

Annex:

Tree Identification and Propagation

Images and text for 29 species found in Nimba County, Liberia

For the report on

“Cocoa Farm Shade Tree Evaluation and Recommendations”

March 2018 - Cecilia Polansky - for FIFES, CSC, and CDP

Listings ALPHABETIC by *Botanical name* and by Local name:

<i>Botanical name</i>	Local name	Page	Local name	Page
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<i>Brachystegia leonensis</i>	NAGA	6	AIELE	8
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<i>Coula edulis</i>	SRA- Walnut	10	Amazakoué	30
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<i>Entandrophragma candollei</i>	KOSIPO	22	FARO	14
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<i>Gilbertiodendron preussii or limba</i>	LIMBALI	26	FRAMIRE	53
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<i>Klainedoxa gabonensis</i>	EVEUSS	38	LOVOA	42
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<i>Lovoa trichilioides</i>	LOVOA	42	MOVINGUI	16
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<i>Petersianthus macrocarpus or Combretodendrum microcarpum</i>	ABALE	47	NIANGON	36
<i>Piptadeniastrum africanum</i>	DAHOMA	49	SAMBA	59
<i>Terminalia superba</i>	FRAKE	51	SAPELE	24
<i>Terminalia ivorensis</i>	FRAMIRE	53	SIPO	18
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<i>Tieghemella heckelii</i>	MAKORE	57	TETRA	55
<i>Triplochiton scleroxylon</i>	SAMBA	59	TIAMA	20

In addition to photos taken on our own field trip to Nimba County in February 2018, the following websites were consulted to obtain images of species and text about uses and propagation of species:

http://www.tropicaltimber.info/	http://www.africanplants.senckenberg.de/root/index.php	http://www.rbge.org.uk/science/herbarium	http://www.floraweb.de/
http://powo.science.kew.org/	https://www.google.com/search on images by species	http://www.wood-database.com/wood-finder/	=http://www.iucnredlist.org/search
http://tropical.theferns.info/	https://www.pfaf.org/USER/Plant.aspx?LatinName	https://tropix.cirad.fr/fiches-disponibles	https://www.prota4u.org/database/
http://uses.plantnet-project.org/en	http://delta-intkey.com/wood/en/index.htm	https://www.gbif.org/species/search	https://www.woodworkerssource.com/

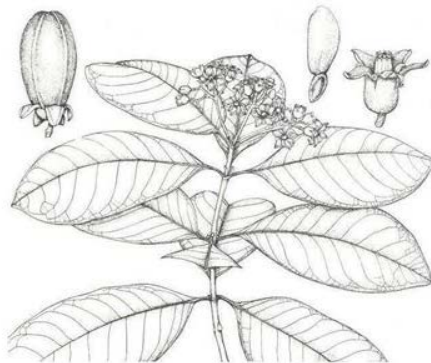
KOKOTI (*Anopyxis klaineana*)

Other local names: Anopyxis, white oak; Côte d'Ivoire as 'bodioa', Ghana as 'kokote'

APPEARANCE AND BARK (<https://www.prota4u.org/>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org/>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence/731723371>)



REGENERATION



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<http://www.tropicaltimber.info/>; <https://www.woodworkerssource.com/>, <http://delta-intkey.com/wood/en/index.htm>, <http://www.prowebcanada.com/taxa>



INFORMATION SHEET ON: **KOKOTI** (*Anopyxis klaineana*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

“Not protected under CITES” - but “vulnerable”

Carpentry and construction

Heavy construction, heavy flooring, exterior and interior joinery, panelling, furniture, turnery and sliced veneer. It is suitable for interior trim.

Heartwood is dull pale brown to yellowish brown or reddish brown, and not distinctly demarcated from the slightly paler sapwood.

Wood is moderately easy to quite difficult to saw and work.

Mine props, railway sleepers

High content of starch (5–6%), which may explain the sensitivity of the wood to some insect attacks

Crafts

Sporting goods, toys, novelties, ladders, tool handles, agricultural implements, boxes and crates.

Firewood use.

Medicinal

Bark maceration is used to treat gonorrhoea, pounded bark is applied externally against bronchitis, lung complaints and kidney pain and on skin infections and wounds.

A bark preparation is administered as enema to treat stomach-ache.

Nutritional

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Cultivation details /Propagation

Seeds with their large wing are dispersed by wind.

Growth of seedlings is slow; they reach 35–50 cm tall 12 months after sowing. Seeds start to germinate 1.5–3 weeks after sowing. The germination rate is variable, but is often recorded to be poor. However, when fresh seeds are sorted, the germination rate may be as high as 90%.

Seedlings are usually found in the open or in light shade, and *Anopyxis klaineana* is classified as a non-pioneer light demander. The survival rate of seedlings is higher in light shade.

Under good conditions, plants may reach a height of 200 cm after 2.5 years.

Shade leaves may differ considerably from normal leaves; they are papery with long hairs.

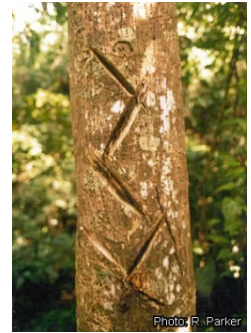
In West Africa flowering trees are most common in August to October and fruits usually ripen in November to April. Said to fruit abundantly every 2–3 years. About 35,000 seeds per kg.

In Liberia the average density of trees with a bole diameter of more than 60 cm has been recorded to be 0.08–0.16 per ha, and the total standing stock of trees with a bole diameter above 70 cm has been estimated at 4 million m³ at the beginning of the 1980s.

AKO (*Antiaris africana* or *toxicaria*)

Other and local names: Antiaris, bark cloth tree, false iroko

APPEARANCE AND BARK (<https://www.prota4u.org/>)



Harvesting of latex

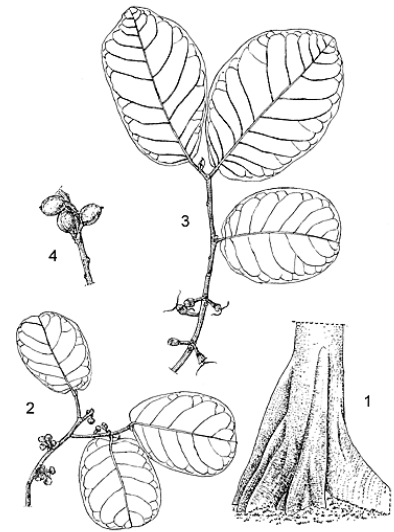


Slash

LEAVES AND SEEDS (our photos, <https://www.prota4u.org/>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>)



Leaf scar



REGENERATION

SAWTIMBER <http://www.tropicaltimber.info/>; <http://delta-intkey.com/wood/en/index.htm>

sapwood not clearly defined from the heartwood



INFORMATION SHEET ON:

AKO (*Antiaris africana* or *toxicaria*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

Antiaris toxicaria is sometimes planted as a roadside tree.

Carpentry and construction

Joinery, panelling, moulding, shuttering, furniture, strip flooring; fairly commonly used domestically for light construction; resembles wood of *Triplochiton scleroxylon*

Peeled and sliced veneer for interior and exterior parts of plywood, fibre and particle board, blockboard.

The wood is not durable. It is liable to fungal attack (e.g. blue stain), and susceptible to termites and dry-wood borers; the sapwood is liable to powder-post beetle attack. The wood should not be used in contact with the ground or exposed to the weather... The sawdust may cause skin irritation and occupational asthma.

Crafts

Boxes and crates, tool handles, toys, carvings; dyeing. The inner bark is used to make rough clothing, hammocks, sandals, hut walls, cordage, sacks, mats and paper. Canoes.

Locally popular for drum making, e.g. in Uganda.

Wood from the roots is sometimes used as a cork substitute.

Leaves are used as fodder.

Medicinal

Bark yields a latex... In Africa the latex is applied to cuts, wounds and skin complaints such as eczema and leprosy, and is taken internally as a purgative. It is also reported to be used as a fish poison and birdlime. The latex yield of a scarred tree may be 100–500 g in 2 days.

Seeds, leaves and bark are used as a febrifuge and the seeds also as an antidiysenteric.

Bark is used as an anodyne and vermifuge, and to treat hepatitis.

Nutritional

The fruit is edible. Fruits are ripe in February–March

Cultivation details /Propagation

Fresh seed has a high germination rate, up to 94% in 2.5–13 weeks.

Under natural conditions, the seeds lose viability rapidly, but when stored in wet sand at low temperatures they still may have a germination rate of 82% after 5 months.

In an experimental plantation in northern Côte d'Ivoire, the survival rate of seedlings after 3.5 years was only 49% and the average height only 60 cm because of high grazing pressure of cattle and wild animals; **planting of 2 m-tall seedlings was recommended.**

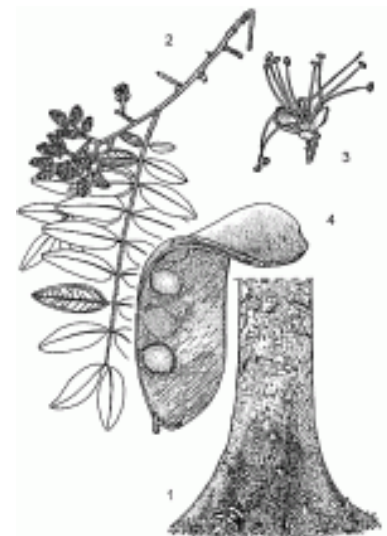
NAGA (*Brachystegia leonensis*)

Other and local names: Okwen, Meblo, Bush mahogany

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



REGENERATION
(no photo found)

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<http://www.tropicaltimber.info/>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **NAGA** (*Brachystegia leonensis*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Several *Brachystegia* species have wood that is similar to that of *Brachystegia leonensis* and is also traded as 'naga', including *Brachystegia cynometroides* Harms, *Brachystegia eurycoma* Harms and *Brachystegia nigerica* Hoyle & A.P.D.Jones.

Brachystegia is a taxonomically difficult genus comprising about 30 species, distributed in mainland tropical Africa and South Africa, the majority of species occurring in southern tropical Africa, where they are characteristic of miombo woodland.

Carpentry and construction - construction, flooring, interior joinery, interior trim, ship building
Its wood has moderate finishing properties and moderate durability.

Crafts - furniture, vehicle bodies, boxes, crates, carvings, veneer and plywood.

Fuelwood

Medicinal

Decoction of the leaves is rubbed onto the gums to treat toothache

Nutritional

Cultivation details /Propagation

Prefers well-drained localities. It is often associated with *Lophira alata* Banks ex C.F.Gaertn. and *Heritiera utilis* (Sprague) Sprague.

Brachystegia leonensis can be managed by coppicing. Coppice shoots may grow to 4.5 m tall in 3 years.

Brachystegia leonensis is among the largest trees in its area of distribution, second in size only to *Tieghemella heckelii* (A.Chev.) Roberty.

Trees flower from January to April, young fruits become conspicuous in June–October, and seed dispersal peaks in December–February.

Old leaves are usually shed between September and mid November. Flushes of reddish brown new leaves appear around the same time.

Aiele (*Canarium schweinfurthii*)

Other and local names: Aiele, bush candle tree, gum resin tree, incense tree, elemi

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>)



Slash



Resin



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



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<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **AIELE** (*Canarium schweinfurthii*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

Symmetrical branching makes it an attractive avenue and shade tree. Intercropping: does not compete with crops and has potential for intercropping.

Carpentry and construction

Heartwood not resistant to decay and is vulnerable to termite attack; sapwood liable to attack by powder-post beetles. Logs must be protected with insecticides and fungicides and converted as soon as possible.

Core veneer, decorative paneling, parquetry, furniture, flooring.

Crafts

Good fuelwood, mortars, canoes

Gum or Resin used in bush candles and as follows:

The bark exudes a heavy, sticky oleoresin that smells like turpentine and solidifies to a whitish resin. It is obtained by slashing the bark and allowing the colourless exudation to trickle to the ground where it solidifies into a sulphur-yellow opaque resin.

The resin is used as primitive illuminant and as incense and releases a lavender-like smell. Also used to repair broken pottery, for caulking boats and as a gum for fastening arrowheads to shafts. Used as a fumigant against mosquitoes

Soot is collected as carbon-black from the outside of pots held over it for use in tattooing and to make ink in **Liberia**.

seeds are strung into necklaces or attached to traditional instruments. The bark of young trees is split off in **Gabon** to make boxes.

Medicinal

A bark decoction is used against dysentery, gonorrhoea, coughs, chest pains, pulmonary affections, stomach complaints, food poisoning, and it is purgative and emetic. The resin is used against roundworm infections and other intestinal parasites. It is an emollient, stimulant, diuretic and has action on skin-affections and eczema. The pounded bark is used against leprosy and ulcers. Root is used against adenites whereas root scrapings are made into a poultice.

Nutritional

Greenish outer pulp of the fruit is oily and edible. Can be eaten raw or softened in warm water to improve palatability. The pulp oil is about 71 % palmitic acid and 18 % oleic acid.

The seed-kernel is oily and edible. They are cooked, and in Nigeria, sometimes prepared into a vegetable-butter and eaten as a substitute for shea-butter.

Boiled fruits are eaten and sold on the market.

Cultivation details /Propagation

Ripe fruits should be collected when they fall to the ground and allowed to decompose, the stones should then be separated from the outer fruit coats. Seeds can be stored for a long time.

Propagated through seedlings, wildings and direct sowing on site. The seeds should be immersed in hot water and allowed to cool then soaked for 24 hours before sowing.

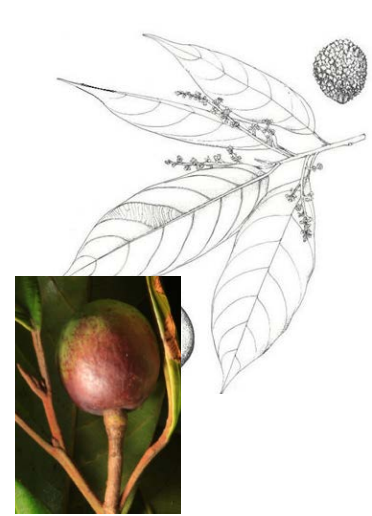
Sra - Walnut (African) (*Coula edulis*)

Other and local names: Sra, Attia, Bodwe, Ekom, Emumu...

APPEARANCE AND BARK)

(no tree photos found)

LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>), <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>



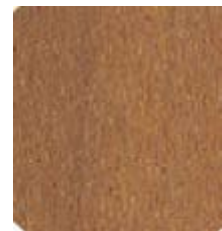
REGENERATION



SAWTIMBER

<http://www.tropicaltimber.info/>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>, <http://www.prowebcanada.com/taxa>

(Not considered commercial)



INFORMATION SHEET ON:
SRA or African Walnut wood (*Coula edulis*)

Carpentry and construction

In great demand, the wood is used in turnery and as a substitute for mahogany, as well as for heavy carpentry, industrial flooring, piles for bridges and railway ties.

Resistant to fungal and insect attack, particularly termites and marine borers

Medicinal

None found

Nutritional

Seed - raw or cooked - A good dessert nut with a pleasant taste.

The oily kernel has a taste comparable to that of a chestnut or hazelnut. It can be eaten raw, grilled or boiled.

The seed contains 50% oil, of which 87% is oleic acid. The seed is also fermented and used as a condiment. The spherical fruit is about 3cm long

Cultivation details /Propagation

“Because of the hard integument, germination is rather poor and may take up to a year” (from PFAP database).

Succeeds in full sun and in partial shade. Shading is beneficial when plants are young. The tree has no special soil requirements. Prefers a well-drained but moist soil.

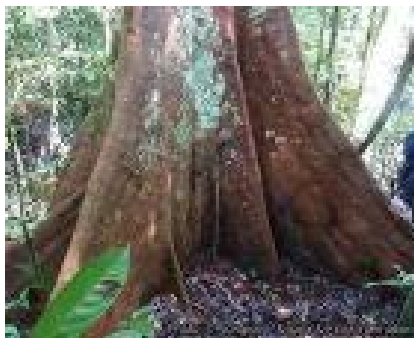
It can grow in semi-shade (light woodland) or no shade.

Gregarious tendency, locally forming a substantial part of the middle story

APOME (*Cynometra ananta*)

Other and local names: Ananta

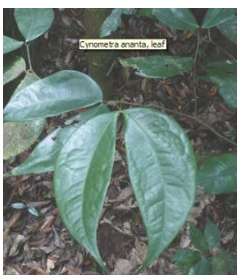
APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>; FIFES inventory 2017)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



REGENERATION



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<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **APOME (*Cynometra ananta*)**

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=Entandrophragma+utile>

Medicinal

(none found for this species of *Cynometra*, but for others.)

Nutritional

(none found for this species of *Cynometra*, but for others.)

Other uses

“The wood of *Cynometra ananta* is used locally and only rarely traded on the international market.” (PROTA4U database)

Carpentry: beams, joists, boards, flooring, parquet, frames, furniture and cabinets, luxury furniture, cabinets, turning. Heavy construction, heavy flooring, bridge building, exterior joinery, interior trim, ship building

Once dry, the wood is not very stable in service.

The wood is difficult to saw and work, and has severe blunting effect on cutting edges and saw teeth; the use of tungsten-tipped cutting edges is recommended.

The wood is durable, being resistant to termite and Lyctus attacks, but occasionally liable to pinhole borer and longhorn beetle attacks.

Crafts: ornaments, turned furniture, cutlery, lasts, Containers, truck bodies, truck flooring, musical instruments, handicrafts; mine props, poles, railway sleepers, sporting goods, toys, novelties, agricultural implements, pattern making; posts for a variety of purposes from vineyards to oyster culture

Cultivation details /Propagation

Seedlings and saplings are often abundant near mother trees.

They are shade tolerant, but in Liberia it has been reported that **saplings of more than 2 m tall are uncommon**. It seems that regeneration is better in logged-over forest.

There are about 650 seeds per kg, and the germination rate is high within 15 days after sowing.

Locally *Cynometra ananta* has gregarious stands and may even be semi-dominant. In forest in Liberia it has been reported to occur at an average density of 0.3 boles of more than 60 cm in diameter per ha, but locally it is much more common, in some areas having an average density of 3 large boles per ha. In Côte d'Ivoire and Ghana it is also locally abundant.

In Côte d'Ivoire it has been recorded to prefer humid, even slightly swampy soils.

Older trees have large, widely spreading buttresses and spreading roots, making establishment on shallow soils and slopes more easy. Shedding of old leaves is immediately followed by new flushes, which are initially brilliant red.

In Liberia trees flower in September–October, in Côte d'Ivoire in October–December.

In Liberia, Côte d'Ivoire and Ghana fruits ripen in December–January, in Côte d'Ivoire also in June–July.

The fruits are explosively dehiscent, dispersing the seeds over short distances.

Cynometra vogelii Hook.f. is a small tree up to 10(–20) m tall with bole up to 100 cm in diameter, occurring from Senegal east to Nigeria. Its reddish brown, hard wood is locally used for tool handles; it is also used as firewood. The foliage is fed to cattle. The seed is reportedly edible.

FARO (*Daniellia thurifera*)

Other and local names: Copal tree, frankincense tree,

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>)

(a better photo of the form of the tree is needed)

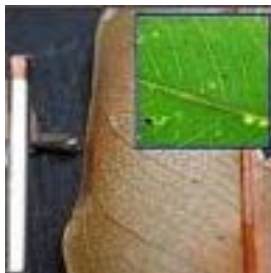
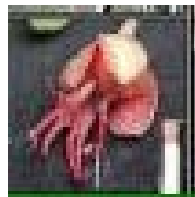
Not: no buttresses or wings



Slash



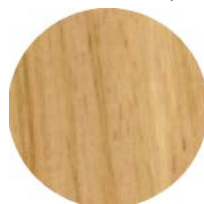
LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



REGENERATION
(no photo found)

SAWTIMBER

<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **FARO** (*Daniellia thurifera*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

In Sierra Leone *Daniellia thurifera* is planted as ornamental tree along roadsides.

Carpentry and construction Logs should be processed quickly after felling or treated with preservatives because the wood is susceptible to discoloration by blue-stain fungi and attacks by insects.

Wood is easy to saw and work with both hand and machine tools, with little blunting effect on saw teeth and cutting edges. The wood is not durable, is susceptible to attacks by fungi, termites, pinhole borers, Lyctus.

The aromatic wood, traded as 'faro' and 'daniellia', is used for light construction, planks, light flooring, joinery, interior trim, boat building.

Crafts furniture, toys, novelties, boxes, crates, agricultural implements, draining boards, turnery, hardboard and particle board. It is suitable for veneer, plywood and pulpwood.

Firewood and charcoal production.

Beehives are made from the bark.

Medicinal - The twigs are used as chew sticks. The resin or gum, known as 'gum copal' and used for cosmetics, perfume, pomades, varnish, soap and fumigation. The gum is rubbed on the body for its fragrance, usually mixed with clay, and it can be used to mend broken pottery.

The seeds yield a clear oil, which is made in Liberia into a hair dressing.

In Ghana a decoction prepared from the powdered gum is taken by the Krobo people to treat cough. The gum is used as embrocation to treat skin diseases, including ringworm.

Nutritional (None found)

Cultivation details / Propagation The tree usually sheds its leaves at the end of the rainy season, and flowering occurs when the tree is leafless, mainly from August to January.

Fruits ripen about 5 months after flowering. When the fruit dries, the two valves start to curl, releasing the seed, which remains attached to one of the valves by a long funicle. When the valve with the seed falls, it rotates rapidly and may be spread by wind far from the mother tree. Fallen seeds are often eaten by rodents.

Natural regeneration of *D. thurifera* - abundant in forest gaps, disturbed forest- it is a pioneer, light demander.

There are 600–800 seeds per kg. The germination rate of fresh seeds is usually high, 50–95%, and germination starts about 2 weeks after sowing. Shading should be removed soon after germination.

Seedlings are ready for planting into the field after one year in the nursery.

Seedlings reach about 12 cm tall after 1.5 months and 15 cm tall after 2.5 months.

In Guinea growth in the field has been reported to be quite slow; seedlings reached 35 cm in height after 1 year, 60 cm after 2 years and 150 cm after 5 years.

In **Liberia** fruit bearing *Daniellia thurifera* trees of about 10 m tall were observed.

In Guinea the mortality of seedlings planted in full sun was 50% after 5 years (lack of weeding?)

In evergreen forest in Côte d'Ivoire, the average density of trees with a bole diameter of more than 90 cm was locally 10 trees/ha, and of saplings with a bole diameter of 10–20 cm about 20 per ha.

In Sierra Leone, plantations of *Daniellia thurifera* have been established. Systematic thinning of the forest was found to be beneficial in terms of recruitment and growth. However, the difference between heavy and light thinning was negligible, and the maximum recommended thinning intensity was 28% of the initial basal area (5–6 m²/ha removed).

It prefers damp areas but avoids swampy conditions.

MOVINGUI (*Distemonanthus benthamianus*)

Other names: Yellow satinwood, Barre (Ivory Coast), Bonsamdua (Ghana), Eyen (Cameroon), Ayanran (Nigeria)

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>; Trees of Liberia/Kunkel 1965



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>



REGENERATION
(no photo found)

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<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **MOVINGUI** (*Distemonanthus benthamianus*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

In 1983 Côte d'Ivoire exported 38,000 m³ of 'movingui' logs, but only 180 m³ in 1996. In 1999 'movingui' timber ranked 10th on the list of most important export timbers of Gabon, with 28,000 m³ of logs exported. In 2000 Gabon exported 36,000 m³ of logs, but the amount decreased to 12,000 m³ in 2009. One large tree may yield 8–15 m³ of wood.

Carpentry and construction - Heavy construction including hydraulic works, heavy flooring, carpentry, mine props, ship building, vehicle bodies, railway sleepers. Fresh wood is quite easy to saw, but dry wood more difficult and may cause over-heating of saw blades. The wood can be sliced for the production of good-quality veneer. It can also be peeled, but this is rarely done because the veneer is not nicely figured.

Crafts - Furniture for interior as well as exterior use, cabinet making, sporting goods, musical instruments, crates, boxes, agricultural implements, tool handles, vats for chemical products, shingles, carvings, turnery, veneer and plywood.

Firewood and charcoal production.

Medicinal

Pounded bark is applied to skin complaints including furuncles and abscesses, used as a sniff against epilepsy, taken to treat palpitation and used as an enema to treat hepatitis.

Bark decoctions are used in a bath or as a vapour bath to treat bronchitis, rheumatism, and fever including malaria.

In Nigeria twigs are used as chewing sticks.

Yellow dye from the roots has been used for body decoration. The tree is used in many local ritual ceremonies.

Nutritional - (none found)

Cultivation details /Propagation

Classified as a non-pioneer light demander, and natural regeneration is limited in mature forest; few saplings are found in forest with a closed canopy. However, seedlings and saplings can be found in the understorey of the forest and tolerate shade. Regeneration in disturbed forest may occur, but is neither abundant. However, in Gabon seedlings have been reported to be locally abundant in secondary and planted forests. To promote regeneration, it was proposed to open the forest canopy just before the trees fruit.

New foliage is coppery red and followed by the quite conspicuous flowers. In Liberia flowering is in January–February and in Ghana usually in February–July, and fruits ripen about 6 months later. Fruiting is reported to be sparse and not annually.

The seeds are difficult to collect, mainly because fruiting is irregular. ...about 2500 seeds per kg. Seeds take 2–6.5 weeks, sometimes to 5 months, to germinate after sowing; germination rate is generally moderate, in Guinea 13–26%... Soaking the seeds in water for 24 hours... promotes germination.

Fastest growing seedlings are about 40 cm tall and ready for planting when 4–5 months old, but generally they need to stay in the nursery for at least one year. After 11 years the mean height was 16.5 m and the mean bole diameter 11.5 cm in the open and 11 m and 6 cm, respectively, in the shade.

Wildlings are occasionally collected for planting.

Growth of seedlings in the nursery is slow; they reach 10–25 cm in height after 5 months. In Guinea they were on average 100 cm tall when planted in moderate shade and 160 cm in full sun 2 years after planting.

It does not appear to have any soil preference.

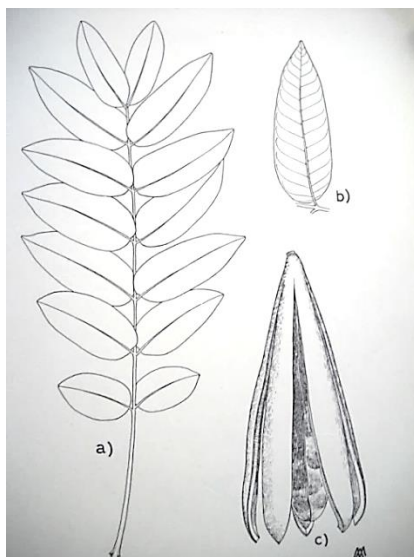
SIPO (*Entandrophragma utile*)

Other local names: Utile, Feather sapele; Bokoi; Akuk, Assie (Cameroon); Okeong (Nigeria); Efuodwe (Ghana)

APPEARANCE AND BARK



LEAVES AND SEEDS



REGENERATION



SAWTIMBER Heartwood - reddish brown to purplish brown; distinctly from pinkish white to pale brown sapwood up to 6 cm wide. Sawing - quarter-sawn irregularly striped; saws and works easily with hand and machine tools. Faint cedar-like smell.



INFORMATION SHEET ON: **SIPO** (*Entandrophragma utile*)

<http://www.tropicaltimber.info/specie/sipo-entandrophragma-utile/>, <http://www.iucnredlist.org/details/32236/0>,
https://www.prota4u.org/database/protav8.asp?h=M26&t=Entandrophragma_utile&p=Entandrophragma+utile#MajorReferences

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	< VULNERABLE >	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
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<https://www.pfaf.org/user/Plant.aspx?LatinName=Entandrophragma+utile>

Carpentry and construction

Wood is moderately heavy, soft to moderately hard, moderately durable, resistant to various pests.

Used in joinery, interior trim, panelling, stairs, furniture, cabinet work, ship building, veneer, plywood, construction, flooring

Other uses

Crafts

Fruit valves are used as spoons.

Medicinal

The bark is used in the treatment of malaria and peptic ulcers. Bark sap is used for stomach pain, kidney pain, rheumatism, eye inflammations, and otitis.

The charred and pulverized bark, mixed with salt and palm oil, is rubbed into scarifications to treat headache.

Cultivation and propagation

Prefers well-drained localities on deep soils. Non-pioneer light demander and is generally noted to be more light-demanding and tolerant of dry conditions than other members of the genus.

Regeneration in large forest gaps is reportedly poor, but seedlings perform well in small forest gaps. Young seedlings grow slowly; root development takes considerable time. In Ghana, seedlings reached only up to 1 metre tall after 4 years, in silviculturally treated forest up to 1.5 metres.

Under nursery conditions, however, seedlings can reach 40 cm tall in 6 months and 75 cm in one year. Fruit production starts when trees have reached bole diameters above 50 cm, and this has implications for forest management; **minimum felling diameters should be well above 50 cm to allow natural regeneration.**

Pre-soaking the seeds in warm water is reported to improve germination. Fresh seeds- germination 13 - 19 days after sowing rate ~ 75%, 3-month-old seeds is ~ 60%; seeds liable to rotting and should barely be covered with soil. Insect damage, to which seeds are very susceptible, avoided by adding ash.

Seedlings physiologically well adapted to heavy shade - usually die when growing under full light conditions. Ideal = 25% of full sunlight. Overhead shade promotes survival of young seedlings, which are liable to mite and insect attacks in full sunlight.

When grown in pots, develop a long taproot; the roots should be cut back several times in the 1 - 2-year-long period raised in the nursery. Success rate of stump [regeneration] is low.

Both male and female forms need to be grown if fruit and seed are required (not self-fertile).

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers moist soil.

TIAMA (*Entandrophragma angolense*)

Other and local names: Edinam, tiama mahogany

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



REGENERATION



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<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

TIAMA (*Entandrophragma angolense*)

<https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>, <https://www.pfaf.org/user/Plant.aspx?LatinName=>

Planted as roadside tree, and occasionally as a shade tree in banana, coffee and tea plantations.

Related to *Lovoa*, *Khaya*, and *Pseudocecrela*. Logs float in water and can thus be transported by river.

IUCN Red list: **vulnerable** - commercial interest in its timber has resulted in extraction of large individuals from the forest throughout the distribution area.

Carpentry and construction - saws and works easily with both hand and machine tools.

Exterior and interior joinery, furniture, cabinet work, veneer and plywood, and is also used for flooring, interior trim, panelling, stairs, ship building, vehicle bodies

Crafts - Musical instruments, toys, novelties, boxes, crates, carvings and turnery

The seeds have a fat content of about 60%. The fat is rich in cis-vaccenic acid, an oleic acid isomer that can be used in the industrial production of nylon-11.

Wood that is not suitable as timber is used as firewood and for charcoal production.

Medicinal - A decoction is drunk to treat fever and the bark is also used, usually in external applications, as an anodyne against stomach-ache and peptic ulcers, earache, and kidney, rheumatic or arthritic pains.

It is also applied externally to treat ophthalmia, swellings, and ulcers.

Nutritional - none noted

Cultivation details /Propagation

Under optimal conditions seedlings grow fairly fast, ...striplings may reach 6 m tall 4 years after planting. Under normal conditions, seedlings have a slower growth. They require shade, but after the seedling stage they should be gradually exposed to more light.

Nigeria seedlings reached only up to 3.1 m tall and 5 cm in stem diameter after 43 months, 72 months in Guinea.

Larger trees showed average annual diameter increments of 2–6.5 mm, with highest increment in the diameter class of 50–70 cm when the crown reached the forest canopy.

In Nigeria it has been estimated that it takes nearly **140 years for a planted tree to reach 100 cm bole diameter**, and in Gabon it has been estimated that it takes **70 years to reach 40 cm in diameter** under adequate silvicultural treatment.

Trees start fruit production at larger diameters, and this has implications for forest management; **harvesting trees of less than 50 cm bole diameter seriously reduces fruit production.**

In **Liberia** *E. angolense* trees are deciduous for a short period at the beginning of the dry season. Flowering occurs near the middle of the dry season, around February.

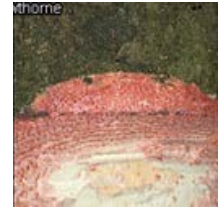
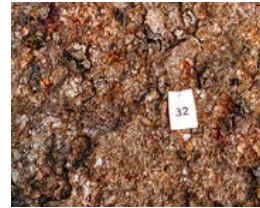
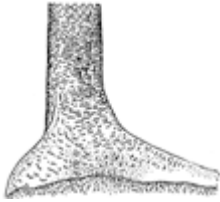
Fruits mature about 8 months after flowering. Ripe fruits may fall unopened under conditions of lasting high air humidity. However, under lower humidity they open on the tree and the seeds are dispersed by wind, although most seeds seem to fall close to the mother tree.

Natural regeneration is often scarce in natural forest, but logging operations that create gaps may promote regeneration. In natural forest, saplings are most common in gaps. Tests with seedlings showed that growth was good under conditions simulating the light conditions in small forest gaps... **Seedlings performed poorly under full-light conditions.**

KOSIPO (*Entandrophragma candollei*)

Other and local names: West African cedar, heavy sapele, heavy mahogany, boubousou rouge

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>)



REGENERATION



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<http://www.tropicaltimber.info/>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

KOSIPO (*Entandrophragma candollei*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Wood of *Entandrophragma candollei* resembles that of *Entandrophragma cylindricum* ... ('sapelli' or 'sapele'), which is often more highly valued because it is slightly less dense and more attractively coloured and figured.

Commercial interest in its timber has resulted in extraction of large individuals from the forest throughout the distribution area. **IUCN Red list - vulnerable**

Carpentry and construction - construction, exterior and interior joinery, boat building. suitable for the production of sliced veneer. It is moderately durable, being liable to powder-post beetle, pinhole borer and marine borer attacks and moderately resistant to termites.

Crafts - furniture, cabinet work, veneer and plywood; flooring, interior trim, vehicle bodies, toys, novelties, boxes, crates and turnery

Medicinal

Bark sap applied externally as an anodyne

Sap of root bark applied to snakebites

Nutritional

(none noted)

Cultivation details / Propagation

Trees start fruit production at larger bole diameters, and this has implications for forest management; harvesting trees of less than 50 cm bole diameter seriously reduces fruit production. Trees can become very old; for the largest specimens ages of up to nearly 1000 years have been suggested.

In Liberia and Côte d'Ivoire trees are leafless for a short period in October, and they usually flower from November to December. Fruits mature about 5 months after flowering. The seeds are dispersed by wind, although most seeds seem to fall close to the mother tree. In Ghana seeds are produced in the dry season and seed production is rather erratic, with generally one good fruiting every 3 years.

Fresh seeds start to germinate 1 week after sowing and the germination rate is 60–75%.

Seedling growth is slow, with a plant height of 13 cm after 5 months and 20–30 cm after 1 year.

Seedlings are very sensitive to sun-scald and have to stay under permanent shade in the nursery. During at least 2–3 years after being planted out the seedlings need slight shade to avoid high mortality, for example by a cover of a young secondary forest. Later, clearing is necessary for good growth.

In experiments with seedlings, *Entandrophragma candollei* performed equally well as *Entandrophragma angolense* (Welw.) C.DC. but significantly better than *Entandrophragma cylindricum* (Sprague) and *Entandrophragma utile* (Dawe & Sprague) on infertile soils.

Natural regeneration is often scarce in natural forest, but gaps created by logging operations may promote regeneration. In natural forest, saplings are most common in gaps.

Under natural conditions, an average annual diameter increment of 5.1 mm has been recorded for *Entandrophragma candollei*. In plantations in Guinea trees reached a mean height of 2.7 m after 6 years.

SAPELE (*Entandrophragma cylindricum*)

Other names: Sapelli mahogany, West African cedar, scented mahogany, cédrat d'Afrique (Fr)

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



REGENERATION



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<http://www.tropicaltimber.info/>; <https://www.woodworkerssource.com>, <http://lesserknowntimberspecies.com/species/index/1/entandrophragma%20cylindricum/0/0/0>



INFORMATION SHEET ON: **SAPELE** (*Entandrophragma cylindricum*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>

The tree is planted as roadside tree and ornamental shade tree. Trees can become over 500 years old.

Sapelli is one of the most important export timbers of tropical Africa. During the 1960s the main exporters were Côte d'Ivoire and Ghana. In 1963–1974 average annual exports from Côte d'Ivoire were 122,000 m³ of logs ... Average annual exports from Ghana in 1963–1967 were 48,000 m³ of logs ... In 1969–1970 Cameroon annually exported about 52,000 m³ of logs per year... **IUCN Red List of Threatened Plants: Vulnerable**

Nowadays the wood is mainly harvested in Central Africa, with an export value of at least US\$ 165 million in 2003, with exports mainly from Cameroon, the Central African Republic and Congo.

Carpentry and construction - Flooring, interior joinery, interior trim, panelling, stairs, furniture, cabinets

Crafts - Musical instruments, carvings, ship building, veneer and plywood; vehicle bodies, toys, novelties, boxes, crates and turnery. The bole is traditionally used for dug-out canoes.

Essential oil from the bark has been analyzed for trees originating from Cameroon and the Central African Republic... characterized by the presence of... a rare isomer of oleic acid... used in the...production of nylon-11.

Wood that can not be valorized as timber is used as **firewood and charcoal**.

Medicinal - Bark decoctions or macerations are taken to treat bronchitis, lung complaints, colds, oedema and as anodyne, whereas bark pulp is applied externally to furuncles and wounds. Bark extracts have been used as protectant of stored maize.

Nutritional - Caterpillars of the butterfly *Imbrasia oyemensis* are commonly found on the leaves; they are edible and in East Africa much sought after for human consumption.

Cultivation details /Propagation

Under natural conditions, seeds germinate abundantly, but mortality of seedlings is high, less than 1% reaching 10 cm stem diameter. Natural regeneration is often scarce in natural forest, but logging operations creating gaps may promote regeneration, larger gaps appearing more favourable.

Seedlings grow slowly, 20–40 cm/year. Root development takes considerable time. Seedlings ... can survive for several years in the shade without significant growth, but when a gap is created in the forest providing enough light further development into a tree starts.

...Trees planted in the open in Côte d'Ivoire reached an average height of 5.4 m and an average stem diameter of 10 cm after 7 years, with a survival rate of 74%.

Trees start flowering when 35–45 years old. Fruit production starts when trees have reached bole diameters above 50 cm. This has implications for forest management; **minimum felling diameters should be well above 50 cm to allow natural regeneration.**

Entandrophragma cylindricum trees lose their leaves for 0.5–1 month, or gradually change leaves during 2–3 months. In **Liberia** and Côte d'Ivoire trees are deciduous for a short period in October–November; flowering occurs near the middle of the dry season, in February–March.

Mature fruits develop about 5 months after flowering. Fruits usually open on the tree and the seeds are dispersed by wind, although most seeds seem to fall close to the mother tree. Seed production is erratic. Although flowering may be common, fruit production is often irregular, e.g. 90% of trees with bole diameters above 50 cm flower each year in Cameroon, but only 50% of them develop fruits.

Entandrophragma cylindricum is characterized as a non-pioneer light demander

Fresh seeds may have a high germination rate, 80–95%. However, seeds lose their viability rapidly, often within 3 weeks. Germination starts 14–26 days after sowing. Soaking of the seeds for one night is reported to speed up germination. Overhead shade is required for young seedlings.

Cuttings 90–110 cm long have been used successfully for propagation.

LIMBALI (*Gilbertiodendron preussii* or *limba*)

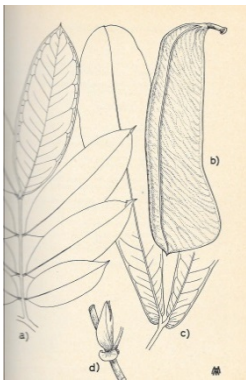
Other and local names: African oak, semme, bo

APPEARANCE AND BARK (<https://www.prota4u.org>,

<http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:22485-1>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:22485-1>)



REGENERATION



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<http://www.tropicaltimber.info/>; <https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

LIMBALI (*Gilbertiodendron preussii* or *limba*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Carpentry and construction

Planks, flooring, joinery. Very little is known about the wood technological properties of this species, and further research is warranted.

Crafts

Canoes; recommended for heavy construction, vehicle bodies, stairs and railway sleepers.

Medicinal

In traditional medicine in Sierra Leone, leaves have been used against fever, and leaf ash mixed with water is applied on ulcers. Leafy twigs are used for the treatment of pelvic inflammation in women.

Nutritional

Seeds edible in time of scarcity

Cultivation details /Propagation

Natural regeneration is abundant under mother trees.

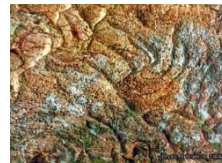
The 1000-seed weight is c. 10 kg.

Seeds usually germinate in 8–15 days, with germination rates over 80%.

BOSSE (*Guarea cedrata*)

Other names: pink mahogany, pink African cedar, scented guarea, Nigerian pearwood, Bossé clair

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>, https://www.gbif.org/occurrence/gallery?taxon_key=8252209) (need a photo of the whole tree)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>)



REGENERATION
(no photo found)

SAWTIMBER

<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **BOSSE (*Guarea cedrata*)**

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

The wood of *Guarea cedrata*, *Guarea laurentii* De Wild. and *Guarea thompsonii* Sprague & Hutch. is all traded as 'bosse'. *Guarea* comprises about 8 species in tropical Africa and about 35 in tropical America.

Wood sometimes shows a mottled or curly figure, has a cedar-like smell when fresh; may have gummy exudate.

The wood of *Guarea thompsonii* Sprague & Hutch. is sometimes mixed with that of *Guarea cedrata*, but is in general slightly heavier and darker. The wood resembles that of *Khaya* spp., and is close to that of *Entandrophragma* spp. It is also difficult to distinguish from that of *Beilschmiedia* spp. ('kanda'). The minimum bole diameter for harvesting of *Guarea cedrata* is 60 cm in Côte d'Ivoire and DR Congo, 70 cm in the Central African Republic, and 80 cm in Cameroon and Liberia. Freshly harvested boles often float in water and can be transported by river.

Guarea mayombensis from Cameroon is included in the IUCN Red list as a vulnerable species because of habitat loss and degradation, selective felling, and poor regeneration due to the absence of seed dispersal agents.

Carpentry and construction

House building, flooring, joinery, interior trim, panelling, window frames, doors, ship building

Crafts - Vehicle bodies, furniture, cabinet work, decorative boxes, crates, veneer and plywood; musical instruments, toys, novelties, carving and turnery, but gum exudation may have adverse effects on the products.

Wood is used for dug-out canoes.

Fuelwood and charcoal production.

Medicinal - Bark decoctions or macerations are taken to treat stomach-ache, food poisoning and gonorrhoea, and used as a wash against kidney pain, bleeding after childbirth, rheumatism and leprosy.

Nutritional - (none noted)

Cultivation details /Propagation

Ripe fruits often develop at the beginning of the dry season. In Côte d'Ivoire trees are recorded as fruiting twice a year, in June–July and in October–December. Birds such as hornbills, monkeys, duikers and porcupines eat the fleshy seedcoat and may disperse the seeds. A study in the Dja reserve in Cameroon showed that hornbills are very important for seed dispersal of *Guarea cedrata*.

Guarea cedrata has comparatively large seeds... They have a short viability, but can be stored in sealed containers for at least 2 weeks. It is recommended to add ash to reduce damage by insects. Germination is irregular and rather slow, taking 20–45...days. Soaking in cold water for 12 hours before sowing... recommended to speed up germination. Seed beds... should be shaded. Seedlings are drought sensitive.

Guarea cedrata is classified as a shade-bearer. Seedlings are most common in the shade... They are often even common in deep shade, where they can survive for a long time. All sizes of seedlings and saplings are less abundant in forest affected by recent logging... However, for further development, some opening of the forest canopy seems essential.

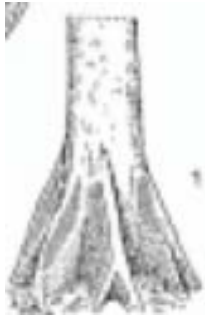
Initial growth of seedlings is slow, less than 30 cm after 1 year. Seedlings showed best growth at 10% of full sunlight. If they are exposed to more sunlight after 1 year, growth may speed up, reaching annual growth rates of up to 1 m in height in plots managed by the tropical shelterwood system. Flushes of new leaves are strikingly pinkish red.

It is recommended to start thinning the upper storey of the forest 4 years after planting so that the saplings receive progressively more light. Planted trees in Ghana reached a height of up to 15 m and 19 cm in bole diameter in 14 years. ...In Nigeria it has been estimated that it takes more than 170 years for *Guarea cedrata* trees to reach 100 cm in bole diameter.

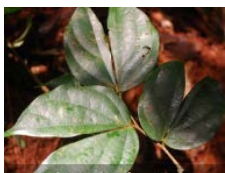
Amazakoué (*Guibourtia ehie*)

Other and local names: Ovangkol, Bubinga, pia pia

APPEARANCE AND BARK (<https://www.prota4u.org>, <https://www.flickr.com/photos/36928008@N08/4940927249>
(need a picture of the whole tree)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>),
<https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>

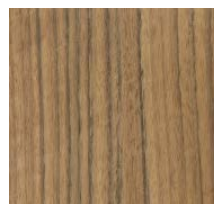


REGENERATION



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<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **AMAZAKOUE** (*Guibourtia ehie*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Traded as 'ovengkol' or 'ovankol' in Gabon, as 'amazakoué' in Côte d'Ivoire and as 'hyedua' in Ghana. After harvesting, logs should not be left in the forest too long because they are liable to splitting.

The wood is in high demand on the timber market, but research is needed to be able to determine its possibilities for commercial exploitation on a sustainable basis.

Carpentry and construction - flooring, joinery, interior trim, panelling

Crafts - furniture, vehicle bodies, agricultural implements, musical instrument, toys, novelties, carvings, turnery, veneer and plywood.

The solidified fresh or semi-fossil resin from the bark ('copal') is made into fragrant necklaces and traded locally. ...Suitable base for varnishes and lacquers, and is also used for illumination.

Medicinal

Traditionally, it is believed to drive away evil spirits when burnt.

The decoction of a mixture of stem barks of *Guibourtia ehie* and *Tetrapleura tetraptera* (Schum. & Thonn.) Taub. is drunk to cure stomach ulcers in Ghana.

Nutritional

The seeds are edible.

The potential of its copal resin in the cosmetic and pharmaceutical industries could be harnessed, and experiments showed interesting possibilities for drug development of the bark. The phytochemistry of the seeds should be investigated to guarantee safe use as food.

Cultivation details /Propagation

Guibourtia ehie grows slowly. In Guinea the mean height of young trees was 3.5 m after 6 years. In Côte d'Ivoire a mean annual bole diameter growth of 0.5 cm has been recorded. It is fairly shade tolerant, but saplings require light at initial stages of growth.

Trees usually have red flushes of leaves. In Liberia and Côte d'Ivoire, trees flower around November, lose their leaves soon thereafter, and new leaf flushes are developed when the fruits ripen in January–February.

Fruits (seeds) are dispersed by wind.

There are about 2500 seeds per kg. Germination starts 10–25 days after sowing and the germination rate is usually fairly high, 65–80% after 5 weeks.

In the nursery, seedlings should be grown in the shade. They reach about 25 cm tall after 4.5 months. In Guinea the mortality was very high (over 80%) in full sun.

Natural regeneration is often abundant around the mother plant. In Liberia it has been reported that seedlings rarely reach sizes of more than 30 cm, but in Ghana saplings have been reported to be locally abundant.

Trees are very sensitive to fire.

There is little information available on growth rates, propagation and planting, and suitable management measures. The apparently slow growth can be a serious drawback because long cutting cycles could be necessary for sustainable exploitation.

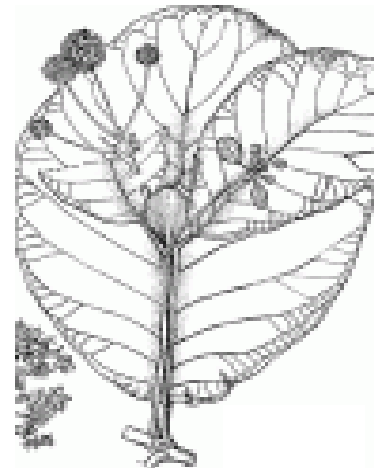
ABURA (*Hallea ciliata* or *ledermannii*, or *Mitragyna ciliata*)

Other and local names: Bahia

APPEARANCE AND BARK (<https://www.prota4u.org>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.gbif.org/occurrence>,



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<http://www.tropicaltimber.info>



INFORMATION SHEET ON:

ABURA (*Hallea ciliata*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <https://www.pfaf.org/user/Plant.aspx?LatinName=>

Evergreen medium-sized to fairly large tree up to 35m tall. In trade it is not distinguished from *Mitragyna stipulosa* (DC.) Kuntze wood and together they are sold under the name 'abura' or 'bahia'.

Carpentry and construction - light construction, flooring, interior joinery, interior trim

Leaves used for thatching...

The wood works easily with hand and machine tools, but the blunting effect on saw teeth and cutting edges is often fairly high in dried wood; the use of stellite-tipped saw teeth and tungsten-carbide cutting edges is recommended. The wood is brittle and moderately fissile.

Crafts

Furniture, vehicle bodies, mine props, sporting goods, toys, novelties, musical instruments, transmission poles, boxes, crates, canoes, oars, tool handles, food containers, carving, draining boards and particle board. In DR Congo the wood is recommended for paper making.

Suitable for veneer and plywood.

Medicinal - (possible inclusion in *Mitragyna* traditional medical products being sold as "kratom"?)

Bark decoctions and macerations are taken to treat fever, vomiting, general weakness, hypertension, dysentery, gonorrhoea, amenorrhoea, leprosy, colds, chest pain, food poisoning and sterility, to ease childbirth, and as anthelmintic and diuretic. Bark decoctions are added to a bath to treat rheumatism, and bark powder is applied to skin complaints. The bark serves as fish poison.

Leaves are occasionally used to treat dysentery and gonorrhoea.

Bark alkaloids have been reported to have local anaesthetic activity, to increase heart rhythm and to affect the lymphatic system of the intestines. Leaves and roots also contain alkaloids. Leaf extracts showed in-vitro antiparasitic activity, also against chloroquine-resistant strains of *Plasmodium falciparum*.

Nutritional - Leaves used for... wrapping kola nuts.

Cultivation details /Propagation - In thinned natural stands in Nigeria, the mean annual diameter increment of boles was 1 cm, with the **fastest growing trees reaching 2 cm/year**.

Occurs in swamps and marshy localities in areas... It needs subsoil moisture during the whole year, but does not grow in swamps that are deeply flooded throughout the year. It is strongly light demanding, and dependent on open swamp sites for regeneration.

Trees produce knee roots a few cm above soil level, later branching to form compound structures in the mud.

Flushes of new leaves are bronze-coloured and conspicuous.

Flowering of trees has been recorded in Liberia in November–January; fruits ripen about 4 months later. ...

Trees disperse large amounts of seed by wind, so.. dense beds of seedlings (up to 500/m²) on exposed mud.

M. ledermannii can be propagated by seed and cuttings. Seed is difficult to collect because it is often already dispersed by wind before the fruits fall. Seeds are very light (1000-seed weight=0.4 g). Seeds germinate rapidly, under wet and sunny conditions in 1–2 weeks. In shade they may remain dormant for up to 8 months. Seedling mortality is often high due to competition from other plants and insect attacks.

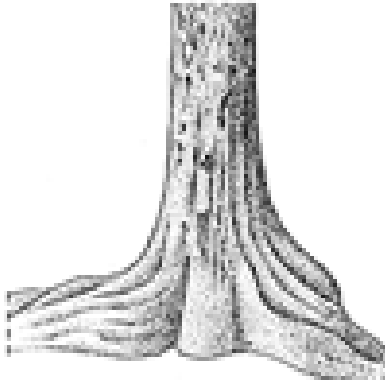
Stem cuttings of about 12 cm long and 2 cm in diameter can be planted in mud beds. Development of roots and shoots is rapid and plants can be transplanted into cleared swamp areas at the beginning of the rainy season. Root suckers can also be used for propagation.

Young plantations need good care during the first years to counteract too much competition by climbers and other fast-growing plant species.

IDEWA (*Haplormosia monophylla*)

Other and local names: Black gum, chêne d'Afrique

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>,



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>
<https://www.gbif.org/occurrence>,



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<http://www.tropicaltimber.info/>, <http://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

IDEWA or Black Gum (*Haplormosia monophylla/macrophylla*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

Small to medium-sized tree up to 20–30 m tall. Difficult to fell with traditional tools because of the hard wood. In trade it is probably often mixed with 'aformosia', i.e. the wood of *Pericopsis* spp.

More information is needed to complete these information sheets.

Haplormosia monophylla* has been included in the IUCN Red list as **vulnerable*

Carpentry and construction - Cabinetry, flooring, interior trim, poles in house building, wharf piles; heavy construction, mine props, ship building

Crafts

Furniture, sliced veneer, vehicle bodies, handles, ladders, sporting goods, agricultural implements, railway sleepers, turnery.

Charcoal production.

Medicinal

(none found)

Nutritional

(none found)

Cultivation details /Propagation

In Liberia and Côte d'Ivoire the tree is briefly deciduous in November–December and it flowers in April.

New leaves are brilliant red. Fruits mature in about 6 months.

Characteristically occurs along river banks and in swampy valleys in lowland evergreen forest, where it locally grows in groups. However, larger-sized trees are often found isolated in the forest at some distance from water courses. Natural regeneration may be abundant on sandy river banks, but it is apparently rare in more closed forest.

NIANGON (*Heritiera utilis*, *Tarrietia utilis*)

Other and local names: Whismore, red cedar, cola cedar; de-orh; yawi (Sierra Leone)

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>, <http://api.tela-botanica.org/img:0002496100.jpg>,

https://www.google.com/imgres?imgurl=https%3A%2F%2Fmivesfa.hu%2Fwp-content%2Fuploads%2F2017%2F06%2FMahagoni_2.jpg&imgrefurl=https%3A%2F%2Fmivesfa.hu%2Fafajlak-niangon-mahagoni%2F&docid=NtuDqu3V1kqP7M&tbnid=PsCixEOV9UR5M%3A&vet=10ahUKEwjlm6fa0ofaAhUMQ60KHUIKBWYQMirAShhMGE..i&w=1024&h=768&itg=1&bih=615&biw=1091&q=niangon%20tree&ved=0ahUKEwjlm6fa0ofaAhUMQ60KHUIKBWYQMirAShhMGE&iact=mr&uact=8



Photo: D. Louppe



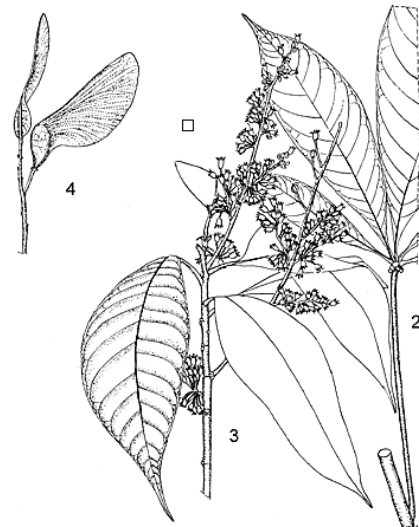
buttresses

LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>
Heritiera utilis may have digitately compound leaves (with leaflets completely free) and *Heritiera densiflora* may have digitately lobed leaves (with lobes distinctly fused at base) -- NB 2 photos by Daniel Johnson



Photo: Bksystematics Group, Wageningen UR

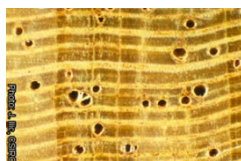
flush



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<https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

NIANGON or WHISMORE (*Heritiera utilis*, *Tarrietia utilis*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>, <http://plants.jstor.org/>
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

Niangon timber has been exported in large quantities for decades, mainly from Côte d'Ivoire. In 1984 exports from Côte d'Ivoire reached a peak of 145,000 m³, thereafter declining dramatically to 3600 m³ in 1989, and increasing again to 30,000 m³ in 1991. **By then, however, the logs exported from Côte d'Ivoire originated mainly from forests in Liberia.** In 1995 Côte d'Ivoire exported 41,000 m³ of logs at US\$ 311/m³

Medium-sized to large tree up to 35(–45) m tall; bole cylindrical but often crooked

Carpentry and construction

The wood blunts edged tools moderately rapidly due to the presence of interlocked grain, and there is a risk of tearing in machining and of clogging due to the presence of resin. Stellite-tipped sawteeth are recommended. A cutting angle of 15° is recommended when planing to prevent tearing. Peeling is difficult due to irregular logs. Logs are debarked soon after felling to prevent attack from powder-post beetles, which lay their eggs under the bark and of which the larvae may attack the sapwood.

Heartwood is moderately durable. It is moderately resistant to fungi and termites, but resistant to dry-wood borers; the sapwood is liable to powder-post beetle attack. The heartwood is extremely resistant to preservative treatment. The wood may cause dermatitis, although it is generally considered non-toxic and non-allergenic.

Exterior and interior joinery, panelling, flooring, moulding, carpentry, furniture, cabinet work, stairs (inside), shipbuilding (planks, deck), and sliced veneer for interior and exterior faces of plywood; planks for house building; shingles

Crafts - Canoes, oars; tanning leather (bark)

Medicinal - Wood is considered to have antidiysenteric properties.

Bark - a decoction applied to skin affections caused by leprosy. Decoction taken internally as an aphrodisiac.

Seed oil is used as an aphrodisiac, whereas ground seeds are applied to abscesses.

Nutritional - Seeds reportedly edible. Fodder for animals

Cultivation details /Propagation

Niangon is a light demander, but seedlings and saplings can tolerate shade for years and start to grow immediately once the canopy is opened.

Niangon is propagated by seed. 1kg= 1250 seeds. Seeds are recalcitrant, have no dormancy. Germination starts after 2–4 days. Fresh seeds have high germination rates, >80% within 2 weeks. Seed is put into the soil with wing protruding. Saplings usually planted in the field when 8–30 months old and 30cm-1.5 m tall. Pruning of lateral roots 1 month before transplanting promotes a dense system of short lateral roots for better survival.

Seedling leaves are simple until about the tenth leaf, when seedlings are 25–30 cm tall, and subsequently they start developing compound leaves with 3 leaflets until about 50 cm tall.

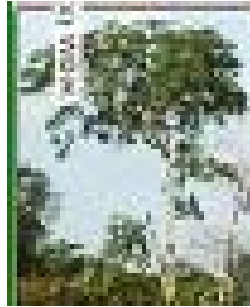
The leaves increase in size until the seedling is 4–5 years old, with leaflets up to 60 cm × 20 cm; after that leaf size decreases. The sapling grows without branching until 5–6 years old and 5–7 m tall. At the same age the stilt-like buttresses may start to develop. Simple leaves develop near the surface of the crown of larger trees. Natural pruning is quite good, but the bole is nevertheless often slightly sinuous, especially in swamp forest.

Trees are evergreen --new leaves appear twice a year during the rainy seasons. They flower Oct–Nov and fruit Jan–March, end of the dry season. Trees start setting fruit at 15–17 yrs old; may be dispersed by wind, but they are not very light, do not travel far.

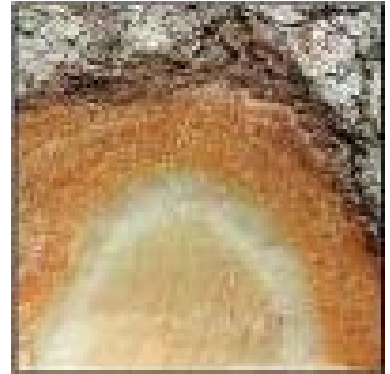
EVEUSS (*Klainedoxa gabonensis*)

Other and local names: Kroma, klamydossia?

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>,



Slash



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>



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SAWTIMBER <http://www.tropicaltimber.info/>,
<https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **EVEUSS** (*Klainedoxa gabonensis*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Reaches a height of 50 m, with trunk diameters from 100 to 150 cm. The bole is usually straight, clear and cylindrical, up to to 30 m in length. It presents high buttresses. Wood is heavy, difficult to saw and work.

Carpentry and construction

Boles of young trees are traditionally used for poles in hut and house construction. Used for heavy construction, industrial flooring, joinery, interior trim, mine props, railway sleepers.

Crafts

Vehicle bodies, toys, novelties, agricultural implements, tool handles and shingles. It is suitable for furniture and ship building. The flexible twigs are valued in Liberia for spring traps. Buttresses have been used for doors in Sierra Leone.

Used as **firewood**.

Medicinal

Powdered or burnt bark is applied to treat rheumatism, lumbago, skin complaints, fractures and dental caries. Bark decoctions are taken to treat venereal diseases, sterility and impotence, and applied externally against smallpox, chickenpox and rheumatism.

Leaves are eaten to treat diarrhoea and intestinal complaints and as aphrodisiac, and leaf decoctions are taken to treat abdominal pain. Ground leaves are rubbed in to treat rheumatism. Leaf sap is taken against cough.

Pounded stipules are applied externally as anodyne.

Fruits ground with calcium carbonate are applied to abscesses and ulcers, and fruit pulp is applied to swellings.

Pulverized seeds are rubbed in to treat furuncles.

Nutritional

Seed kernels eaten raw or roasted; they can be made into a paste to produce vegetable oil which is traditionally used for cooking, as a substitute for shea butter.

Fruit pulp is used to make a mucilaginous sauce which is often eaten with meat.

Fruits are used as bait in traps.

Cultivation details /Propagation

Seedlings are usually found in the shade, but saplings have been recorded in small canopy gaps. Young trees have up to 12 cm long spines on the bole, which gradually disappear when the tree becomes larger.

Evergreen, but it may be leafless for a short period.

Flowering of trees is common at the end of the rainy season and at the beginning of the dry season. In Côte d'Ivoire trees flower in July–Novembe. Ripe fruits develop about 9 months after flowering. They are an **important food for forest elephants, porcupines, duikers and gorillas. Elephants serve as dispersers of the fruit stones.** More rapid seed germination has been reported in elephant dung, as well as better growth of seedlings.

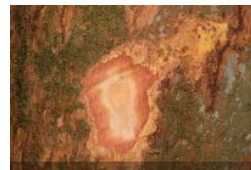
K. gabonensis prefers sandy soils. The tree is usually left standing when forest is cleared due to the hardness of the wood but also for fruit production, and this may explain why it is commonly found in secondary forest.

Each fruit contains 4-5 stones, which take a long time to germinate, 6–48 months. From one fruit, 1–3 seedlings may develop. Germination rate = 5–40%. In **Liberia regeneration in the forest has been reported to be scarce** ... In Liberia, density of up to 0.3 tree per ha with a bole diameter of > 60 cm has been reported.

EKKI (*Lophira alata* or *procera*)

Other and local names: Azobé, red ironwood, Niam tree

APPEARANCE AND BARK (<https://www.sciencedirect.com/science/article/pii/S2314808X17303779>,
http://korupplants.myspecies.info/gallery?ff0=im_field_taxonomic_name%3A408, <https://www.prota4u.org>.)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>),
<https://www.gbif.org/occurrence>, <http://www.liberianfaunaflora.org/liberian-flora/>



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<http://www.tropicaltimber.info>; <https://www.woodworkerssource.com>,
<http://delta-intkey.com/wood/en/index.htm>, <http://www.prowebcanada.com/taxa>



INFORMATION SHEET ON: **EKKI, Azobé (*Lophira alata*)**

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>, <https://www.pfaf.org/user/>

CITES status

“...listed as **vulnerable** due to a population reduction of over 20% in the past three generations, caused by a decline in its natural range, and exploitation” (<http://www.wood-database.com/ekki/>)

Carpentry and construction

Good resistance to insect attacks. Wood is very dense; very hard; very heavy; elastic; very durable, being resistant to fungi, dry wood borers, termites and toredo. It seasons slowly, with a high risk of checking and distortion; once dry it is poorly stable in service. It is very difficult to work with hand and machine tools; there is a severe blunting effect if machined when dry so stellite-tipped and tungsten carbide tools are recommended.

Used for heavy, durable construction work, harbour work such as jetties, heavy-duty flooring, parquet flooring, railroad crossties. Because the wood is rich in silica, and is resistant to marine borers, it is favoured for use in jetties.

Crafts

An oil obtained from the seed is used as a hair oil and is also suitable for making soap.

Sporting goods, toys, novelties, agricultural implements, turnery and hardboard.

Excellent CHARCOAL.

Medicinal

In traditional medicine in Gabon, the bark is applied topically to treat kidney problems.

Cameroon, Gabon and Congo - bark decoctions are taken or applied as enema against menstrual problems, beginning hernia and stomach problems. Against kidney pain and toothache. Bark also used for wound healing.

Nigeria - a similar mixture is used against cough, fever and jaundice. The bark is credited with analgesic and sedative properties and is used to treat convulsions, epilepsy, eye problems and yaws.

Central African Republic - bark is applied against snake bites.

Liberia and Congo - leaves are used in the treatment of leprosy; seeds are sometimes used similarly.

Leaves are also used as a wash for women during childbirth, as a lotion against respiratory diseases and dysentery, also added to preparations which are administered for the treatment of yellow fever and sleeplessness.

Twigs are used as toothbrush.

Nutritional

Edible oil from the fruit. Flowers attract honey bees.

Cultivation details /Propagation [reference: PFAF database]

Grows best in a sunny position. Light gaps in the forest are necessary for successful regeneration, as seed germination does not occur in shady understorey. Plants are sensitive to drought.

Estimated that it takes 220 years for a tree to reach a girth of 2.7 metres in Nigeria.

Seed best sown as soon as it is ripe since the seed has a short viability. Even sown fresh, germination rates are usually less than 50%, dropping to 5% after 3 months.

Germination takes 3 - 5 weeks. To improve growth in the nursery, it is recommended to **add soil from under an established tree to the substrate to ensure development of mycorrhizal fungi**. Air layering is possible. ... Stem cuttings are also possible.

LOVOA (*Lovoa trichilioides*)

Other and local names: **Dibetou**, African walnut wood

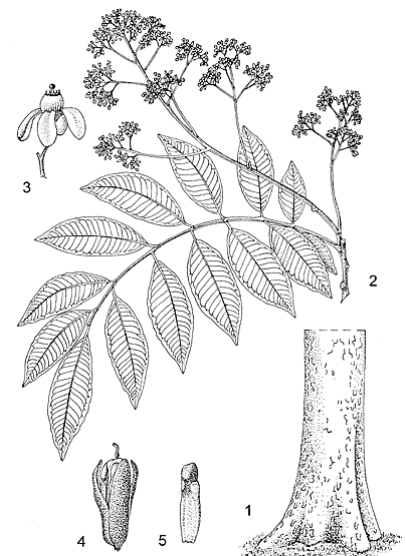
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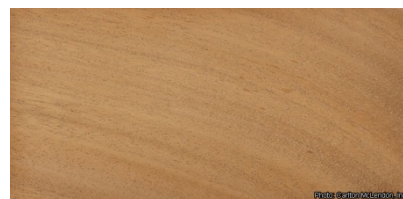


LEAVES AND SEEDS (our photos, <https://www.prota.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>



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INFORMATION SHEET ON: **LOVOA or dibetou (*Lovoa trichilioides*)**

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Evergreen large tree up to 45 m tall. Wood is easy to saw and work.

Occasionally planted as a roadside tree.

Carpentry and construction

Cabinet work, flooring, carpentry, joinery, interior trim, stairways, panelling; house construction, ship building

Crafts

Furniture, and decorative veneer and plywood; vehicle bodies, implements and handles, and to make canoes. Suitable for sporting goods, toys, novelties, railway sleepers, carving, boxes, crates, turnery and pulpwood.

Firewood and charcoal production.

Medicinal - Pulped bark is rubbed on the chest to treat pulmonary troubles; bark used against dental caries.

Nutritional - Flowers are a source of nectar for honey bees.

Cultivation details /Propagation

Natural regeneration is often abundant, although the seed suffers heavy predation. Seedlings of about 20 cm tall may be abundant in full shade, but saplings only grow where gaps develop in the forest canopy. Early growth is slow, with planted seedlings reaching 150 cm in 3 years. After the first years, growth becomes faster, and there are records of trees attaining 9 m in height after 7 years...In natural forest the mean annual diameter increment is about 5 mm.

In West Africa trees flower in the dry season and fruits are ripe in February–April. However, seeds are not produced each year; in **Liberia** and Nigeria good seed years reportedly occur every 3–4 years. The seeds are dispersed by wind, turning like a propeller while falling. The presence of vesicular-arbuscular mycorrhizal fungi of the genus *Glomus* in the soil close to *Lovoa trichilioides* trees has been demonstrated.

It prefers moist but free draining localities on alluvial soils and more than 2000 mm annual rainfall.

For planting, seeds are collected from the forest floor, although many seeds may already be attacked by insects. The seed including the wing is usually covered for up to three-quarters with soil. Seeds have a short viability, with up to 90% germination after 8–16 days for fresh seed, but only about 30% germination after 2 months. Seeds stored in sealed containers and ash added because they are very susceptible to insect attack.

Wildlings are sometimes used for planting; watered abundantly. A successful method of propagation by stem cuttings has been developed in Cameroon. Long, thin cuttings with large leaf areas (50–200 cm²) made from apical nodes of multi-stemmed stock-plants rooted best, up to 60%. Stem cuttings rooted best in coarse gravel.

For transplanting in the forest, seedlings in bags should be about 50 cm tall. Stumps or striplings 150–180 cm long can also be used. For planting in the field it is recommended to plant under moderate shade and to avoid full sun. It has been reported that trees developed very successfully when planted in groups or lines in thinned natural forest. ...Initial weeding is important and climbers have to be removed. It is difficult, however, to progressively remove the shade without hurting the saplings.

In the forest, large trees of *L. trichilioides* generally occur scattered. ... In Liberia the average number of exploitable trees is 12 per 100 ha... In Cameroon approximately 6400 ha have been planted with *L. trichilioides*. Plantations have also been established in Côte d'Ivoire, Nigeria and Uganda. **Pruning prevents early branching and is advantageous for timber production.** In Nigeria it is recommended that pure stands of *Lovoa trichilioides* be thinned to about 300 trees per ha by the 15th year, and to 100 trees per ha by the 30th year, to enable the trees to attain a diameter of about 90 cm in 60–70 years.

IROKO (*Milicia excelsa*, *Chlorophora excelsa*)

Other and local names: African teak, semei, odum

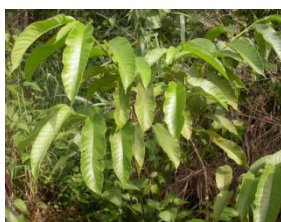
APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>,



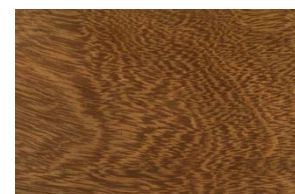
LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>



REGENERATION



SAWTIMBER <http://www.tropicaltimber.info/>,
<https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **IROKO** (*Milicia excelsa*, *Chlorophora excelsa*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, http://uses.plantnet-project.org/en/Milicia_excelsa (PROTA)

A **nitrogen-fixing tree that can also be used as a shade tree**. It is large and deciduous, growing up to 50 m high and 350 cm in trunk diameter. The trunk is often buttressed and can be branchless for up to 20 m. The crown is wide and flat. *Milicia regia* is closely related.

It is considered to be an indicator of fertile soil suitable for cultivation. It prefers well-drained soils and does not tolerate impeded drainage.

Iroko belongs to the most valuable timbers of Africa, due to its attractive appearance, durability, stability and good working properties. At present its exploitation is not sustainable in most countries. It requires protection and exploitation has to be limited if it is to become sustainable. Plantation is difficult due to a pest problem. The identification of sources of resistance to the iroko gall fly deserves high priority and can possibly be complemented by the development of effective control methods, especially the use of natural parasites or predators of the iroko gall fly.

Carpentry and construction

A highly valued commercial timber in Africa, for which demand is large. It is used for construction work, shipbuilding and marine carpentry, sleepers, sluice gates, framework, trucks, draining boards, outdoor and indoor joinery, stairs, doors, frames, garden furniture, cabinet work, panelling, flooring and profile boards for decorative and structural uses.

Crafts

MORTARS; carving, domestic utensils, musical instruments and toys.

As it is resistant to acids and bases, it is used for tanks and barrels for food and chemical products and for laboratory benches. It is used as sliced veneer but only rarely as rotary veneer.

Firewood and charcoal.

Medicinal

[The wood and sawdust may cause dermatitis, irritation to nose and throat, and asthmatic reactions, due to the presence of the phenol chlorophorin]

Chlorophorin, a phenolic compound found in the plant, has inhibitory effects on melanin biosynthesis. Its more stable derivative, hexahydrochlorophorin, may have potential for use in skin-whitening agents and for treating disturbances in pigmentation.

Often considered a sacred tree and is frequently protected near houses and in cultivated fields. In Benin the foliage is used as a fetish; in Nigeria the tree has a special place in the folklore and traditions of the people.

BARK: A methanol extract of the stem bark has shown in-vivo anti-inflammatory properties. Preparations from the bark are taken to treat cough, asthma, heart trouble, lumbago, spleen pain, stomach pain, abdominal pain, oedema, ascites, dysmenorrhoea, gonorrhoea, general fatigue, rheumatism, sprains, and as a galactagogue, aphrodisiac, tonic and purgative. Bark preparations are externally applied to treat scabies, wounds, loss of hair, fever, venereal diseases and sprains. They are applied as an enema to cure piles, diarrhoea and dysentery.

ROOT: A decoction to treat female sterility. A decoction of root and stem bark is taken as an aphrodisiac.

LATEX: applied on burns, wounds, sores and against eczema and other skin problems. It is also taken against stomach problems, hypertension and as a galactagogue, and it is used for treatment of tumours and obstructions of the throat.

LEAVES: Eaten to treat insanity; a leaf maceration is drunk as a galactagogue. A decoction of leaves is for treatment of gallstones. Leaf preparations applied to snakebites and for fever; as eye drops for filariasis.

Nutritional - Young leaves - cooked.

Ripe fruits are edible. The fruit juice is used for flavouring -- green, wrinkled, fleshy and resembles a fat green caterpillar, up to 7.5cm long

IROKO (*Milicia excelsa*, *Chlorophora excelsa*) - continued

Cultivation details /Propagation

[http://uses.plantnet-project.org/en/Milicia_excelsa_\(PROTA\)](http://uses.plantnet-project.org/en/Milicia_excelsa_(PROTA))

M. excelsa is mostly propagated by seed. The 1000-seed weight is 1–4 g. A bout 40 kg of fruits is needed for 1 kg of seeds.

As the colour of the infructescences does not change during ripening, maturity has to be determined by cutting the infructescence to see if the pulp has softened. If unripe infructescences are picked from the tree, it is necessary to leave them in the shade for some days to ripen. It is easier to collect them from the ground, but seeds should be extracted before the infructescences have begun to ferment.

Seeds can be separated by crushing infructescences after immersing them in water for about a day. Viable seeds sink in water and can be easily separated from floating unviable seeds. Fresh seeds normally germinate well; the germination rate may be >90% within 4 weeks; best sown within 3 months after collection, because viability decreases rapidly. Seeds dried to 8% moisture content can be stored at 0–5°C for at least a year.

Seeds are sown in a seedbed and transplanted to pots or nursery beds 3 weeks after germination.

Seeds normally germinate 2–4 weeks after sowing. Young trees grow continuously, but growth of adult trees is periodical. In the dry season, deciduous for a short period. From West Africa to Sudan it flowers from December to March. It takes 5–6 weeks from fertilization to fruit maturation. Seed dispersal is mostly by birds, bats and squirrels.

In a 6-year-old plantation in northern Côte d'Ivoire some trees were over 6 m tall, but the variability was large. In Ghana the annual increment in diameter is 0.33–0.59 cm. In Cameroon a mean diameter growth of over 1 cm per year has been recorded for trees about 25 years old.

Seedlings should be grown under shade to limit attacks by *Phytolyma* spp. About 4 months after sowing the seedlings are around 30 cm tall and ready for planting out in the field. Young plants transplant well. In Ghana seedlings planted during the long rainy season have shown much better growth than seedlings planted during the short rainy season. The better growth persisted for at least 9 years. Planting in a mixed stand with *Terminalia superba* Engl. & Diels (in equal proportions at planting) gave better growth than planting in pure stands.

Milicia excelsa can be propagated vegetatively by stem and root cuttings, grafting, layering and in-vitro tissue culture. Successful propagation has been achieved using stem cuttings from 1- and 2-year-old trees, but from mature trees cuttings should be taken from coppice shoots. Stakes and posts made of branches may strike root like cuttings.

The wide sapwood of *Milicia excelsa* means that thinnings in plantations are of little value, so it is recommended to plant at wide spacings.

Management: *Milicia excelsa* is mostly extracted from natural forest, as plantations are severely affected by pest problems. It prunes and coppices well.

Diseases and pests: The major constraint on the cultivation of *Milicia excelsa* and *Milicia regia* are gall-forming *Phytolyma* spp. (iroko gall flies). Eggs are laid on buds, shoots or young leaves, and after the emergence of nymphs galls are formed, followed by dieback of foliage down to the woody tissue. This disrupts physiological processes, causes growth reduction, and in many cases kills seedlings.

Secondary infection by fungi probably aggravates the damage. Mature leaves are not seriously affected. Efforts to control this pest have had little success, but the development or selection of more resistant *Milicia* genotypes may offer prospects. Planting in light shade, in mixtures and in low plant densities seems to help to reduce damage by *Phytolyma*. Elephants eat the bark and may destroy plantations.

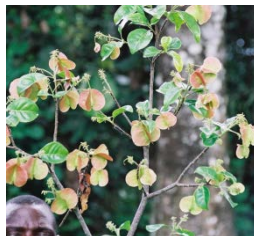
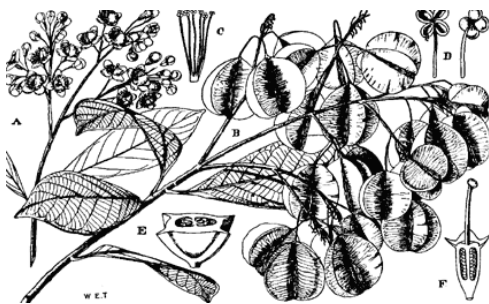
ABALE (*Petersianthus macrocarpus* or *Combretodendrum microcarpum*)

Other and local names: Essia, Stinkwood tree, soap tree

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>), <https://www.gbif.org/occurrence>,



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http://www.westafricanplants.senckenberg.de/images/pictures/petersianthus_macrocarpus_ndembo_16-1-02_plath000094_6467_6a7d09.jpg

SAWTIMBER <http://www.tropicaltimber.info/>, <https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **ABALE** (*Petersianthus macrocarpus* or *Combretodendron macrocarpum*), stinkwood tree

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

The green wood produces an extremely unpleasant smell when cut, but this disappears upon drying. Deciduous medium-sized to large tree up to 45 m tall; bole branchless for up to 25 m, usually straight and cylindrical, up to 130 cm in diameter; thickened, slightly fluted at base or with small buttresses

Carpentry and construction - used in both

Crafts

Furniture, canoes, mortars, tool handles, sliced veneer and plywood. It is suitable for flooring, mine props, vehicle bodies, railway sleepers, sporting goods, toys, novelties, agricultural implements and draining boards.

Valued as **firewood and for charcoal** production.

Medicinal

BARK: In Côte d'Ivoire the bark is used as a purgative and laxative and is considered abortifacient. In Ghana bark decoctions are taken as expectorant, and in DR Congo as cholagogue and as a cure for stomach pain, pneumonia and jaundice. In Equatorial Guinea the bark is administered as anthelmintic and to cure cough. Bark decoctions are widely used to clean wounds and to promote wound healing. Hot bark is applied to the skin against muscle soreness.

LEAF: In Gabon leaf decoctions have been used orally and by enema for the treatment of haemorrhoids, constipation, paralysis and ulcerative wounds. In Cameroon the leaves are used as a medicine for dysentery.

Nutritional - Edible caterpillars, which feed on the leaves, are collected and eaten after roasting or boiling.

Cultivation details /Propagation

Growth of seedlings is slow; after 9 months they reach about 11 cm tall. When planted in full sun, seedlings were only 75 cm tall after 5 years, but in moderate shade they reached about 1 m tall 4 years after planting.

Although *Petersianthus macrocarpus* is considered to be an indicator of disturbances in the forest, seedlings ... tolerate some shade and are most common in small forest gaps...

Trees are leafless for a short period towards the end of the dry season. Leaves turn red before shedding.

In **Liberia** and Côte d'Ivoire flowering is irregular but peaks around December and May. During flowering the ground under the tree is covered with fallen petals and stamens with a penetrant and unpleasant smell.

It has been reported that abundant fruiting occurs twice a year. The fruits are dispersed by wind. In forests where elephants are present, *Petersianthus macrocarpus* trees have strongly swollen bases as a reaction to regular debarking. After debarking the bark grows back not only from the edge of the injury but also from pores in the wood which speeds up recovery and results in reduced rates of infection.

In **Liberia** *P. macrocarpus* is most common in moist semi-deciduous forest... In southern Cameroon it is frequently found in agroforestry plantations of cocoa.

In Guinea and Côte d'Ivoire seeds are best collected in January–February(–April) and August. There are about 4300 seeds per kg. Germination rate 15–25%; many fruits do not develop a viable seed or are attacked by insects. Germination starts 3.5–10 weeks after sowing. Seedlings are ready for planting after 1 year. In planting tests in Guinea, mortality was quite high, particularly when seedlings had been planted in full sun.

Trees can be coppiced.

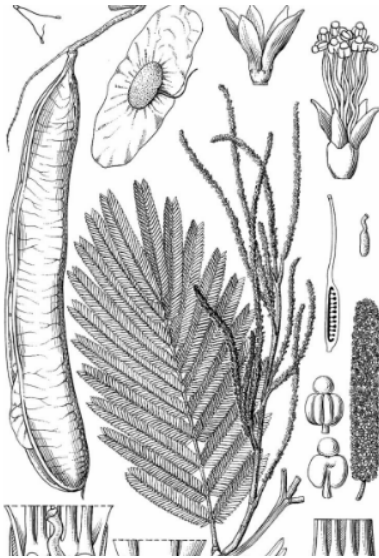
DAHOMA (*Piptadeniastrum africanum*)

Other and local names: Dabema, mbele, odan

APPEARANCE AND BARK <https://www.prota4u.org>, <http://www.prota.org>, <http://www.africanplants.senckenberg.de>, https://www.gbif.org/occurrence/gallery?taxon_key=2945196,



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>, <http://tropical.theferns.info/image.php?id=Piptadeniastrum+africanum>)



REGENERATION



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<http://www.tropicaltimber.info/>, <https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

DAHOMA (*Piptadeniastrum africanum*)

<http://www.tropicaltimber.info/>, <https://www.prota.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

The tree is planted or left during forest clearing as a shade tree in coffee, cocoa and banana plantations. Deciduous or evergreen large tree up to 50 m tall; bole straight and cylindrical

Carpentry and construction - “African oak”

Marine construction and bridges, flooring, mine props, ship building, vehicle bodies, interior trim, joinery. Wood is fairly easy to saw and work, but with some blunting effect on cutting edges.

Crafts

Furniture, including garden furniture, cabinet work, sporting goods, turnery, hardboard, particle board and pulpwood. It is used traditionally to make dug-out canoes. Bark fibre has been used to weave mats.

Medicinal

Bark decoctions are used internally to treat cough, bronchitis, headache, mental disorders, haemorrhoids, genito-urinary infections, stomach-ache, dysmenorrhoea and male impotence, and as an antidote; externally, they are applied to treat fever, toothache, pneumonia, oedema, skin complaints and rheumatism, to expel worms, to dispel fleas, and as a purgative and abortifacient. A decoction of the bark also enters in a complex treatment of leprosy. The bark is used in arrow poison, and as ordeal poison and fish poison; mixed with rice it is used to poison mice. It is also used as a soap substitute.

Pygmy people in Cameroon and DR Congo use both root bark and stem bark as an ingredient of arrow poison. Root extracts or macerations are applied against mental disorders, and as an abortifacient and aphrodisiac.

Pounded leaves and leaf decoctions are applied as an enema to treat gonorrhoea and abdominal complaints. Leaves are used to poison mice.

In various countries *Piptadeniastrum africanum* is considered a magic tree.

Nutritional - Edible caterpillars feed on the leaves, and the flowers are a source of nectar for honey bees.

Cultivation details /Propagation

Seedlings are common in the forest, even in dark shade. However, they grow very poorly in shade, where they may be only 20–35 cm tall when 3 years old... Saplings and young trees demand light, and are usually found in small gaps in the forest. In Sierra Leone mean annual bole diameter increments of 1.2 cm have been recorded for the first 20 years after planting... In Nigeria a tree reached 90 cm bole diameter in 71 years.

Young trees have a rounded crown, which develops into 2 distinct layers, of which the lower one disappears later and the upper one develops horizontally and ultimately becomes fragmented. Adult trees have huge, flat crowns that spread in the upper canopy of the forest. The trees are often briefly deciduous, but frequently do not shed all leaves at the same time. The leaflets fold up at sunset.

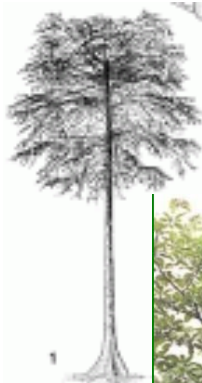
In Sierra Leone, **Liberia** and Côte d’Ivoire trees usually flower in May–August and fruits mature in December–March... The winged seeds are mainly dispersed by wind, but distribution by water and birds is also possible. *P. africanum* nodulates with rhizobia.

Seeds for planting are collected from the forest floor... Seeds lose their viability quickly and cannot be stored for more than one month. They do not show dormancy, and germinate in 1–3 weeks. In a germination test, 96% of the seeds germinated within 8 days. They should be sown in shaded nursery beds. The growth of seedlings is slow and they may stay in the nursery for more than one year before planting. Wildlings are sometimes collected for planting.

FRAKE (*Terminalia superba*)

Other and local names: Limba, White afara, shinglewood

APPEARANCE AND BARK (<https://www.prota4u.org>, photos by P. Latham and Marco Schmidt; <https://www.gbif.org/occurrence>,



Slash



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REGENERATION



<http://www.ochanalliance.org/category/uncategorized/>

SAWTIMBER <http://www.tropicaltimber.info/>, <https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON:

FRAKE (*Terminalia superba*)(limba, shinglewood)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=E>

Was one of the major timbers of Africa but exports much declined from 1960s to 1980s. Wood is not durable, being liable to attacks by pin-hole borers, powder-post beetles, longhorn beetles, termites and marine borers. Deciduous medium-sized to large tree up to 50 m tall; bole branchless for up to 35 m, usually straight and cylindrical, up to 150 cm in diameter, with large, fairly thick, plank-like buttresses up to 5–8 m high. The trees are self-pruning, soon developing long and clear boles, up to 16 m long when 12 years old.

Carpentry and construction

Interior joinery, door posts and panels, mouldings, temporary house construction, planks, roof shingles

Crafts

Furniture, office-fittings, crates, matches, and particularly for veneer and plywood; ehicle bodies, sporting goods, toys, novelties, musical instruments, food containers, vats, turnery, hardboard, particle board and pulpwood; canoes, paddles, coffins, boxes and domestic utensils

Yellow dye in the bark used traditionally to dye fibres for matting and basketry, also for dyeing textiles blackish.

Firewood and charcoal production.

Medicinal

Bark decoctions and macerations are used in traditional medicine to treat wounds, sores, haemorrhoids, diarrhoea, dysentery, malaria, vomiting, gingivitis, bronchitis, aphthae, swellings and ovarian troubles, and as an expectorant and anodyne. Bark is anodyne, astringent.

Leaves serve as diuretic and roots as laxative.

Nutritional - none noted (<https://www.pfaf.org/USER/Plant.aspx?LatinName=Terminalia+superba>: “No plant part is edible”)

Cultivation details /Propagation

Growth is rhythmic, resulting in clustered leaves and whorled branches. Annual growth rates of 2.5 m in height have been reported for the first 10 years after planting, but in Ghana trees have reached 14 m in height and 22 cm in bole diameter at an age of 4 years. Under good conditions planted trees may reach a bole diameter of 50 cm in 20 years.

They are leafless for 2–3 months in the dry season. New leaves and flowers appear at the beginning of the rainy season. Trees may start flowering when the bole is 30 cm in diameter, which can be reached after 6 years. The flowers are visited in the second half of the day by insects such as flies and bees. The age of first fruiting is between 15 and 25 years. Fruits ripen 6–9 months after flowering in the dry season and are dispersed by wind.

Tolerates a wide range of soil types, from sandy to clayey-loamy and lateritic. It does not tolerate prolonged waterlogging, but withstands occasional flooding. It is susceptible to fire. *T. superba* is often found in association with *Triplochiton scleroxylon*.

T. superba is a pioneer species. It usually regenerates well after forest exploitation. Seedlings are often abundant along roadsides and in medium-sized forest gaps. One kg contains 5000–7000 fruits, and about 8000–10,000 de-winged nuts. The seeds show some dormancy. After collection, fruits should be dried in the sun for a few days. SEE ALL PLANTING DETAILS AT:

<https://www.prota4u.org/database/protav8.asp?h=M4&t=Terminalia,ivorensis&p=Terminalia+ivorensis#Synonyms>

T. superba can be planted in pure stand or in mixed stands with other timber species such as *Terminalia ivorensis* A.Chev., *Milicia excelsa* (Welw.) C.C.Berg and *Triplochiton scleroxylon* K.Schum., or on fertile soils with *Khaya* and *Entandrophragma* spp.

FRAMIRE (*Terminalia ivorensis*)

Other and local names: Baji, emire, yellow terminalia, black afara

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>,



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REGENERATION



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<https://www.woodworkerssource.com>, <http://delta-intkey.com/wood/en/index.htm>



INFORMATION SHEET ON: **FRAMIRE** (*Terminalia ivorensis*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=>

Deciduous medium-sized to large tree up to 45(–50) m tall.

“It is a medium rotation species for plantation. The duration of the rotation is 30 years, to reach 40 to 45 cm diameter, or 40 years, to reach 45 to 50 cm in diameter.” <http://www.tropicaltimber.info/specie/>

Used in agroforestry systems as a shade tree in cocoa, banana, coffee plantations; planted as roadside tree.

In Europa and the United States the wood of *Terminalia ivorensis* is sometimes used as a substitute of oak (*Quercus spp.*).

Carpentry and construction - Light construction, door and window frames, joinery, furniture, cabinet work, veneer and plywood; flooring, interior trim, house construction, planks, roof shingles, fencing posts, dug-out canoes, drums and mortars. Mixed with other woods, it is suitable for paper making.

Firewood and charcoal production

Crafts - Vehicle bodies, sporting goods, boxes, crates, matches, turnery, hardboard, particle board and pulpwood. A yellow dye in the bark and wood is used traditionally to dye clothes and fibres for basketry.

Medicinal

Bark decoctions or powdered bark are used in traditional medicine to treat wounds, sores, ulcers and haemorrhoids, against malaria and yellow fever, and as an anodyne in rheumatism and muscular pain.

Leaf sap is applied to cuts and against colds, and is also taken, together with bark decoctions, as an enema to treat gonorrhoea and kidney complaints, and as an aphrodisiac.

Nutritional - none noted

Cultivation details /Propagation - For all details on seed treatments and panting, consult and print out:

<https://www.prota4u.org/database/protav8.asp?h=M4&t=Terminalia,ivorensis&p=Terminalia+ivorensis#Synonyms>

Seedlings grow rather slowly immediately after germination, but after a few months growth accelerates. In medium-sized to large gaps in the forest, young trees may reach 17 m tall and 25 cm in bole diameter 8 years after germination. In Côte d'Ivoire planted trees reached after 20 months a mean height of 2.9–4.9 m, but a maximum height of 9 m, and 3–6 cm in bole diameter. Trees of 22 years old reached 36.5 m in height and 75 cm in bole diameter, but more normal bole diameter increments are 1.5–2.5 cm/year... in plantations in Nigeria ...height growth was most rapid in the first 10 years and decreased steadily afterwards...

The trees are self-pruning, soon developing long and clear boles.

They are leafless for 2–3 months in the dry season. Young trees may start flowering and fruiting when 5 years old. New leaves and flowers appear at the beginning of the rainy season, and flowering may continue for 2–3 months from April to July. In each inflorescence the lower flowers are bisexual and the upper functionally male. The flowers are pollinated by insects such as small butterflies and flies...

Fruits ripen towards the end of the dry season... They are usually produced annually and in large quantities, but often they are attacked by fungi and insects... natural abscission is also common, probably correlated with adverse temperatures. Fruits can remain for a long time on the tree, but are eventually dispersed by wind.

T. ivorensis is associated with vesicular arbuscular mycorrhizae.

T. ivorensis occurs on a wide range of soil types, from sandy to clayey-loamy and lateritic. It does not tolerate prolonged waterlogging, and is vulnerable to fire.

TETRA (*Tetraberlinia tubmaniana*)

Other and local names: Sikon, gola, ekop, ekaba

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>,

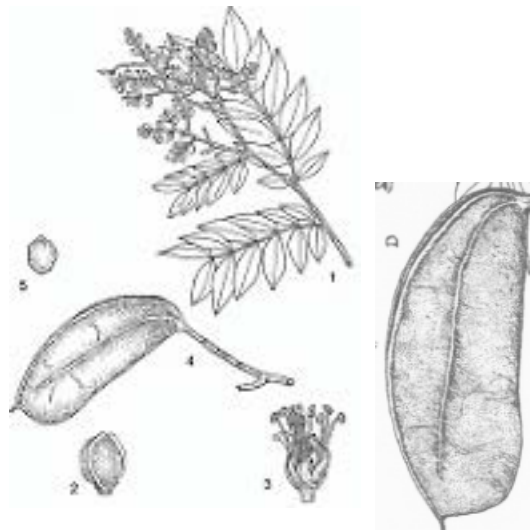


Note: more photos of this tree that is indigenous to Liberia are needed

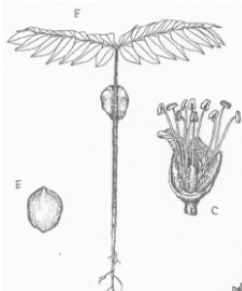
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LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>



REGENERATION



SAWTIMBER <http://www.tropicaltimber.info/>, <https://www.woodworkerssource.com>,



INFORMATION SHEET ON: **TETRA** (*Tetraberlinia tubmaniana*)

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,

Evergreen, small to medium-sized tree up to 30(–42) m tall; bole branchless for up to 23 m, straight and cylindrical, up to 125 cm in diameter, base without buttresses but often somewhat swollen or with to 50 cm high root swellings.

CITES /IUCN Red List: classified as “vulnerable”. “Only known from Liberia, but it may also be present in adjoining parts of Sierra Leone and Côte d’Ivoire.”

<https://www.prota4u.org/database/protav8.asp?h=M4&t=Tetraberlinia,tubmaniana&p=Tetraberlinia+tubmaniana#Synonyms>

Carpentry and construction - mainly used for furniture, veneer and plywood. It is locally used for construction. The wood slices and peels very well. Staining with iron compounds may occur. The heartwood is only moderately durable. It is liable to attacks by fungi. The sapwood is susceptible to *Lyctus* attacks.

Crafts - Suitable for light flooring, joinery, interior trim, vehicle bodies, ladders, toys, novelties, boxes, crates, tool handles, turnery, hardboard and particle board.

Medicinal

No medicinal uses are recorded but further research is warranted.

Nutritional

None noted.

Cultivation details /Propagation

Tetraberlinia tubmaniana flowers in April–June, and the fruits are ripe in November–January. Young trees only 9 m tall and 8 cm in bole diameter have been observed to flower already.

When the fruits dehisce, the seeds are ejaculated from the coiling valves. Regeneration is good; seedlings are abundant in the forest.

It grows on flat to slightly undulating terrain with deep soils; the terrain should not be inundated nor have a high water-table. It often occurs gregariously, and in some forests, such as the Krahn-Bassa National Forest in south-eastern Liberia, it is the dominant species over large areas, not only dominating the canopy, but also the middle and lower layers. Trees seem to suffer when suddenly exposed to full light, for instance when too many canopy trees are cut.

The 1000-seed weight is 600–1900 g.

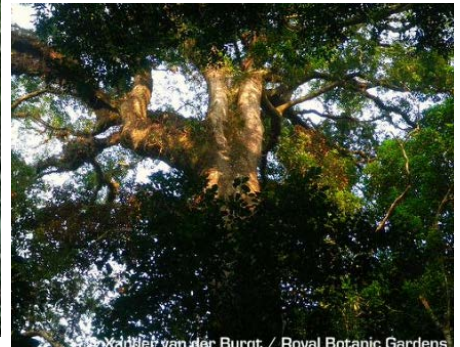
Management:

In the 1960s the total standing stock of *Tetraberlinia tubmaniana* in south-eastern Liberia was estimated at over 7 million m³, and estimations of the amount of exploitable timber in old forests were as high as 70 m³ per hectare. In the 1970s it was recorded that stands in the Krahn-Bassa National Forest contained about 30 trees per ha with a diameter over 40 cm.

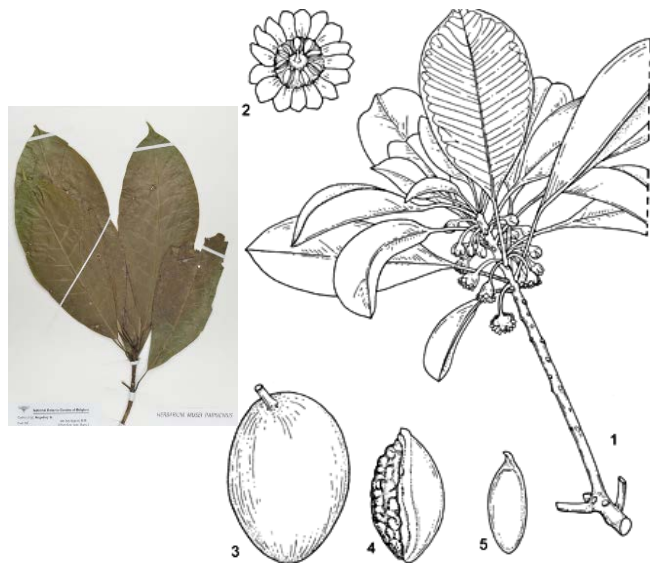
MAKORE (*Tieghemella heckelii*)

Other and local names: Baku, Douka

APPEARANCE AND BARK (<https://www.prota4u.org>, <https://www.gbif.org/occurrence>)



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, <https://www.pfaf.org>, <http://www.africanplants.senckenberg.de>)



REGENERATION



SAWTIMBER (<http://www.tropicaltimber.info/>, <http://delta-intkey.com/wood/en/index.htm>, prota4u.org)



INFORMATION SHEET ON: **MAKORE** (*Tieghemella heckelii*) - also Baku, Douka

<https://www.prota4u.org/database/>, <https://www.pfaf.org/user/Plant.aspx?LatinName=>

An emergent tree of primary rain forest, most common in coastal lowland and diminishing towards the eastern parts of its range. From Sierra Leone eastwards to southern Nigeria; not in Togo or Benin,

Very large tree up to 55 m tall; bole up to 250 cm in diameter, sometimes much more, straight and cylindrical, often swollen in lower part, reaching up to 30 m to the first branches, angular or ridged at base, or with large, narrow buttresses up to 3 m high and heavy, spreading surface roots; bark c. 2 cm thick. *Tieghemella africana* resembles *T. heckelii* and may be conspecific. The former differs in the longer, filiform median segment of the corolla lobes, larger staminodes and slightly smaller seed scar. A taxonomic study is needed to clarify the species limits and the status of the genus, which is complicated by the fact that the name ***Tieghemella* was first published for a genus of fungi.**

Logs tend to split badly during felling. Logs of larger trees may be hollow.

Carpentry and construction - Exterior and interior construction,

Crafts - Furniture, flooring, doors, vehicle frames, sports goods, railway sleepers, turnery and sculptures, and makes good and decorative veneer, often used to face plywood, especially for marine uses.

Medicinal - [Dust from sawn wood may cause irritation to skin and mucous membranes. It has been suggested that this is caused by the presence of saponins or the contact allergen].

The fat from seed oil is applied as a pomade to the body and hair, and used in soap production.

FRUIT: fleshy and very sticky pulp of the fruits is sometimes used as birdlime. The fruit is sticky and juicy, with an unpleasant smell and bitter taste. The kernel comprises about 60% oil by weight. The oil is yellowish and semi-fluid, has no distinct flavour or taste (occasionally slightly spicy), and consists of about 51% oleic acid, 43% stearic acid, 3.5% palmitic acid and 2.5% linoleic acid.

BARK: is reportedly effective for treating blennorrhoea and toothache

Liberia - young buds are used to treat snake bites.

Nutritional - Seed kernels (cotyledons, known as 'baco') are rich in an edible fat known as 'dumori butter' or 'makore butter', which is locally popular as a cooking or seasoning oil and often preferred to palm oil.

Propagation - refer to details at:

<https://www.prota4u.org/database/protav8.asp?h=M4&t=Tieghemella,heckelii&p=Tieghemella+heckelii#Synonyms>

Initial growth of seedlings is fast, up to 70 cm in 4 months, but then often ceases while a strong taproot (c. 20 cm long) is formed. Growth of young makore trees is reported as slow, but strongly depends on light. ... growth may be up to 1 m/year; under 10% growth is almost nil. Other reports indicate, however, that maximum growth is reached at an irradiance of 10% of unshaded values. In Ghana, young trees have been reported to be 1–2 m tall after 1–1.5 years in a nursery, and when planted under shade trees in the field 1.5–3.5 m tall after 13 years. However, in western Côte d'Ivoire, trees have been reported to be 3 m tall after 4 years and 9–11 m tall after 20 years with a stem diameter of 13–16 cm, occasionally even 28 m tall after 21 years with a diameter of 37 cm. For 35–80-year-old trees the mean annual increment is 0.4–0.8 cm.

Trees develop according to Aubréville's model: the monopodial trunk shows rhythmic growth, with whorled branches, which also grow rhythmically but modularly...

Makore is easy to propagate... Trees start flowering and fruiting after about 17 years, but sometimes after 10 years. Flowers open in the early morning, the corolla being shed in the afternoon of the same day. In **Liberia**, flowering is from February to May; ripe fruits can be found between October and December. A large tree produces approximately 3000–4000 fruits at a time. **The fruits are eaten** by elephants, which are probably the main seed dispersers; bush-pigs are also reported to feed on the fruits.

Makore has been planted on a very small scale (almost 6 ha), mainly for seed oil production, in western Côte d'Ivoire (near Taï National Park)... It is often planted at a density of 120 trees/ha, in association with coffee, cocoa, rubber or rice...

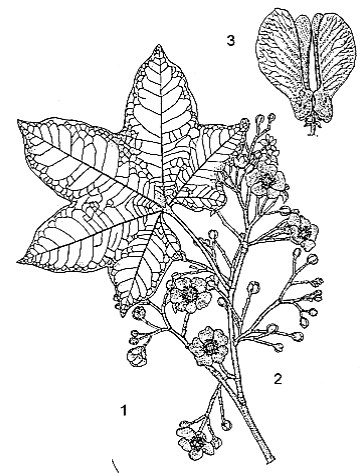
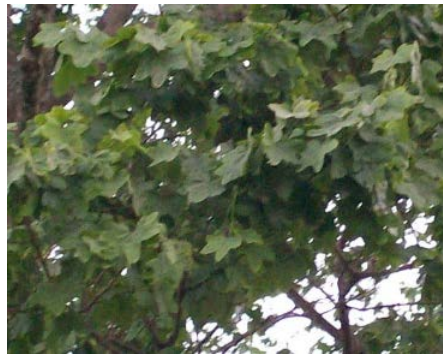
SAMBA (*Triplochiton scleroxylon*)

Other and local names: Obeche, wawa, ayous, African whitewood

APPEARANCE AND BARK (<https://www.prota4u.org>, <http://uses.plantnet-project.org/en>),
<https://www.gbif.org/occurrence>,



LEAVES AND SEEDS (our photos, <https://www.prota4u.org>, https://www.gbif.org/occurrence/gallery?taxon_key=3671814)



REGENERATION



SAWTIMBER

<http://www.prota.org/>, <https://www.pfap.org>

Philipp Zinger wikimedia.org



Photo: CIRAD



Photo: CIRAD

INFORMATION SHEET ON:

SAMBA (*Triplochiton scleroxylon*), Obeche or Ayous

<http://www.tropicaltimber.info/>, <https://www.prota4u.org/database/>, <http://www.iucnredlist.org/details/>,
<https://www.pfaf.org/user/Plant.aspx?LatinName=Triplochiton+scleroxylon>

A large, tropical, deciduous tree about 65 m in height and 150 cm in trunk diameter, with large buttresses and straight trunk covered with dark gray, smooth bark.

Often preserved in cocoa plantations to serve as shade trees. Not considered vulnerable by IUCN.

Carpentry and construction - Fresh wood has an unpleasant smell, which disappears upon drying. Very light in weight; very soft; not durable, being liable to fungal attack (e.g. blue stain), and susceptible to termites, powder-post beetles and dry-wood borers - it should not be used in contact with the ground or exposed to the weather.

Widely used for interior joinery, panelling; house building, beams, posts and planks, and roof shingles.

Bark is used to cover the roof and walls of huts.

Crafts

Moulding, furniture, boxes and crates, sculptures, matches, pencils, peeled and sliced veneer for interior and exterior parts of plywood, fibre and particle boards, and blockboard.

Wood from the buttresses is used to make doors, platters, bowls and sandals, and the bole is used for dugout canoes. Wood pulp can be used to produce paper of moderate quality.

Medicinal

[Sawdust has been known to cause occupational allergic contact dermatitis, allergic rhinitis and asthma in workers in sawmills]

Bark for treatment of oedemas and as an anodyne.

Nutritional

Leaves - cooked - are used as a cooked vegetable or sauce in traditional cuisine in west Africa

T. scleroxylon is a food plant of the silkworm *Anaphe venata*, the larvae of which are a good source of protein and commonly eaten.

Sawdust is used for the production of edible fungi (*Pleurotus spp.*).

Cultivation details /Propagation

Seed starts to germinate 1 - 2 weeks after sowing, but the germination rate is often low. Germination rate and speed increase when the seeds are pre-treated by moistening between layers of damp cotton wool.

Fruits with wings removed are shallowly buried in pots placed under shade. The seedlings are pricked out when first leaves appear. They are fragile and sensitive to damping off. They develop a taproot, which is often forked, with few lateral roots in the upper 15cm of the soil. The taproot of a 2m tall sapling may be 1m long.

Seedlings of 1 - 3 years old with their tops intact but the root system severely cut back to permit planting in 40 cm x 4 cm holes were successful. However, it has also been observed that cutting the primary root for planting causes serious drawbacks; new roots form slowly, which makes the plant liable to parasitic attacks.

The fruits can be collected from the trees when still green just before maturation. Fruits stored at 18°C fully retained their viability for 18 months. However, at 25°C viability drops... More than 50% of the seeds may still germinate after being stored for 7.5 years in sealed containers at 4°C.

Single-node cuttings with one leaf were rooted successfully under mist; rooting was improved by a hormone dip and a high temperature in the bed (30°C)[299]. Cuttings 10cm long with 2 - 4 leaves taken from 2 month-old branches can be used. These are placed in a nursery under 40 - 60% shade under mist. It takes about 12 weeks to obtain a rooted and hardened plantlet.

Marcotting is possible by ringing a branch at an internode; results are optimal when the foliage is at maximum density, between August and October, with up to 50% success in 12-year-old trees.