. Fibre from the inner bark of *Adansonia digitata* L., the African baobab tree, has been in use in England for making currency paper [5902] .

*Pulp, paper:*

It yields 40-50% of pulp suitable for making paper [5902] .

*Ropes, inner bark:*

Tethering rope [5902] .

*Ropes, bark:*

Yields a good rope [1331] .

*Strings (for musical instruments), bark:*

Used for strings for banjo-type instruments [1331] .

The best results are obtained by soaking the inner bark very thoroughly before beating it to soften it and to yield good fibre [1331] .

*Cloth, clothing, bark:*

The bark can be dried and beaten to yield a crude bark-cloth usable as aprons and loin-cloths [549] .

*Cloth, inner bark:*

Yields fibre cloth [5892] .

*Cords, inner bark:*

Used for cordage [5892] .

*Woven material, inner bark:*

Fibre is woven into fabric [2180] .

*Harnesses, inner bark:*

Harness straps [5892] .

*Hats:*

In both Senegal and Ethiopia the fibres are woven into waterproof hats that may also serve as drinking vessels [5892] .

*Sacking, packing, bark:*

The bark can be dried and beaten to yield a crude bark-cloth usable as sacking and packing material for local trade [549] .

*Bark:*

A method has been evolved for extracting the cellulose fibre from the standing tree (Oberstein 1952) [1340] .

*Pulp, paper:*

The wood pulp has been found suitable for both wrapping and writing paper, but attempts to exploit the wood for paper making have so far failed because of the cost of extracting the moisture from the turgid tissues [5892] .

*Bark:*

Fibres may be 3 to 4 feet long (Anon 1907) [1340] .

*Harnesses, inner bark:*

Fibre used for preparation of cattle tethers and carrying bindings [2890] .

*String, sacks, mats, fishing nets, ropes, root bark:*

The root bark is used as string or rope for making fishing nets, sacks, mats etc [5892] .

*Bark:*

The most useful portion of the wood is probably the bark which, after being stripped, pounded and soaked, provides fibrous material of up to 1.5 m long. The process of removing the bark is done so that the tree is not damaged - rectangular strips of bark are cut which are then beaten with a mallet. The fibre is then rolled against the upper leg into a yarn [5092] .

*Paper, wood:*

The wood can be pulped for paper-making, but quality is doubtful [549] .

*Paper, inner bark:*

The reddish-white ribbons of the inner bark yield 32% of pulp which gives a soft flexible white paper of reasonable quality (Heim et al 1920, Adriaens 1945) [1340] .

*Paper, inner bark:*

The soft inner layer of the bark is the only part suitable as a fibre source and was, at one time, sold on the London market for the manufacture of paper (Anon 1904) .

*Paper, wood:*

Suitable as pulp for the manufacture of paper [5092] .

*Hats:*

Waterproof hats [5693] .

*String:*

Used for making strings [2774] .

*Paper, wood:*

The Imperial Institute (Anon 1917) has found that the air-dried wood gives a good yield of pulp which furnishes a brown paper of fair strength [1340] .

*Paper, wood:*

The wood is too soft and spongy to be of use except possibly for making paper (Mogg 1950) [1340] .

*Basketry (from fibre), baskets, trunks:*

Fibre from trunk used for weaving baskets [2719] .

## **MATERIALS - WOOD**

*Plates:*

Used for making large plates which are very light [2838] .

*Fishing floats, plates:*

Used for making wooden platters, trays, floats for fishing nets, etc [2180] [5892] .

*Dugout canoes:*



Wide and light canoes can be made [\[549\]](#) [\[2180\]](#) [\[5892\]](#) .

*Wood board:*

It has been suggested that the wood may be suitable for making ceiling board and fibre board (Pardy 1953) [\[1340\]](#) .

## **MATERIALS - TANNINS/DYESTUFFS**

*Dyes, bark:*

The green bark is used as a dye and for decoration [\[6286\]](#) .

*Dyes, red, roots:*

In East Africa, roots are used to make a soluble red dye [\[6286\]](#) .

*Dyes, red, roots:*

The roots are used in East Africa to yield red dye [\[549\]](#) .

*Tannins, bark:*

In some countries the bark is used for tanning [\[5892\]](#) .

## **MATERIALS - LIPIDS**

*Cosmetics, seed oil:*

Since seed oil is used to treat skin complaints, to a degree it is used cosmetically [\[6286\]](#) .

*Oils, seeds:*

Source of cooking oil but this is not widespread, although there has been interest in expanding such use due to deficits of vegetable oils. Oil extracted by pounding the seeds [\[6286\]](#) .

## **FUELS - UNSPECIFIED FUELS**

*Fruits, epicarp:*

Fruit shells are used as fuel in Tanzania and as water dippers [\[6286\]](#) .

*Fruits, epicarp:*

The seed pods are burnt as a fuel in north Nigeria [\[549\]](#) .

*Fruits, epicarp:*

The husks can be used as fuel [\[5892\]](#) .

*Fruits, epicarp:*

Fruit husks burned as domestic fuel [\[2180\]](#) .

## **FUELS - FUELWOOD**

The wood makes poor firewood unless thoroughly dried out. A large amount of mucilage present, which enables the tree to withstand dessication, obstructs the drying process [\[549\]](#) .

*Fruits, epicarp:*

Fruit shells are used as fuelwood [\[2719\]](#) .

## **FUELS - CHARCOAL**

*Wood:*

Wood can be turned into a poor quality charcoal [\[549\]](#) .

## **SOCIAL USES - SMOKING MATERIALS/DRUGS**

*Fruits, epicarp, peduncle, smoking materials:*

The powdered husk or peduncle may be smoked as a substitute for tobacco [\[549\]](#) [\[5892\]](#) .

## **SOCIAL USES - 'RELIGIOUS' USES**

*Bark, ritual/religion/magic:*

It is believed that a drink made from the bark will impart great strength [\[2506\]](#) [\[5082\]](#) .

*Live plant in situ, religion:*

An extensive fair is held every year during July-August to worship these trees as the 'Wishing Trees'. The popular belief among the people of the locality is that "those are the only trees of the kind in the world". Two saplings have been planted there on the festival day as a sapling gift to the people. These have put up a fast growth and by now they have also become an object of worship along with the bigger trees. A seed sown in a pot in Delhi in April 1977 had grown to a height of 6 ft. by the end of rainy season. Eventually, it was transplanted in a temple compound [5902] .

*Live plant in situ, religion:*

Trees are seen as objects of worship [5902] .

*Bark, ritual/religion/magic:*

It is believed that a baby boy should be washed in water in which the bark has been soaked, but not for too long lest he become obese [5082] .

*Live plant in situ, sacred plant:*

Rarely cut down so as not to incur the wrath of tree spirits [1331] .

*Live plant in situ, magic:*

The odd appearance of the tree has resulted in magical and superstitious uses. In Upper Volta it is left standing as a fetish tree when clearing bush. Primitive tribes of North Nigeria revere it by cutting symbols in the bark [549] .

*Live plant in situ, religion:*

In places it is worshipped as a fertility symbol [549] [1331] .

*Bark, magic:*

Powdered bark is used by sorcerers as a magic remedy for various ills. The healer takes powder in hand, marks patient on face and lips and then throws powder to east and west [1304] .

*Seeds, ritual/religion/magic:*

It is believed that sucking or eating the seeds will attract crocodiles [5082] .

*Fruits, ritual/religion/magic:*

Gilkes (1933) reports from Northern Rhodesia (Zambia) that African women may not eat the fruit while they are in the process of brewing beer, as this will make the beer go bad [1340] .

*Seeds, ritual/religion/magic:*

Some tribes believe that drinking water in which the seeds have been soaked provides protection against crocodiles. Other superstitious beliefs are associated with this species, for example, evil spirits will visit any person who plucks the flowers of the plant [5082] [5092] [5093] .

*Live plant in situ, ritual/religion/magic:*

In the Sudan and West Africa, the tree is worshipped as a 'fertility tree'. It has a magical value to the indigenous inhabitants of the Limpopo valley where the vast majority of rock paintings of women depict life-size seed-pods of Baobab instead of breasts (Friede 1953) [1340] .

*Sacred plant:*

A tree surrounded by complex myths and beliefs among most peoples in areas where it grows. Young plants not cut at all (Tharaka), while large trees are not debarked during or just before rains (Kamba) for fear of rain failure. A sacred and peaceful tree (Giriama). A cut tree is said to bleed like a human being, and this brings bad luck to whoever cuts it (Giriama). A person is believed to turn to opposite sex if he/she walks round it with a goat (Meru) [2719] .

## **SOCIAL USES - MISCELLANEOUS SOCIAL USES**

*Flowers:*

Boys in Jamaica use the flowers to play a game called "keep up". They compete to see who can bounce a flower up and down on their feet the most times. The flower, when used in this way, is called "seaway lash" [2672] .

## **VERTEBRATE POISONS - UNSPECIFIED VERTEBRATES**

*Latex, heart, arrows:*

The latex contains a cardiac glucoside, Strophanthin, which slows the heartbeat. The poison is so toxic that it is much favoured by the Bushmen for use on poisoned arrows [5092] .

## **NON-VERTEBRATE POISONS - UNSPECIFIED MICROBES**

*Fruits, epicarp:*

The seed-pods are burnt. Water which has been filtered through the ash is sometimes added to soup in the belief that

it will kill germs, e.g. those on unwashed baobab leaves [549] .

## **NON-VERTEBRATE POISONS - ARTHROPODA**

*Fruit pulp, Insecta, repellent, livestock pest control:*

Fruit pulp burns with an irritating smoke; used as a fumigant to keep biting insects away from domestic animals [549] [1331] [2180] [2838] [5092] [5892] .

## **MEDICINES**

Its benefit as a febrifuge has not been detected in experimental malaria treatments [5892] .

## **MEDICINES - UNSPECIFIED MEDICINAL DISORDERS**

*Bark, seed oils:*

Contain B-sitosterol which is a medicinal compound [6286] .

*Leaves, bark, humans:*

Contain lupeol acetate as well as B-sitosterol, scopoletin, friedelin and baueronol. Bark additionally contains betulinic acid [6286] .

*Root bark, humans:*

Used in India in traditional medicine. It contains B-sitosterol and 2 glycosides [6286] .

*Stem bark, humans, internal application:*

Stem bark has been used in many medicinal uses. When prepared it is made into a decoction for internal use and functions due to its soluble and insoluble tannin, and gummy and albuminous constituents [6286] .

*Leaves, humans:*

The leaves form a component of many herbal remedies [2180] .

*Fruits, epicarp, humans:*

Ash from burnt seed-pods is used for curing an illness known as 'dankanoma' [549] .

## **MEDICINES - ABNORMALITIES**

*Young leaves, humans, oedemas, poultices:*

Externally, use is made of young leaves, crushed into a poultice, for painful swellings [6286] .

## **MEDICINES - BLOOD SYSTEM DISORDERS**

*Bark, humans, blood, sickle cell anaemia, oral ingestion:*

An aqueous extract of bark is drunk in Nigeria [5901] .

*Leaves, humans, blood:*

Given in smaller amounts, it is blood making [549] .

## **MEDICINES - CIRCULATORY SYSTEM DISORDERS**

*Leaves, humans, blood pressure, hypertension:*

Leaves are hypotensive [549] .

## **MEDICINES - DIGESTIVE SYSTEM DISORDERS**

*Bark, leaves, humans, intestine, diarrhoea:*

In West Africa the bark and leaves are regarded as a remedy for mild diarrhoea (Dalziel 1937) [2618] .

*Fruit pulp, humans, intestine, diarrhoea, oral ingestion:*

A drink prepared from fruit pulp has apparently been used to treat diarrhoea (Dragendorff 1898, Anon 1906) [1340] .

*Bark, humans, teeth, mouth washes:*

Used as a mouth wash for toothache in Tanzania [549] [5892] .

*Leaves, humans, colic, oral ingestion:*

Treated by 'lalo' by mouth or in liquid preparations [549] .

*Leaves, humans, intestine, diarrhoea:*

Leaves pounded in water used to treat diarrhoea [5054] .

*Seeds, humans, teeth, gums:*

The crushed, roasted seeds are applied as a paste to diseased teeth and gums [549] [5892] .

## MEDICINES - GENITOURINARY SYSTEM DISORDERS

*Bark, leaves, humans, urinary tract:*

In West Africa the bark and leaves are regarded as a remedy for urinary disorders (Dalziel 1937) [2618] .

*Leaves, humans, male infertility, female infertility:*

A mixture of the leaves of baobab with those of *Tamarindus indica* is used as a prescription in cases of male and female infertility [5903] .

*Bark, humans, menstruation:*

Used for treating menstrual problems [5054] .

*Leaves, humans, urinary tract, oral ingestion:*

Diseases of the urinary tract treated by 'lalo' by mouth or in liquid preparations [549] .

*Infructescences, humans, menstruation, amenorrhoea:*

Fibres lining the husk are used as a decoction to treat amenorrhoea [549] [5892] .

## MEDICINES - ILL-DEFINED SYMPTOMS

*Roots, fatigue:*

Used to treat fatigue [5054] .

## MEDICINES - INFECTIONS/INFESTATIONS

*Fruit pulp, humans, digestive system:*

Used against dysentery [549] [2180] [2838] [5892] .

*Bark, humans, fever:*

In the past bark has been exported to Europe, for use as a fever treatment. It was traded as cortex cael cedra [6286] .

*Bark, humans, malaria, fevers:*

Adansonin in the bark is thought to be the active principle for treatment of malaria and other fevers [6286] .

*Bark, humans, periodic fever, fever, internal applications:*

In Indian medicine, bark is used internally as antipyretic, antiperiodic. It is used as a decoction, 30g/l of water, boiled down to two thirds [6286] .

*Leaves, humans, fever, prophylactic, teas:*

According to Sebire (1899), the botanist explorer Adanson managed to keep free from fever by taking half a litre of a tea, made from boiling the leaves, morning and evening [2838] .

*Fruit pulp, humans, digestive system, fever, oral ingestion:*

The white pith is used as a remedy and a cooling drink for cases of dysentery and fever [2506] .

*Bark, humans, fever:*

Bark was once marketed commercially for the treatment of fevers under the name 'cortex cael cedra' [2618] [5092] .

*Bark, humans, fever:*

The bark has medicinal properties as a febrifuge in West Africa and in other parts of the world. Its benefit as a febrifuge has not been detected in experimental malaria [549] .

*Bark, humans, malaria:*

It has been used as a quinine-substitute [549] .

*Fruits, seeds, humans, digestive system:*

In Central Africa the fruit and seed have been used as a dysentery remedy (Osol and Farrar 1955, Anon 1907, Anon 1906, Dragendorff 1898) [1340] .

*Fruits, humans, colds, fever, oral ingestion:*

The boiled edible fruit improves colds [5098] .

*Fruits, seeds, humans, digestive system:*

In Central Africa the fruit and seed are believed to help dysentery [1340] [5098] .

*Fruit pulp, humans, fever:*

Used as a febrifuge [549] .

*Humans, malaria:*

Said to be a malaria remedy (Githens 1949) [1340] .

*Fruit pulp, humans, smallpox, measles, eye drops:*

Used in the treatment of smallpox and measles as an eye instillation [549] [2180] [5892] .

*Leaves, humans, malaria, prophylactic:*

In Sierra Leone the leaf is used as a prophylactic against malaria (Anon 1906) [1340] .

*Fruits, humans, fever:*

Used as a febrifuge [5892] .

*Bark, humans, fever:*

Since 1848 the bark, which has a bitter taste, has been an article of commerce in Europe under the name of 'cortex cael cedra' and has been used in fevers, and as a substitute for cinchona bark (Braun 1930) [1340] .

*Seeds, humans, fever, oral ingestion:*

When soaked in water seeds make a palatable drink that has been used to treat fevers [5082] .

*Bark, humans, fever:*

Used as a febrifuge in Puerto Rico (Loustalot 1949) [1340] .

*Leaves, humans, fever:*

Leaves pounded in water used to treat fever [5054] .

*Leaves, humans, fever, prophylactic:*

Used as a prophylactic against fevers (Anon 1906, Anon 1907) [1340] [5892] .

*Bark, humans, fever, vapour baths:*

Bark decoction used for steam bathing of infants with high fever [2719] .

*Fruit pulp, humans, fever, oral ingestion:*

Juice made from pulp is drunk to treat fever (Giriama) [2719] .

## **MEDICINES - INFLAMMATION**

*Bark, leaves, humans, inflammation:*

In West Africa, the bark and leaves are claimed to have anti-inflammatory properties (Dalziel 1937) [2618] .

## **MEDICINES - INJURIES**

*Leaves, humans, wounds:*

In Yola, Nigeria, the leaves are crushed in hot water and used for healing circumcision wounds [5903] .

*Fruit pulp, humans, lungs, haemorrhages, oral ingestion:*

A drink prepared from fruit pulp has apparently been used to treat haemoptysis (Dragendorff 1898, Anon 1906) [2618] [5098] .

*Leaves, humans, wounds, external applications:*

Crushed leaves are applied to wounds for better healing [5098] .

*Leaves, humans, wounds, oral ingestion:*

Wounds treated by 'lalo' by mouth or in liquid preparations [549] .

## **MEDICINES - METABOLIC SYSTEM DISORDERS**

*Bark, humans, temperature regulation, refrigerant:*

In Indian medicine, bark is used internally as a refrigerant [6286] .

*Leaves, humans, sweating, antiperspirant:*

Powdered leaves are similarly used to check excessive perspiration [6286] .

*Bark, leaves, humans, sweating, diaphoretic:*

In West Africa the bark and leaves are believed to have diaphoretic properties (Dalziel 1937) [2618] .

*Leaves, humans, sweating, antiperspirant:*

The Wolofs in Senegal use the dried powdered leaves 'lalo' to diminish excessive perspiration [5903] .

*Leaves, humans, sweating:*

In Sierra Leone the leaf is used to check excessive sweating (Anon 1906) [1340] .

*Leaves, humans, sweating, antiperspirant:*

Used to check excessive perspiration [549] [5892] .

*Leaves, humans, sweating, diaphoretic:*

Used in Central Africa (Dragendorff 1898) [1340] .

## MEDICINES - MUSCULAR-SKELETAL SYSTEM DISORDERS

*Leaves, humans, back, oral ingestion:*

Backaches treated by 'lalo' by mouth or in liquid preparations [549] .

## MEDICINES - NEOPLASMS

*Leaves, humans, unspecified neoplasms, oral ingestion:*

Tumours treated by 'lalo' by mouth or in liquid preparations [549] .

## MEDICINES - NUTRITIONAL DISORDERS

*Leaves, horses, tonic, oral ingestion:*

The mixture is non-fattening and, in small quantities, tones the blood [1331] .

*Bark, humans, rickets, baths:*

Bark decoction used to bathe rickety children in Congo-Brazzaville [549] [5892] .

*Roots, humans, tonic:*

A mash prepared from the dried, powdered roots is given to malarial patients as a tonic (Sierra Leone) [549] [2180] .

*Leaves, humans, tonic:*

It is a tonic when given in smaller amounts [549] .

*Seeds, humans, vitamin C deficiency, oral ingestion:*

When soaked in water, seeds make a palatable drink that has been used to treat scorbutic complaints [5082] .

## MEDICINES - PAIN

*Leaves, humans, stomach, anodyne:*

Leaves pounded and soaked in water are used to treat stomach ache [5054] .

*Bark, humans, teeth, anodyne, mouth washes:*

Used as a mouth wash for toothache in Tanzania [549] [5892] .

*Leaves, humans, back, anodyne, oral ingestion:*

Backaches treated by 'lalo' by mouth or in liquid preparations [549] .

## MEDICINES - POISONINGS

*Seeds, humans, antidote:*

An alkaloid extracted from seeds, adansonine, is said to be an antidote against strophanthine [2180] [2838] [5092] .

*Bark, humans, antidote:*

Used as an antidote to Strophanthus poisoning [5892] .

*Bark, humans, antidote:*

An antidote to a variety of poisons [5054] .

*Fruit pulp, seeds, humans, antidote:*

Both the pith and the seeds, like the bark, contain an antidote to Strophanthus poisoning that is carried by a special member of the Shangaan hunting party [5892] .

*Leaves, humans, insect stings:*

Given in smaller amounts it is good for subcutaneous swellings caused by insect-bites [549] .

*Bark, leafy stems, humans, antidote:*

In East Africa the bark and young shoots are used to counteract Strophanthus poisoning [5155] .

*Bark, leafy stems, humans, antidote:*

The bark and young shoot are used in East Africa as an antidote to Strophanthus poisoning (Braun 1930) [1340] .

## MEDICINES - PREGNANCY/BIRTH/PUERPERIUM DISORDERS

*Fruit pulp, humans, lactation stimulant, oral ingestion:*

Fruit pulp is prepared as a porridge if there is insufficient milk after delivery [2795] .

## MEDICINES - RESPIRATORY SYSTEM DISORDERS

*Leaves, humans, chest, asthma, coughs, oral ingestion:*

The leaves are prepared like spinach and the extracted water taken for asthma, coughs and chest complaints [5098] .

*Leaves, humans, oral ingestion:*

Respiratory difficulty treated by 'lalo' by mouth or in liquid preparations [549] .

*Fruit pulp, humans:*

Traditionally used to treat haemoptysis [2795] .

*Leaves, humans, expectorant:*

Used in Central Africa (Dragendorff 1898) [1340] .

*Seeds, humans, hiccoughs:*

Near Messina the African uses the powdered seed as a remedy for hiccough in infants and children (Bischoff 1932, pers comm to J.M. Watt) [1340] .

## **MEDICINES - SENSORY SYSTEM DISORDERS**

*Fruit pulp, humans, eyes:*

Used for eye diseases [2838] .

*Leaves, humans, ears, oral ingestion:*

Ear troubles treated by 'lalo' by mouth or in liquid preparations [549] .

*Leaves, humans, eyes, oral ingestion:*

Ophthalmias treated by 'lalo' by mouth or in liquid preparation [549] .

## **MEDICINES - SKIN/SUBCUTANEOUS CELLULAR TISSUE DISORDERS**

*Bark, gum, humans, sores, external applications:*

The bark contains a quantity of edible, insoluble, acidic, tragacanth-like gum. This is used for cleaning sores [549] .

*Bark, humans, sores:*

A semi-fluid gum obtained from baobab bark is used to treat sores [2180] .

*Leaves, humans, astringent:*

In Sierra Leone the leaf is used as an astringent (Anon 1906) [1340] .

*Gum, humans, sores, external applications:*

The gum is odourless, tasteless, acidic and insoluble and is used for cleansing sores [5892] .

*Roots, humans, skin, baths:*

In Zambia an infusion of the roots is used to bath babies in order to promote smooth skin [5892] .

*Leaves, humans, sores, poultices:*

David Livingstone treated indolent sores with poultices of powdered baobab leaf; the success of the treatment may be because the ulcers were of dietetic origin [5892] .

## **ENVIRONMENTAL USES - SHADE/SHELTER**

*Live plant insitu, towns:*

Particularly valued for shade in Jamaica [2672] .

*Live plant in situ:*

This giant tree has also been used for shelter, the African traveller excavating a hole in the trunk. Extra large-sized trees have been used as farm storage rooms (de Villiers 1951) [1340] .

## **ENVIRONMENTAL USES - INDICATORS**

Since the buffalo-weaver birds in Northern Transvaal always rest on the western side of the baobab, the tree can be used in lieu of a compass [5892] .

The nocturnal blossoming of these trees, taken in association with (mw)-arange (*Delonix elata*), is used as a weather indicator for planting at the start of the long rains in March-April [2890] .

Appearance of new leaves or flowers signals the start of the rainy season (Kamba, Mbeere) [2719] .

## **ENVIRONMENTAL USES - SOIL IMPROVERS**

*Fertilisers, entire plant ex situ:*

The ash of all parts has value as a fertiliser [549] .

*Fertilisers, infructescences:*

Fruit husk burned as a domestic fuel. The residual ash, which is rich in potassium is used as a fertiliser [2180] .

*Fertilisers, entire plant ex situ:*

Fallen trees improve the soil quality considerably [2719] .

## **ENVIRONMENTAL USES - ORNAMENTALS**

*Live plant in situ, gardens:*

In India, usually planted in gardens and near tombs of Muslim saints [1604] .

*Live plant in situ, streets:*

Planted as an avenue tree [5054] .

*Potted plants, live plant in situ:*

A popular species for bonsai specimens. The South Africa 'Baobab Style' originated from this species [5097] .

*Live plant in situ, gardens:*

Planted as an ornamental outside its range [2719] .

## **ENVIRONMENTAL USES - BOUNDARIES/BARRIERS/SUPPORTS**

*Agricultural supports, live plants in situ:*

The tree is often used as a beehive hanging focus, the stout branches are climbable and will support the weight of a man, from which hives can be suspended easily out of the reach of the ratel (honey badger) [2719] [2890] .

## **USES NOTES - MISCELLANEOUS**

The raw seeds, acid and refreshing, are sucked to relieve thirst on a journey [2506] .

## **NUTRITIONAL VALUE**

Fermentation of powdered de-hulled seeds is known to increase protein digestibility. It also reduces the trypsin inhibition activity sixfold, but increases tannin content [6286] .

*Fruit pulp, nutritional analyses:*

Rich in pectin, most of it being water soluble with a low content of protopectin. It was found to have a low degree of esterification. Intrinsic viscosity values of the water soluble pectin are about one fifth of those of commercial apple pectin and hence does not give a good jelly of high solids content because it tends to precipitate rapidly in acid media to form irregular gels [6286] .

*Leaves, nutritional analyses:*

High protein and mineral content both in crude and purified mucilage. The mucilage contains a very small amount of neutral sugars-rhamnose and galactose. Uronic acid is present as a mixture of galacturonic and glucuronic acids. The relatively high proportion of uronic acids classifies the mucilage as a galacturonorhamnan polysaccharide which is acidic. Viscosity depends on the mix of carbohydrates, proteins and minerals in the mucilage and is lowered with cooking at high temperatures. Nonetheless, baobab mucilage has great potential as a thickening agent [6286] .

*Leaves, nutritional analyses:*

In terms of protein content and WHO standards, leaves of baobab can be rated 'good' in that they score well for 5 of the 8 essential amino acids. It should be noted that the leaf amino acids such as tryptophan are increased to acceptable levels when consumed with other staples such as coarse grains. Nordeide et al (1996), who had analysed leaves from southern Mali, showed that lysine appeared to be a limiting amino acid relevant to the FAO reference protein for children 2-5 years old (FAO, 1985), but threonine and tryptophan exceeded the standard. Leaves are also known to be significant sources of minerals, especially magnesium and manganese. Glew et al., 1997 pointed out that baobab leaves have a high content of iron compared to numerous other wild gathered foods and are a rich source of calcium. Iron is of special importance because of the prevalence of iron-deficiency anemia in savannah areas. Glew et al., 1997 recorded the total lipid content of baobab leaves at 55 mg/g of dry weight, and that they were not significant source of linoleic acid. Nordeide et al., 1996 recorded that the level of vitamin A was about one-third the content in *Amaranthus* dried leaves. Becker, 1983 noted the absence of vitamin C but a significant content of vitamin B2 [6286] .

*Fruit pulp, vitamin C:*

Very rich in ascorbic acid, up to 373 mg per 100 g [2838] .

The high content of tannin may be acceptable in terms of normal usage of the leaves due to an emollient present



[6286] .

*Leaves, nutritional analyses of field samples:*

Calcium (23.00 +/- 0.28 mg/g), magnesium (4.99 +/- 0.03 mg/g), potassium (15.67 +/- 0.22 mg/g), phosphorus (0.47 +/- 0.02 mg/g), copper (31.20 +/- 0.40 ug/g), iron (3.2 +/- 0.2 ug/g), manganese (53.3 +/- 0.3 ug/g), sodium (8.6 +/- 0.2ug/g), zinc (95.0 +/- 1.3 ug/g). Analyses based on mean of 4 determinations [5903] .

*Leaves, nutritional analyses of field samples (% dry weight) :*

Moisture (% wet wt) (68.60 +/- 1.5), ash (9.20 +/- 0.10), crude protein (15.91 +/- 0.10), crude lipid (3.38 +/- 0.10), crude fibre (17.48 +/- 0.29) carbohydrate (54.11 +/- 1.20) [5903] .

*Leaves, nutritional analyses of field samples in mg/100 g:*

Carotene (10.25 +/- 0.21), riboflavin (1.23 +/- 0.03), thiamine (0.48 +/- 0.03), total ascorbic acid 203.8 +/- 25), reduced ascorbic acid (131.2 +/- 1.8). Analyses were based on 4-8 determination [5903] .

*Leaves, nutritional analyses of field samples in mg/g dry wt.:*

Aspartic acid (12.2), threonine (6.1), serine (7.0), glutamic acid (15.3), proline (5.7), glycine (4.0), alanine (4.2), cysteine (0.5), valine (7.4), methionine (2.4), isoleucine (7.6), leucine (10.2), tyrosine (3.7), phenylalanine (6.9), lysine (10.2), histidine (3.6), arginine (9.5), tryptophan (2.1), total N (24.5 mg), total N from amino acid (18.8 mg). Analyses were based on mean of 3 determinations and total N was analysed using Kjeldahl method [5903] .

*Leaves, nutritional analyses of market sample (in %dry wt.):*

Moisture (% we wt) (9.53 +/- 0.01), ash (12.23 +/- 0.05), crude protein (16.17 +/- 0.08), crude lipid (3.10 +/- 0.09), crude fibre (15.64 +/- 0.21), carbohydrate (52.90 +/- 1.40) Analyses based on mean of 4-8 determinations [5903] .

*Leaves, nutritional analyses of market samples in mg/100 g:*

Carotene (8.51 +/- 0.51), riboflavin (1.15 +/- 0.05), thiamine (0.57 +/- 0.03), total ascorbic acid (171.0 +/- 3.6), reduced ascorbic acid (48.0 +/- 1.1) Analyses based on mean of 4-8 determination [5903] .

*Leaves, nutritional analyses of market samples in mg/g dry wt.:*

Aspartic acid (13.3), threonine (6.7), serine (7.3), glutamic acid (15.5), proline (6.1), glycine (4.2), alanine (4.5), cysteine (0.5), valine (8.4), methionine (2.7), isoleucine (7.7), leucine (10.7), tyrosine (4.1), phenylalanine (5.4), lysine (10.3), histidine (4.3), arginine (9.5), tryptophan (2.4), total N (25.9 mg), total N from amino acid (19.4 mg) Analyses based on mean of 3 determinations. Total N was analysed using Kjeldahl method [5903] .

*Fruit pulp, vitamin C:*

Very rich in vitamin C [1331] [5092] [5098] .

*Leaves, nutritional analyses of market samples:*

Calcium (32.49 +/- 0.20 mg/g), magnesium (5.13 +/- 0.60 mg/g), potassium (16.43 +/- 0.26 mg/g), phosphorous (0.59 +/- 0.02 mg/g), copper (21.9 +/- 0.30 ug/g), iron (3.0 +/- 0.2 ug/g), manganese (48.8 +/- 0.4 ug/g), sodium (9.3 +/- 0.2 ug/g), zinc (94.1 +/- 0.8). Analyses were based on mean of 4 determinations [5903] .

*Fruits, vitamin C:*

The Nutrition Council of Southern Rhodesia (Zimbabwe) regards the fruit as an important source of ascorbic acid, in view of its high content and storage qualities (Anon 1956) [1340] .

*Fruit pulp, carbohydrates, tartrates, calcium, vitamin C:*

The seeds are embedded in the dry acidulous, mealy pulp which is rich in mucilage, pectins, tartrates and free tartaric acid. The presence of tartrates gives rise to the name 'cream of tartar tree'. Calcium and, when eaten raw, vitamins B, and C are abundant [549] .

*Seeds, proteins:*

The residual seed cake, after oil extraction, is rich in protein [2180] .

*Leaves, nutritional analyses:*

The leaves are rich in mucilage containing uronic acids, rhamnase and other sugars. Tannins, potassium tartrate, catechins and a flavonic pigment, Adansonia flavonoside, are also present. On alkaline soils at least, if not on others, the leaves contain a high calcium content. It is said that Dakaroise consume 35-49 gms of 'lalo' daily providing an adequate calcium intake. The fresh leaf is rich in vitamin C but this is lost on drying in producing 'lalo' [549] .

*Fruit pulp, vitamin C:*

The vitamin C content is tenfold that of oranges [1382] [2180] .

*Seeds:*

The kernel compares favourably in protein value with that of domestic nuts, the principal protein being a globulin. It contains no starch but yields about 12% of oil [5092] .

*Leaves, nutritional analyses:*

Fresh leaves are rich in vitamin C as well as containing uronic acids, rhamnase and other sugars, tannins, potassium tartarate, catechins, etc [5892] .

*Seeds, nutritional analyses:*

Rich in protein and thiamine, 100 gm daily being adequate to supply an adult's requirement. Oil-content by ether

extraction is recorded as 68% of the kernel. The oil is non-drying and consists of stearic, palmitic and oleic acids. The kernel is free of starch, alkaloid and cyanogenetic glycosides [549] .

*Fruit pulp, nutritional analyses:*

Fruit pulp contains sugars but no starch, and is rich in pectins. It is also a good source of assimilable calcium and thiamine [2180] .

*Leaves, nutritional analyses:*

Fresh young leaves have a protein content of 4%; they are rich in vitamins A and C and contain more assimilable calcium than some cultivated green vegetables such as kale [2180] .

*Seed kernels, nutritional analyses:*

Have a protein content greater than that of groundnuts; also richer in lysine, with a high content of thiamine, calcium and iron. They contain 12-15% edible oil, of which the dominant fatty acids are palmitic, linoleic and oleic. The defatted seed flour contains up to 48% protein and 2% thiamine [2180] .

*Leaves:*

Young leaves rich in Vitamin C [1382] .

*Seeds:*

Very tasty and highly nutritious [2795] .

## ANTINUTRITIONAL FACTORS

*Seed oil:*

Upon cooking or frying, polyunsaturated fatty acids of seed oil undergo transformations such as oxidation, polymerisation and cyclisation. Some of the cyclic compounds may be toxic [6286] .

*Seeds, tannin, adansonine:*

Known to contain tannin, a trypsin inhibitor and an alkaloid adansonine. Normal processing in cooking renders most levels acceptable and there are potential methods for reduction if oil is processed. However, amylase inhibitor is seen in seeds but is considerably reduced when dehulled [6286] .

*Unspecified parts:*

The species *Adansonia* contain cyclopropene and cyclopropane fatty acids. Whereas cyclopropane fatty acids appear to have no adverse effect on normal fatty acid metabolism, cyclopropene fatty acids or sterculic acid can have adverse effects [6286] .

*Leaves:*

Have high mucilage content, but if used in large quantities may reduce assimilation of dietary nitrogen [2180] .

## TOXICITY/POISONOUS COMPOUNDS

*Latex, strophanthin:*

The latex contains a cardiac glucoside, strophanthin, which slows the heartbeat [5092] [5093] .

## BIOLOGICAL ACTIVITY

*Bark:*

Extracts of the bark have proved ineffective against experimental malaria (Karel and Roach 1951, Spencer et al 1947) [1340] .

*Leaves:*

Give negative tests for haemolysis and presence of alkaloids, tannins and sterols (Wall et al 1955) [1340] .

## CHEMICAL ANALYSES - MISCELLANEOUS

*Bark:*

Some time ago bark was obtained from a very large tree in Madhya Pradesh for the purpose of carrying out suitability tests as raw material for paper. The material obtained was nevertheless, very inappropriate and was only 10% fibre and 90% mealy powder. The fibre length is 7 mm and diameter 0.025 mm showing that if a pure sample of bast fibre could be obtained it might give good strength. During the course of training in Paper Technology the Junior author had the opportunity to test another set of material. With "all this and heaven too" there should be no doubt left about the industrial potential of *Adansonia digitata* as a raw material for various types of paper, particularly 'currency paper' [5902] .

A dietetic analysis of the fruit pulp, leaf and seed is available (Imperial Bureau of Animal Nutrition 1936) [1340] .

*Bark, alkaloids:*

The bark allegedly contains adansonine, with an action opposite to that of *Strophanthus* [5098] .

*Leaves, chemical analyses of field samples in mg/100g:*

Total oxalate (4.37 +/- 0.14), soluble oxalate (1.75 +/- 0.07), phytic acid (0.05 +/- 0.01), phytic acid (%total of P) (10.6 +/- 0.04), tannins (19.8 +/- 0.3), hydrocyanic acid (40.5 +/- 3.2). Analyses based on mean determination of 4-8 determination [5903] .

*Leaves, chemical analyses of market samples in mg/100 g:*

Total oxalate (5.26 +/- 0.21), soluble oxalate (1.96 +/- 0.10), phytic acid (0.04 +/- 0.01), phytic acid (total P) (6.8 +/- 0.02), tannins (17.8 +/- 0.3), hydrocyanic acid (37.2 +/- 2.6). Analyses based on mean of 4-8 determination [5903] .

*Fruit pulp, citric acid:*

Rich in citric acid [2618] [5092] [5155] .

*Bark:*

An unnamed alkaloid is recorded present, and also the presence of the alkaloid, adansonin, but examination of Nigerian material gave inconclusive results on the presence of alkaloids [549] .

*Fruit pulp, flavonols, triterpenoids:*

Medicinal value may possibly be ascribed to one of several flavonols, such as quercetin-7-O-beta-D-xylopyranoside or perhaps also to 7-baueren-3-acetate, a triterpenoid which has also been isolated from the plant [2618] .

*Fruit pulp, tartaric acid:*

Rich in tartaric acid [2506] [2618] [5092] [5098] [5155] .

*Fruit pulp:*

Contains potassium acid tartrate [2506] [5092] .

*Fruits, vitamin C:*

Carr (1955) isolated 175 to 445.4 mg per cent [1340] [5155] .

*Bark:*

According to Loustalot and Paga, 1949 there are no alkaloids present, and accounts from Nigeria are inconclusive (Burkil ined). However, according to Watt and Breyer-Brandwijk, 1962, it contains the alkaloid adansonin, which has a *Strophanthus*-like action [5892] .

*Leaves, bark:*

Contain a high percentage of mucilage [5092] .

*Leaves, calcium:*

Rich in calcium [5098] .

*Seeds, alkaloids:*

Contain an alkaloid, adansonin, used traditionally as an antidote for *Strophanthus* poisoning [5092] .

*Bark:*

Contains adansonin which has a *strophanthus*-like action (Bally 1938) [1340] [5155] .

*Bark:*

The bark juice contains a tragacanth-like gum (Bally 1938) and the bark itself abounds in mucilage [1340] .

*Fruit pulp, ascorbic acid:*

Very rich in ascorbic acid (up to 373 mg of vitamin C per 100 g) [2838] .

*Fruit pulp:*

Contains malic acid [5155] .

*Fruit:*

Watt and Breyer-Brandwijk (1962) provide several references relating to chemical composition of the fruit [1340] .

*Kernel, oil:*

Yields 11.6 % of fixed oil (Anon 1913, Pelly 1913) [1340] .

*Leaves:*

Rich in vitamin C, sugars and potassium tartrate [5097] .

*Seeds, oils:*

Contain 11 - 13 % oil [2506] [5118] [5155] .

*Seeds, oils:*

Contain 12.92 % (Wehmer 1929-31) [1340] .

*Seeds, oils:*

Oil is clear viscous and bright yellow with no marked odour and taste (Anon 1913) [1340] .

## **POLITICAL/SOCIOECONOMIC CONSTRAINTS**

The tree has a proven adaptability to India where some of the existing ones are perhaps older than the oldest

indigenous trees. Curiously enough, the opinions expressed in favour of its extension for over a century ago have not gained the attention they deserved. The need for new raw materials is no doubt more acute now than it was ever before and it is time that a serious thought is given to the proposal. As is evident from the observations given above, in India, baobab is definitely a fast growing species. If judiciously planted, its performance can be improved upon and collection of bark can perhaps be started at a fairly early age, say, 5-8 years [5902] .

## CONSTRAINTS - MISCELLANEOUS

Wood is too pulpy to be used as timber [2506] .

*Fruiting, West Africa:*

Time required to produce fruit is 8 years [2180] .

*Fruiting, Zimbabwe:*

Time required to produce fruit is 23 years [2180] .

Areas where the baobab can be grown are restricted to those with not more than one day of frost per year [5097] .

The tree should not be planted near houses since lateral roots may reach over 100 m in length [2719] .

Wood is easily attacked by fungi [549] [5892] .

*Fruiting, Kenya:*

It is said to produce its first fruits after 60 years (Kitui) [2719] .

Eating much fruit pulp with little else is said to cause weaknesses and swelling of joints [2719] .

## CLIMATE

Semi-arid areas, being mostly encountered in the Taveta/Isiolo climate type [2241] .

The baobab is widespread throughout the hot, drier regions of tropical Africa [2180] .

In low, hot, high humidity coastal areas [2719] .

## RAINFALL

Grows in zones with 100-1000 mm annual rainfall, but trees are often stunted in the lower rainfall areas [2180] .

*Kenya:*

300-900 mm [2719] .

250-1100 mm [2838] .

## TEMPERATURE

Can tolerate very high temperature (mean maximum 40-42°C in West Africa) and for minimum temperatures, can survive as long as there is no frost. Typically mean annual temperature is 20-30°C [6286] .

Mean annual temperatures of 20-30 degrees C [2180] .

## ALTITUDE

Common altitudes appear to be 450-600 m a.s.l., but sometimes has been quoted from 1-1500 m including 1500 m in Ethiopia [6286] .

Sea level to 1500 m a.s.l. [2838] .

In Eritrea and Somalia it is typically lowland, but in Sudan it thrives in the Nuba Mountains [6286] .

*Ethiopia:*

Generally limited to lower than 900 m, but found up to 1500 m [2180] .

*Southern Africa:*

100 - 1060 m [5104] .

*Tanzania:*

1250 m [2774] .

*Kenya:*

From the coast to 1250 m a.s.l. [5693] .

## TOPOGRAPHY/SITES

Coastal plains of Togo and Benin [2838] .

*West, Central Africa:*

Along tracks and associated with habitation [6286] .

*West, Central Africa:*

It is found on coastal areas e.g. estuarine areas of Senegal, coastal plains of Ghana, Benin and Togo, also coastal regions of Zaire, suggesting secondary colonisation after introduction [6286] .

## **DRAINAGE**

Found on quite poorly drained soils in Zimbabwe and on the poorly drained plains of the Zambezi delta and is also reported on sandy soils overlying compacted silt, liable to flooding in heavy rain, in Nigeria [6286] .

## **GEOLOGY**

*Kruger National Park, South Africa:*

Granite, basalt, dolerite, Karoo sediments [5155] .

## **SOILS**

Stony, non agricultural soil, rocky and lateritic soils. Also clays, sands, alluvial silts and loams of various kinds [6286] .

Characteristically occurs on free-draining sandy textured soils, but not on deep sands, where it is unable to get enough moisture or anchorage. It is pH independent and tolerates shallow lateritic soils. Also found on rocky hillsides, in calcareous soils (Cape Verde, Senegal, Mali), on sites receiving run-off, or where water accumulates [2180] .

Grows in most well drained soils, deep rooted, drought hardy, prefers a high water table [5693] .

Varied, but common on red soils, sandy loam and in rocky areas [2719] .

Acid or calcareous, and either clays, sands or stony soils [2838] .

## **VEGETATION**

*Ghana, Togo and Benin:*

Coastal savanna [2838] .

It was present in the last remnants of dense deciduous forest [2838] .

*Eastern Africa:*

In Kenya, southwards to Mozambique, populations are coastal as well as scattered in lowland bush and scrub, although in Tanzania it is a relict on upland plateaux cleared for cultivation [6286] .

*Southern Africa:*

In Angola and Namibia it occurs in mature woodland and throughout Angola, Zimbabwe and northern South Africa as a savannah component. In Angola there are also coastal lowland populations [6286] .

*West, Central Africa:*

Savanna [6286] .

*Africa:*

Tropical savannas [5902] .

*Tanzania:*

Coastal woodlands, bushlands and wooded grasslands [5054] .

*Kenya:*

Grows in dry low country in *Sterculia-Delonix alata-Acacia-Commiphora* bushland [2719] .

*Namibia:*

Open woodland and village meadow [5118] .

*Southern Africa:*

Dry woodland, mostly in rocky well-drained soil [5097] .

## **ECOTYPES**

Its frequent association with similar habitats of *Tamarindus indica*, *Butyrospermum paradoxum* (shea), *Parkia* spp. (locust bean), *Balanites aegyptiaca* (desert date) or *Acacia albida* places it into a category of incipient domesticate and a likely tolerance beyond its natural home into ecotones [6286] .

## POLLINATION

Pollination is chelropterophilous and anemophilous. The androeceum and corolla later drop from the young fruit [2838] .

In 1945 a fruit bat (*Eidolon helvum*) was recorded pollinating baobab in West Africa. Other evidence for bat pollination came from East Africa. The species were all fruit bats; *E. helvum*, *Epomorphorus gambiensis* and *Rousettus aegyptiacus*. The flowers emit a scent that attracts the bats. The scent is described resembling carrion (i.e. a sour smell). Bats swoop down on the flowers to seek the nectar secreted on the inner basal part of the sepals from secretory hairs. Visits are for seconds only and bat claws cling to and damage both corolla and staminal tube of the flowers. Bats have also been thought to eat some pollen. Suggestions that wind pollination could occur (Jaeger, 1945; Wickens, 1982) or that ant pollination is possible (Humphries, 1982) are discounted by Baum, 1995a although the suggestion that bush babies (*Otolemur crassicaudatus* and *Galago senegalensis*), known to feed on the flowers, play a pollinating role (Coe and Isaac, 1965) is not discounted; nevertheless they probably only play a minor role. The sour scent of the flowers also attracts certain flies and nocturnal moths as well as several species of bollworms that might effect some pollination. However, the pendulatory nature of the flowers and phenology favours the action of fruit bats [6286] .

Lifespan of the flower is not more than 24 hours [2180] .

It is pollinated by bats (*Galago crassicaudatus*) and insects, but is also adapted for wind pollination [2180] [5082] . Pollination effected by Straw-coloured Fruit-bat (*Eidolon helvum*) in north and central Africa. Although this species does occur in southern Africa, it's involment in pollination has not been confirmed here. In the Okavango Delta it is probably the most common fruit bat, Peter's Epauletted Fruit Bat (*Epomophorus crypturus*), which is mainly responsible for pollination. Blooms unfold just before dark and only last 24 hours. The heavy, carrion-like scent of the flowers also attracts large numbers of nocturnal insects which may also play a role in pollination, as well as the predatory bats that hunt them [5092] .

Flowers are said to be pollinated by bluebottles [1171] .

In North Africa, pollinated by a species of bat, *Eidolon helvum*. In the Transvaal the same species of bat occurs but it has not been determined whether it is responsible for pollination there [5155] .

The unpleasant smelling nectar attracts pollinating fruit bats [2774] [5054] [5693] .

## FLOWERING/FRUITING/SEED SET

### *Flowering:*

March-April, probably a little later in the Sudan Sahelian zone. There are, however, large differences between individuals [2838] .

### *Fruiting:*

The first fruits appear when the tree reaches the age of 8-10 years, but they are not abundant before the tree reaches the age of 30 [2838] .

### *Flowering, South Africa, Zimbabwe:*

Baobabs started to flower at 16-17 years, while in Zimbabwe, first flowerig has been suggested at 22-23 years. This high divserity could be due to climatic differences [6286] .

### *Flowering, fruiting, West Africa:*

Baobab flower and fruit from 8-10 years. Elsewhere, there are diverse ages reported [6286] .

### *Fruiting, Ivory Coast:*

Baobabs fruit twice a year in Bouake region in Ivory Coast [6286] .

### *Fruiting:*

In general, fruits can be produced from 8-23 years onward. The first fruits are ripe in December and harvesting goes on until April [6286] .

### *Fruiting, Zimbabwe:*

Fruits edible from April-June [2506] .

### *Flowering, Namibia:*

October to March, but most often in November and December, with a second peak in February [5121] .

### *Flowering, South Africa:*

October to December [2618] .

### *Flowering, Nigeria (north):*

Flowers usually appear between June and August [5903] .

### *Flowering, southern Africa:*

October to December [5082] [5097] .

### *Flowering:*

The flowering season varies with the latitude of its location [5903] .

### *Fruiting, Namibia:*

Mostly January to April; young fruit appear in October and November [5121] .

### *Fruiting, southern Africa:*

April to May [5082] [5097] .

### *Flowering:*

Lifespan of the flower is not more than 24 hours [2180] .

### *Flowering, South Africa:*

Flowers usually appear in November, but may be as early as October [5155] .

### *Fruiting, Namibia:*

Fruit available April to May [5118] .

### *Fruiting, South Africa:*

Fruits mature in April/May and can persist on the trees until the next spring [5155] .

### *Fruiting, Kenya:*

July-September [2719] .

## **DISPERSAL**

Seed dissemination is efficiently carried out by men and animals that eat the fruits. The seeds are found in the faeces [2838] .

## **GERMINATION**

The seed seems to germinate in vitro without any difficulty. They are very fragile, brittle and do not seem to be able to survive in the presence of grazing animals [2838] .

Germination is poor [2241] [5693] .

Germinate only in very good rainy seasons [5092] .

## **SEEDLING DEVELOPMENT**

Young trees develop a distended underground organ for storing water from which the tap and side roots emerge [5092] .

## **VEGETATIVE GROWTH**

Irvine (1930) claims it is very slow, but Aubreville (1950) says he saw individuals giving evidence of fast growth. According to Chaumeton (1814), the growth of baobab is at first very quick, but progressively reduces to an extremely slow growth rate [2838] .

On average, a height of 2 m is reached in 2 years and about 12 m by 15 years. Young trees add 30 cm per year in diameter. Transplanted individuals of 0.5 m height grow to 2 m in the first year after transplanting (This data relates to seed propagated trees) [6286] .

Once started, it grows well and can be 2 metres tall in two years [2241] .

A sapling planted in the premises of the Sugar Factory at Munderwa, Distr. Basti, U.P. grew to a height of about 6 feet by the end of the rainy season. It has since been growing pretty fast and the measurements taken after 8 years (December 1975) showed a girth of 165 cm (5 ft. 6 in.) close to ground level. At b.h. it measured 100 cm (3 ft. 4 in.) and a total height of about 18 ft. There are 2 very ancient trees of *Adansonia* (girth 30 ft. and 23 ft.) growing at Mangliawas near Ajmer [5902] .

### *India:*

It is a fast growing tree [5902] .

### *Growth rate:*

A 17 year-old tree was 6 m high. A tree planted in Kruger National Park reached 20 m in 38 years, with a circumference of 3.5 m. It has been established that they grow fast in the first 270 years, reaching a diameter of approximately 2 m during that period. Subsequently, the average annual increase is limited to about 2.5 mm [5092] [5155] .

Under good conditions, rapid growth in diameter and height is possible, reaching 2 m in 2 years, up to 15 m in 12 years [2180] .

## *Africa:*

Moderate to fast (500-800 mm per year), especially for the first 5 years [5097] .

Fairly fast growing when young [2774] [5155] .

Fairly fast-growing [5693] .

Seedlings have flattened hypocotyls and the first leaves are petiolate (with a leaf stalk), generally simple and narrowly linear [5097] .

## **LONGEVITY**

It lives to an incredible age without any signs of decay [5902] .

Carbon-dating and the examination of core samples from stems indicate that specimens with a diameter of 10 m may be more than 2000 years old [5082] .

Grow to great age and are very tough and difficult to destroy [1331] .

One of the largest and longest living trees in the world (3000 years) [2506] [2774] [5054] [5693] .

The University of Rhodesia radio carbon-dated a tree of 5 m diameter as being 1010 years old. Vogel, Fulls and Visser (CSIR) recently carbon-dated a tree of 5 m diameter as being only 600 years old. These differences may be attributable to climatic differences. In practice, during times of drought, the girth of these trees actually decreases, emphasising that size is not a reliable guide to age [5092] .

The fabled longevity of the tree is not satisfactorily confirmable, but the age of a tree cut down for the Kariba Dam project was determined by carbon14 dating as 1010 plus or minus 100 years old, with an inference that really large individuals could, indeed, be several thousand of years old [549] .

May live for hundreds of years [2180] .

A mature baobab has remarkable vitality and resilience and it can recover even after being ring-barked [5082] [5092] .

## **CYTOLOGY**

For the genus,  $x = 8$  (high polyploidy) [5150] .

## **PHYSIOLOGICAL TOLERANCES**

*Adansonia digitata* has an outstanding ability to withstand severe drought and fire, two of the major hazards to plant life in dry areas of Africa. Early shedding of the leaves, a water conserving device of many plant species in areas of low rainfall is seen baobab. It is also observed that the trunk of the tree contracts when the environment becomes dry and it expands in the wet season. Owen, 1974 reported a marked increase in the circumference of a baobab after heavy rainfall, which followed a long drought in South Africa. It is reported that the trunk of baobab is covered by a thick fire resistant bark with regenerative powers. The regeneration results in a thickened uneven integument, which gives the baobab its distorted appearance resembling elephant skin [6286] .

The tree is not much affected by bush fires, but it is subject to damage by elephants who like to rub themselves against the trunk [2838] .

One of the most important factors in favour of the bast fibre being useful is that *Adansonia* bark stripped off again and again replenishes afresh without killing the tree [5902] .

Roots retain vitality after tree is cut down [1331] .

The baobab has an extensive root system and high water holding capacity. It survives well in dry climates and is resistant to fire [2180] .

The bark is fibrous. It is commonly stripped off the lower bole. The tree appears to be able to survive considerable rough treatment and to regenerate the bark [549] .

The bark fibres are commonly completely stripped from the lower trunk yet the tree is able to survive and regenerate new bark [5892] .

## **ASSOCIATED MAMMALS**

Unpleasant-smelling nectar attracts pollinating fruit bats [5054] .

Leopards and spotted genets utilise water which collects in trees with hollow trunks. Rats also invade the hollow trunks [5092] .

## **ASSOCIATED BIRDS**



Birds such as rollers, hornbills, parrots and barn owls nest in the trunk recesses [5092] .

## ASSOCIATED INSECTS

The baobab harbours several pests of the cotton plant [2838] .

Host for members of the Pseudococcoidae, the mealy bugs, which can be vectors for viral diseases of cocoa, also the cocoa capsid, *Distantiella theobroma* [6286] .

Minor host of the mango mealy bug (*Rastrococcus iceryoides*) and the nematode *Rotylenchus reniformis*. This nematode, in addition to the *Meloidygyne* sp. nematode, has implications for baobab as an inoculum source for newly developed agricultural enterprises in semi-arid areas of Africa [6286] .

*Hymenoptera:*

Bee swarms establish hives in the trunks' crevices. Bushmen harvest honey from these hives [5092] .

*Diptera:*

Trees with hollow trunks which hold water are conducive to the breeding of mosquitoes [5092] .

*Lepidoptera:*

Leaves are eaten by large caterpillars [1171] [2506] .

## ASSOCIATED FUNGI

Baobab roots can be colonized by *Glomus* sp., but there is low dependency and no increase in biomass as a result [6286] .

## ASSOCIATED ORGANISMS - MISCELLANEOUS

*Reptilia:*

Reptiles invade the hollow trunks [5092] .

## INSECT PESTS

*Coleoptera (beetles):*

In Ghana and unidentified black beetle can damage and eventually destroy branches by girdling. In West Africa, there is a report of a longhorn beetle, *Aneleptes trifasciata*, which will attack and kill young trees by girdling [6286] .

*Lepidoptera:*

In the Transvaal of South Africa a caterpillar, *Gonimbrasia herlina* can feed on the leaves [6286] .

The cotton bollworms *Heliothis armigera*, *Diparopsis castanea* and *Earias biplaga*. Cotton stainer bugs such as *Dysdercus fasciatus*, *D. intermedius*, *D. nigrofasciatus* , *D. suberstitiosus*, *Odontopus exsanguinis* , *O. sexpunctatus*. *Oxycarenus albipennis* as well as flea beetles, *Padagricra* spp. [6286] .

## MAMMALIAN PESTS

*Baboons:*

Greatly relished by baboons which destroy large numbers of the fruits, tearing open the woody shells to gain access to the contents (Codd 1951) [1340] .

*Elephants:*

Cause severe damage, especially during times of drought, when large portions of inner trunk wood are chiselled out [5092] .

*Elephants:*

Sometimes destroy vast numbers of baobab trees by tearing off pieces of the stem for moisture. The only way to save these trees is to restrict the number of elephants in the area [5097] .

*Elephants:*

Very much liked by elephants who eat the spongy tissues of the bole and can damage or destroy trees [2774] .

## FUNGAL DISEASES

The only macrofungi recorded are *Daldinia concentrica* (Bolt.) Ces.& Br.) and *Trametes socrotana* Cooke. There are only 2 records for fungal diseases; a leafspot in Sudan (*Phyllosticta* spp.) and a powdery mildew in Tanzania

(*Leveillula taunica* (Lev.) Arnaud.) [6286] .

## VIRAL DISEASES

Although not serious, mistletoe, *Loranthus mechouvii* Engl. has been recorded as a parasite on the baobab in Angola, and parasitic figs have also been seen [6286] .

## PHYSIOLOGICAL DISEASES

Trees have been reported to be dying and which exhibit a blackened appearance ('sooty' baobab) in Zimbabwe. There are sooty moulds present along with homopteran insect exudates. It appears that the condition is a secondary manifestation of a physiological disorder which is episodic and related to lengthy periods of below average rainfall aggravated by increasing intensive land use in arid areas. It is likely that such trees can recover if turgidity returns to normal [6286] .

## CULTIVATION

In some parts the trees are pollarded so as to produce an abundance of young leaves [549] .

*India:*

It is cultivated to a small extent in some parts of India but deserves to be extended. It is chiefly met with in Bombay, being plentiful on the coast. The abandoned capital, Mandoo, near Indore, is overrun with *Adansonia*s. Pretty common about Madras; at one time it was proposed to cultivate it on account of the fibrous material in its bark [5902] .

*India:*

It is useful tree which thrives well in most parts of India and its cultivation should be encouraged [5902] .

The tree should not be planted near houses. Lateral roots may reach a length of 100 m or more [2719] .

## SEED WEIGHT

Over 100 seeds of about 1 cubic cm are found in one fruit [2241] .

Approximately 2600 seeds weigh 1 kg [5155] .

2000-3000 seeds per kg [2774] .

1500-2500 seeds per kg [5693] .

## SEED STORAGE

The seeds keep their vitality for years [5092] .

Seed can be stored for a long period [2774] [5693] .

Seeds retain their viability for a long time [5155] .

## PROPAGATION FROM SEED

Direct seeding into the field has not been very successful, hence seedlings are mainly raised and transplanted into the field at 10x10 m spacing. The hole size is 60x60x60 cm, but smaller may be suitable (40cm<sup>3</sup>). Planting is done when the rainy season has started [6286] .

Floating the seed removes about a third of the total, increasing potential germination percentage in the rest [2241] .

The only effective pre-treatment found so far is cracking the seed coat, but this can damage the seed [2241] .

Seeds require pretreatment, and the normal method is to scarify with concentrated sulphuric acid for 6-12 hours. This leads to germination of more than 90%. Alternatively concentrated sulphuric acid or nitric acid for only 15 minutes give germinations of 98% and 86% respectively. In Mali, the Forest Research Institute uses sulphuric acid for 90 minutes followed by water rinsing for 24 hours, giving germination of 92% or more. Seeds are sown in nursery potting mixture (3 parts topsoil, 1 part sand and 1 part compost); they can be sown in beds, pots or polybags. After pretreatment emergence is 4-6 days after sowing, and all those that will germinate will have emerged by 18 days. In rural areas the acid pretreatment can be replaced by manual scarification i.e. chipping). In some cases seeds are boiled in water for 15 minutes, but this is a more risky procedure. When seedlings emerge it is best to shade them for 8 days, provide half shade for 4-7 days and then expose to full light at 12-15 days after emergence. Early transplanting is not possible. Normally seedlings need to be at least 3-4 months old, when they have reached a height

of 40-50 cm, for transplanting. Nursery seedlings can be fertilised using bi- or tricalcic phosphorous and urea with 46%N [6286] .

The tree is often planted near villages, but there is limited information on local tree husbandry practices. Seeds remain viable for several years, but before sowing it is necessary to break dormancy. In nature, dormancy is broken by passage through the digestive system of large animals. In cultivation, dormancy may be broken by immersing the seed in hot water for several minutes or by chipping the seed coat. Seeds that float in water should be rejected. In the Sahel, seed is sown in plastic bags in the nursery in February/March. The seedlings are transplanted to their final positions 4-6 months later, at the beginning of the rains [2180] .

Easily propagated from seeds [2506] [5054] [5082] .

Seeds germinate fairly easily and, given good treatment and protection from frost, plants often flower after 16 - 23 years [5082] .

Seeds germinate well in a nursery where sufficient water can be provided. The seeds keep their vitality for years. The hard testa should be broached by being filed and immersed in hot water. Young trees soon develop a distended underground organ for storing water from which the tap and side roots emerge. Seedlings should be transplanted only after water-storing bulbs have been developed and when they are leafless [5092] .

Germination presents no problem but the hard testa should be broached before planting [5155] .

Germination is fair, but very sporadic, up to 3 months. Good well-treated seed can germinate in 30-50 days [2774] .

Seeds are immersed in hot water, allowed to cool and soaked for 24 hours [2774] .

Nick, or pour boiling water over seed and soak for 24 hours before sowing [5693] .

Propagated from seedlings [5693] .

Seed can be collected from picked or fallen fruit. After crushing the hard woody shell of the fruit, the seeds can be extracted from the dry acidic pulp. The seeds should be soaked in hot water overnight and planted in a soil mixture of washed river sand and compost (5 parts to 1). Plant the seed no deeper than 10 mm. Seed sown during the summer months is likely to germinate within two weeks. Seedlings can be transplanted when they are 60 mm tall. Weaning of the plants is critical before planting them out into the full sun [5097] .

Scarify or put seed in boiling water and let cool together. Naturally the seed may take several years before germination, hence the belief that it only germinates after abandoning the present homestead (Giriama) [2719] .

## PROPAGATION - VEGETATIVE

### *Cuttings:*

Since pruned branches frequently sprout young leaves when minimal conditions are present, stem cuttings may be taken, rooted in the nursery and transplanted to the field [6286] .

### *Grafting:*

The Forestry Department of Mali has shown that it is easy to graft baobab. A veneer graft is used with a plastic film to control transpiration. Rootstocks used are 3 month old nursery seedlings. Scions were collected in Segou and Koutiala region from high vitamin C content fruit trees. A success rate of 46% was found with scions kept for 8 days. However the best rate of success (92%) was found with 1-2 day old scions. The use of a cap to control transpiration is required in the case where scions are conserved for sometime. Use of grafting result in trees of a lower height than those developed from seeds. This facilitates the access for harvesting leaves and fruits. First flowering after grafting is at 3 years. This is extremely significant because grafting noticeably shortens the time to first flowering (8-23 years in plants raised from seed) [6286] .

Truncheons have, so far, been unsuccessful [5092] .

## 'CROP' MANAGEMENT

### *Fertiliser application:*

Organic matter is added during planting [6286] .

### *Protection from animals:*

Protection has to be provided against animal grazing and fire [6286] .

### *Watering, protection from animals:*

Seedlings require watering morning and evening (but not excessively otherwise there is a danger of stem rot) and also protection from rodents such as rats and mice by using a small mesh wire netting [6286] .

### *Crop protection:*

Effective protection against livestock is essential [2180] .

### *Pollarding:*

The trees may be pollarded in order to encourage an abundance of young leaves, pollarding is also carried out on

hollow trees used for water storage in order to prevent them becoming top-heavy and falling over [5892] .  
Lopped [5693] .

## HARVESTING

The bark may be removed by making 2 parallel cuts around the stem 1.0-1.5 m apart and a vertical cut joining them; the bark is then separated from the sapwood along the vertical cut at the season of sap flow. One can thus unroll a section of bark. The tree usually survives and the bark slowly reconstitutes itself [2838] .

Fruit pulp is usually sun-dried, but occasionally fermented for use in cooking [6286] .

To dispose of it, these roots must be severed one by one before the tree is pulled down. It is then difficult to dispose of the mass, which does not burn easily and rots only slowly. In practice, the tree has to be sawn into pieces for removal [2838] .

Stripping the bark does not kill the tree [2241] .

Several methods can be employed in collecting baobab seed. The simplest is collecting dropped fruits from the ground, but this has disadvantages since some immature fruits may have fallen from the tree. The fruits may also have stayed on the ground for a long time, thereby causing the seeds to lose viability or become infected. Fruits from short trees can be harvested from the ground or by climbing up a ladder. The most common method of harvesting fruits from all trees is by climbing the trunk and plucking from the crown. As a result of this practice, many trees are found pitted along the trunk where sticks were stuck in to aid climbing the tree. Poles and sticks can also be thrown into the canopy to dislodge fruits. The collected seeds are air-dried, then stored in clean, dry, sealed and labelled containers in cool dry places to protect them from moisture, insects, fungal infection, or attack by rats and mice [6286] .

The age of trees when leaves can be harvested for processing into leaf powder is variable and depends essentially on site conditions. Trees can be harvested from any age. In general, leaf exploitation could start before the sixth year when site conditions are favourable. Women traditionally start harvesting when leaves start to develop and the period varies according agroecological zones (April to May). In south Sudanian zone, young leaves are available in March. In more humid zones (Bouake zone in Ivory Coast) leaves are available all the year. Mass leaf harvesting is done in September and October. When the main work in the fields has ended, the men will climb up in the trees to do the large harvest to keep leaves for use in the dry season. Trees with good tasting leaves are cut regularly to prevent the development of branches and fruits, and to improve the food quality of leaves. The tools used in harvesting leaves are sickle (96%), dole (81%) and hand (18%). Some farmers estimate that dole is better because it can only cut unligified shoots and small branches and resprouting is therefore fast. Some others indicate that the sickle is the best because it gives a clean cut without the damage which the dole tends to cause. Infact each tool is well adapted to their respective season of use; the dole is used when the petiole is fresh and easy to cut while the sickle is used towards the end of the harvesting season when the petiole is lignified. Harvesting by hand picking is done less since it is difficult to climb a baobab tree. It is not easy to note the end of the adolescence period of baobab in Sudanian zoe because of intensive pruning of trees for leaf production. Young men use a dole tool commonly for fruit harvesting but sometimes fruits are harvested using sticks and are also picked by hand [6286] .

The bark yields a specially strong useful fibre which is stripped off in large sheets (iinner bark) after removing the outer bark first. This is beaten with sticks to remove the pithy matter, sun-dried and then packed into bales for shipment to England [5902] .

The bast fibres of *Adansonia digitata* (monkey bread tree) of Africa is imported in strips 80 cm long, 8-10 mm thick and 40-50 mm broad. It is brown and very strong. The unbleached fibres are used along with jute and manila, from which two it is difficult to distinguish, for production of strong wrapping paper [5902] .

In arid climates, new leaf growth occurs just before the rains or throughout the year, except at the peak of the dry season. Leaves and fruits drop before the following rainy season [2180] .

Collected from the wild and often protected by local people in homesteads and farms [5054] .

Parching and crushing can be practised to decorticate the seed. The oil can be obtained by boiling it off and this has uses for gala occasions in Senegal [549] .

Leaves are collected during the rains and the fruit during the rainy season [5054] .

The bark contains a white, semi-fluid gum obtainable from bark wounds [5892] .

The bark yields a specially strong useful fibre which is stripped off in large sheets (inner bark) after removing the outer bark first. This is beaten with sticks to remove the pithy matter, sun-dried and then packed into bales for shipment to England [5902] .

Seed can be collected from September to October [5693] .

To obtain fibre, two cuts, one above and the other below, are made on the trunk and strips of string pulled out (the trunk is fibrous from surface to the centre). Strings for baskets are first chewed to soften them (Kamba) [2719] .

## STORAGE

Seeds store well in cool, dry conditions and are not greatly threatened by insects [2241] .

Pulp can be stored for fairly long periods for use in soft drink production but it needs airtight containers. Storage is improved by the use of sodium metabisulphite (Ibiyemi et al., 1988). It can also be frozen if ground to a powder (Obizoba and Amaechi, 1993) [6286] .

Ground seeds, shaped into small cakes with the addition of a little water, are dried and stored as reserve food or used when travelling [2506] .

Leaves are not stored, while the fruit or fruit pulp can be stored for about a year [5054] .

Fresh leaves may be sun-dried, ground and stored as a powder [2180] .

Whole fruits can be stored for months under dry conditions [2180] .

## YIELDS

Allowing for variation in site conditions, genotypes and amount of leaf harvesting incurred, an average mature fruiting baobab produces 200 kg of fruit per season. However, it has been noted that wild trees may go several years not fruiting and this is probably due to ecological factors [6286] .

## PRODUCTION

On the basis of fruit size, palatability, yield, abundance and nutritional value, the fruits have exceptional potential [2795] .

## TRADE

Baobab powder mixtures are commonly available in many public markets but quality can be poor and some can be fraudulent [6286] .

Seed pulp is traded [6286] .

Bark was once marketed commercially for the treatment of fevers under the name 'cortex cael cedra' [549] [5092] [5892] .

The fibre was imported into England from Portuguese West Africa (i.e. Angola) [5902] .

At one time the bark was exported to Europe to make a strong packing paper [549] [5892] .

At one time the pulp was exported to Europe as an imposture of terra Lemnia, or terra sigillata, a medicine of the ancients mined from the Island of Lemnos in the Aegaeon [549] .

The fruit and fruit pulp are sold in township markets [5054] .

The pulp coated seeds (mbuyu) are coloured, sugar-coated and sold as sweets in coastal towns (Swahili) [2719] .

Large quantities of fruits harvested and sold in coastal markets. Coloured pulp sold as sweets. Fibre sold in markets (Tseikuru, Mwingi, Tharaka). Baskets (ciondo, syondo) sold in curio shops. Usually more expensive than sisal baskets [2719] .

## RESEARCH NEEDS

It is important that data on market values of products and supply and demand estimates are gathered. Additionally data are needed on the production or collecting to consumption chain to see the income derived by the various players and how better processing can lead to value-added products. Such data are essential for any promotion of microindustries [6286] .

List of priorities include seed collecting and provenance testing, patterns of genetic variation and selection and clonal propagation of specific genotypes for different production objectives. Extension gaps relate to use of products as food and their correct processing in terms of nutrient contents; and promotion of local micro-industries for such products; and more use of intensive production [6286] .

Since leaves are an important source of iron and other minerals, the bioavailability of the minerals requires further study [6286] .

There are many non-governmental organizations involved with rural development, local nutrition and tree planting. Suitable manuals need to be developed for their use. Under the Fruits for the Future Project, ICUC is publishing extension manuals to complement the monograph series, of which this book is a part. Information is more focused on practical aspects of production, propagation, harvesting, processing and utilisation, and methods are illustrated to ease understanding. Extension materials should be produced in partnership with NGOs, drawing on their field

experience and contact with local communities. Likewise distribution should make use of the networks and relationships adopted by local based organizations [6286] .

Adansonin has a strophanthin-like action, yet in East Africa the bark is said to be antidotal to *Strophanthus* arrow-poison. These anomalies clearly merit further examination [549] .

## SEED SUPPLIERS

Baobab Farm Ltd, P.O. Box 81995, Mombasa, Kenya [6286] .

Institute Senegalais de Recherches Agricoles, 76 Rue Mousse Diop, BP 320, Dakar, Senegal [6286] .

Kenniex Ltd, P.O. Box 50982, Nairobi, Kenya [6286] .

## SEED/GENE BANK SOURCES

EMI Forestry Project, c/o Provincial Forest Officer, P.O. Box 2, Embu, Kenya; East Pokot Agricultural Project, Kositei, Catholic, Nginyang via Nakuru, P.O. Box Marigat, Kenya; The Chief, Miambani Location, c/o District Forest Officer, Kitui, P.O. Box 106, Kitui, Kenya; The Forester, Gede, P.O. Box 201, Malindi, Kenya [2241] . Seeds of this species are, or have been, stored at the Henry Doubleday Research Association, Coventry, U.K. .

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Data transferred from SEPASAL Paper Files by Ruth Adeka, KENRIK, National Museums of Kenya, August 2005 . Updated for southern Africa by A. Jarvis, checked by C. Mannheimer and M. Sinkela; SEPASAL Namibia, National Botanical Research Institute, November 2005 .

Data transferred from Traditional Food Plants of Kenya by Ruth Adeka, KENRIK, National Museums of Kenya, March 2004 .

## MISCELLANEOUS NOTES

### *Roots:*

It is said by the Temne of Sierra Leone that a root decoction taken with food causes stoutness hence their vernacular name for the plant 'an-derebai' meaning 'the chief's body' [549] .

Rock-art in the Limpopo Valley depicts women's breasts as baobab pods. In Upper Volta children of the Ela born under the sign of this tree (kukulu, Lyela) are given the patronymic 'kukulu', boys, or 'ekulu', girls [549] .

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