

# Kew

PLANTS PEOPLE  
POSSIBILITIES



This report was generated from the SEPASAL database ([www.kew.org/ceb/sepasal](http://www.kew.org/ceb/sepasal)) in August 2007. This database is freely available to members of the public.

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which has been updating the information on Namibian species from Namibian and southern African literature and unpublished sources.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

New query

Edit query

View query results

 *Display help*In names list include:  synonyms  vernacular names and display: All  names per page*Your query found 1 taxon***Pterocarpus angolensis DC. [1362]**

Family: LEGUMINOSAE-PAPILIONOIDEAE

## Synonyms

None recorded

## Vernacular names

Unspecified language	muninga [1265] [1362], muhagata [1362], makwa [1280], Rhodesian teak [1280], sealing wax tree [1280], Matabeleland deal [1280]
Afrikaans	kiaat [5097]
Afrikaans (Namibia)	dolf [1304] [5083] [5087] [5098] [5121] [5534], kiaat [5083] [5087] [5098] [5534], kiaatboom [1304], dolfhout [5534]
Afrikaans (South Africa)	bastergreinhout [5534], bloedhout [5534], greinhout [5534], kehatenhout [5534], kejaat [5534], kiaat [5534], lakboom [5534]
Afrikaans (Southern Africa)	dolf [2795], greinhout [2795]
Afrikaans (Zimbabwe)	bastergreinhout [5534]
Barakwengo-Bushmen (Namibia)	nlgáo [5087] [5534], †ga? [5087], gaû [5534], ngcawu [5534]
Central Shona (Zimbabwe)	mubvinza [5534], mubvinzinaropa [5534], mukulu [5534], mukwa [5534], mulombwa [5534], mushambaropa [5534]
Chitonga (Zimbabwe)	mukulambira [5534], musomba [5534]
Eastern Shona (Zimbabwe)	mukambira [5534], mukulu [5534], mukwamaropa [5534], mukwirambira [5534]
English	bloodwood [1265] [1280] [1340] [2774], African teak [1280] [1340] [2774], Rhodesia teak [1340], kejaat [1340], kiaat [1340] [5092] [5139], mininga timber [1340]
English (Botswana)	African teak [5093], bloodwood [5093], kiaat [5093]
English (Namibia)	African teak [1304] [5083] [5111], South African teak [1304], bloodwood tree [1304], dolf [5088] [5118], kiaat [5088] [5111] [5118] [5121], transvaal teak [5087] [5098] [5534], wild teak [5083] [5087]
English (South Africa)	bloodwood [5096] [5534], kiaat [3016] [5096], wild teak [3016], sealing wax tree [5534], transvaal teak [5534]
English (Southern Africa)	bloodwood [2795], kiaat [1280] [2795], wild teak [3045]
English (Zimbabwe)	Matabeleland deal [5534], bloodwood [5534], mukwa [5534], sealingwax tree [5534]
Fipa (Tanzania)	asanninga [2774]
Gciriku (Namibia)	ughuva [5098], uguva [5087] [5098] [5534]
German (Namibia)	Dolf [5083] [5098] [5121], Dolfhholz [1304] [5083] [5087] [5098] [5534]

Gogo (Tanzania)	mpagata [2774]
Hehe (Tanzania)	mninga [1340]
Herero (Namibia)	omuhuva [5083] [5087] [5098] [5534], omuryamhaha [5534]
Hlengwe (Zimbabwe)	kwanambila [5534], mubonambiti [5534], mukonambiti [5534]
Jul'hoan (Namibia)	n#hang [5083], n#hàng [5088] [5101]
Kalanga	mubvamaropa [1340], mubvaropa [1340], mukurambira [1340]
Kaonde (Zambia)	mukulakula [5534]
Khukh (Namibia)	lnaob/s [5083], lnaohais [5083]
Kilongo	muninga [1340]
Kilwa	mtumbati [1340]
Kung Bushmen (Namibia)	n#hang [5098], n#heng [5087]
Kwambi (Namibia)	n 'heng [5534]
Kwangali (Namibia)	uguva [5087] [5098] [5534], uguya [5534]
Kwanyama (Namibia)	omuuva [1304] [5087] [5098] [5534], omyuuva (pl.) [1304]
Kxoe (Namibia)	#gau [5083], nlgao [5083]
Lindi	mtumbati [1340]
Lozi (Namibia)	mikwa [5083], milombwe [5083], mukwa [5083] [5087] [5534], mulombe [5121] [5534], mulombwe [5083] [5087] [5534]
Lozi (Zambia)	mukulu [5534], mukwa [5534], mulombe [5534]
Luguru (Tanzania)	mhagata [2774], mlambadanda [2774]
Lunda (Zambia)	mukula [5534]
Luvale	mukala [1340]
Manyika	mubvamaropa [1340]
Mbukushu (Namibia)	ghughuva [5087] [5098] [5534], ghughuwa [5118], muwa [5534], muwuwa [5534], uwuwa [5534]
Mwera (Tanzania)	mtumbati [2774], mtumbati jangwa [2774]
Ndau (Zimbabwe)	mukulu [5534], mukwamaropa [5534], mukwirambira [5534]
Ndebele	umvagazi [1340]
Ndebele (South Africa)	umbila [5534], umvagazi [5534]
Ndebele (Zimbabwe)	mvangezi [5534], umvagazi [5534]
Ndonga (Namibia)	omuguya [5087] [5098] [5534]
Nguni	umvagazi [1340]
Nkhonde (Malawi)	mbila [5534], mlombwa [5534], mtubati [5534]
Nkhonde-north (Malawi)	mtumbati [5534]
Norekau Bushmen (Namibia)	! ee [5083] [5087] [5534], n'n [5083] [5087] [5534]
Northern Sotho	morôto [5097] [5534]
Nyamwezi	miniga [1340], mninga [1340], mwininga [1340]
Nyamwezi (Tanzania)	mninga [2774]
Nyanja (Zambia)	mlombe [5534], mlombwa [5534]
Oshikwanyama (Namibia)	omuuva [5083], omyuuva [5083]
Oshindonga (Namibia)	omuguya [5083]
Oshiwambo (Namibia)	omu(h)uva [5121]
Otjiherero (Namibia)	omu(h)uva [5121]

Punguvlei (Namibia)	n#hng [5111]
Rukwangali (Namibia)	uguva [5083] [5121]
Rumanyo (Namibia)	ughuva [5083], uguva [5083] [5121]
Sangu	mninga [1340]
SeTswana (Botswana)	ilombe [5093], malombe [5093], moninga [5093], moowa [5093] [5534], morotomadi [5093] [5534], mukwa [5093], senyamadi [5093], thotamadi [5093]
Sena (Mozambique)	mecurambira [5534], mukunambira [5534]
Sesuto (South Africa)	moretchure [5534]
Setswana (Namibia)	mokwa [5083]
Shambyu (Namibia)	uguva [5087] [5098] [5534]
Shangaan (Mozambique)	gulombira [5534], imbilo [5534], kula [5534]
Shangaan (South Africa)	mokoto [5534], mokwa [5534], mulombwa [5534], munaabenaabe [5534], murotso [5534]
Shangaan (Zimbabwe)	kwanambila [5534], mubonambiti [5534], mukonambiti [5534]
Shona	mubvinza-maropa [1340], mukurambira [1340]
Sotho	mukulu [5534]
Sotho (Botswana)	mukwa [5534]
Sotho (South Africa)	mukwa [5534]
Sukuma	mninga [1340], mwininga [1340], ng'wininga [1340]
Sumbwa	mninga [1340]
Swahili	mtumbati [1340]
Swahili (Tanzania)	mninga [2774]
Swati	umvangatsi [1340]
Swazi (South Africa)	um-Vangati [5534], um-vangati [5534], umVangatsi [5534], umVangatzi [5534]
Swazi (Swaziland)	mbila [5534], um-Vangati [5534], um-Vangatsi [5534], umvagatsi [5534]
Thimbukushu (Namibia)	ghughuwa [5083] [5121]
Tonga (Zambia)	mukula [5534]
Tonga (Zimbabwe)	muzwamalowa [5534]
Trade name [timber]	Brown African Padau [5534]
Tsonga	ntsonde [5139]
Tsonga (South Africa)	murotso [5139], mvhangazi [5139]
Tsongo (South Africa)	mokoto [5534], mokwa [5534]
Tswana (Botswana)	mokwa [5092] [5534], molombe [5534], mukwa [5534]
Tswana (South Africa)	morotomadi [5534]
Unknown	mukwa [1340]
Unknown (Angola)	girasonde [5534], mirahonde [5534], murilahonde [5534], mutete [5534]
Unknown (Malawi)	mukwa [5534], mulombwa [5534]
Unknown (Mozambique)	ambila [5534], gulombila [5534], mbila [5534], mucurambira [5534], thondo [5534], umbila [5534]
Unknown (Namibia)	muwa [5534], unkulambila [5534]
Unknown (South Africa)	matabeleland deal [5534], ngillasondo [5534]
Unknown (Tanzania)	maninga [5534], mninga [5534], mtumbati [5534], muhagata [5534], muhangata [5534], muninga [5534], mutondo [5534]
Unknown (Zaire)	mlinga [5534], mubalakula [5534], mulombwa [5534], mutondo [5534], mutondo-mashi [5534]

Unknown (Zambia)	mulombwa [5534], n'dombe [5534], ndombe [5534]
Unknown (Zimbabwe)	ndombe [5534], uvagazi [5534]
Vasekele (Namibia)	n#hng [5111]
Venda (Botswana)	mukwa [5534]
Venda (South Africa)	mukwa [5534], mutondo [5534]
Venda (Zambia)	mukulu [5534], mukwa [5534]
Yao (Malawi)	mtumbali [5534]
Zaramo (Tanzania)	mninga [2774], mtumbati [2774]
Zezuru	mubvamaropa [1340]
Zigua (Tanzania)	muhagata [2774]
Zigula	mhagata [1340]
Zinza	mninga [1340], muwasagama [1340]
Zulu	umVangazi [5097]
Zulu (South Africa)	umVangazi [5534], umbila [5534], umvagazi [5534]

## Distribution

Plant origin	Continent	Region	Botanical country
Native	Africa	East Tropical Africa	Tanzania [1355] [1362] [5534]
		South Tropical Africa	Angola [1355] [1362] [5096], Malawi [5096] [5534], Mozambique [1355] [5082] [5096] [5534], Zambia [1355] [5096], Zimbabwe [1355] [2607] [5082] [5096] [5419]
		Southern Africa	Botswana [5082] [5093] [5096], Caprivi Strip [5121] [5534], Namibia [1355] [1669] [5082] [5104] [5534], Natal [1669] [5096] [5097] [5104], Swaziland [1355] [1669] [5096] [5104], Transvaal [1669] [5096]
		West-Central Tropical Africa	Zaire [1355] [1362] [5097]

**ISO countries:** South Africa [1669] [5082] [5096] [5097] [5104]

## Descriptors

Category	Descriptors and states
DESCRIPTION	Single Stemmed [5096] [5121]; Can be Coppiced [2774] [5121] [5534]; Fast Growth Rate [1280]; Deciduous [1280] [2774] [3045] [5096] [5097] [5534]; Erect [5088]; Terrestrial [3045]; Shrub [1355]; Slow Growth Rate [1280] [5096]; Tree [1099] [1279] [1280] [1355] [2774] [5097] [5104] [5118]; Perennial [1355] [5104]; Taproot Present [1099] [5097] [5534]; Fragrant - inflorescences [5121] [5534]; Plant Height 5-30 m [1304] [5097] [5104]; d.b.h. <= 120 cm [5534]

CLIMATE	Not Frost Tolerant [5092] [5097]; Frost Tolerant [5534]; Annual Rainfall 520-600 mm [1280] [1304]; Dry Season Length <= 6 months [1099]
SOILS	Deep [1280] [3045] [5092] [5111] [5534]; Well Drained [2774] [5096] [5534]; Acid [1099]; Boulders/Rocky [3045]; Neutral; Saline [1304]; Alkaline; Sandy [1099] [1279] [3045] [5092] [5111] [5121] [5534]; Dry [3045]; Sandy Clays [1279]
HABITAT	Coastal Regions [1265]; Lowland [1279] [5534]; Forest [1279] [5118]; Plains/Flats/Pans [1265]; Woodland [1099] [1265] [1279] [1362] [2774] [3045] [5082] [5092] [5097] [5118] [5121] [5534]; Shrubland/Bushland/Scrub [1279] [3045]; Wooded Grassland [1279] [1362] [2774] [5082] [5097] [5534]; Hillsides/Slopes [1279] [5534]; Dunes [5121]; Watercourses [5121]; Plains [5121]; Altitude 300-1650 m a.s.l. [1099] [1304] [1362] [5104]
PHYSIOLOGY	Light Demanding [5121] [5534]; Root Nodules Present [144] [5534]; Fire Resistant/Regenerates After Fire [1099] [1279] [2774] [5082] [5092] [5121] [5534]; Drought Tolerant [5534]
WOOD PROPERTIES	Low Density [1280] [5092]; Heartwood Brown/Shades of Brown [1279] [2774] [2795] [5082] [5088] [5096] [5097] [5111]; Workability - Easy [1265] [1279] [2774] [2795] [3045] [5082] [5534]; Sawing - Easy [5534]; Gluing - Easy [1279] [5082] [5534]; Nailing/Screwing - Easy [1279] [5082] [5534]; Turning Properties - Good [5534]; Finish - Good [2795] [5534]; Sanding Finish - Good [5534]; Painting Finish - Good [5534]; Polishing Finish - Good [1265] [2774] [2795] [5082] [5092] [5096] [5534]; Shrinkage - Very Small [1279] [1280] [5082] [5092] [5097]; Very Durable [1279] [5082] [5092] [5534]; Durable in Marine Conditions [1279]; Wood Resistant to Termites [1265] [1279] [1304] [5534]; Wood Resistant to Marine Borer [5534]; Medium Density [3045] [5534]; Heartwood Red/Shades of Red [1279] [2774] [2795] [5082] [5088] [5097] [5111]; Blunting Effect - Moderate [5534]; Shrinkage - Small [1265] [5096]; Durable [1265] [2774] [2795] [5092] [5096]; Susceptible to Powder Post (Lyctid and Bostrychid) [5534]; High Density [1265] [5097]; Sapwood White/Yellow [2795] [5082] [5096] [5097] [5111]; Wood Susceptible to Termites [1304] [5082] [5092] [5096] [5534]
PRODUCTION AND VALUE	Subsistence Value [2795]; Wild Plants Utilised [5118]; Traded Locally [5092]; Commercial Value [1280] [2795] [5111] [5121]; Traded Within a Country [1280]; Recommended for Cultivation [5082] [5097]
SOURCES OF PLANTING MATERIAL	RBG Kew Seed Bank; Other Seed Sources [5181]
FURTHER DATA SOURCES	Botanical Illustration [5082] [5092] [5093] [5098] [5121] [5534]; Additional References [1099] [1452] [5174] [5280] [5311] [5371] [5423] [5425] [5529] [5530] [5531] [5532] [5533] [5534] [5561] [5562]; Included in PROTABASE [5450]; Regional Distribution Map [3045] [5082] [5450] [6044]; Botanical Photograph [3045] [5082] [5088] [5096] [5097] [5111] [5534]; Databases [5123] [5341]; Habit Illustration/Photograph [5082] [5088] [5092] [5096] [5097] [5450] [5534] [6044]; Use Related Illustration/Photograph [2795] [5088] [5092] [5111] [5534]; PROTA 3 - Dyes and Tannins [6044]; Grid Map [5093] [5121] [5123]
SEPASAL DATASHEET STATUS	All Data Transferred from SEPASAL Paper Files; Nomenclature Checked [2963]
CHEMICAL ANALYSES	Tannins - seeds [5101]; Tannins - sap/leaf sap [5092] [5097]; Tannins - unspecified parts [1340] [5096]; Other Analyses - stems [1340]; Phenols - stems [1340]; Phenols - unspecified parts [5096]

## Uses

Major use	Use group	Specific uses
ANIMAL FOOD	Fertile Plant Parts	entire immature fruits, primates [5096]; fruits, primates [3045] [5092] [5097] [5534]; fruits, squirrels [5092]
	Aerial Parts	leaves, fodder [2774]; leafy stems/branches, fodder [2774]; leaves, game mammals, browse [3045] [5092] [5097]; young leaves, game mammals [5096]
BEE PLANTS		nectar source [5092]; pollen source [5097]

[2774]

## MATERIALS

Fibres

Wood

Gums/Resins

Tannins/Dyestuffs

inner bark, baskets [1304] [3016] [5096]; inner bark, woven material, bags [5092]; bark, cord/string/twine, bags [5534] floors [1265] [1280] [5534]; walking sticks [1280]; paddles [1279]; plates/bowls [1279]; plywood [1265]; boat/ship parts [1265] [1279] [2774] [5534]; brake blocks [1280]; ornaments [1280]; poles (from wood), huts [1304]; timber, constructions [2774] [5534]; timber, tool handles [2774] [5534]; wood, carpentry tools [2795] [5098]; wood, poles (from wood), huts [1304]; wood, poles (from wood), chairs [1304] [5111]; wood, poles (from wood), tables [1304] [5111]; wood, poles (from wood), tools [1304] [5118]; wood, timber, cabinets [1304]; wood, joinery [1265] [1304] [1340] [5534]; wood, timber, membranophones [1304] [5082] [5534]; wood, canoes [1279] [1304] [1340] [2774] [2795] [5082] [5092]; wood, doors [1304] [2795] [5534]; wood, plates/bowls [2795] [5082] [5139]; wood, mortars [2795] [5082]; wood, spears [1279] [2795] [3045] [5082] [5092]; live plant in situ, fences [5082]; wood, tool handles [5088]; wood, scabbards/sheaths [5088]; wood, musical instruments [2795] [5088]; wood, beds [5111]; wood, carved wood [1265] [1280] [1304] [2774] [2795] [5097] [5111] [5121] [5139] [5534]; heartwood, wood, furniture [3045] [5082] [5096]; heartwood, wood, ornaments [3045]; wood, timber, panels [1340] [2795] [5092] [5097] [5534]; wood, turned wood [2795]; wood, timber, window frames [1280] [2795] [5097] [5534]; wood, timber, boats/ships [2795] [5534]; wood, timber, furniture [1304] [1340] [2795]; wood, timber, bridges [1340] [5092]; wood, timber, boat/ship parts [2795]; sapwood, timber, boat/ship parts [1340]; wood, dugout canoes [5092] [5118]; wood, furniture [1257] [1265] [1280] [2774] [3016] [3045] [5092] [5097] [5111] [5118] [5139] [5534]; wood, spoons [5139]; wood, timber [1265] [1280] [1304] [1340] [1355] [1362] [2774] [2795] [5096] [5121] [5534]; wood, parquet floors [5097] [5534]; wood, door frames [1280] [5097] [5534]; wood, boats/ships [5534]; wood, plywood [5534]; wood, timber, ornaments [1280] [5534]; wood, timber, bobbins/spools/reels [5534]; wood, timber, coffins [5534]; wood, timber, clogs [5534]; wood, buckets/pails [5534]; wood, timber, musical instruments [5534]; wood, timber, containers/holders [5534]; wood, timber, canoes [5534]; wood, timber, paddles [5534]; wood, timber, spears [5534]; wood, timber, stools [5534]; wood, timber, trays [5534]; wood, timber, mortars [5534]; wood, timber, beehives [5534]; wood, timber, pestles [5534]; wood, timber, plates/bowls [5534]; wood, timber, shelves [5534]; wood, timber, tools [2795]; bark, blown idiophones [5101]; wood, paddles [2795] [5082] [5092]; wood, timber, shoemakers' lasts [5534]; sapwood, timber, containers/holders [1340] gum [1304] [5096] gum, dyes, red [1304] [3016] [5096]; roots, dyes, cosmetics, red [1304]; roots, dyes, baskets, red [1304]; kernels, tannins [5101]; sap, dyes, clothes, red [1279] [5082] [5092] [5534]; bark, dyes, baskets, red [5092]; bark, dyes, baskets, brown [5092]; unspecified aerial parts, dyes [1355]; heartwood, dyes, red [5088]; heartwood, dyes, brown [5088]; roots, dyes, baskets, brown [1304]; inner bark, dyes, cosmetics, red [1304];

	Essential Oils	heartwood, dyes, cosmetics, red [1304]; bark, tannins [5534] root bark, cosmetics [1280]
	Other Materials/Chemicals	roots, cosmetics [5082] [5098]; kernels, cosmetics [5101]; bark, bags [1340]; root bark, body paints [5082] [5092]; inner bark, bags [5092]; sap, hair dyes [5534]; wood, cosmetics [5534]; root bark, cosmetics [5082] [5534]; leaves, fish bait [1340] [5092]; leaves, fishing lures [5092]
FUELS [2774]	Fuelwood	
	Charcoal	
SOCIAL USES	'Religious' Uses	heartwood, ritual/religion/magic [5088]; bark, ritual/religion/magic [3045]; roots, ritual/religion/magic [3045]; root bark, ritual/religion/magic [5092]
VERTEBRATE POISONS	Fish	bark, fishing [5534]
MEDICINES [1279] [1340] [1355]	Unspecified Medicinal Disorders	leaves, humans [1257]; roots, humans [1257] [2774] [3045]; bark, humans [3039]; bark, humans [2774] [3045]; flowers, humans [2774]; seeds, humans [2774]; sap, humans [2774]; humans, mouth washes [5098]; seeds, humans, oral ingestion [5082]; humans [1340]
	Abnormalities	roots, humans, eyes, oedemas, poultices [5098]; roots, humans, eyes, oedemas, oral ingestion [5098]
	Blood System Disorders	gum, humans [3016] [5092]
	Circulatory System Disorders	bark, humans, haemorrhoids, oral ingestion [5097]
	Digestive System Disorders	bark, humans, stomach [5082]; heartwood, humans, stomach, oral ingestion [5088]; heartwood, humans, stomach, external applications [5088]; roots, humans, diarrhoea, oral ingestion [5097]; seeds, humans, gums, external applications [5097]; bark, humans, stomach, oral ingestion [5082] [5097] [5534]
	Genitourinary System Disorders	wood, humans, aphrodisiac, internal applications [1340] [5092]; roots, humans, aphrodisiac, oral ingestion [5092]; bark, humans, haematuria, oral ingestion [5097]
	Infections/Infestations	gum, humans, ringworm [3016] [5096]; roots, humans, malaria [5082] [5092] [5097] [5098] [5534]; sap, humans, parasitic infections, internal applications [1340] [5098] [5534]; bark, humans, gonorrhoea [5082] [5092] [5534]; roots, humans, fever [5082] [5097] [5098]; flowers, humans, ringworm, ointments [5082] [5534]; sap, humans, ringworm, external applications [1340] [5092] [5098]; roots, humans, gonorrhoea, oral ingestion [5082] [5092] [5534]; gum, humans, intestine, parasitic infections [5096]; roots, humans, schistosomiasis, oral ingestion [5097]; roots, humans, tuberculosis, oral ingestion [5097]; bark, humans, skin, ringworm [5097]; bark, humans, gonorrhoea, oral ingestion [5082] [5534]; sap, humans, skin, ringworm, external applications [5092]; seeds, humans, parasitic infections, oral ingestion [5098]; sap, humans, parasitic infections, oral ingestion [5098]; sap, humans, parasitic infections, enemas [1340]; roots, humans, gonorrhoea [1340]; bark, humans, mouth, viral infections, oral ingestion [5097]
	Inflammation	seeds, humans, skin, inflammation [1340] [5097] [5098] [5534]; seeds, humans, gums, inflammation [5534]; seeds, humans, skin, inflammation, external applications [5097]
	Injuries	sap, humans, wounds, external applications [5098] [5534]; humans, haemostatic [5098]; humans, wounds [5098]; roots,



	game mammals, haemostatic, oral ingestion [5098]; seeds, humans, gums [1340] [5098]; bark, mammals, injuries, external applications [5139]; sap, humans, haemostatic [5082] [5098]; bark, humans, burns, external applications [5534]; sap, humans, burns, external applications [5534]
Pain	leaves, humans, back, antidote, internal applications [1340] [5092]; bark, humans, head, anodyne [5082] [5098]; roots, humans, abdomen, anodyne, oral ingestion [5097]; bark, humans, head, anodyne, teas [5082] [5534]; bark, humans, head, anodyne, oral ingestion [5097]; bark, humans, ears, anodyne, oral ingestion [5097]; fruits, humans, chest, anodyne, scarification [5534]
Pregnancy/Birth/Puerperium Disorders	bark, humans, lactation, lactation stimulant, external applications [5082] [5092] [5098] [5534]
Respiratory System Disorders	sap, humans, nose, other respiratory system disorders/effects [5082] [5092] [5098] [5534]; roots, humans, asthma, oral ingestion [5097]; sap, humans, coughs, external applications [5111]; sap, humans, coughs, oral ingestion [5111]; bark, humans, congestion, oral ingestion [5111]; roots, humans, coughs, oral ingestion [5111]
Sensory System Disorders	roots, humans, eyes, poultices [5092] [5098] [5534]; heartwood, humans, eyes, eye drops [5088]; sap, humans, eyes, cataracts, eye drops [5097]; roots, humans, eyes, washes [5082] [5092] [5098] [5534]; roots, humans, eyes, oral ingestion [5098] [5534]; flowers, humans, eyes, vapour baths [5082] [5092] [5098] [5534]
Skin/Subcutaneous Cellular Tissue Disorders	gum, humans, sores [3016]; bark, humans, skin, urticaria [5082] [5092] [5098] [5534]; bark, humans, ulcers [5082] [5098] [5534]; roots, humans, ulcers, vapour baths [5098]; flowers, humans, ulcers, vapour baths [5098]; sap, humans, skin, ointments [5111]; sap, humans, sores [1340]; bark, humans, rashes, teas [5082] [5092] [5534]; gum, humans, skin, rashes [5096]
ENVIRONMENTAL USES	Unspecified Environmental Uses
	hedges
	Erosion Control
	dunes [1280]; sands [1280]
	Shade/Shelter
	shelterbelts, croplands/orchards [1280] [5097]
	Indicators
	other environments [5097]
	Soil Improvers
	nitrogen fixers, nodulated plants [144] [2774]
	Ornamentals
	infructescences, everlasting 'flowers' [1257]; live plant in situ [5082]; potted plants [5097]
	Boundaries/Barriers/Supports
	live fences [1279]; live fences, homesteads [5082]

## Picture

None recorded

## Notes

## NOMENCLATURE/TAXONOMY

### *Name derivation:*

The name "Pterocarpus" is derived from the Greek words "pteran" meaning "a wing" and "karpos", meaning "fruit", alluding to the winged fruit "angolensis" from Angola [5092] .

*P. angolensis* was first described in 1825 by A.P. de Candolle (D.C.) in the second of his works, *Prodromus Systematics Naturalis Regni Vegetabilis* (Prodrome to a Natural System of the plant kingdom), which was published in Paris. The type specimen was gathered in Angola by an unknown collector [5534].

## VERNACULAR NAMES

The Kwanyama names "omuuva" and "omyuuva (pl.)" were formerly "omuva" and "omiva (pl.)" and "omiuva (old pl.)" wrongly called "omuuni" by Le Roux (1971) [1304].

The Mbukushu, a tribe living in the Delta (Botswana) and the western Caprivi, refer to it as "morotomadi", which means "exudes blood", referring to the blood-red wood sap which is released when the bark is damaged [5092].

The vernacular name "kiaat" is derived from "kajaten", Dutch name for "teak" because of the resemblance to the original teak (*Tectona grandis*), which is native to India and South-east Asia [2795] [5092].

## DISTRIBUTION

*Botswana:*

North [5093].

*Namibia:*

Ovamboland, Kavango districts [5098].

*Africa:*

From Zaire in the north to KwaZulu-Natal in the south [5097].

*South Africa:*

Limpopo, Mpumalanga and Kwazulu-Natal [5104].

*Namibia:*

Limited to the northern regions, namely Caprivi, Kavango and Ovamboland (Von Breitenbach 1973) [5534].

*Zambia:*

Throughout [5534].

*Southern Africa:*

Widedpread; from Tanzania and southern Zaire to Angola, Namibia, the Transvaal and Swaziland [1362].

## RARITY/CONSERVATION

Considered neither rare nor threatened in Lock (1989) [1355].

*Africa:*

Since 1967 this species has been legally protected in Bantu territories [5096].

*Botswana:*

One of the timber species specified as protected on State Lands by Botswana's Forest Act (Forest Chapter 38:04, 1968) [5093].

*Namibia:*

Assessed under IUCN categories (2001) as near threatened (NT) [5424].

*Namibia:*

Protected by the Forestry Ordinance [5121].

*Namibia:*

Results from an inventory undertaken in 1996/97 by the Directorate of Forestry (under guidance of the Finnish Development Agency) showed that there is almost no natural regeneration and that most younger classes are totally absent [5111].

*South Africa:*

Protected [5092] [5097].

*South Africa:*

The tree is protected in the homelands and the wood is not easily obtainable [5139].

With the development of fibre-glass alternatives for dug-out canoes, many kiaat trees and others such as jackalberry trees (*Diospyros mespiliformis*) are being saved [5092].

The adverse effect of man on the relative abundance of the species is further aggravated by the clearing of woodland for agricultural purposes [5534].

## BOTANICAL DESCRIPTION

There is little variation within the species and only one variety (*latifolius* De Wild.) has been described, from a single specimen collected at Tshirenda in the Congo. Variation of heartwood colour from red to brown and even purple is common but seems not to be connected with botanical variation (cited in Geary 1972) .

## DESCRIPTION

### *Roots:*

Taproot important to reach soil moisture reserves held relatively deep in soil in early part of growing season. Surface roots in position to utilise rainwater as soon as rainy season begins [1099] .

### *Height:*

20 m [1099] [2774] .

### *Roots:*

Root system shows same characteristics at all sites and consists of a well defined tap root plus an extensive system of lateral roots in the top half-metre of soil (cited in Geary 1972) .

### *Fruits:*

Pods bulky and difficult to open without damaging the seed (Geary 1972) .

### *Roots:*

Taproot grows rapidly downwards [1099] .

### *Bark:*

Brownish grey on mature trees, fissured and somewhat corky [2795] .

### *Bark:*

Exuding a blood-red sticky sap when injured [3045] [5092] [5096] [5111] .

Flowers and fruits are conspicuous. The tree is fairly distinctive with its tall, erect trunk and umbrella-shaped canopy [5121] .

### *Flowers:*

In axillary racemes with yellow petals [5098] [5101] .

### *Fruits:*

Circular pods that can reach a diameter of 13 cm and are covered by a tangle of long, stiff bristles on both sides over the seed [5098] .

### *Fruits:*

Large, disk-shaped [5088] .

### *Fruits:*

Unique, in the middle it forms a circular, ball shaped case covered with harsh bristles, which contains one single, brown, kidney shaped seed. The case is surrounded by a thin, also circular wing [5111] .

### *Fruits:*

Up to 12 cm in diameter, the central part densely covered with harsh bristles [5101] .

### *Height:*

A medium-sized to large tree up to 16 m in height, but reaching 20 m under ideal conditions [1280] [5082] .

### *Height:*

Up to 15 m [5098] [5101] .

### *Leaves, flowers:*

The foliage turns into a magnificent display of red and yellow in autumn. In spring the yellow flowers add to the attractiveness of this species [5088] .

### *Leaves:*

Imparipinnate [5092] [5101] .

### *Leaves:*

Intensive green [5111] .

### *Leaves:*

Large, pinnate, consisting of 6-8 pairs of leaflets [5098] .

### *Leaves:*

Leaflets elliptic-lanceolate to obovate, 2.5-7 x 2-4.5 cm, upper surface hairless, under surface with hairs when young but losing these at maturity [5082] .

### *Leaves:*

Pinnately compound, 20-30 cm long, 6-8 leaf pairs, leaflets 3-8 cm long [1304] .

### *Height:*

A tree of over 8 m high [5121] .

### *Odour:*

The flowers are sweetly scented [5121] .

*Bark:*

On young twigs bark is smooth, grey and covered with hairs but dark grey and rough to fissured on the older branches and stems [5097] .

A straight bole and an open crown [2774] .

*Bark:*

Dark grey to brown, rough and longitudinally fissured [1280] [2774] [5082] [5098] [5121] .

*Leaf fall:*

The tree remains bare for some months [2774] .

*Leaves:*

Compound, 5-9 pairs of leaflets plus a terminal leaflet, thin and oval, to 7 cm, the short stalks hairy, base rounded, tip pointed [2774] .

*Flowers:*

Appearing before the leaves, pea-like, yellow turning orangy yellow, sweetly scented and in branched sprays up to 20 cm long [5097] .

*Flowers:*

Orange-yellow, pea-shaped, in large, branched sprays, 10-20 cm long, before the new leaves [1280] [2774] [5082] .

*Fruits:*

Very distinctive round pod, densely covered with stiff brown hairs. The pod contains 1 seed and has a papery wavy wing up to 3 cm wide. It does not split open [2774] [5082] .

*Fruits:*

Non-splitting and up to 15 cm in diameter, with a broad wing and the centre part covered with hard bristles [5097] .

*Height:*

The highest specimens occur in Mozambique, Tanzania and Zambia, where trees over 25 m in height and with diameters of up to 1.2 m are not uncommon, while the shortest are to be found in Angola [5534] .

*Stems:*

Trunk single, straight [5121] .

*Stems:*

Up to 90 cm in diameter [5096] .

*Leaves:*

Compound, with 9-25 sub-opposite pairs of leaflets and a terminal leaflet, the young leaves soft and covered with brown hairs [5097] .

*Leaves:*

5-9 pairs of sub-opposite to alternate leaflets [1280] [5082] .

*Fruits:*

Indehiscent circular pod. Seed case covered with harsh bristles and surrounded by a broad membranous ring [1280] .

*Sap:*

When the tree is cut or the bark is injured, a dark red, sticky sap exudes from the wounds, which resembles human blood weeping from the wound [5111] .

## IDENTIFICATION

*P. angolensis* may be distinguished from two similar African species, *P. osun* and *P. mildbraedii*, by the fact that the latter do not have the long, slender spines set in the centre of their pods. *P. osun* has very short, collapsed spines while *P. mildbraedii* totally lacks spines. Apart from *P. angolensis* and *P. osun*, the only other African species with a bristle-covered pod centre is *P. erinaceus*, the pods of which, however, are smaller and laterally beaked (Von Breitenbach 1973). Boaler (1966) states that the pods of *P. erinaceus* are symmetric while those of *P. angolensis* develop asymmetrically, one side growing faster than the other so that the tip of the mature pod is close to its base. The bigger flowers of *P. angolensis* can also be used to distinguish between the two species (Gomes and de Sousa 1947) [5534] .

*P. brenanii*, a shrub or small tree from eastern Zimbabwe and Mozambique, has similar circular pods but lacks the bristles on the seed case. It also has conspicuous leafy stipules and larger leaflets (usually 120 x 80-120 mm) [3045] .

## ANIMAL FOOD - FERTILE PLANT PARTS

*Entire immature fruits, primates:*

Baboons eat the young pods [5096] .

*Fruits, primates:*

Pods are eaten by baboons and monkeys [3045] [5092] [5097] [5534] .

*Fruits, squirrels:*

The pods are eaten by yellow-footed squirrels [5097] [5534] .

## **ANIMAL FOOD - AERIAL PARTS**

*Young leaves, game mammals:*

Kudu eat the young leaves [5096] .

*Leaves, game mammals, browse:*

The leaves are browsed by game, particularly elephants [3045] [5092] .

*Leaves, game mammals, browse:*

The leaves are browsed by elephant and kudu [5097] .

## **BEE PLANTS**

*Nectar source:*

The flowers provide a good source of nectar for honeybees [5092] .

*Pollen source:*

Popular with farmers as it is a good source of pollen for honeybees [5097] .

## **MATERIALS**

*Wood properties:*

Heartwood is a beautiful golden red-brown [2774] .

*Wood properties, wood density:*

Fairly light (air-dry 656 kg per cubic meter) [5092] [5096] .

*Wood properties:*

Although the white sapwood is susceptible to borer attack, the heartwood is very durable and resistant to both borers and termites [5082] [5092] .

*Wood properties:*

Easily worked, glues and screws well and takes a fine polish [5082] .

*Wood properties:*

Heartwood is not eaten by termites, but the sapwood is and can be treated with 10% zinc chloride immediately after being cut into lumber to keep out termites [1304] .

*Wood properties:*

Sapwood is not durable and while still green should be treated with zinc chloride against insect ravages [5096] .

*Wood properties:*

Sapwood is off-white with quite noticeable pale brown annual rings, and the heartwood is normally brown with paler brown blotches. In the heartwood there are inconspicuous pores [5096] .

*Wood properties:*

The heartwood is attractive, moderately dense, easily worked and widely used for high quality furniture and ornaments [3045] .

*Wood properties:*

The timber is not particularly heavy or hard. Green it weighs 1072 and air-dry 656 (544-768) kg/cub m (67 and 41 [34-48] lb/cub ft) [5096] .

*Wood properties:*

The timber is said to vary in colour, from pale brown to red to copper brown with purple bands running through it [5096] .

*Wood properties:*

The wood is stable, strong, elastic, hard and durable. It is slightly coarse-grained but can easily be worked and finished, and takes a fine polish [2795] .

*Wood properties:*

It saws easily and slices neatly, glues and turns well, sands to a reasonably smooth surface, polishes and paints well, and in general has good nailing and screwing properties [5534] .

*Wood properties:*

The heartwood is resistant to wood-rotting fungi, as well as attack by termites, ants and terrestrial and marine borers,

besides which it is durable in fresh water. The sapwood however, is susceptible to insect attack and is readily damaged by powder-post beetles (Bostrychidae and Lyctidae) and other borers [5534] .

*Wood properties:*

Resists borers and is handsomely figured with golden, yellow or reddish streaks [1265] .

*Wood properties:*

The timber has a medium resistance to cutting tools and only a moderate blunting effect [5534] .

*Wood properties:*

The wood is medium hard, with an off-white sapwood and the heartwood pale honey-brown to reddish brown with purplish brown to dark brown streaks, moderately heavy (air-dry 650 kg per cubic meter) [5097] .

*Wood properties:*

Most generally used and valuable woods in south tropical Africa golden/red-brown heartwood [1279] .

*Wood properties:*

Kiaat wood from Rhodesia and Namibia is lighter and softer than that from South Africa [1280] .

## **MATERIALS - FIBRES**

*String, bags, bark:*

String and bags can be made from the bark fibre [5534] .

*Woven material, bags, inner bark:*

The inner bark can be used for the making of bags by braiding rope from the fibre and using it as weaving material [5092] .

## **MATERIALS - WOOD**

*Timber:*

In 1971, considered one of the most valuable timber species in Tanzania, with extensive forest reserves established to control its exploitation [1362] .

Although not always readily available, the timber is popular for furniture, carpentry, panelling, turning and carving [2795] .

*Containers, timber, sapwood:*

The sapwood is used for making shooks [1340] .

*Timber, bridges:*

In the past it was very popular for bridge-building [5092] .

*Canoes:*

It shrinks very little when drying from the green condition, and this quality, together with its high durability, makes it particularly suitable for boat-building. It is considered to be one of the best woods for canoe construction [5082] .

*Carpentry tools:*

The wood is favoured by carpenters for tools and other items [2795] [5098] .

*Cosmetics:*

The African makes a cosmetic from the powdered wood (Groome 1957) [1340] .

*Dugout canoes:*

In the Okavango Delta and Chobe area it is one of the favourite choices for dug-out canoes [5092] .

*Fences, live plant in situ:*

They are often seen around a chief's enclosure where they form a live fence [5082] .

*Furniture, heartwood:*

The golden or reddish brown heartwood makes high-quality furniture as it is easily worked, glues and screws well and takes a fine polish [5082] .

*Furniture, timber:*

Lumber is extensively used in Zambia for furniture and it is used extensively for all kinds of carved objects such as birds, drums, model canoes, and even doors by the Okavango people in Namibia [1304] .

*Furniture, heartwood:*

Furniture made from the heartwood is usually quite pale brown with darker markings and only becomes red-brown to dark brown after being treated with the ordinary oily furniture polishes [5096] .

*Furniture, timber:*

Many large trees have been cut down and taken to the sawmill at Oshakati, where wood is made into lumber for furniture, including desks for public schools and for teachers, office furniture including tables, cabinets, chairs etc. for numerous government offices in Ovamboland and furniture for the government hospital [1304] .

#### *Joinery:*

Frames for the Ovambo "piano", the sanza, are made from wood. Remainder of the instrument is made from native mined iron. Keys are flipped to get music [1304] .

#### *Carved wood:*

In the curio trade it has proved itself as a carving and sculpting medium [5534] .

#### *Timber:*

One of the most useful and valuable of African timber trees [2774] [5534] .

#### *Furniture:*

Ranks as one of the finest furniture woods in the world [5097] .

#### *Paddles:*

It is one of the few woods favoured for canoe paddles [2795] [5082] [5092] .

#### *Joinery:*

It is one of the best woods to use for door and window frames as the linear shrinkage is minimal [5097] .

#### *Timber:*

The timber, which is known as muninga, is valuable (Brenan and Greenway 1949, Gilges 1953, Groome et al. 1957) [1340] .

#### *Tools, timber:*

The excellent quality and stability makes this one of the most popular timbers for general carving and for a wide range of household items [2795] .

#### *Tools, tool handles, musical instruments:*

Jul'oansi in north eastern Namibia use the wood for knife handles and sheaths and thumb pianos, among other items [5088] .

#### *Blown idiophone, bark:*

The bark of young shoots is used to make whistles [5101] .

#### *Window frames, doors, boats, timber:*

The exceptional stability of the timber, even under wet conditions, makes it ideally suited for window frames, outer doors and boat building [2795] .

#### *Timber:*

It is one of the most highly esteemed timbers in the world for furniture, building and high-class joinery [5534] .

#### *Timber:*

The timber has been employed for a variety of less select purposes such as boat-building (except for parts requiring steam-bending), shelving, parquet and strip flooring (including "brown and white" sapwood flooring), doors, window frames, marine and utility plywood, decorative work, turnery (such as handles, spools and bobbin), coffins, bellows, clogs, buckets, shoe lasts, musical instruments and containers (such as cartridge case holders and ration boxes). In the tribal areas the timber is used for canoes, canoe paddles, game and fish spears, stools, trays, drums, mortars, platters, beehives, stamp blocks and dishes [5534] .

#### *Spears, wood:*

Favoured for game and fish spears [1279] .

#### *Membranophones:*

The wood is used to make drums [1279] [2795] .

#### *Boats, wood:*

Its high durability makes it particularly suitable for boat building [1279] [2795] .

## **MATERIALS - GUMS/RESINS**

#### *Gum:*

The gum is used in pharmaceutical preparations as colouring matter [5096] .

Living trees exude a gum when injured, or when the bark is incised. Red blood-coloured gum has long been used by some African tribes (De Winter et al. 1966) [1304] .

## **MATERIALS - TANNINS/DYESTUFFS**

#### *Dyes, red, brown, baskets, bark:*

The bark is used as a dye in the basket industry, where the bark is boiled with palm leaves to impart a reddish-brown colour [5092] .

#### *Dyes, red, brown, baskets, roots:*

Red ochre is used as a dye for colouring palm-fibres (*Hyphaene petersiana*), for basket weaving, producing a reddish

brown dye. Strips of palm leaves are boiled all night in such a solution and resulting dyed fibres are sometimes used in making designs in baskets [1304] .

*Dyes, red, cosmetics, inner bark, heartwood:*

Red underbark and red heartwood of the stems is used by some Kwanyama people to obtain dye. The resulting powder is called olukula, omalukula (pl.) and is the principal dye used as a cosmetic when mixed with various oils and fats, and is applied to all exposed portions of the body, including hair, face, bare breasts, arms and legs, in the style of clothing originally used by these people [1304] .

*Dyes, red, heartwood:*

Jul'hoansi in north eastern Namibia use the reddish-brown powder derived from the rotten, softened heartwood to bring back the colour of faded leather items [5088] .

*Dyes, red, cosmetics, roots:*

Red ochre dye from heartwood of roots used for cosmetics. The roots are crushed between harder pieces of wood or chipped very finely [1304] .

*Tannins, kernels:*

The brick coloured kernel is pounded to fine powder that is used to colour skins that have been tanned and smeared with a fatty substance [5101] .

*Tannins:*

The tree yields a resinous kino (Groome 1957), which assays 76.7% of tannin (Anon 1926) [1340] .

*Tannins, bark:*

The bark is valuable for tanning (Williamson 1975) [5534] .

*Dyes, red, clothes, sap:*

When cut it exudes a red, sticky and blood-like sap that leaves a permanent stain on cloth and therefore makes an effective dye [1279] [5082] [5092] .

## **MATERIALS - OTHER MATERIALS/CHEMICALS**

*Bags, bark:*

The African makes bags from the bark (Groome 1957) [1340] .

*Cosmetics, kernel:*

The brick coloured kernel is pounded to fine powder that is used as a cosmetic. It is applied to the hair [5101] .

*Cosmetics, roots:*

In the Okavango (Namibia) a red cosmetic powder is made from the roots [5098] .

*Leaves, fishing lures:*

In Zambia the crushed leaves are thrown into traps to lure fish [5092] .

*Cosmetics, wood:*

A cosmetic can be made from the ground wood (Groome et al. 1957) [5534] .

*Cosmetics, root bark:*

The inner bark of the roots, powdered and mixed with fat, has provided an ointment for anointing the body [5082] [5534] .

*Hair dyes, sap:*

In Namibia the cambium of the tree (which contains the red sap) is dried, powdered, mixed with fat and used by women to colour their hair [5534] .

*Leaves, fish bait:*

The Luvale use the leaf to lure fish into a trap (Gilges 1953) [1340] .

*Kernels, adhesives:*

The brick coloured kernel is pounded to fine powder. When the shaft of an assegai has been hollowed out to receive the shaft of the blade, some of this powder is poured into the hole. The shaft of the blade is heated and pushed into the hole. The result is that the blade is fitted firmly into the shaft [5101] .

*Roots:*

In Namibia thin roots of the trees are used by locals to prick ears (Le Roux, in prep) [5534] .

*Cosmetics, root bark:*

Red inner root bark is sold, powdered and mixed with fat as cosmetic [1280] .

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

*Bark, roots, magic:*

Bark and roots are extensively used for magical purposes [3045] .



#### *Heartwood:*

The reddish-brown powder derived from the rotten, softened heartwood is taken by the Jul'hoansi in north eastern Namibia during the women's initiation. When they menstruate for the first time, the girls are kept in seclusion for about a month. Before they are allowed to leave their hut a kiaat powder and fat mixture is applied to their bodies. This is partly as an adornment, and partly to strengthen the girls' bodies. This is accompanied by the use of specific implements, as they are not allowed to touch food. Older women also use the ointment by smearing it on their bodies and onto necklaces and other personal items. This practice is said to make the women strong [5088] .

#### *Root bark:*

In Ovamboland in Namibia the inner bark of the roots is sold in small bundles as an ingredient for an anointing mixture. To prepare the anointing lotion the bark is first powdered and then mixed with oil, after which it is applied to the body [5092] .

### **VERTEBRATE POISONS - FISH**

#### *Fishing, bark:*

According to Storrs (1980) the bark and resin have been used as a fish poison [5534] .

### **MEDICINES - UNSPECIFIED MEDICINAL DISORDERS**

#### *Humans, mouth washes:*

In Europe Pterocarpus species are manufactured into mouth-wash solutions (Hoppe 1943) [5098] .

#### *Humans:*

The plant is used medicinally in Zambia, particularly among the Luvale (Gilges 1953) [1340] .

### **MEDICINES - BLOOD SYSTEM DISORDERS**

#### *Gum, humans:*

A traditional medicine in the Transvaal for treating blood system disorders [3016] .

#### *Sap, humans:*

Because of its red colour, the wood sap is regarded as a cure for blood impurities, bleeding gums and a bleeding nose [5092] .

### **MEDICINES - CIRCULATORY SYSTEM DISORDERS**

#### *Bark, humans, haemorrhoids, oral ingestion:*

A decoction of the bark is taken orally for piles [5097] .

### **MEDICINES - DIGESTIVE SYSTEM DISORDERS**

#### *Heartwood, humans, stomach, external applications:*

The reddish-brown powder derived from the rotten, softened heartwood is used by the Jul'hoansi in north eastern Namibia as a treatment against stomach ailments. The powder is mixed with fat to make an ointment which is used to cure stomach problems by drawing lines on the belly of the sick person [5088] .

#### *Heartwood, humans, stomach, oral ingestion:*

The reddish-brown powder derived from the rotten, softened heartwood is taken by the Jul'hoansi in north eastern Namibia as a treatment against stomach ailments. The powder is stirred into cold water and drunk, leaving the powder at the bottom of the cup or glass [5088] .

#### *Bark, humans, stomach, oral ingestion:*

A cold infusion made from the bark is taken to relieve stomach disorders [5097] [5534] .

#### *Roots, humans, diarrhoea, oral ingestion:*

An infusion made from roots is taken orally for the treatment of diarrhoea [5097] .

#### *Bark, humans, stomach, teas:*

A cold infusion from the bark alone can be taken to relieve stomach disorders [5082] [5098] [5534] .

### **MEDICINES - GENITOURINARY SYSTEM DISORDERS**

#### *Roots, humans, aphrodisiac, oral ingestion:*

In Zimbabwe and Mozambique, a soup made from the root mixed with that of the purple-leaved albizia (*Albizia antunesiana*) and the hooves of cattle is highly regarded as an aphrodisiac [5092] .

*Sawdust, humans, aphrodisiac, internal applications:*

One young woman packed kiat sawdust into the vagina to sexually arouse the husband (Gilges 1953) [1340] .

*Bark, humans, haematuria, oral ingestion:*

A cold infusion made from the bark is taken to relieve blood in the urine [5097] .

## MEDICINES - INFECTIONS/INFESTATIONS

*Gum, humans, ringworm:*

A traditional medicine in the Transvaal for treating ringworm [3016] .

*Bark, roots, humans, gonorrhoea:*

Either the bark or the root, boiled with fresh meat, is used as a preliminary accelerator in the treatment of gonorrhoea [5082] [5534] .

*Flowers, humans, ringworm, ointments:*

A remedy for ringworm consists of an ointment containing more or less equal parts of crushed flowers, fowl manure and the fruit of a shrubby species of *Solanum*, which are burned and combined with fat to form a paste. Very often the patch of ringworm is scrubbed vigorously with a dried maize cob before the ointment is rubbed on to it [5082] [5534] .

*Bark, humans, skin, ringworm:*

The bark is boiled and the resulting red fluid is used in treating skin lesions and ringworm [5097] .

*Roots, humans, gonorrhoea, intestinal parasites, malaria, blackwater fever:*

A root decoction is believed to cure these diseases [5092] .

*Roots, humans, gonorrhoea, oral ingestion:*

It is widely believed in Africa that a man can contract an illness by having sexual contact with a menstruating woman and to treat this illness (which is thought to be gonorrhoea), a root decoction is taken by mouth [5092] .

*Roots, humans, malaria, fever:*

A root decoction is believed to help for malaria and blackwater fever [5082] [5092] [5097] [5098] [5534] .

*Sap, humans, ringworm, external applications:*

This tree is one of the most widely used and most important cures for ringworm (fungal skin infection) in Botswana. The red sap obtained from underneath the bark is applied directly to the affected area. Alternatively, the crushed flowers are mixed in equal parts with poison apple fruit (*Solanum panduriforme* or *Solanum incanum*) and fowl manure. This is mixed with fat to make an ointment. The ringworm patch is first scrubbed vigorously with a maize cob and the ointment is applied directly to the skin [5092] .

*Sap, humans, ringworm, external applications:*

The reddish sap underneath the bark is used externally for ringworm [1340] [5098] .

*Sap, humans, parasitic infections, enemas:*

An enema of the sap is used to get rid of intestinal parasites (Gilges 1953) [1340] .

*Sap, seeds, humans, parasitic infections, oral ingestion:*

The reddish sap underneath the bark is used internally for intestinal parasites. The seed ash is also used for the same purpose [5098] .

*Roots, humans, schistosomiasis, oral ingestion:*

An infusion made from roots is taken orally for the treatment of bilharziasis [5097] .

*Roots, humans, tuberculosis, oral ingestion:*

Roots are burnt and the ashes drunk in water to treat tuberculosis [5097] .

*Bark, humans, ulcers, mouth, oral ingestion:*

A cold infusion made from the bark is taken to relieve ulcers in the mouth [5082] [5097] [5098] .

*Roots, humans, gonorrhoea:*

A decoction of the root is used as a remedy for gonorrhoea and intestinal worms (Gilges 1953) [1340] .

## MEDICINES - INFLAMMATION

*Seeds, humans, skin, inflammation:*

In Zambia and Zimbabwe the seed's ashes are employed for inflammatory skin conditions and bleeding gums [1340] [5098] [5534] .

*Seeds, humans, inflammation, skin, external application:*

Ripe seeds are burnt and the ashes applied to inflamed areas of the skin and to bleeding gums [5097] .

## MEDICINES - INJURIES

*Bark, mammals, injuries, external applications:*

The bark is used in veterinary medicine. It is believed to cure limping if it is placed on the injured part of the beast [5139] .

*Humans, haemostatic, wounds:*

In Europe Pterocarpus species are manufactured into haemostatic, as well as wound medicaments (Hoppe 1943) [5098] .

*Bark, sap, humans, burns, external application:*

Powdered bark, mixed with water, and the sap are used to treat burns [5534] .

*Roots, game mammals, haemostatic, oral ingestion:*

According to the Kavango in Namibia, elephants eat the roots to stop bleeding [5098] .

*Sap, humans, wounds, external applications:*

The plant is employed as a wound-healing remedy. The reddish sap underneath the bark is used externally for wounds [5098] .

## MEDICINES - PAIN

*Bark, humans, head, anodyne, teas:*

A cold infusion from the bark alone can be taken to relieve headaches [5082] [5534] .

*Bark, humans, head, anodyne:*

In Namibia a bark extract is regarded as a remedy for headaches [5098] .

*Leaves, humans, back, antidote, internal application:*

In Zambia the pounded leaf has been used to relieve backache by packing it into the rectum, the result being purging and haemorrhage from the bowel for 48 hours (Gilges 1953) [1340] [5092] .

*Bark, humans, head, ears, mouth, anodyne, oral ingestion:*

A cold infusion made from the bark is taken to relieve headaches and earache [5097] .

*Fruits, humans, chest, anodyne, scarification:*

Those who suffer from chest pains, roast and powder the fruits and rub the powder into incisions made over the painful area (Coates Palgrave 1956) [5534] .

*Roots, humans, abdomen, anodyne, oral ingestion:*

An infusion made from roots is taken orally for the treatment of abdominal pain [5097] .

## MEDICINES - PREGNANCY/BIRTH/PUERPERIUM DISORDERS

*Bark, humans, lactation, lactation stimulant, external application:*

A bark decoction, mixed with figs, is said to promote lactation if rubbed into the maternal breast [1340] [5082] [5092] [5098] [5534] .

## MEDICINES - RESPIRATORY SYSTEM DISORDERS

*Sap, bark, roots, humans, coughs, external applications, oral ingestion:*

The sap is used to treat severe coughs. A young tree is cut and the fresh red sap is applied in a line downwards from the armpits on both sides of the body. Then a little bit of the fresh sap is eaten. A decoction is then prepared of either the bark or the roots and drunk. This remedy is used for children as well [5111] .

*Sap, humans, nose, other respiratory system disorders:*

In Namibia a red sap contained in all parts of the plant is used for nosebleeds [5098] .

*Sap, humans, nose, other respiratory system disorder:*

In some areas, the sap is used as a cure for nose-bleeds [5082] [5092] [5534] .

*Roots, humans, asthma, oral ingestion:*

Roots are burnt and the ashes drunk in water to treat asthma [5097] .

## MEDICINES - SENSORY SYSTEM DISORDERS

*Heartwood, humans, eyes, eye drops:*

The reddish-brown powder derived from the rotten, softened heartwood is used by the Jul'hoansi in north eastern Namibia as a treatment against eye ailments. The powder is stirred into cold water and a drop of this water is taken

and applied directly to the eye to cure eye ailments [5088] .

*Roots, flowers, humans, eyes, ulcers, baths, vapour baths:*

In Namibia corneal ulcers are treated by administering eye baths with an extract which is obtained by soaking cleaned roots for six hours in water. In addition, the plant's flowers can be placed in boiling water and an eye steam bath taken [5098] .

*Roots, flowers, humans, eyes, ulcers, washes, vapour baths:*

Cleaned and left to soak in water for six hours, roots produce an eyewash in which corneal ulcers are bathed. In the follow-up treatment of this complaint, the flowers are placed in boiling water over which the patient holds his face, allowing the steam to fill his eyes [5082] [5092] [5098] [5534] .

*Roots, humans, eyes, oedemas, oral ingestion, poultices:*

A root decoction is taken for swollen, watery eyes and a corresponding poultice placed over the ailing eyes [5098] .

*Roots, humans, eyes, oral ingestion, poultices:*

In Botswana a swollen and discharging eye is treated by drinking a decoction of the boiled roots and by binding the remainder of the root matter to the eyes with a string made of ostrich leather. The cure is believed to be successful only if ostrich leather is used, because of the excellent eyesight of an ostrich [5092] [5534] .

*Roots, humans, eyes, oral ingestion, poultices:*

A root decoction is taken for swollen, watery eyes and a corresponding poultice placed over the ailing eyes [5098] .

*Sap, humans, eyes, cataracts, eye drops:*

Cataracts and sore eyes are treated by dropping sap on to the eyes [5097] .

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

*Gum, humans, sores:*

A traditional medicine in the Transvaal for treating sores [3016] .

*Bark, humans, skin, urticaria, teas:*

A cold infusion from the bark alone provides a remedy for nettle rash [5082] [5092] [5534] .

*Bark, humans, skin, urticaria:*

In Namibia a bark extract is regarded as a remedy for urticaria [5098] .

*Humans, ulcers:*

In Europe *Pterocarpus* species are manufactured for ulcer-healing medicaments (Hoppe 1943) [5098] .

*Sap, humans, skin, ointments:*

When the tree is cut or the bark is injured, a dark red, sticky sap exudes from the wounds, which resembles human blood weeping from the wound. This sap is dried, pounded and mixed with oil to make an ointment. This ointment is applied to the whole body for skin care by old women [5111] .

*Sap, humans, sores:*

The red sap from under the bark heals sores quickly (Gilges 1953) [1340] .

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

Farmers in suitably warm areas can seriously consider planting woodlots or small plantations of African teak. Plantations like this have been successfully planted in Mozambique. Up to 20 trees can be grouped in camps where shade is needed during the hot summer months [5097] .

## **ENVIRONMENTAL USES - INDICATORS**

Regarded as an indicator of well drained soils [5097] .

## **ENVIRONMENTAL USES - ORNAMENTALS**

*Fruits, everlasting flowers:*

Useful as florist material [1257] .

*Potted plant:*

It make a good bonsai material, reaching an adult shape in three to four years, with leaves much reduced in size. The roots are not aggressive [5097] .

*Live plant in situ:*

Make good garden subjects [5082] .

## ENVIRONMENTAL USES - BOUNDARIES/BARRIERS/SUPPORTS

*Live fences, homesteads:*

They are often seen around a chief's enclosure where they form a live fence [5082] .

## TOXICITY/POISONOUS COMPOUNDS

*Wood, humans:*

Wood dust may be an irritant. Can cause irritation and asthma [1280] .

## CHEMICAL ANALYSES - MISCELLANEOUS

The known 2, 4-dihydroxy-4'-methoxy-a-methyldeoxybenzoin, (aR)-angolensin, is accompanied by the novel (aS)-4-0-methylangolensin and a unique epimeric pair comprising (aR, 1" R, 4" S, 4" aR, 8" a R) -4-0-a-cadinylangolensin and (aR, 1" S, 4" S, 4" a R, 8" a R) -4-0-T-cadinylangolensin in the heartwood of the plant. The absolute configuration and conformation of the former was determined by X-ray analysis. Bis-(2-ethylhexyl) phthalate accompanies the above metabolites. Heartwood also contains (aR)-a, 2'-dihydroxy-4, 4'-dimethoxy-dihydrochalcone (Bezuidenhoudt, Brandt and Roux 1981) .

*Heartwood, phenols:*

King et al (1952) isolated 0.55% of a new crystalline phenol muningin from the heartwood. It is 6: 4-dihydroxy-5: 7-dimethoxyisoflavone. In addition it yields to petroleum ether 0.68% of yellow oil, to cold ether 5.6% of dark red resin, to boiling chloroform 3.04% of an extract containing muningin from the heartwood and to boiling alcohol a red brown product yielding 25% of muningin [1340] .

The species contains various organic substances such as tannin, chrystalline phenol and a yellow oil [5096] .

*Sap, tannins:*

The red gummy sap contains 76.7% tannin and a dark red resin [5092] [5097] .

## CROP PEST/DISEASE HOST PROBLEMS

Numerous beetles attack the sapwood of the felled plant logs and timber and a few also attack the heartwood. Boaler, S.B. 1996 lists some of the families of coleoptera recorded as feeding on live plant. *Armillaria mellea* (honey fungus) is common in miombo woodland in Tanzania and has been responsible for the death of trees in an experimental plot (they are burned plot) at Ndola, Zambia. Seems likely that death or fall (inevitably followed by burning of large miombo trees, which leave the canopy gaps characteristic of miombo, often due to fungal attack in roots. The tip of the new shoots usually dies back at the end of the growing season. Proportion of shoot dying back was some 10% in plants growing in the open at Lupa (Tanzania) in 1962-3 and some 85% in plants in woodland. The cause of this die-back was not known in 1966 (cited in Geary, T. F. 1972) .

Heartwood is not eaten by termites but the sapwood is and can be treated with 10% zinc chloride immediately after being cut into timber to keep out termites [1304] .

*Vertebrate pests:*

White sapwood is susceptible to borer attack but heartwood is very durable and resistant to both borer and termites [1279] .

*Vertebrate pests:*

Susceptible to borer attack should be treated with an insecticide [1280] .

## CONSTRAINTS - MISCELLANEOUS

*Fruiting:*

May bear fruit at the age of 20 years (that is, within about 15 years of a permanent shoot being formed), but fruiting is light until about 35 years [5534] .

*Timber, asthma:*

Workers with the timber sometimes suffer from skin irritation and from asthma (Timber Technology 1957) [1340] [5096] .

Attempts to establish plantations have met with little success [1265] .

The species is not well suited to plantation forestry. Germination problems are mentioned above. For nursery plants to survive planting out, tap roots need to be well-developed, which causes time and handling problems. Even with a large tap root, the danger of annual die-back remains for several years. The best method of regeneration is to

maximise the use of the self-sown suffrutex population, with additional planting to fill gaps [1099] .

## CLIMATE

The climate range is that of the dry sub-humid regions with a single-season rainfall regime, a mean annual rainfall of between 500 and 1250 mm, and mean minimum temperatures of 20°C for the warmest month and 4°C for the coldest month [5534] .

*Tanzania:*

Miombo, i.e. with a single dry season lasting six months [1099] .

## RAINFALL

*South Africa:*

Prefers an annual rainfall of more than 500 mm [5096] .

520 mm [1304] .

600 mm [1279] .

## TEMPERATURE

Seasonal variation 1.7°C to 40.6°C [1304] .

*Tanzania:*

Mean minimum of coldest month >4 °C; mean of warmest month >=20 °C [1099] .

## ALTITUDE

0 to 1650 m in Tanzania [1099] [5534] .

*Angola:*

The trees grow on the plateau at an elevation of 800 to 2000 m [5534] .

*Malawi:*

900 to 1200 m [5534] .

*South Africa, Zambia:*

From 600 to 1200 m [5534] .

1100 m average [1304] .

*Zimbabwe:*

Between 900 and 1600 m [5534] .

## TOPOGRAPHY/SITES

*Namibia:*

Mostly sandy plains and dunes in mixed woodlands [5121] .

*Southern Africa:*

Kalahari sand veld with dunes [1280] .

## SOILS

Species probably has preference for more alkaline soils than those commonly found in the miombo but this tendency is obscured by the effects of aspects of the miombo environment such as annual burning and soil water regime which restrict the pH range of sites where often factors favour the species to the acid side of neutral [1099] .

Best on soils permitting rapid drainage through top 30cm of soils. Where soil is shallow normal tap root formation and ability to obtain water in pre-rains and early rains period will be reduced (Geary 1972) .

*Tanzania:*

Widespread in Kilwa, Lindi, Morogoro and Tabora, preferring well-drained soils [2774] .

*Tanzania:*

Serpentine [1099] .

Sandy top soil and low nutrients [1099] .

## VEGETATION

Occurs in miombo. Is the post-cultivation vegetation in many areas of forest cleared for cultivation, as on the lower slopes of the Nguru hills (Eastern region) in Tanzania. There is usually a marked change in the soil from its forest state, followed by deterioration in structure during cultivation, to the miombo state [1099] .

Woodland, in the Zambezi regional centre of endemism [1355] .

*Botswana:*

Very abundant in the Miombo woodland in Chobe [5092] .

*Central and Southern Africa:*

Widespread in woodland and wooded grassland [2774] .

Occurs in woodland and wooded grassland. Sometimes as stunted trees in wooded grassland on mountain tops (e.g Soutpansberg) [5097] .

Occurs in savanna woodland [1265] .

*Zambia:*

Throughout, and may be found in all woodland types as well as dry evergreen and dry deciduous forests (Storrs, 1980) [5534] .

*Tanzania:*

Occurs in miombo vegetation [1099] [5534] .

Kalahari sandveld with dunes covered with pioneer and trees [1280] .

*Southern Africa:*

Occurs in savanna [1279] .

*East Africa:*

Found in Brachystegia and other deciduous woodland, wooded grassland, and often in areas cleared for cultivation [1362] .

Content typical of woodland zones of catena in miombo Tanzania [1099] .

## ENVIRONMENTAL FACTORS - MISCELLANEOUS

Exhibits fire-resistance and annual die-back of seedlings helps it to survive in the miombo environment. Annual burning is an integral part [1099] .

Is one of the most fire-resistant of miombo (with annual fires) canopy trees [1099] .

*Namibia:*

The trees can withstand fire, dying back to woody rootstock and coppicing next season. It is a light-demanding species, remaining as a suffrutex for many years if growing in shade [5121] .

These trees are very resistant to fire, but repeated heavy burning produces a "stag-headed" appearance, which also occurs if the tree is suffering as a result of unfavourable conditions such as shallow, stony soil, or too much water [5082] [5092] .

## POLLINATION

Carried out by insects [1099] .

## FLOWERING/FRUITING/SEED SET

*Flowering, Zaire:*

June, July and September [1279] .

*Fruiting, Zaire:*

September, October, November to December and April to May [1279] .

*Flowering, Tanzania:*

September to October [1279] .

*Fruiting:*

Fruits fall mostly in the late dry season of the year after formation, but some remain on the tree until the following rainy season. The fruit becomes fixed to the ground by soil splashed up in the rainy season and termite galleries can sometimes be seen anchoring the fruit, whose coats the termites are eating. .

Flowering period is hottest, driest time of year and continues with peak of flying insect activity in miombo [1099] .

*Flowering, Namibia:*

October to December with a second flush in April [5121] .

*Flowering, Namibia:*

September to October, in attractive yellow panicles [5111] .

*Flowering, Namibia:*

Spring [5088] .

*Flowering, South Africa:*

September/October [5096] [5534] .

*Fruiting, Namibia:*

December to May mainly, but present all year round [5121] .

*Fruiting, South Africa:*

The pods ripen in late summer [5096] .

*Flowering, Mozambique:*

October [5534] .

*Flowering, Zambia:*

August to October [5534] .

*Flowering:*

From August to February [5097] .

*Fruiting:*

From January to June [5097] .

*Flowering, Tanzania:*

From October [1099] [5534] .

*Fruiting, Tanzania:*

End of October to November. Fruits form 3-4 weeks after opening of flowers [1099] .

*Flowering, southern Africa:*

August to December [1279] [5082] .

*Fruiting, southern Africa:*

January to April [1279] [5082] .

*Flowering, southern Africa:*

September to November (at the same time as the leaf buds are shooting); flowering is short, at less than two weeks, before the beginning of the summer rains [1280] .

*Fruiting, southern Africa:*

Fruits mature in January, in the dry season [1280] .

*Fruiting:*

Mature pods in winter, during dry season in January [1280] .

## **DISPERSAL**

*Fruits:*

A winged pod naturally dispersed by wind [1099] .

Fruits are dispersed by wind for surprising distances from the parent tree (Boaler 1966) [5534] .

## **GERMINATION**

Seeds from some fruits germinate during the latter part of the first rainy season after formation, others do so in the second rainy season. Pods non-dehiscent and open at one side, the seed germinating usually inside the open fruit. Repeated wetting and drying induces fruit opening. Damaged seed almost invariably failed to germinate. Physical damage to the testa caused the seeds to go mouldy. Marked dormancy effect in the seed. Soaking in concentrated sulphuric acid for 15 minutes, followed by 5 minutes washing said to help break dormancy. Light is not essential for seed germination [1099] .

Boaler (1966) found that seed blackened by fire had a germination capacity of only 18-23%, in contrast to the 50% that can be expected from good *Pterocarpus* seed [5534] .

In natural conditions, germination occurs within the seed pod when it has been split open after repeated wetting and drying. The protection afforded by the pod is probably important to the success of the seedling. In nursery conditions, the pods are difficult to open without damaging the seed. There is marked seed dormancy and filing the seeds or soaking them in concentrated sulphuric acid for 15 minutes, followed by 5 minutes of washing, has been suggested [1280] .

## **SEEDLING DEVELOPMENT**



Development of seedling is much more rapid below than above ground [1099] .

*Namibia:*

An informal trial of the root development showed that within 100 days of germination, the roots of a seedling can be up to one metre deep already. This may partly explain the bad survival rates of planted seedlings [5111] .

Below-ground development is much more rapid than that above ground. The species develops a tap root, important in order to reach soil moisture reserves deep in the soil in the early growing season. In deep soils, an extensive system of lateral roots also develops in the top 50 cm of the soil. In shallow soils, the species' ability to obtain water in pre- and early rains is reduced [1099] .

The above-ground parts of plants die back each dry season and are replaced by new shoots in the rainy season for several years after germination. Only when the root system has grown sufficiently can a shoot receive enough water and nutrients to survive the dry season. A study in Tanzania showed that the proportion of shoots dying-back was higher in woodland (85%) than in the open (10%), but no causal factors were suggested [1099] .

## VEGETATIVE GROWTH

*South Africa:*

Slow growing [1280] .

*Zimbabwe:*

Fairly fast growing [1280] .

*Growth rate:*

The growth rate is rather slow but varies considerably between trees. Although external environmental factors play an important role, it appears that the growth of individual trees is also strongly genetically controlled [5534] .

*Growth rate:*

Under favourable conditions the growth rate is 500-700 mm per year [5097] .

## LONGEVITY

The life expectancy of the species is probably no more than 100 years except where the tree grows in an exceptionally favourable environment. They go on producing fruit until they die (Boaler 1966) [5534] .

## GENETICS

Little intraspecific variation has been discovered [1099] .

## NITROGEN FIXATION/NODULATION

As a nitrogen-fixing tree the leaves have been found to contain 50% more nitrogen than those of *Julbernardia globiflora*, which has no nodules, growing alongside [2774] .

Investigations on the roots of Zimbabwean species of legumes showed that *P. angolensis* produces nodules (Corby 1974) and that these enable it to compete successfully in its habitat [5534] .

## ASSOCIATED INSECTS

*Lepidoptera:*

The butterfly *Charaxes achaemenes* breeds on the tree [3045] .

*Lepidoptera:*

The larvae of the butterfly called bushveld charaxes (*Charaxes achaemenes*) feed on the leaves of kiatat [5092] [5097] .

Boaler (1966) observed cockchafer larvae attacking the roots of newly germinated seedlings. Such attacks during the first two weeks of the plant's life are usually fatal [5534] .

## INSECT PESTS

Sapwood is susceptible to insect damage [2774] .

## CULTIVATION

Place of planting in regeneration of *Pterocarpus* stands seems likely to be restricted to the completing of areas of suffrutices. Transplanting (in Tanzania) during dormant period May-August after herb layer has been burned. Select plants with as large tap-roots as possible, as these have largest food reserves. Cut lateral roots C. 2.5cm (1") from taproot. The smaller the diameter of the taproot where it is cut the greater will be the chance of success [1099]. Farmers in suitably warm areas can seriously consider planting woodlots or small plantations of African teak. Plantations like this have been successfully planted in Mozambique. Up to 20 trees can be grouped in camps where shade is needed during the hot summer months [5097].

## SEED WEIGHT

Number of seeds per kg is 3,400-5,000 [2774].

## PROPAGATION FROM SEED

Experiments by the Seed Conservation Section, Royal Botanic Gardens, Kew, Wakehurst Place, showed that germination can be achieved by removal of the seed from the fruit, chipping of the seed coat, placing the seed on 1% plain agar medium and keeping it at 21°C with 12/12 hour light-dark regime [2606].

*Namibia:*

Germination results and survival rates of planted seedlings are not very good. Best germination results were achieved by sowing early September, 1996 with 37% germination rate from 1996 seeds and 34% from 1995 seeds [5111].

*Namibia:*

Germination results and survival rates of planted seedlings are not very good. Best germination results were achieved by sowing early September, 1996 with 37% germination rate from 1996 seeds and 34% from 1995 seeds. The seeds had only been removed from the seed case and no seed pre-treatment was tested [5111].

Direct sowing of fruits appears to be unsuccessful (Groome et al. 1957). Better results have been achieved with direct sowing of seeds [5534].

Germination is usually 30-70% [2774].

The seed is very difficult to remove from the pods as the hard, fibrous, spiny, central portion is awkward to handle [5096].

Pods collected in the veld must be opened and the seed taken out. If the seeds are not scarified, only a few, if any, will germinate. Seeds must be left in water for 1-2 days and then planted in flat seedling trays filled with river sand. They should germinate within 20-30 days. Initially, seedling growth is slow but it speeds up later. Transplant seedlings at an early stage for they soon develop a very long taproot [5097].

In nursery conditions, the pods are difficult to open without damaging the seed. There is marked seed dormancy and filing the seeds or soaking them in concentrated sulphuric acid for 15 minutes, followed by 5 minutes of washing, has been suggested [1280].

Soaking in concentrated sulphuric acid for 15 minutes, followed by 5 minutes washing said to help break dormancy. Light is not essential for seed germination [1099].

The pod does not split open and for nursery work it must be broken open. Difficulty in germinating seeds has been experienced. Seeds which have been filed germinate more readily than untreated seeds but this is not satisfactory [1280].

## PROPAGATION - VEGETATIVE

Cannot be easily and rapidly regenerated [5534].

Cuttings made from young coppice shoots should be planted in early spring and can be treated with growth-stimulating hormones before planting. Plant truncheons of 100 mm in diameter or thicker during October in a hole preferably 1 m deep with some river sand placed in the bottom. The sand prevents fungal growth and speeds up root formation [5097].

Seedlings, truncheons (large woody cuttings) [2774].

Truncheons (branches of about 2 m long and at least 10 cm in diameter), if planted in October when the sap is rising, grow fairly easily and successfully. They should be planted in a hole about 1 m deep with river sand at the bottom. The river sand prevents fungal growth and speeds up the formation of roots. It will only thrive in frost-free areas and may grow between 50 and 70 cm per year if conditions are favourable. The plants should be protected from wind for the first years [5092].

Truncheons (branches of about 2 m long and at least 10 cm in diameter), if planted in October when the sap is rising, grow fairly easily and successfully [5082] [5092] [5096].

### *Southern Africa:*

Responds well when planted by truncheon [5097] .

Large cuttings, i.e. branches up to 2 m long and 10 cm diameter, will take root in the season when the sap rises. Leaving the branch in rooting hormone for 24 hours is recommended [1265] .

## 'CROP' MANAGEMENT

Unsuited to plantation forestry because, in order to succeed in forest, nursery plant needs root system so large as to make it awkward to handle and costly to produce [2255] .

A persistent coppicer in the seedling and establishment stages, producing strong shoots from stumps and low pollards (Groome et al. 1957) [5534] .

Pruning, coppicing [2774] .

It is always better to protect young plants from cold winds for the first two years [5097] .

The best method of regeneration is to maximise the use of the self-sown suffrutex population, with additional planting to fill gaps [1099] .

## YIELDS

A *P. angolensis* tree can have from nought to two seeds per fruit. The ratio, however, varies considerably throughout the natural distribution area of the species [5534] .

The mean number of fruits per tree, as determined by Boaler (1966) at two localities in the eastern region of Tanzania, varied from 100 to 400. An individual tree with some 2400 fruits was also noted, while in some years a few trees in woodland areas bore no fruit at all [5534] .

Number of seeds per kg is 3,400-5,000 [2774] .

## TRADE

### *Namibia:*

In Ovamboland in Namibia the inner bark of the roots is sold in small bundles as an ingredient for an anointing mixture [5092] .

### *Namibia:*

The species represent the only commercially harvested wood in Bushmanland and is therefore an important tree, but it is doubtful whether the harvesting is sustainable [5111] .

### *South Africa:*

It is a favoured wood for making items for sale as curios [5139] .

### *Southern Africa:*

The characteristic dishes made from kiat are nowadays readily available at roadside craft stalls, craft markets and curio shops. These dishes are easily recognised by the contrasting colours of the reddish brown heartwood and the yellowish sapwood [2795] .

### *Namibia:*

Used in Ovamboland, commercially [1280] .

## RESEARCH NEEDS

Investigate possible intraspecific variation by collection of more botanical specimens from named and described localities throughout the species range. Collect seed and vegetative material from named trees in stands throughout range and distribute for cultivation at a number of testing sites. Carry out further field trials of fruit germination rates under a variety of conditions within the normal range of miombo environment variability. Carry out more root and shoot ring counts on saplings to determine length of time spent in suffrutex stage, and on suffrutices to determine the maximum age to which these plants may live. More experiments required to show the relationships between values of environmental factors and rates of recruitment to sapling size in suffrutex populations. Comparative data required on rates of growth and death in suffrutex population between *Pterocarpus* and other tree species, under different burning treatments (in Tanzania). Further information needed to show rates of *Pterocarpus* height and diameter growth and crown development in relation to the development of the canopy vegetation layer as a whole, in stands regenerating after the abandonment of shifting cultivation in Tanzania. Very extensive work required to throw further light on environmental conditions in which timber sized trees of species occur. More annual bole-girth increment measurements of individual trees should be made in stands throughout the miombo area in Tanzania

[1099] .

## ACKNOWLEDGEMENTS AND DATASHEET PROGRESS

All data transferred from SEPASAL Paper Files by Maryam Imbuni, KENRIK, National Museums of Kenya, October 2003 .

Updated for southern Africa by M. Sinkela; checked by C. Mannheimer and A. Jarvis; SEPASAL Namibia, National Botanical Research Institute; April 2005 .

## MISCELLANEOUS NOTES

Second to stinkwood in popularity in South Africa [1280] .

---

## References

- [144] Allen, O.N. and Allen, E.K. 1981. *The Leguminosae. A source book of characteristics, uses and nodulation*. London: Macmillan. En.
- [1099] Boaler, S.B. 1966. *The ecology of Pterocarpus angolensis DC. in Tanzania*. London: HMSO. En. Ministry of Overseas Development, Overseas Research Publication No. 12.
- [1257] Moss, H. and Taylor, F.W. 1983. *Final report on the potential for commercial utilization of veld products. I. Resources and their management*. Gaborone, Botswana: Government Printers. (28p). En.
- [1265] National Academy of Sciences. 1979. *Tropical legumes: resources for the future*. Washington, D.C.: National Academy of Sciences. x, 331p. En.
- [1279] Coates Palgrave, K. 1977. *Trees of Southern Africa*. Cape Town, Johannesburg: C. Struik Publishers. 959p. En.
- [1280] Palmer, E. and Pitman, N. 1972. *Trees of Southern Africa, covering all known indigenous species in the Republic of South Africa, Southwest Africa, Botswana, Lesotho and Swaziland*. Cape Town: Balkema. 2235p. En. 3 vols.
- [1304] Rodin, R.J. 1985. *The ethnobotany of the Kwanyama Ovambos*. St. Louis, U.S.A.: Missouri Botanical Garden. 163p. En. Monographs in Systematic Botany from the Missouri Botanical Garden Vol. 9.
- [1340] Watt, J.M. and Breyer-Brandwijk, M.G. 1962. *The medicinal and poisonous plants of southern and eastern Africa*. Edinburgh and London: E. and S. Livingstone. ix, 1457p. En. 2nd ed.
- [1355] Lock, J.M. 1989. *Legumes of Africa. A checklist*. Kew, U.K.: Royal Botanic Gardens, Kew. 619p. En.
- [1362] Flora of Tropical East Africa. 1952-. London: Crown Agents; Rotterdam: Balkema. En. Edited by W.B. Turrill et al.
- [1452] Williamson, J. 1975. *Useful plants of Malawi*. Zomba: University of Malawi. 336p. En.
- [1669] Arnold, T.H. and de Wet, B.C., eds. 1993. *Plants of Southern Africa: names and distribution*. Pretoria, South Africa: National Botanical Institute. iv, 825p.
- [2255] SEPASAL.. *Survey of Economic Plants for Arid and Semi-Arid Lands. Notes from SEPASAL datasheet*. Kew, U.K.: Centre for Economic Botany, Royal Botanic Gardens, Kew.
- [2606] Wood, J.A. 1998. *Pers. comm., 1998*. En. Information about Pterocarpus angolensis.
- [2607] Seward, B.R.T. 1993. Threatened dry-forest ecosystems. Harare: Division of Research and Development, Forestry Commission. 273-278. En.
- [2774] Mbuya, L.P., Msanga, H.P., Ruffo, C.K., Birnie, A. and Tengnas, B. 1994. *Useful trees and shrubs for Tanzania: identification, propagation and management for agricultural and pastoral communities*. Nairobi, Kenya: Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA). 542p. En.
- [2795] Van Wyk, B.-E. and Gericke, N. 2000. *People's plants: a guide to useful plants of Southern Africa*. Pretoria, South Africa: Briza Publications. 351p. En.
- [2963] SEPASAL. 2002. *Nomenclature check*. Royal Botanic Gardens, Kew.
- [3016] Funston, M., Borchert, P. and Van Wyk, B. 1993. *Bushveld trees. Lifeblood of the Transvaal lowveld*. Vlaeberg, South Africa: Fernwood Press. 120p. En.
- [3039] Grace, O.M., Prendergast, H.D.V., Jager, A.K. and van Staden, J. 2002. Bark medicines used in KwaZulu-Natal, South Africa: an inventory. *South African Journal of Botany*. In press. En.
- [3045] Van Wyk, B. and Van Wyk, P. 1997. *Field guide to trees of Southern Africa*. Cape Town, South Africa: Struik. 536p. En.

- [5082] Coates Palgrave, K. 2002. *Trees of Southern Africa*. Cape Town: Struik Publishers. 3rd ed.
- [5083] Craven, P. and Kolberg, H. In prep. *Common names of Namibian plants*. Windhoek.
- [5087] Le Roux, P.J. 1971. The common names and a few uses of the better known indigenous plants of South West Africa. *Department of Forestry Bulletin*. 47: 1-81.
- [5088] Leffers, A. 2003. *Gemsbok bean & Kalahari truffle. Traditional plant use by Jul'hoansi in North-Eastern Namibia*. Windhoek: Gamsberg Macmillan Publishers.
- [5092] Roodt, V. 1998. *Trees and shrubs of the Okavango Delta. Medicinal uses and nutritional value*. Gaborone: Shell Oil Botswana. 21(1): 67-73. The Shell field guide series: part I.
- [5093] Setshogo, M.P. and Venter, F. 2003. *Trees of Botswana: names and distribution. SABONET Report No. 18*. Pretoria: Southern African Botanical Diversity Network.
- [5096] Van Wyk, P. 1972. *Trees of the Kruger National Park. Vol. I*. Cape Town: Purnell & Sons.
- [5097] Venter, F. and Venter, J.-A. 1996. *Making the most of indigenous trees*. Arcadia, Pretoria: Briza Publications.
- [5098] Von Koenen, E. 2001. *Medicinal, poisonous and edible plants in Namibia*. Windhoek: Klaus Hess Publishers. Edition Namibia, Vol. 4.
- [5101] Giess, W. and Snyman, J.W. 1986. The naming and utilization of plantlife by the Žul'hōasi Bushmen of the Kau-kauveld. Pretoria: University of South Africa. Pp. 237-246.
- [5104] Germishuizen, G. and Meyer, N.L., eds. 2003. *Plants of southern Africa: an annotated checklist*. Strelitzia 14. Pretoria: National Botanical Institute.
- [5111] Leger, S. 1997. *The hidden gifts of nature. A description of today's use of plants in west Bushmanland (Namibia)*. ed. German Development Service.
- [5118] Ostermeier-Noczil, B. 1997. *Smallholders of northern Namibia. Ethnobotanical case study of the traditional Mbukushu village "Kaké" in the Kavango/Caprivi-region*. Vienna: University of Vienna. Unpublished Diploma thesis.
- [5121] Curtis, B.A. and Mannheimer, C.A. 2005. *Tree Atlas of Namibia*. Windhoek: National Botanical Research Institute of Namibia. 704p.
- [5123] National Herbarium of Namibia. Undated. *Specimen Database (SPMNDB)*. Windhoek: National Botanical Research Institute of Namibia.
- [5139] Liengme, C.A. 1981. Plants used by the Tsonga people of Gazankulu. *Bothalia*. 13(3&4): 501-518.
- [5174] Brenan, J.P.M. and Greenway, P.J. 1949. *Check lists of the forest trees and shrubs of the British Empire. Part 5: Tanganyika Territory*. Oxford (UK): Imperial Forestry Institute.
- [5181] National Plant Genetic Resources Centre. undated. Windhoek, Namibia: National Botanical Research Institute of Namibia.
- [5280] Corby, H.D.L. 1974. Systematic implications of nodulation among Rhodesian legumes. *Kirkia*. 9(2): 301-329. En.
- [5311] Gilges, W. 1953. Title unknown. *Trees in S. Afr.* 5: 17.
- [5341] National Plant Genetic Resources Centre. undated. *Database*. Windhoek, Namibia: National Botanical Research Institute of Namibia. En.
- [5371] De Winter, B., De Winter, M. and Killick, D.J.B. 1966. *Sixty-six trees of the Transvaal*. Pretoria: Voortrekker-pers.
- [5419] Mapaura, A. and Timberlake, J., eds. 2004. *A checklist of Zimbabwean vascular plants. SABONET Report No. 33*. Pretoria and Harare: Southern African Botanical Diversity Network. iv, 148p.
- [5423] Groome, J.S. 1957. Title unknown. *For. Abstr.* 18: 153.
- [5424] Loots, S. 2005. *A Red Data Book of Namibian plants. SABONET Report No. 38*. Pretoria: Southern African Botanical Diversity Network.
- [5425] Timber Technology. 1957. Title unknown. 65: 205.
- [5450] PROTA (Plant Resources of Tropical Africa). 2002-. *Protabase*. Wageningen, The Netherlands: PROTA Foundation. Published on the internet; <http://database.prota.org/search.htm>.
- [5529] Gillett, J.B., Polhill, R.M. and Verdcourt, B. 1971. Leguminosae subfam. Papilionoideae. London: Crown Agents.
- [5530] Groome, J.S. 1957. A summary of information on *Pterocarpus angolensis*. Part 1. *Forestry Abstracts*. 18(1): 3-8.
- [5531] Onderstall, J. 1984. *Transvaal Lowveld and Escarpment. South African wild flower guide 4*. Kirstenbosch: Bot. Soc. of South Africa.
- [5532] Robyns, W., ed. 1954. Papilionoideae - Dalbergieae, Viciae, Phaseoleae. Vol.6.
- [5533] Storrs, A.E.G. 1980. *Know your trees. Some common trees found in Zambia*. Zambia: Forest Department Publication.
- [5534] Vermeulen, W.J. 1990. *A monograph on Pterocarpus angolensis*. Pretoria: SARCCUS Standing Committee

- for Forestry. Southern African Regional Commission for the Conservation and Utilisation of the Soil (SARCCUS).
- [5561] Gomes, E. and de Sousa, A.F. 1947. Imprensa Nacional de Mocambique. *Dendrologia de Mocambique*. Vol. I.
- [5562] Von Breitenbach, F. 1973. *Pterocarpus angolensis* - a monograph. *Trees in South Africa, Jnl. of the Tree Soc. of SA*. Vol XXV, part 3.
- [6044] Jansen, P.C.M. and Cardon, D., eds. 2005. *Plant Resources of Tropical Africa. 3 Dyes and tannins*. Wageningen, The Netherlands: PROTA Foundation; Leiden, The Netherlands: Backhuys Publishers; Wageningen, The Netherlands: CTA. 216p.

*SEPASAL's development has been funded by The Clothworkers' Foundation and its Internet development is funded by The Charles Wolfson Charitable Trust. Nutritional information on African wild foods is funded by Nestlé Charitable Trust.*

All data © The Trustees of the Royal Botanic Gardens, Kew, 1999-2007 [Full copyright statement](#)

If you wish to cite SEPASAL, please read [this](#) first

To send us feedback and bug reports, please click [here](#)