

**LOCAL NAMES**

Afrikaans (kremetart,kremetartboom); Arabic (hamaraya,hamao,gungole (fruit),humier (fruit),teidoum,tabal,tebeldi); Bemba (mubuyu); Creole (mapou zombi); English (upside-down tree,baobab,guinea tamarind,monkey bread tree,lemonade tree,cream-of-tartar tree,sour gourd); French (pain de singe,baobab,calebassier,arbre aux calabasses,mapou zombi,mapou etranger); Fula (boki,bokchi); German (Affenbrotbaum); Hausa (kuka); Hindi (gorakh-imli,gorak lichora,gorak amla,gorak ali,gorakh-cinch,kapla-vriksha,khura-sani-imli); Lozi (mubuyu,muyu); Mandinka (sito,sira); Nyanja (mbuyu,mkulukumba,mlambe); Sinhala (aliha gaha); Somali (yak); Swahili (mbuyu); Tamil (paparapulia,anaipuli,anaipuliya-maram,perruka); Tigrigna (kommer,hermer banba,momret,duma); Tongan (mubuyu); Tswana (mowana); Wolof (bui,buee,goui,gui,gwi); Zulu (isiMuku,isiMuhu,umShimulu)

**BOTANIC DESCRIPTION**

*Adansonia digitata* is a large, round canopied tree with a swollen trunk, about 10-25 m in height, often with a bole of 3-10 m (giant individuals attain a girth of up to 28 m); bark is soft, smooth, fibrous, reddish-brown, greyish-brown or purplish-grey; bark of leaf-bearing branches is normally ashy on the last node; a green layer below the outer, waxy layer of the bark, presumably to assist in photosynthesis when the tree has shed its leaves.

The thick, fibrous bark is remarkably fire resistant, and even if the interior is completely burnt out, the tree continues to live. Regrowth after fire results in a thickened, uneven integument that gives the tree its gnarled appearance resembling an elephant's skin but that serves as added protection against fire.

Mature thick and extensive lateral roots anchor the tree on the ground and end in clusters of potato-like tubers; the thick, strong, prominent taproot at 6 months is 3 times the length of the seedling; roots grow fast but never penetrate far beyond a depth of 2 m, which explains why in old age they are often found toppled when the branches increase in weight.

Leaves alternate, digitately 3- to 9-foliate; leaflets oblong to ovate, 5-15 x 3-7 cm, lower leaflets being the smallest and terminal leaflet the largest; leaflets dark green, with short, soft hairs; lateral veins looping; apex and base tapering; margin entire; petiolules absent or almost so; petiole up to 12 cm long.

Flowers a waxy white, up to 20 cm in diameter, axillary, solitary, pendulous, bisexual; all floral parts in 5s; calyx deeply lobed, with white, silky hairs inside; large, crinkly, spreading petals; many stamens on a large central column that is shed with the petals; ovary superior, 5-10 chambered; petals bruise easily and become brown; flowers have an unpleasant scent.

Fruit ovoid, 12 cm or more in length, with a hard, woody shell, covered with yellowish-grey velvety hairs, indehiscent; seeds smooth, embedded in a whitish powdery pulp, have little or no endosperm.

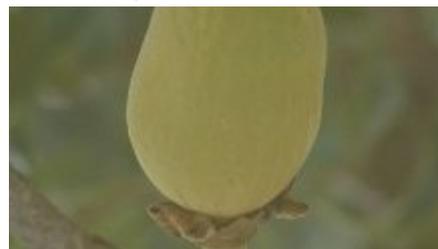
The name commemorates the French botanist Michel Adanson (1727-1806), who lived in Senegal for 6 years and wrote a work on that country's natural history. Linnaeus dedicated the genus and species to him; 'digitata' means hand shaped, referring to the shape of the leaf.

**BIOLOGY**

Mostly bats (*Ephormorphus wahlbergii* and *Rousettus aegyptiacus*) pollinate the flowers. The flowers emit what some describe as a strong carrion smell, which is presumably attractive to the bats; it is also known to attract the bluebottle fly (*Chrysomya marginalis*) and at least 3 nocturnal moths: American bollworm (*Heliothis armigera*), red bollworm (*Diparopsis castanea*) and spring bollworm (*Earias biplaga*). In East Africa, the bush



*Adansonia digitata* flower (Joris de Wolf, Patrick Van Damme, Diego Van Meersschaut)



*Adansonia digitata* fruit (Joris de Wolf, Patrick Van Damme, Diego Van Meersschaut)



*Adansonia digitata* bark (Joris de Wolf, Patrick Van Damme, Diego Van Meersschaut)

baby (*Galago crassicaudatus*) feeds nocturnally on the flowers, thus aiding in pollination. In southern Africa the tree flowers from October to December and fruits from April to May.

**ECOLOGY**

The tree is characteristic of thorn woodlands of the African savannahs, which are characterized by low altitudes with 4-10 dry months a year split into 1 or 2 periods. *A. digitata* is resistant to fire, termite and drought, and prefers a high watertable. It occurs as isolated individuals or grouped in clumps irrespective of soil type. It is not found in areas of deep sand, presumably because it is unable to obtain sufficient anchorage and moisture. *A. digitata* is very sensitive to waterlogging and frost. All *A. digitata* locations can be described as arid and semi-arid, with not more than a day frost per year.

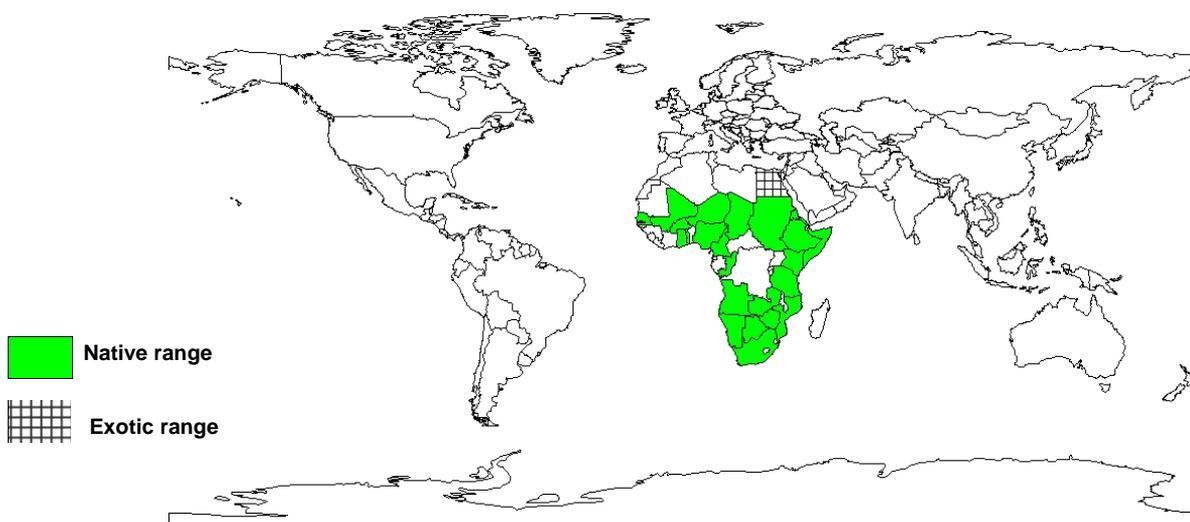
**BIOPHYSICAL LIMITS**

Altitude: 0-1500 m, Mean annual rainfall: (100)250-1 000(1500) mm.

Soil type: Shows a preference for well-drained soils that are acidic (pH <6.5), preferably with sandy top soils overlaying loamy substrates.

**DOCUMENTED SPECIES DISTRIBUTION**

- Native:** Angola, Botswana, Burkina Faso, Cameroon, Chad, Congo, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan, Tanzania, Togo, Zambia, Zimbabwe
- Exotic:** Antigua and Barbuda, Bahamas, Barbados, Central African Republic, Cuba, Democratic Republic of Congo, Dominica, Dominican Republic, Egypt, Gabon, Grenada, Guadeloupe, Guyana, Haiti, India, Indonesia, Jamaica, Malaysia, Martinique, Mauritius, Montserrat, Netherlands Antilles, New Caledonia, Philippines, Puerto Rico, Sao Tome et Principe, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Trinidad and Tobago, US, Virgin Islands (US)



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

**PRODUCTS**

**Food:** An edible white, powdery pulp found in the fruit is very rich in vitamin C and B2 and makes a refreshing drink. Ripe fruits are collected and cracked to remove the 'flour', which is mixed with milk to prepare a flavoured fermented porridge. Young leaves are also rich in Vitamin C, contain uronic acids, and are high in demand in West Africa as a soup vegetable. In Ferlo, North Senegal, an extract of the leaves, called 'lalo', is used to give couscous (millet porridge) a smooth consistency. The leaves also form an excellent condiment and seasoning.

The small stem and roots of the seedlings are eaten as vegetable; mature, thick roots are cooked and eaten during famine. A root decoction is widely used in Sierra Leone as food. It is prepared by boiling, roasting, soaking or fermenting the roots, and tastes like almonds. Having a high water content, the wood is chewed by humans and animals in case of extreme water scarcity. The wood can be used as a salt substitute. The acid pith is used as a substitute for cream of tartar in baking, to curdle milk and smoke fish. It is also roasted and used as a coffee substitute. The seeds contain appreciable quantities of tartaric acid and potassium bitar; they are refreshing to suck, and when soaked in water make a palatable drink.

**Fodder:** Young leaves, fruit, pods and seeds provide fodder for game and domestic animals. During drought, donkeys and game animals chew both the bark and fibrous wood for sap. Livestock and game often destroy young trees.

**Apiculture:** The tree is a source of fine quality honey. Wild bees manage to perforate the soft wood and lodge their honey in the holes. In many parts of Africa, the hollow trunks are used for beekeeping.

**Fuel:** The long-fibred wood is suitable for firewood. The shell and seeds are also used for fuel, which potters use to smooth earthenware necklaces before firing.

**Fibre:** The bark from the lower part of the stem of younger trees and of the roots can be removed to produce a valuable fibre. If managed properly the trees are not seriously damaged, and even after repeated use the bark regenerates and can be stripped again some years later. It is used to make excellent cordage, ropes, harness straps, mats, snares and fishing lines, fibre cloth, musical instrument strings tethers, bed-springs and bow strings. In both Senegal and Ethiopia, the fibres are woven into waterproof hats that may also serve as drinking vessels. The fibre is the best for making the famous 'kiondo' baskets of Kenya. Strong, tough and tear-resistant paper is produced from the fibre. It is commercially exploited in India for currency notes.

**Timber:** The wood is whitish, spongy and light (air-dried 320 kg/cubic m). It is used for making canoes, rafts, insulating boards, wooden platters and trays, boxes and floats for fishing nets.

**Gum or resin:** Glue can be made by mixing flower pollen with water.

**Tannin or dyestuff:** The wood contains some tannins, and the acid pith is used to coagulate rubber. In East Africa, the roots produce a useful red dye.

**Lipids:** A non-drying, golden yellow oil of agreeable taste, which is used in gala occasions in Senegal, may be obtained by distilling the seeds. In Bicha and Mondo villages in Tanzania, *A. digitata* seeds are used as a substitute for cooking oil.

**Alcohol:** The Wasandawe of Tanzania use the liquid from the pulp for brewing beer, as do the Akamba people of Kenya, who use the seed pulp as fermenting agent in some local beer.

**Poison:** The bark is boiled for days to extract a substance poisonous to ants. Fruit pulp burns with an acrid, irritating smoke that can be used to deter insects troublesome to livestock.

**Medicine:** Hyposensitive and antihistamine properties are present in the leaves, which are used to treat kidney and bladder diseases, asthma, general fatigue, diarrhoea, insect bites, and guinea worm. Leaf and flower infusions are valued for respiratory problems, digestive disorders and eye inflammation. The seed paste is used for curing tooth and gum diseases. The fruit pulp, seed and bark are reputedly an antidote to *Strophanthus* poisoning. Gum from the bark is used for cleansing sores. It is also used as an expectorant and a diaphoretic. The bark is used in steam baths for calming shivering and high fever. A decoction of the roots is taken as a remedy for lassitude impotence and kwashiorkor. The bark is boiled and taken as a cure for body pains. This infusion is also used to treat colds, fever and influenza. Seeds are used to cure gastric, kidney and joint diseases; they are roasted then ground and the powder smeared on the affected part or drunk in water.

**Other products:** Ash from the shell, bark and seed, rich in potash, is widely used in making soap, prepared by boiling the bark and fruit ash in oil. The shell can be used as a dish, water dipper, vessel for liquids, snuffbox, fishing float; it also makes an excellent rat trap. The powdered husk or penducule may be smoked as a tobacco substitute or added to snuff to increase pungency. The pulp extract can be used as a hair wash.

**SERVICES**

Soil improver: Decaying wood of a tree that has died of old age or from lightning is spread on fields as a fertilizer. Ashes from the shell, bark and seed are rich in potash and are useful as a fertilizer.

Ornamental: *A. digitata* is a popular species for bonsai specimens. The South African 'Baobab Style' originated with *A. digitata*.

Other services: In dry regions, *A. digitata* plays a vital role in water storage; a hollowed trunk may be carved out in 3-4 days. A medium-sized tree may hold 400 gallons while a large tree could contain over 2000 gallons, and water stored in them is said to remain sweet for several years if the hollow is kept well closed.

In East Africa the trunks are hollowed out to provide shelter and storage, and in West Africa the hollowed trunks are sometimes used as tombs.

**TREE MANAGEMENT**

Once established, the seedlings grow well, becoming 2 m tall in 2 years, and 7 m tall in 10 years. The tree then grows slowly but lives long; under favourable conditions some *A. digitata* may live for more than 1000 years. There is a prehistoric drawing of an *A. digitata* tree at the National Museums of Kenya. The trunk may even shrink during periods of severe drought. *A. digitata* may be pollarded or lopped to encourage abundance of leaves.

**GERMPLASM MANAGEMENT**

Seeds are probably orthodox; no loss in viability during 1 year of hermetic storage at 4 deg. C; viability can be maintained for several years in hermetic storage at 3 deg. C with 8-11% mc. There are normally 2000-3000 seeds/kg.

**PESTS AND DISEASES**

The tree is very much liked by elephants, which cut the storage tissue of the bole and can damage or even destroy a tree.

Insects include cotton bollworms (*Diparopsis castanea*, *Earias biplaga* and *Heliothis armigera*), cotton stainer bugs (*Dysercus fasciatus*, *D. intermedius*, *D. nigrofasciatus*, *D. suberstitious*, *Odontopus exsanguinis*, *O. sexpunctatus* and *Oxycarenum albipennis*), and flea beetles (*Podagrica* spp.). Pollarding was formerly practised in the Sudan to control cotton stainers, but was also found to stop the fruiting for at least 2 years. In Ghana an unidentified black beetle is reported to damage and eventually destroy branches by girdling. Also from West Africa there is a report that a long-horn beetle, *Aneleptes trifasciata*, attacks and kills young trees by girdling the stem. In the Transvaal, the masonga caterpillar or mopane worm, *Gonimbrasia herlina*, is said to feed on the leaves.

*A. digitata* is also host to members of the Pseudococcoidae family, the mealy bugs, which act as the vectors for various virus diseases of cocoa in West Africa, as well as the cocoa capsid, *Distantiella theobroma*.

The sooty baobab syndrome is an episodic, drought-induced phenomenon related to climatic changes, made worse in recent times by human interference that limits local availability of soil moisture. Affected trees, which appear dead or dying exhibit a striking, blackened or burnt appearance, hence the colloquial term 'sooty baobabs'.

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