

ISAR
GROUP



Forestry

Guibourtia coleosperma (Benth.) J. Léonard (Mushibi)

Nomenclature etc. CAESALPINIACEAE. Syn.: Copaifera coleosperma Benth. Trade name: very similar to Bubinga, but traded as a separate range under the names: mushibi, copalier, Rhodesian copalwood (GB), muzaule (ZW) wood quite similar to that of G. demeusii (Bubinga) but traded under separate names: mushibi, copalier, Rhodesian copalwood (GB), muzaule (ZW).

Tree

Geographical distribution: tropical Africa.

General

Growth ring boundaries distinct. Demarcated by marginal parenchyma and slight changes in vessel frequency. Heartwood basically brown, red, purple; with streaks. Sapwood colour distinct from heartwood colour. Odour indistinct or absent. Density 0.72–0.76–0.88 g/cm³.

Vessels

Wood diffuse porous. Vessels arranged in no specific pattern, in multiples, commonly in short (2–3 vessels) radial rows. Average tangential vessel diameter 80–130–180 µm. Vessels per square millimetre very few, or few. Perforation plates simple. Intervessel pits alternate, average diameter (vertical) 6–9 µm, pits vestured. Vessel-ray pits with distinct borders, similar to intervessel pits. Helical thickenings absent. Other deposits present (dark brown).

Tracheids and fibers

Fibres of medium wall thickness to very thick-walled. Fibre pits mainly restricted to radial walls, simple to minutely bordered. Fibres non-septate.

Axial parenchyma

Axial parenchyma banded or not banded. Bands marginal (or seemingly marginal). Bands fine. Axial parenchyma apotracheal, or paratracheal. Apotracheal axial parenchyma diffuse, or diffuse-in-aggregates. Paratracheal axial parenchyma vasicentric, or aliform, or confluent. Aliform parenchyma of the lozenge type. Axial parenchyma as strands. Average number of cells per strand: (2–)4–8.

Wood rays

Rays multiseriate, (1–)2–5(–6) cells wide. Height of large rays up to 500 µm, or commonly 500 to 1000 µm. Rays composed of a single cell type (homocellular); homocellular ray cells procumbent.

Storied structures

Storied structure absent.



Secretory structures

Intercellular canals absent.

Mineral inclusions

Crystals present, prismatic, located in axial parenchyma cells. Crystal-containing axial parenchyma cells chambered. Number of crystals per cell or chamber one. Silica not observed.

Physical and chemical tests

Heartwood fluorescent (green). Water extract not fluorescent; colour of water extract colourless to brown to red. Ethanol extract fluorescent (purple). Colour of ethanol extract red. Froth test positive, or negative.

Uses

The seeds are used cooked.

The fruits or the arillus are edible. The arillus is used boiled in a soup.

The bark is used medicinally.

The beautiful, heavy, hard and reddish wood is in great demand.

It is known as African Rosewood, Mushibi, Rhodesian Copalwood, Teak or Mahogany as well as Muzaule.

Faurea saligna

Faurea saligna is a graceful, semi-deciduous tree of the family Proteaceae growing to about 10 metres, or up to 20 metres under forest conditions. Found from tropical Africa south to the Transvaal, Swaziland and Natal, often in large communities on sandy soil and along stream beds.

Its dark-grey to black bark is rough and deeply fissured, while the narrow drooping leaves are reminiscent of a willow (*saligna* meaning *Salix*-like). The timber was much-prized by the Voortrekkers for furniture and they named it Transvaal Boekenhout for the timber's resemblance to that of the European Beech. There are some 15 species of *Faurea* occurring in Africa and Madagascar.



Description

Faurea saligna is a small, willowy tree, 7-10 m tall but reaching up to 20 m in KwaZulu-Natal. The trunk is slender and straight, and the bark is dark grey to black.

The leaves are long and narrow, almost hairless, 65-125 x 13-20 mm, lanceolate-elliptic, slightly sickle-shaped, drooping and waxy. The leaf margins are entire, green in summer and red in autumn. The leaf stalk is 20 mm long. It resembles the karee tree, *Searsia lancea* (= *Rhus lancea*), but it does not have trifoliate leaves.

It flowers in spring around September. The flower heads are formed in slender spikes, 120-150 x 20-30 mm, green to creamy white. The flower heads are borne at the branch tips and have a honey or coconut scent. The flowers are 12 mm long and are densely covered with adpressed, grey hairs when young. The fruit is a small nut with hairs. It is a moderately slow grower.

Conservation Status

Faurea saligna is not threatened as it is common and well distributed. It grows in large populations.

Distribution and habitat

Faurea saligna occurs in the northeastern part of southern Africa from Zimbabwe, Mozambique, down to North-West Province, Gauteng, Limpopo Province, Mpumalanga, Swaziland and KwaZulu-Natal. *Faurea* is the only genus in the Proteaceae that is not endemic in the southwestern Cape.

It occurs in sandy or red loamy soils, and on rocky ridges. It tolerates low to medium altitude and rainfall of 508 mm per annum. It is sensitive to cold, but will thrive in areas with a mild winter.

Derivation of name and historical aspects

The genus *Faurea* was named by Harvey as a tribute to the memory of a young soldier, who was enthusiastic and passionate about botany, W.C. Faure, the son of a minister of the Dutch Reformed Church in Cape Town. He was killed in India by an unknown person while on his way to the regiments. The specific epithet *saligna* means resembling a willow tree, referring to the drooping leaves and flowers. This tree received its common name boekenhout or beech from the resemblance of the wood to that of the European beech tree. There are about 15 species of *Faurea* in Africa and Madagascar, of which six species occur in southern Africa. *F. rochetiana* is another attractive tree in this genus.

Ecology

The wood is not susceptible to borers and termites.

Uses

Faurea saligna wood is good for furniture. It is also used to make poles. The first telephone poles between the old South African Republic and Natal were mainly African beech poles (Palmer & Pitman 1972). The wood is resistant to termites. It also makes good firewood. A red dye is made by soaking *Faurea saligna* in water. This is a very decorative garden tree.

Growing Faurea saligna

Faurea saligna is grown from seeds and germinates well. Sow seeds in summer in a well-drained soil medium. This tree is suitable for large gardens as it eventually grows into a big tree, so it is not suitable in areas with a limited space for spread. It can be grown successfully in more temperate regions, such as Pretoria, the Lowveld and KwaZulu-Natal.

Brachystegia spiciformis,

commonly known as zebra wood, or msasa, is a medium-sized African tree having compound leaves and racemes of small fragrant green flowers. The tree is broad and has a distinctive amber and wine red colour when the young leaves sprout during spring (August–September). It grows in savanna, both open woodland and closed woodland of Southern and Eastern Africa, mostly Tanzania, Zambia, Zimbabwe, Malawi and Mozambique. The word msasa is commonly used as a proper name in African place names. The word also means ‚rough plant‘ in Swahili. Other common names: mundu, myombo, mtondo (Tanzania), muputu (Zambia). The plant is known in the Venda language as mutsiwa, which means ‚the one that is left behind‘. An outlying population of Brachystegia has recently been discovered in the Soutpansberg mountains of northern South Africa. This tree is a protected species in South Africa.

Distribution

The msasa is a tropical tree and grows best in open woodland where there is a sharp distinction between wet and dry seasons. The northern end of its range is near Tabora in Tanzania (about 5° S) and its southernmost extent is near Quissico on the coast of Mozambique just outside the tropics (about 25° S). Msasas need a minimum of around 500 mm rain, although the amount of rain in the summer growing season is more important than the annual rainfall. It needs a mean annual temperature of around 19 to 20 °C. It does not thrive under a combination of cold and wet conditions, and like many tropical plants it requires a hot dry period before the onset of the growing season.

Appearance

The tree typically reaches a height of about 16 metres, although it is less tall in more drought-prone areas. In central Zambia and eastern Angola, magnificent specimens of about 18–19 metres are common due to the reliability of heavy rain during the growing season. It favours inland situations at an altitude of around 1000–1400 metres (due to the sharp difference between day and nighttime temperatures), although it grows down to sea level at its southern extremity. The tree presents a series of changes according to the seasons. It starts to lose its leaves as the cool season begins in late May (somewhat sluggishly), and by early August it is bare or nearly so. In late August, as temperatures rise again, the new leaves are produced. These are often bright red in colour, but vary from almost purple to brownish in different individuals. The colour shifts to deep green over a period of 10–20 days. The insignificant flowers appear after the new leaves and these are followed by the dehiscent pods (about 12–15 cm in length) in April. As with many legume species the pods split explosively and the flat seeds (about 2 cm across) are flung some distance from the parent tree.

Ecology

The msasa is ecologically dominant over large areas of central Africa where sufficient summer rainfall is received. In many parts of Zimbabwe, Zambia, and Malawi, it is the dominant woodland tree, and its colourful springtime foliage is a striking seasonal marker. It can withstand light frost as long as little rain falls during the cool season, such as on the Mashonaland plateau, where it is often co-dominant with the similar mtondo (Julbernardia globiflora). Further north it is less dominant, but it reaches its greatest size.

The msasa develops heavy spreading boughs and a shapely crown and mature specimens are valued in parks and gardens. However, it grows very slowly, so is seldom grown in cultivation.

Verwendet

The pale brown and heavy wood is not durable and is not useful for making most items or furniture. While in some regions, where msasa trees do not grow very tall, it is often heavily branched and used mainly as fuel such as charcoal and firewood, in other parts, such as central and northern Mozambique, it is used for furniture, sleepers, and construction timber. In parts of southern Tanzania, the hard wood is highly sought after. It is also used for beehives, boats, and general construction. It is considered an all-purpose wood. Furniture production has increased, since the wood can be artificially dried in kilns, which prevents further drying and twisting of the processed wood.

In southern Tanzania, B. spiciformis has several medicinal applications, including using the roots to treat dysentery and stomach problems. It is an important shade tree. The leaves are known to be a good fodder and would likely provide good mulch. The species is not nitrogen-fixing.



Julbernardia paniculata

Julbernardia paniculata is a medium to large tropical tree, also known as muchesa. It is widespread over the warmer parts of south tropical Africa, preferring moderately high altitudes, typically 1,000 to 1,200 metres (3,300 to 3,900 ft). It is very common over its range and is the dominant woodland tree in Miombo woodland over much of central Zambia and northern Malawi.

Distribution

The muchesa is restricted in its range by availability of reliably wet conditions in the growing season of November to March. The rest of the year's rainfall is less important although it should be much drier as it requires at least a short dry resting period so its northern limits are determined by sufficient contrast between these two seasons. It does not occur south of the Zambezi river as it cannot withstand any frost or months with average temperatures of 15 °C (59 °F) or below. As a result, it grows in a band across the continent from north and north-east Angola through Katanga in Democratic Republic of the Congo and across the northern two-thirds of Zambia towards the inland plateau of north Mozambique and as far north as central Tanzania.

Appearance

Unlike its close relatives the msasa and mnondo the muchesa does not become bare during the dry season and only loses its leaves in the run-up to its spring flush of new leaves between mid-August and early September. As a result, it makes much less of a brilliant show of colour than other miombo woodland trees. The new leaves are, however, a very attractive red colour.

The tree itself grows a well-proportioned shape and fine specimens are common, usually reaching heights of 20–23 metres (66–75 ft) in its favoured localities such as plateau woodland. The tree is recognisable by its grey bark, which flakes off in chunks leaving a rough surface and a rusty-brown inner bark exposed. The leaves contain two leaflets, with the end two being bigger than the first two so the leaf hangs slightly on still days. The flowers are insignificant themselves, as with other *Julbernardia* species, but are noticeable as velvety-brown sprays among the foliage. The dehiscent pods appear in September and split open to scatter the seeds when mature.

Uses

The bark is used to extract tannin for tanning leather, while the leaves are highly prized for feeding to cattle due to their high nutritional content. They are also the source of favourite local delicacy - some kinds of fat caterpillars that feed on the leaves and are collected and roasted as a snack.

Perhaps the greatest value attached to the tree is its use as a source of nectar. The small blossoms may appear on the tree from late March (the end of the growing season) until June or even later and contain copious quantities of nectar at a time when few other trees are in bloom so beekeepers rely on it to maintain their production throughout the year.



Baikiaea plurijuga Harms (Mukusi)

Nomenclature etc. FABACEAE-CAESALPINIOIDEAE. Trade and local names: m`kusi, i`gusi, i`kusi, umgusi (ZW); m`papa (AO); Zambesi redwood, Rhodesian teak, Rhodesian redwood (GB, trade). Not protected under CITES regulations.

Tree

Geographic distribution: tropical Africa (Zimbabwe, Zambia, S.Angola, N.Namibia), southern Africa.

General

Growth ring boundaries distinct. Heartwood basically copper or orange brown; with streaks. Sapwood colour distinct from heartwood colour. Odour indistinct or absent. Density 0.58–0.78 g/cm³.

Vessels

Wood diffuse porous. Vessels arranged in no specific pattern, in multiples, commonly in short (2–3 vessels) radial rows or in radial rows of 4 or more. Average tangential vessel diameter 40–70–90 µm. Average number of vessels/mm² 17–30. Average vessel element length 250–320–400 µm. Perforation plates simple. Intervessel pits alternate, average diameter (vertical) 5–8 µm, pits vestured. Vessel-ray pits with distinct borders, similar to intervessel pits. Other deposits present (yellowish brown).

Tracheids and fibres

Fibres of medium wall thickness. Average fibre length 630–1450 µm. Fibre pits mainly restricted to radial walls, simple to minutely bordered. Fibres non-septate.

Axial parenchyma

Axial parenchyma banded. Bands marginal (or seemingly marginal). Bands fine. Apotracheal axial parenchyma diffuse-in-aggregates. Paratracheal axial parenchyma scanty, or vasicentric, or confluent, or unilateral. Axial parenchyma as strands. Average number of cells per strand: 2–4.

Rays

Rays 7–11 per tangential mm, multiseriate, 2–3(–4) cells wide. Height of large rays up to 500 µm. Rays composed of a single cell type (homocellular), or two or more cell types (heterocellular); homocellular ray cells procumbent. Heterocellular rays with square and upright cells restricted to marginal rows, mostly 1 marginal row of upright or square cells.

Storied structures

Storied structure present, all rays storied, axial parenchyma storied, vessel elements storied, fibres storied. Arrangement of tiers regular, or irregular. Number of ray tiers per axial millimetre 3–4.

Mineral inclusions

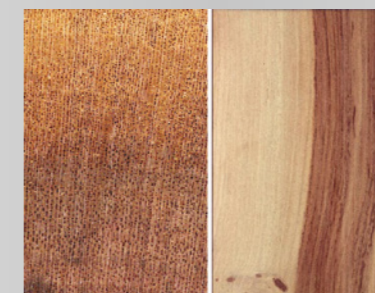
Crystals present, prismatic, located in axial parenchyma cells. Crystal-containing axial parenchyma cells chambered. Number of crystals per cell or chamber one. Crystal containing cells of normal size and enlarged (idioblasts). Silica not observed.

Physical and chemical tests

Heartwood not fluorescent. Water extract not fluorescent; colour of water extract red. Ethanol extract fluorescent (green). Colour of ethanol extract red. Froth test positive.

Illustrations

- Macroscopic images. transverse (ca. 10x). radial (natural size).
- Transverse section. variable expression of cross section in different specimens as a function of vessel size/frequency and amount of axial parenchyma.
- Tangential section.
- Radial section.



Applications

The hard, quite heavy and durable, beautiful but difficult to treat wood is known as Zambez(s)i or Rhodesian teak, redwood.

The tannic bark, gum and sap are used medicinally. Jewelry is made from the seeds.

Summary

Rhodesian Teak (*Baikiaea plurijuga*) is a tropical, slow-growing, semi-deciduous tree with a rounded crown and rough and cracked bark. It can grow up to 20 m in height with a trunk diameter of up to 120 cm when fully mature. The bark is used to treat syphilis and toothache and to make a restorative tonic. It is a source of tannins. The large, flat seeds are used as beads in crafts. The wood is heavy, very durable, strong, fine-grained and resistant to termite attack, making it considered one of the best commercial woods in the world. It also makes good fuel and is used in charcoal making. The plant is grown by stem cuttings or seed sowing. Other common names include African teak, mukusi, Zambian teak, and Zambezi redwood. Other names: African Teak, Mukusi, Mukusyi, Muse, Zambezi Teak or Zambesi Redwood.

Mukwa-Tree, also African Teak (Pterocarpus angolensis)

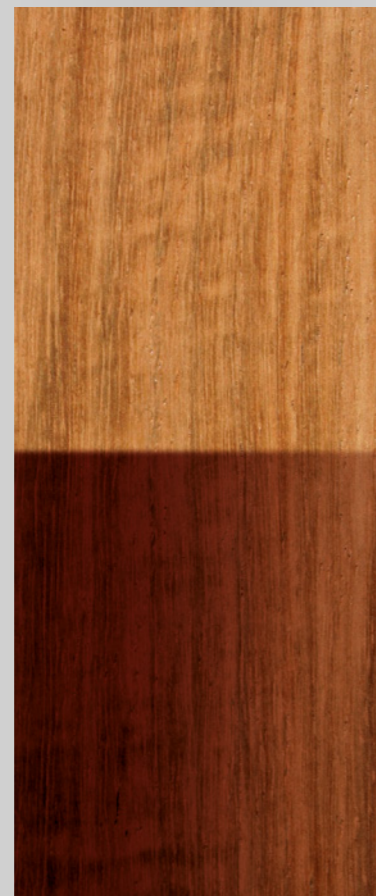
The Mukwa tree - also known as Imbila, Mebila or Muninga - is a hardwood deciduous tree that can grow to around 30 meters in height. The bark is dark gray and cracked. The color of the wood ranges from chocolate brown to reddish brown to golden brown with reddish stripes. The sapwood or pith is pale gray to yellowish. The grain varies from even to coarse.

One finds Mukwa trees in forests as well as in lightly wooded pastures in the Congo, Tanzania, Zambia, Mozambique, Zimbabwe, up to the South African province of KwaZulu-Natal. Mukwa flowers from August to February at the latest. Baboons, but also kudu and elephants feed on the leaves and fruits of the Mukwa tree.

But it is also said that where the Mukwa tree grows, the soil has dried out or is very depleted.

The Mukwa tree is one of the finest woods for the furniture industry. It is used for stable window frames, wooden floors and parquets, but also for paneling.

The bark of the Mukwa tree is also used as a medicine. Crushed it is said to help with malaria or blackwater fever. Asthma is said to be relieved by burning the roots and drinking the ash with water. Abdominal complaints, from diarrhea to billharzia, can also be treated with infusions made from the roots of the Mukwa tree.



Very decorative: the wood of the Mukwa tree.

Pinus (Kiefer)

Local name: Mulemu, Pinus

English name: Pine

Botanical name: *Pinus kesiya/oocarpa*

Family: **Pinaceae**

This month's tree, pine, is one that can be recognized all over the world. Here in Zambia the two most common species of pine are *Pinus kesiya* and *Pinus oocarpa*. Without close examination these two species are difficult to tell apart, and are generally just called pine. The main use of pine is for sawn lumber, or planks as they're called here. However, pine can also be used for poles, firewood and wind-breaks. *Oocarpa* is often the preferred pine species due to its smaller branching and better timber qualities. This pine is best suited to be grown as a single even-age crop in a plantation. Growing in a tight uniform stand helps these trees self prune and grow tall and straight with small branches, producing lumber with fewer and smaller knots. Interest in creating pine plantations began after Independence in 1965. There was concern to take pressure off the indigenous forests while still meeting current demands, especially for the increasing mining industry in the Copperbelt.



Young Commercial Plantation

Like all trees, pine require a specific mycorrhiza fungi in order to grow well. When pine was first introduced to Zambia it was important to inoculate the soil when planting, but now it is thought to not be necessary since pine has been widespread in Zambia for many decades now.



Pine Plantation Near Mkushi



Inside Pine Plantation



Pine Plantation Ground



Pine 2x4's

Pterocarpus angolensis

Pterocarpus angolensis (African teak, wild teak, Portuguese: Girassonde, Afrikaans: Kiaat, Sotho: Morôto, Tswana: Mokwa, Venda: Mutondo, Shona: Mukwa, Shona: Mubvamaropa, Zulu: Umvangazi) is a species of *Pterocarpus* native to southern Africa, in Angola, Mozambique, Namibia, South Africa, Eswatini, Tanzania, Democratic Republic of the Congo, Zimbabwe, and Zambia. It is a protected tree in South Africa. The name Kiaat, although Afrikaans, is sometimes used outside South Africa as well. In Zimbabwe, depending on what region you are in, it is known as Mukwa or Mubvamaropa.

Description

It is a deciduous tree usually growing to 16 m tall, with dark brown bark and a high, wide-crowned canopy of shiny compound leaves. In favoured wetter locations the trees are typically about 18–19 m tall. The leaves appear at the time of the flowers or shortly afterwards. They are alternate, deep green, imparipinnate, with 11–19 subopposite to alternate leaflets, the leaflets 2.5–7 cm long and 2–4.5 cm broad. It produces an abundance of scented, orange-yellow flowers in panicles 10–20 cm long; flowering is in the spring. In southern Africa, this is usually just at the end of the dry season, often about mid-October. The pod is 2–3 cm diameter, surrounded by a circular wing 8–12 cm diameter, reminiscent of a brown fried egg, and containing a single seed. This brown papery and spiky seed pod stays on long after the leaves have fallen. In poorly drained locations, the tree can still grow but it becomes more open in shape with leaves on the end of long branches - a 'stag-headed' appearance. It is referred to as a blood wood tree: when it is cut, it appears to bleed because of dark red sap.

Ecology

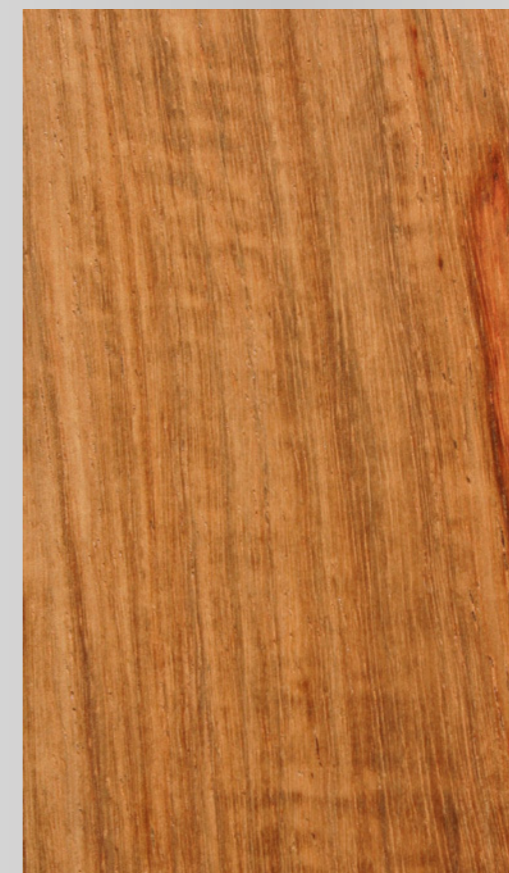
Pterocarpus angolensis grows in southern and eastern Africa over a wide range of localities where there is a dry season contrasting with a wet season. It grows best where it is warm and free of frost. The soil type must be deep sandy soil or well drained rocky slopes where the rainfall is above 500 mm per year. It grows well in areas of open woodland such as the Mashonaland plateau in Zimbabwe and northern Kwazulu-Natal region of South Africa, where it assumes a broad crown with heavy branches, and is a pioneer species on woodland and forest margins. The best specimens grow in the seasonal closed woodland of central Mozambique and parts of Malawi, where they sometimes form pure stands.

Pterocarpus angolensis is fed upon by many animals that include the charaxes butterfly in larval state, squirrels, baboons and monkeys that feed on the seed pods, which have a diameter of about 12 cm. The elephant has been known to destroy *P. angolensis* by pushing it over.

Uses

There are several uses for the wood of *P. angolensis*. The brown heartwood is resistant to borer and termite, is durable and has a pleasing spicy fragrance. The wood polishes well and is well known in tropical Africa as Mukwa when used to make good quality furniture that has an attractive light brownish-yellow colour. It can also be used for curios, and implements. Since the wood does not swell or shrink much it is great for canoe building. Furniture and curios are often made from the reddish sapwood. The colour of the sapwood is a result of the remarkable, dark red sap of the plant; an alternative name of Bloodwood rises from this. This wood also produces a rich, resonant sound and can be made into many different musical instruments. In Zimbabwe, the mbira is traditionally made from mukwa.

It is valued for several medicinal uses. It has been recorded to treat ringworm, eye problems, blackwater fever, stabbing pains, malaria, and to increase the supply of breast milk. The resemblance of the sap to blood has led to the belief in supposed magical healing powers concerning the blood. Because of all these reasons and that it is also fire resistant, *P. angolensis* is sometimes planted around the chief's enclosure to make a living fence.



Ziziphus mucronata,

known as the buffalo thorn, is a species of tree in the family Rhamnaceae, native to southern Africa. It is deciduous and may grow up to 17 metres tall. It can survive in a variety of soil types, occurring in many habitats, mostly open woodlands, often on soils deposited by rivers, and grows frequently on termite mounds. Its Zulu name "umLahlankosi" alludes to its use as a grave marker for tribal chiefs, while the Afrikaans name "Blinkblaar-wag-`n-bietjie" alludes to the shiny light green leaves and the hooked thorns.



Bark

Description

The buffalo thorn is a small to medium size tree, reaching a height of about 10 metres (33 ft), or rarely 17 metres (56 ft). The bark is a red-brown (on young stems) or roughly mottled grey, cracked in small rectangular blocks revealing a stringy red underbark. The bark becomes rough and turns to a dark grey or brown colour. The shrub or tree has distinctive zigzag branchlets, armed with pairs of thorns, one hooked and the other straight. In some instances adult trees lose their thorns completely. The fruit vary in size but regionally may grow larger than grape, and ripen to a deep brown-red colour. From October to April the greenish yellow flowers with silvery sheen are found in dense bunches in the axils of the leaves. Fruit are found from February to August.

Ecology

Their small, greenish yellow flowers attract many insects. They produce abundant nectar and consequently yield honey. Several species of bird feed on the brownish-red fruit. The leaves as well as fruit are also sought after by wild animals and domestic stock. Giraffes and impala browse the leaves.

Uses

It makes a good perimeter barrier as its thorns are profuse on young shoots and are difficult to untangle because one points forward while the other points backward. Certain tribes believe the tree is safe to use as a shelter against lightning, and it may be planted as a grave marker for a deceased chief.

Medical uses

A blend made from the roots is used as a painkiller and for dysentery while the bark and leaves are used for respiratory ailments and sepsis on the skin. A paste made from the roots and leaves will treat boils, sores and swelling. The above may be attributed to the peptide alkaloids and antifungals isolated from the bark and leaves. Branches are used for protection of cattle kraal and sometimes on the graves of dead tribal members. The wood is used for implements and fuel. The leaves bark and roots are used medicinally and magically for pain relief, respiratory complaints and skin infections, especially for chest and stomach disorders. The leaves if crushed may be used to stop bleeding. Steam baths from the bark are used to purify and improve the complexion. In East Africa, roots are used for treating snake bites.

Nutritional uses

The leaves are edible and can be cooked into spinach. The seeds can be roasted and ground as a substitute for coffee. The fruit are not very tasty, though a type of beer can be made from them. The Ovambo people use it to distill ombike, a traditional liquor. The leaves and fruits are also a valuable source of forage for livestock.



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