A Guide to INDIGENOUS TREES

for Sustainable Plantations on Mt Kilimanjaro

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Indigenous Tree Selection Guide for the Plantation Belt: Enhancing Mount Kilimanjaro's Ecosystem

NGO TanzMont Kidia/Old Moshi

Founded in 2014. Many tenthousand indigenous trees planted on the compound of the Lutheran Church in Kidia, the nearby Msaranga valley, at TPC, Kahe (village Kyom), and Agape Secondary school and other private properties on Kilimanjaro.

Introduction

Trees are invaluable for their multifaceted benefits to both people and the environment. Beyond providing essential resources like firewood, timber, and livestock fodder, they play a crucial role in environmental sustainability. In reforesting degraded areas, the initial planting of pioneer species such as *Macaranga kilimandscharica* or *Polyscias fulva* is essential. These species thrive even in direct sunlight, offering the foundation for more valuable timber trees like African Teak *(Milicia excelsa,* mvule), White Mahogany *(Khaya anthotheca)*, or the endangered Msohu *(Prioria msoo)* to be planted beneath them once they provide shade.

The use of indigenous trees such as White Mahogany *(Khaya anthotheca)* is paramount, given their adaptability to the environment and growth rates comparable to non-native species like Silky Oak *(Grevillea robusta)* or *Eucalyptus* species. Unlike introduced trees, indigenous species contribute positively to the soil. They foster a diverse ecosystem with decomposers like bacteria, fungi, and small soil insects working on leaves for an extended period. Introduced trees, like *Eucalyptus*, Pines or *Grevillea*, pose environmental challenges. They have a high water demand, contribute to soil degradation due to a lack of effective decomposition, and can increase the risk of wildfires, especially in the case of *Eucalyptus* with its inflammable oil content. Moreover, relying on non-indigenous trees can transform the distinctive African landscape into a generic environment found in various parts of the world. Choosing indigenous trees not only preserves the unique local ecology but also ensures sustainable and harmonious coexistence with the environment.

Afrocarpus (Podocarpus) falcatus
Bastard Yellowwood

Eastern and southern Africa. Family **Podocarpaceae**.

Propagation
The seeds maintain viability for several years under standard storage conditions. To ensure robust and uniform germination, it is helpful to break and remove the seed coat. Freshly collected seeds typically germinate well, reaching up to 60% within nine weeks, even with the seed coat intact. However, once the seeds have been dried, germination may extend beyond six months unless the seed coat is removed. Some reports suggest that soaking the seeds in saturated saltwater just before sowing can enhance germination. Alternatively, stratification between two layers of compost for 3 - 5 days is recommended to weaken the seed coat. The seeds are directly sown into nursery bags or seedbeds containing a mixture of compost and sand (1:1). The seeds should be pressed into the mixture and covered with a thin layer of soil. It is crucial to prevent the mixture from drying out.

Agroforestry uses
The tree is very useful for soil protection against water erosion. It is also planted to provide shade, shelter and as a windbreak.

Edible uses
The ripe fruit is edible, but resinous. Edible oil has been extracted from the seeds of the closely related *Afrocarpus gracilior* in Ethiopia.

A Close-up of leaves and fruits
B Branch with flowers
C Huge tree in the upper montane zone of Mt Meru

Medicinal uses
The outer covering of the tree and its seeds are utilized in traditional healing practices. The tree bark is boiled or soaked in water to make a solution, which is then used to relieve pain and discomfort, as well as to ease stomach issues like diarrhea. It is also applied directly to soothe skin irritations. Crushed seeds are applied to address certain types of inflammation in the brain and sunburns. In Ethiopia, the oil extracted from the seeds is used to treat gonorrhea. Additionally, the tree's sap is used to help with chest problems. (all information from Tropical.theferns.info).

Albizia schimperiana
(mfurúhánjè`, mrukà`)

Fabaceae. East tropical Africa - Eritrea, Ethiopia, east DR Congo, Uganda, Kenya, Tanzania, Zambia, Malawi, Zimbabwe.

Propagation
Seeds. The seedlings are ready to be transplanted approximately 4 months after germination.

Agroforestry uses
The tree is planted in Agroforestry systems as a shade tree and for soil conservation and improvement (N-fixation).

Other uses
In addition to its primary uses, this plant serves various other practical purposes. The bark is a valuable source of saponins and serves as a substitute for soap. The powdered seeds, when mixed with water, create an effective insecticide. The leaves can be used to impart a yellow color to wool. The ash derived from the bark is added to snuff tobacco to enhance its pungency. The wood, while not termite-resistant, is reasonably strong, easy to work with, and finds applications in construction, joinery, tool handles, beehives, stools, grain mortars, spoons, needles, plywood, and matchboxes. Additionally, the wood is utilized for fuel and in the production of charcoal.

Albizia schimperiana (mfurúhánjè`, mrukà`)

Medicinal uses
This plant has medicinal applications, where a root infusion is incorporated into porridge to alleviate headaches and other pains. The stem bark is employed for treating warts, and it serves as a remedy for coughs. Chemical compounds such as spermine alkaloids and various triterpenes, including lupeol, lupenone, oleanoic acid, and hederagenin, have been identified in the bark, contributing to its therapeutic properties (all information from Tropical.theferns.info).

A Tree Kidia
B Flower and leaves

Calodendrum capense
Cape Chestnut

Rutaceae. Cultivated widely for its beautiful flowers. Widespread from Kenya to the Cape. The larvae of several butterfly species breed on the foliage. Birds do not find the nectar-filled flowers inviting, but butterflies do feed on them. Monkeys, and various birds eat the seeds.

Propagation

Once a year seeds are produced which are black and square-cut. Germination takes place about 2 weeks after the seeds were put into moist soil.

Agroforestry uses

The timber is white or light yellow, fairly hard but bends well and is easily worked. It is used for tent bows, wagon-making, yokes, planking, shovel handles, and furniture, and is considered one of the most generally useful hard woods.

Medicinal and other uses

The bark is used as an ingredient of skin ointments and is sold at traditional medicine markets. Cape chestnut oil, obtained from the seeds, otherwise known as Yangu oil, is a popular oil in African skin care. Its inherent ultraviolet protection, its high content of essential fatty acids and antioxidants and its mild odour destined it for natural cosmetics. Seeds are crushed and boiled to obtain oil that is suitable for making soap. Some tribes in Africa believe that the seeds have magic properties, and hunters used to tie them around their wrists when hunting to bring them skill and good luck (all information from pza.sanbi.org).

A Tree in flower
B Sapling in the nursery Kidia
C Flowers
D Part of capsule and seeds

Cordia africana
(mringà-ríngà´)

Boraginaceae. Widespread in tropical Africa from Guinea to Ethiopia and from the Sudan to Angola and northern South Africa; also Arabia (zambiaflora.com).

Propagation

Seed - can be stored for up to 12 months. Sow the seeds in a nursery seedbed in full sun or light shade. A germination rate of about 65 % can be expected, with the seeds starting to sprout after about 2 weeks, and most of them sprouting after 3 weeks. The young plants can be transplanted to their permanent positions about 4–6 months later (Tropical.theferns.info).

Agroforestry uses

The tree is an early colonizer in forest regrowth and has a wide range of uses. Although quite slow growing, it has good potential for use as a pioneer species when re-establishing woodland. It is often left when forests are cleared for cultivation, as the tree is an excellent shade tree for crops. In northern Tanzania it is favoured as a shade tree for coffee because of its short bole. It provides very good mulch and can be used in other mixed cropping systems on cropland, pastureland, or rangeland to improve microclimatic conditions. The sweetly scented flowers yield plenty of nectar and are very attractive to honey bees. They are known for their high quality honey production (Tropical.theferns.info).

Tree Ureni village/Old Moshi

Medicinal uses

The wood-ash, mixed with butter, is applied to certain skin-troubles. Leaf decoctions are administered to treat headache, nose bleeding, dizziness and vomiting during pregnancy, and worms. The leaves are dried and powdered to sprinkle over wounds. A root-decoction is drunk as a treatment for jaundice and schistosomiasis. The fresh, juicy bark is used to tie a broken bone; this splint is changed occasionally with a fresh one until the bone is healed. A stimulating tonic, used to treat fatigue and exhaustion while on a journey, is prepared from the bark and fruits along with the stems of *Abelmoschus esculentus*. Fresh bark is applied to fractures and bark extracts and is also taken against fatigue (Tropical.theferns.info).

Other uses

The small branches are used for starting fires. The inner wood is pinkish-brown to reddish-brown, clearly separated from the 25–40 mm wide layer of pale gray outer wood. The wood grain is typically tangled, with a medium to coarse texture that's consistent; it has a shiny appearance. It's moderately lightweight, and reports differ on its hardness, but it's generally moderately soft. It's moderately resistant to decay, but can be affected by termites and small boring insects. It's easy to work with both machines and hand tools, producing a smooth surface when planed or shaped; it polishes well with a filler, holds nails and screws securely, and glues effectively. It can be peeled or sliced satisfactorily. It's suitable for various uses such as carpentry, making cabinets, light construction, shipbuilding, vehicle bodies, toys, novelty items, vats, kitchen counters, food containers, matches, veneers, plywood, hardboard, particle board, and pulp for paper production. Traditionally, it's used for crafting canoes, drums, beehives, grain mortars, water containers, utensils, and tool handles. The wood is also valued as a source of fuel (Tropical.theferns.info).

A Young tree with typical large leaves
B Flowers

Croton megalocarpus (mfurù-fúrù´)

Euphorbiaceae. Widespread in sub-Sarahan Africa. Fast-growing, up to 36 m, drought-resistant, surviving also in a harsh climate (Tropical.theferns.info).

Propagation

Usually a tree produces numerous brown seeds after five to seven years that need no pre-treatment for germination. The germination rate is over 95%, seeds sprouting within the first 45 days (Pfaf.org).

Agroforestry uses

A natural pioneer species, it is fast-growing and also has a wide range of uses. It is a very good choice in plantings to re-establish native woodland or to set up woodland gardens. *Croton* trees play an important role in local ecosystems for shade, wind protection, and soil conservation (tropical.theferns.info). In Kidia it was planted to prepare for other more valuable species to grow in its shade – e.g. *Prioria* (Msohu) or *Entandrophragma*.

Uses

The wood from the trees makes good fuelwood and charcoal. The wood is also known for its termite resistance and is used for fence posts and poles in construction. Given their high nitrogen content, the leaves are often used for mulch. The seeds can be used to dye wool yellowish (Tropical.theferns.info).

A About 20 years old tree in nursery Kidia
B Fully grown flowering tree, Kitendeni, Kilimanjaro

Medicinal uses

Maceration or decoction of the bark is taken agains worms, and is also used to treat whooping cough, pneumonia, stomach-ache, fevers including malaria, and abdominal complaints associated with gall bladder and spleen problems. Sap from leaves and young twigs are applied to wounds. The oil has purgative activity and also showed Epstein-Barr virus activating potency. Bark extracts showed weak antibacterial activity in in-vitro tests (Tropical.theferns.info).

Biofuel

Recently, croton nuts are being used as a commercial product in local communities in East Africa. Previously a wasted resource, croton has been promoted as a local, more sustainable avenue to biofuel production in place of failed *Jatropha* projects. The nut itself has multiple uses but most well-known is the oil, used to make biofuel or biodiesel. *Croton* seeds contain approximately 30% oil and a high protein content of 30% (e.g. Kivevele & Mbarawa 2010: Wikipedia 2022).

Seedcakes

Byproducts from the oil include *Croton* seedcake that can be used in animal feeds due its high protein content. The husks of the nut are processed into fertilizer or as a biomass (Wikipedia 2022).

C Leaves
D Flowers and fruits

Entandrophragma excelsum
Tallest Tree of Africa

Meliaceae. Occurs in DCR, Eastern Africa down to Malawi and Zambia. The tallest tree of Africa that grows on Mt Kilimanjaro and is 81,5 m high and has an estimated age of 600-800 years (Hemp et al. 2016).

Propagation

A dioecious species, both male and female forms need to be grown if fruits and seeds are required (Tropical.theferns.info).

Agroforestry uses

The wood of *Entandrophragma excelsum* is not in much demand for local applications because it often warps and twists considerably upon drying. Moreover, it is not durable and not very attractively figured (Wikipedia).

The wood is suitable for the production of sliced and rotary veneer, and can be made into plywood of satisfactory quality. The wood is suitable for construction, flooring, joinery, interior trim, furniture, cabinet work, musical instruments, vehicle bodies, toys, novelties, boxes, crates, carvings, turnery, and veneer. The wood is used for fuel and to make charcoal. The tree is used to provide shade in coffee plantations (Tropical.theferns.info).

Medicinal uses

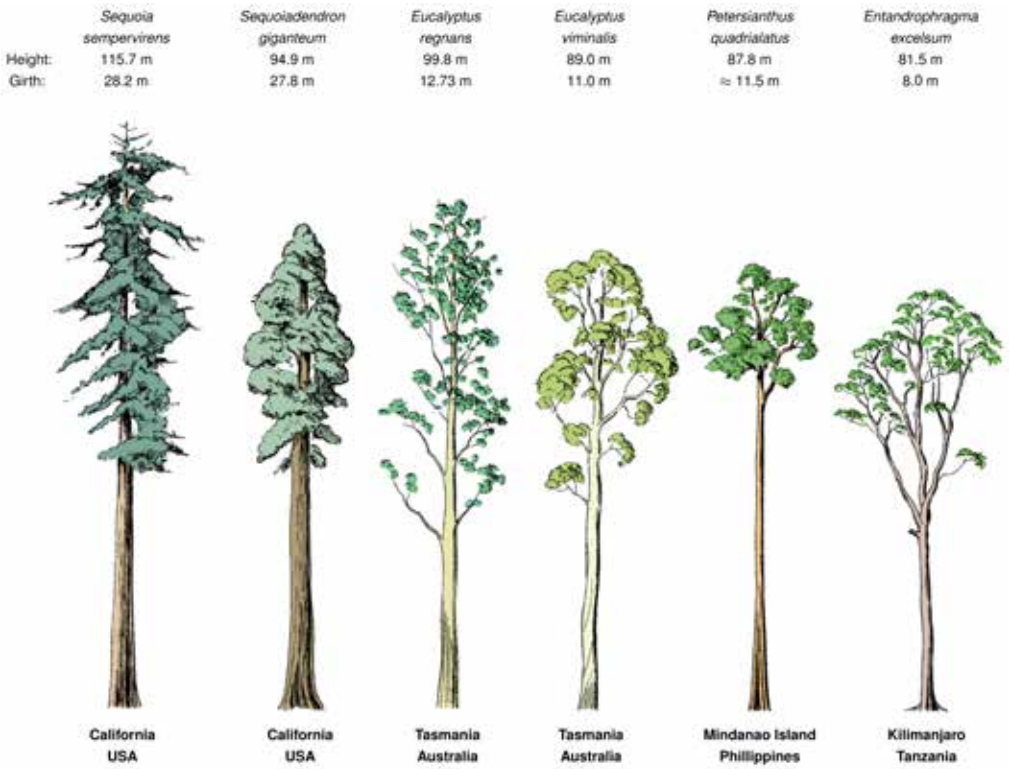
Ash made from the root bark is rubbed into scarifications to treat blood cough. The roots are used to treat gonorrhoea and hernia (Tropical.theferns.info).

A Saplings in the tree nursery Kidia, about 1 year old
B Tallest tree with 81,5 meters, Mrusunga valley, Kilimanjaro

C

D

C Group photo in front of tallest tree of Africa
D Fruits and seeds



The height, girth, and locations of some of the world's tallest tree species (from Hemp et al. 2016).

Ficus lutea

Dahomey Rubber Tree (mtembó´, kmuyù´, mkuyù´)

Moraceae. Widespread in tropical Africa.
The tree is harvested from the wild for local use as a source of medicines, fibers, dyes, latex, and potash. It is cultivated in parts of Africa for the bast fibers obtained from its bark, with the variety Textilis being commonly grown. Additionally, it is planted in villages as a shade tree and often grown as an ornamental. Plantations have been established in Florida and Southeast Asia for latex production, which is highly valued in the pharmaceutical industry.

Propagation
From the seed, best at a temperature around 20°C.
Other uses
The bark provides fiber used to make twine and bark cloth. The tree produces latex, valued in the pharmaceutical industry and used for caulking canoes. This latex is also used to make high-quality rubber known as Dahomey rubber. The bark yields red-ochre dyes for raffia and silk textiles. The wood can be used as soap, and its ashes are a source of potash, useful for soap making. Additionally, the wood is used to make bowls.

Edible uses
The fruit can be eaten raw. It is yellow to orange to brownish and up to 17 mm in diameter.
Medicinal uses
The latex is valued in the pharmaceutical industry.
A bark decoction is used to treat stomach disorders, dysentery, sterility, and colds.

Fully grown tree, Kidia

Uses for environment

This remarkable tree serves as a crucial food source and habitat for birds, small mammals, and even monkeys. It plays a vital role in the plantation zones of mountains and other areas. Hornbills feed on the tree's fruits and help spread the seeds through their feces, acting as nature's gardeners. It is like a wildlife haven since the tree provides a resting spot for various animals, making it a cozy and essential part of the ecosystem.

A Fruits of the related Ficus sur
B Leaves with small fruits

Garcinia tanzaniensis

Clusiaceae. Detected by Andreas Hemp in the forest where the tallest trees were measured and a species new to science only recently described (2007). Only known from Kilimanjaro, the North and South Pare Mountains at present. Critically endangered (IUCN Red List). A species of submontane forests.

A Adult tree, Mrusunga valley
B Flowers
C Tree trunk
D Young tree planted in Kidia on the premises of the Lutheran Parish

Hagenia abyssinica –
East African Rosewood (mwangá`, mlangà´)


A

Rosaceae. Widespread The native range of this species is Eritrea to Zambia (Pfaf.org). A highland tree (2000–3000 m) (Tropical.theferns.info).

Propagation
Seeds can be stored in a dry condition without any specific requirements for a period of 6 to 12 months. Germination typically occurs at a rate of approximately 40% to 60% within 2 to 3 weeks from the time of sowing. Notably, the seeds are exceptionally lightweight, with 400 to 500 seeds per gram (Tropical.theferns.info).

Agroforestry uses
The trees are employed in soil-conservation activities. A fire-resistant species, it can be planted to form a firebreak. The tree constantly sheds leaves, providing mulch and green manure (Tropical.theferns.info).

Edible uses
The seeds are used as a condiment or spice (Tropical.theferns.info).


B

A Tree above Kidia/Old Moshi at 2700 m
B Bowl made from Rosewood
C Details of leaves
D Elephants made from Rosewood
E Flowers


C


D


E

Medicinal uses
The flowers are commonly used in Africa for medicinal purposes, especially to get rid of worms. However, it's a potent medicine with toxic effects, so it should not be taken in large amounts. Strong doses can lead to fainting, vision problems, or even death. People also use the plant to induce abortion. The dried and pounded female flowers are specifically used to expel tapeworms. Traditionally, a tea made from the flowers is consumed every three months to eliminate tapeworms from the body. The roots are cooked with meat to make a soup that is believed to treat general illness and malaria. The bark can be pounded, mixed with cold water, and drunk to alleviate diarrhea and stomachaches. Possible side effects include irritation of the stomach, increased salivation, nausea, headache, fainting, weakness, and diarrhea. Some think that using male flowers might cause more severe side effects, including greater vomiting tendencies (Tropical.theferns.info).

Other uses
The bark is employed to dye textiles a yellowish-red hue. The wood boasts an attractive appearance and finds use in crafting furniture, poles, flooring, carving, and cabinet making. It serves as a reliable source of firewood and charcoal (Tropical.theferns.info). In Moshi, artisans create various sculptures to sell to tourists.

Khaya anthotheca
White Mahogany

Meliaceae. Widespread in tropical Africa but endangered due to intensive harvesting. The tree is classified as 'Vulnerable' in the IUCN Red List of Threatened Species. Large, fast-growing, semi-deciduous tree with a dense crown, sometimes exceeding 60 metres in height (Tropical.theferns.info).

Propagation

Seeds of this plant can remain viable for over a year, but germination is significantly better when sown fresh, often reaching nearly 100%. It's observed that sowing in lightly shaded nursery seedbeds yields better results than using containers. Germination typically starts in about three weeks. Once the seedlings reach around 5cm in height, they are transplanted into individual containers and nurtured for approximately 12 months until they reach a height of 30cm, ready for outdoor planting Tropical.theferns.info).

Agroforestry uses

An important source of African mahogany with very precious and beautiful timber (Tropical.theferns.info).

A Tree planted at TPC, Moshi, three years of age showing how fast growing this species is
B Seed capsules
C Adult tree of almost 60 m in Rau forest near Moshi
D Sapling in the nursery Kidia

Medicinal uses

The bitter-tasting bark is widely used in traditional medicine. An infusion is drunk to treat colds and fevers. A decoction or infusion of the bark is taken in the treatment of fevers, colds, pneumonia, abdominal pain, vomiting and gonorrhoea. The pulverized bark is taken as an aphrodisiac and to treat male impotence. Applied externally, the bark is used to treat wounds, sores and ulcers. The oil from the seeds is rubbed into the hair to kill lice. Root decoctions are drunk to treat anaemia, dysentery and rectal prolapse. The leaves are said to be used for making an arrow-poison. The wood dust may cause irritation to the skin (Pfaf.org).

Other uses

This tree serves as a shade provider and is often employed along avenues and in public open spaces. In Agroforestry, it is occasionally planted to offer shade. The bark yields a reddish-brown dye, while the wood is highly prized for its attractive grain. It is extensively utilized in furniture making, high-quality cabinet work, veneer production, and any application requiring a superior medium-weight hardwood. Traditionally, large logs are utilized for crafting dugout canoes. The wood is also suitable for fuel and charcoal production (Pfaf.org).

Leptonychia usambarensis

Malvaceae.
Distributed in eastern tropical Africa.
A small tree.

Propagation

The seed it sown.

Agroforestry uses

The tree is harvested from the wild for its timber and fibre. It is sometimes planted for shade, amenity, and bee forage (Tropical.theferns.info).
The white wood is slightly heavy and easy to work. It is used for making tool handles, spoons, bedsteads and whip-sticks (all information from Tropical.theferns.info).

A Young tree in nursery Kidia
B Fruit
C Flowers and leaves

Macaranga kilimandscharica (ihahá´, mnahá-nàhá`)

Euphorbiaceae. Found in regions including Sudan, Ethiopia, eastern DR Congo, Uganda, Kenya, Rwanda, Burundi, Tanzania, Mozambique, Zambia, and Malawi. Typically thrives in montane and upper montane evergreen forests, particularly in moist environments, at elevations ranging from 1,300 to 3,000 meters.

A Adult tree, 2700 m, Maua Route, Kilimanjaro
B Leaves and flowers
C Cut into tree trunk showing the typical pink colour
D Flowers and leaves, close-up

Propagation

Primarily through seeds.

Agroforestry uses

This species is known for its rapid growth and is often a pioneer species in montane evergreen forests. It readily regenerates in areas that have been cleared, such as clearfelled areas, secondary forests, forest edges, riverine forests, and disturbed locations. Its presence is beneficial for soil protection on logged sites and for the restoration of native woodland, as the leaf litter enriches the soil. Additionally, it promotes the regeneration of other species like Camphor *(Ocotea usambarensis). Macaranga* is commonly integrated into complex multilayered Chagga homegardens, where its inclusion contributes to diversity, reducing the risks associated with monocultural farming. It's also utilized for providing shade in coffee plantations.

Medicinal uses

Root extracts are traditionally consumed to treat ailments such as bilharzia, coughs, and colds. A decoction made from the leaves is employed to alleviate stomach-related issues (all information from Tropical.theferns.info).

Milicia excelsa

African Teak (mvulè` (kisw.), mriè`)

Moraceae. Distributed in tropical Africa from sea level to about 1,600 metres. This tree produces one of the most valuable timbers of Africa, where it is often also planted as an ornamental and shade tree (Tropical.theferns.info). Because of its high quality timber, this species has been greatly over-exploited in the wild, where it became rare, including Tanzania.

Propagation

Seeds can be stored at room temperature for at least 12 months. When planted fresh, they typically exhibit robust germination rates of 90% or more within 2 to 4 weeks. Initial sowing takes place in a seedbed, and after 3 weeks of germination, seedlings are transplanted to pots or nursery beds. It is advisable to cultivate seedlings under shade to mitigate attacks by *Phytolyma* spp. Approximately 4 months after sowing, seedlings reach a height of around 30cm, making them suitable for transplantation into the field. Young plants adapt well to transplantation. Propagation through stem cuttings has proven successful, with favorable results obtained from cuttings of 1- and 2-year-old trees. For mature trees, cuttings should be taken from coppice shoots. Other methods include root cuttings and grafting.

Agroforestry uses

The tree is used for soil improvement through its leaf mulch, and soil conservation. A natural pioneer species within its native range, supplying a high-grade timber. It could be a useful addition in reforestation projects to restore native woodlands.

Edible uses

The ripe fruits are edible. The fruit juice is used for flavouring. The fruit is green, wrinkled, fleshy and resembles a fat green caterpillar.

A Adult tree (Rau forest, Moshi)
B Adult tree at East Kilimanjaro
C Andreas Hemp in front of large tree in Rau forest showing diameter
D Fruits
E Desk and chair made of mvule
F Leaves

Medicinal uses

African teak is widely used in African traditional medicine.
A root decoction is taken to treat female sterility. A decoction of the root and stem bark is taken as an aphrodisiac.
It is used to treat a wide range of conditions including cough, asthma, heart trouble, lumbago, spleen pain, stomach pain, abdominal pain, oedema, ascites, dysmenorrhoea, gonorrhoea, general fatigue, rheumatism, sprains. Bark preparations are externally applied to treat scabies, wounds, loss of hair, fever, venereal diseases and sprains. They are also applied as an enema to cure piles, diarrhoea and dysentery. It is taken in the treatment of stomach problems, hypertension, tumours and obstructions of the throat. Externally, it is applied on burns, wounds, sores and against eczema and other skin problems. The leaves are eaten to treat insanity, and a decoction is taken for the treatment of gallstones. Externally, leaf preparations are used in the treatment of snakebites and fever, and as eye drops to treat filariasis (all information from Tropical.theferns.info).

Newtonia buchananii
East African Newtonia (mkufí´)

Fabaceae. Distributed in tropical Africa.

Propagation
Seeds exhibit remarkable characteristics, displaying no dormancy and typically germinating within a span of 3 to 4 weeks. The germination rates are notably high, ranging from 70% and, exceptionally, up to 90%. However, it is crucial to note that the seeds lose their viability rapidly and cannot be stored effectively for more than a few weeks at room temperature. Additionally, their susceptibility to insect attacks poses a challenge in preservation.
Apart from seed germination, alternative propagation methods include the use of root suckers. These root suckers offer an alternative means for successful reproduction. Moreover, enthusiasts occasionally opt for collecting wildlings for planting purposes (Pfaf.org).

Agroforestry uses
Newtonia buchananii serves a variety of Agroforestry purposes, notably as a shade tree in coffee-banana plantations on Kilimanjaro. Its crown provides a light shade, making it an ideal choice for this environment. Along riverbanks, the tree is strategically planted to stabilize the soil and prevent erosion. Additionally, the leaves of *Newtonia buchananii* find use as effective mulch, contributing to soil fertility, also due to N-fixation. The tree's vibrant flowers play a crucial role as a rich source of nectar and pollen, attracting and sustaining bee populations in the vicinity (Pfaf.org).

Medicinal uses
The bark is used as an aphrodisiac. In DR Congo an air-dried bark decoction is applied as powder to treat abscesses (Tropical. theferns.info).

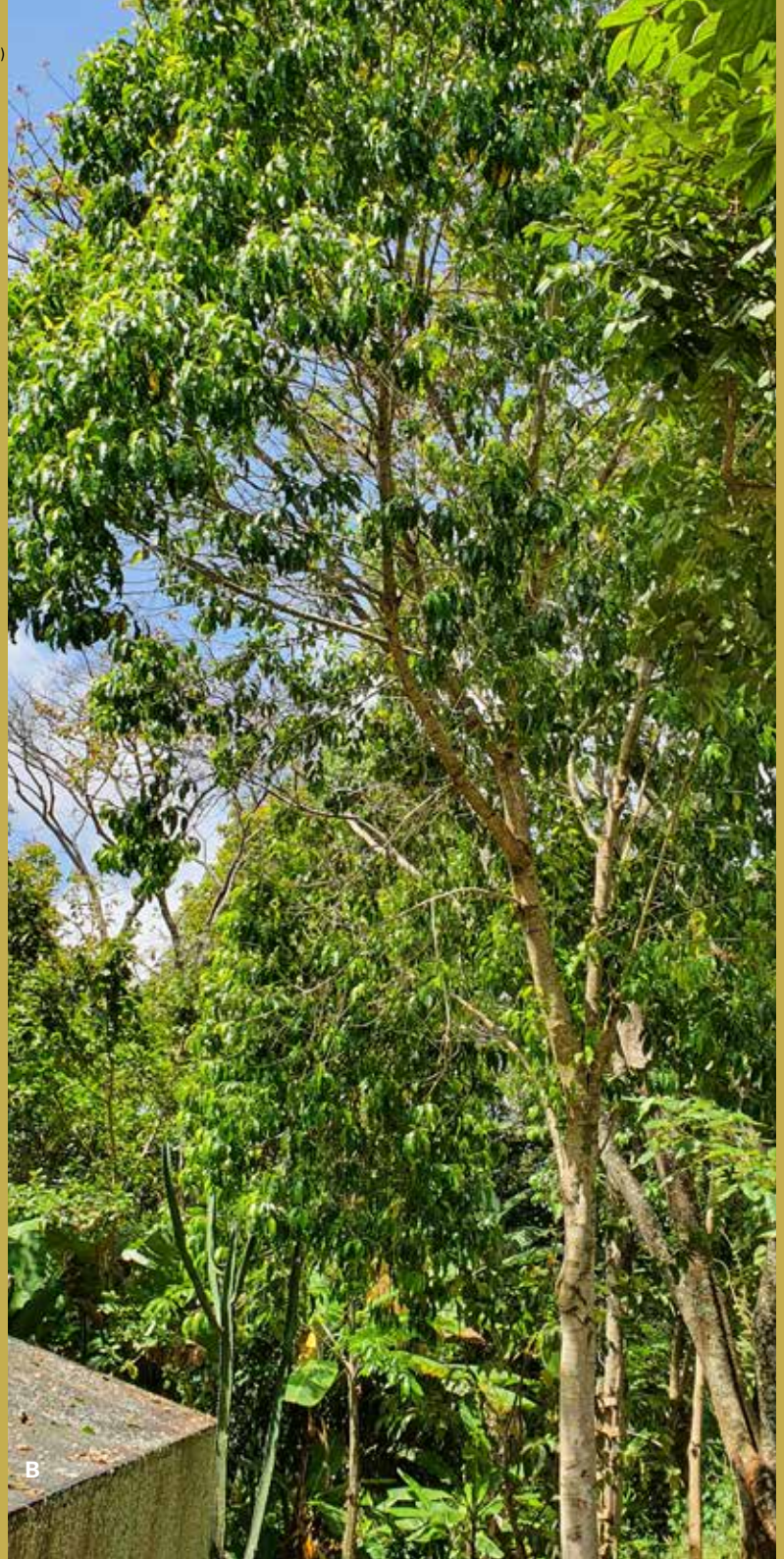
A Stand of adult trees in a riverine forest at Mt Kasigau, Kenya
B Sapling in the tree nursery Kidia
C Bed made of *Newtonia buchananii*
D Single tree at Mt Kasigau, Kenya

Other uses
Beyond Agroforestry, *Newtonia buchananii* presents various other applications. When the bark is incised, a valuable yellow-brown resin is exuded. The medium-weight wood, exhibiting a balance between softness and moderate hardness, is employed for an array of purposes. While it demonstrates moderate resistance to termite attacks, caution is needed against powder-post beetles, pinhole borers, and marine borers.
The wood is employed in crafting tool handles, implements, carpentry, joinery, cabinet work, doors, door frames, bridges, boat building, vehicle bodies, and fencing. Its suitability extends to light construction, flooring, interior trim, boxes, crates, veneer, and plywood. *Newtonia buchananii* is a traditional choice for crafting dugout canoes, showcasing its versatility. The wood also stands as a high-quality fuel, often utilized in charcoal production. Furthermore, the plant serves as a valuable fodder resource in agricultural practices (Pfaf.org).

Olea capensis ssp. welwitschii
Black Ironwood or East African Olive (mshihiò`)

Oleaceae. Found in tropical Africa, specifically in drier areas spanning from Sierra Leone to Somalia, and extending southward through eastern Africa to South Africa.

Propagation
Seeds are best sown immediately upon ripening.
Edible uses
The fruit is edible.
Agroforestry uses
This tree provides shade in coffee plantations and serves as a natural pioneer species within its native range. The wood is notably dark and heavy, sinking in water.
Medicinal uses
The roots are utilized in treating infertility in women (all information from Tropical.theferns.info).



A Tree slice from Kidia. These trees were cut down a couple of years ago and this slice rescued to show the dimensions and estimate the age of one of these trees
B Young tree of about 4-5 years, Kidia

Olea capensis ssp. welwitschii – Black Ironwood or East African Olive (mshihiò`)

Other information
In the Old Moshi area, this tree was believed to be the abode of the gods. On the grounds of the Lutheran Church, several large trees were recently cut down, though they were once considered sacred. Rituals surrounding these trees involved spilling milk or banana beer (pombe) around a central area while praying to the gods. These areas were common among the villages of the Wachagga tribe. Even today, people gather at those places in December, slaughtering goats or cattle and also spilling banana beer. Children present are introduced to this ritual, becoming acquainted with the community. The slaughtered animals are then eaten, and the banana beer is drunk, celebrating the occasion. In former times, when a person was lost, this ritual of applying milk was done to ask the gods for the safe return of that person. Also, when a person was very sick and no reason for this sickness was found, and no medicine helped, family members went to these places to sacrifice milk and pombe, asking for the person's recovery. What was special about this latter ritual was that the banana beer had to be freshly made and sacrificed without anyone having drunk from it.

Podocarpus latifolius

Broad-leaved Yellowwood – Podo

Podocarpaceae. Widespread in Africa.

Propagation

To initiate successful growth, it is essential to promptly clean and plant fresh seeds within a 4-day window. Utilize a mixture of well-decomposed compost and washed sand for optimal results. Germination typically occurs within 1 to 2 months, with a success rate of up to 80%. Enhancing germination can be achieved by deliberately cracking the seed coat. During transplantation, exercise caution to avoid harm to the taproot. Adequate watering is crucial for the well-being of the seedlings. Planting in shade, rather than direct sunlight, is commonly advised. Occasionally, wildlings are also gathered for cultivation. For prolonged storage, seeds can be kept in a cold store for up to 1 year without significant reduction in germination capacity; however, it is important to prevent moisture loss. Studies indicate that seeds stored in perforated polyethylene bags with moist sawdust maintained a germination rate of 72% after one year.

A Large tree, montane zone north Kilimanjaro
B Young tree, Kidia
C Close-up of leaves and fruits

Agroforestry uses

A precious but slow-growing timber species. The tree is very useful for soil protection against water erosion. It is also planted to provide shade, shelter and as a windbreak.

Other uses

The timber, commonly known as ‚podo,' holds significant value in the furniture and shipbuilding industries. Additionally, it finds utility in the crafting of poles, paneling, boxes, veneer, and plywood. Renowned for its application in creating butcher's blocks, it is prized for its relative hardness, lack of fragrance, and resistance to chipping. Its versatility extends to construction, flooring, joinery, interior trim, vehicle bodies, railway sleepers, toys, novelties, agricultural implements, musical instruments, coffins, food containers, vats, carving, pattern making, matches, turnery, hardboard, and particle board. Furthermore, it is esteemed as high-quality pulpwood.

Medicinal uses

The sap is used as a remedy for chest complaints. The bark and seeds are used in traditional medicine. Bark decoctions or infusions are used as a soothing medicine, also to treat diarrhoea and stomach-ache. A bark decoction is also applied to itching rash. Pulverized seeds are applied to treat tuberculoid meningitis and sunburn (all information from Tropical.theferns.info).

Polyscias fulva

Araliaceae. Distributed in tropical Africa and the Arabian Peninsula.

Propagation

Seed - plant in a nursery seed-bed with partial shade. Typically, germination rates are favorable, with approximately 75% of the seeds sprouting within 5–7 weeks. Gradually expose the seedlings to sunlight, and after 4–6 months in the nursery, they can be transplanted into the field. Harvest fruits when they turn purplish-black for optimal results, either directly from the trees or, at times, from the ground. Dry the fruits in the shade for 1–2 days. Subsequently, soak the fruits in water for 4–6 hours, and extract the seeds; they will float in the water. After drying the seeds in the shade, they can be stored for up to 2 years, preferably at 3°C with a moisture content of 7–10%. Alternatively, consider using cuttings.

A Tree in a clearing along Weru Weru River on Kilimanjaro
B Leaf
C Typical mark on trunk after leaf has fallen off
D Close up of crown

Agroforestry uses

A fast-growing tree that is a natural pioneer within its native range. It can be useful in re-establishing native woodland. The leaf fall provides a good mulch, with the soil under the tree being quite fertile. The high crown lets in sunlight, making the tree suitable for intercropping with crops such as banana, coffee or cocoa. It is planted in living fences. The flowers are a good source of nectar and pollen for honey bees. The wood is used for interior joinery, doors, utensils, musical instruments, containers, boxes, crates, beehives, carvings, matches, veneer and plywood. It is valued for carving to make handicrafts and masks, and also for making drums.

Medicinal uses

A tea or boiled mixture of the tree bark is consumed to help with fever and malaria, to ease stomach pains, and as a way to cleanse the body. The bark is combined with other plants to help manage epilepsy. A liquid made from soaking the bark is used as nose drops to aid with mental health issues. Finely ground bark is sniffed to relieve pain and also to help with coughs, coughing up blood, and tuberculosis. Tea made from the leaves is drunk to help with stomach problems, especially those caused by parasites. Crushed leaves are used to treat stomach ulcers and are also put on the skin to help with broken bones (all information from Tropical.theferns.info).

Prioria msoo Msohu

Fabacae. Only known from Kenya and Tanzania (Plants of the World Online). Probably extinct in Kenya, very rare in Tanzania, less than 100 adult trees counted in the Kilimanjaro area. Described from Rau Forest near Moshi. Very nice timber, a tree of over 60 m with a very straight trunk.

Agroforestry uses

The red wood is light, surprisingly soft, easy to cut and split, and somewhat resinous. The wood is used as timber for general utility and for building houses, canoes, plywood, tool handles, spoons, grain mortars, water pots and carvings (Tropical.theferns.info).

Medicinal uses

Used by the Chagga people against internal abscesses, e.g. in arms and legs (Hemp et al. 2020).

A/B Large tree in Rau forest near Moshi
C Lutheran Bishop of Tanzania, Dr. Shoo, planting Oxystigma in Kahe area of Kilimanjaro
D Sapling in the nursery Kidia
E Seeds
F NGO TanzMont planting Prioria and other trees in degraded area on the foothills of Kilimanjaro

Spathodea campanulata African Tulip Tree

Bignoniaceae. Commonly known as the African tulip tree, is a medium-sized tree reaching heights of up to 35 meters with a diameter of 175 centimeters. Native to Africa, it spans the west coast from Ghana to Angola and extends inland across the tropical rainforest region to southern Sudan and Uganda. Typically found in secondary forests within the high forest zone, it also thrives in deciduous transition and savanna forests (https://www.cabidigitallibrary.org).

Propagation

Through seeds, cuttings, or root suckers (Missouri Botanical Garden).

Uses

This tree serves various purposes, including land rehabilitation due to its rapid growth. The creamy-white, soft, and lightweight wood is suitable for rough carpentry, crates, and shuttering. In Africa, the seeds are used as food, and plant extracts play a role in traditional medicine. The hard central portion of the fruit yields a poison used for animal control. Despite its versatility, caution is advised when using it as a street tree, as its heavy branches may break in the wind, posing a risk to those below. Additionally, its value as fodder is limited (cabidigitallibrary.org).

Medicinal uses

In Africa, the stem bark is commonly used to address malaria, while in India and Africa, the leaves are utilized for treating skin disorders. The leaves also find application in addressing epilepsy, liver disorders, asthma, measles, and sore throat.
The root is employed for treating worm infections, stomach ache, dysentery, and hallucinations. The flower is considered an antidote against animal poison and cataracts. Traditional uses highlight its efficacy in treating malaria, gastrointestinal issues, skin infections, wound healing, and kidney problems. The bark is the most commonly used part, although the leaves and whole plant are also utilized, either independently or in combination with other medicinal plants (Padhy 2021).

A Tree of about 10 years of age, Kidia
B Flowers

A Young tree Kidia
B Fruits
C Flowers
D Adult tree, Manyara Nationalpark

Trichilia emetica
Natal Mahogany
(ngoèdá`, mtsutsù´)

Meliaceae. Tropical and southern Africa.

Propagation

The optimal time for sowing seeds is immediately upon ripening. To enhance germination, it is advisable to remove the surrounding aril by macerating the seed in water before promptly sowing it. The fresh seeds can be sown either directly in their final growing location or in nursery bags. Typically, germination occurs within a span of 10 to 20 days. After 6 to 8 months, the seedlings are ready to be transplanted into their permanent positions. Additionally, cuttings can be obtained from one-year-old coppice shoots, and layering or root suckers can also be utilized as propagation methods.

Agroforestry uses

The plant greatly assists in soil conservation. It is widely planted as a windbreak in urban and rural areas. It is sometimes used in reforestation projects. The pressed seedcake left after oil has been extracted, with an approximate protein content of 16%, is suitable as a fertilizer. The plant is regarded as an indicator of areas with palatable grass species.

Warning

The seeds are poisonous and the poisonous compounds seem to be concentrated in the seedcoat.

Edible uses

A sweet, milky, potable liquid is extracted from the arils. The fleshy seed envelope is chewed as a substitute for kola. The skinned seeds can be eaten raw or soaked in water and ground, the resultant liquid mixed with spinach dishes.
An edible oil is obtained from the fleshy seed envelope. The seeds are squeezed in water and the resulting tasty fatty suspension is used for cooking.

Medicinal uses

The leaves can be used as an antidote for the irritation caused by the buffalo bean.
The bark is used in the treatment of pneumonia. A macerate of the root bark is used to treat epilepsy and leprosy. Pieces of bark or the powdered bark are soaked in warm water and used as an emetic or enema to treat intestinal ailments. It is used in small doses only, since its effect can be violent. The bark is used in the treatment of skin complaints. The roots are purgative. They are used in the treatment of colds and also to treat infertility and to induce labour in pregnant women. The powdered root is used in the treatment of cirrhosis, river blindness, ascariasis and dysmenorrhoea. A decoction of the bark and roots combined is a remedy for colds, pneumonia and for a variety of intestinal disorders including hepatitis. A bitter-tasting medicinal oil, obtained by boiling the ground seed in water, is taken orally to relieve rheumatism. The oil is applied externally as a treatment for leprosy; sores; ringworm and other parasites; skin diseases (all information from Tropical.theferns.info).

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All pictures shown by Andreas and Claudia Hemp.




About the authors

Claudia and Andreas Hemp, environmental researchers from Germany, have dedicated 34 years to studying East Africa's ecology. In 2014, they co-founded the NGO TanzMont, advocating for the planting of indigenous trees in Tanzania. Establishing a nursery at the Lutheran parish in Kidia/Old Moshi, they received crucial support from the Lutheran Church, particularly from Bishop Dr. Frederick Shoo.

Beatrice Mmary, an unwavering and passionate Chagga woman deeply dedicated to environmental causes, has been a tireless volunteer with the NGO since 2014. Renowned for her exceptional leadership skills, she has spearheaded and triumphed in various replanting projects, rallying the community in Kidia and actively involving secondary school students in the process. Her impact extends beyond environmental efforts, as she has skillfully leveraged her relationships within the local community to contribute valuable insights to the 2020 publication, "Medicinal Plants of Mt Kilimanjaro". Beatrice's influence has successfully bridged gaps, encouraging locals who were previously hesitant to share their extensive knowledge of medicinal plants with those outside the community.

Dominick Eduard Kavishe is a passionate advocate for environmental issues and an active, dedicated member of the NGO, TanzMont. Hailing from the Maasai tribe, he brings a wealth of profound knowledge about the medicinal properties of plants and their versatile applications. His commitment to preserving the environment and leveraging traditional wisdom underscores his invaluable contributions to this booklet.

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In this booklet 20 tree species typical for the submontane plantation belt, partly originating from the montane forest zone, are treated. We provide information about their propagation, Agroforestry, edible and medicinal uses. The following trees are depicted: *Afrocarpus (Podocarpus) falcatus* – Bastard Yellowwood, *Albizia schimperiana Oliv.*, *Calodendron capense* – Cape Chestnut, *Cordia africana*, *Croton megalocarpus, Entandrophragma excelsum* – Tallest Tree of Africa, *Ficus lutea* – Dahomey Rubber Tree, Garcinia tanzaniensis, *Hagenia abyssinica* – East African Rosewood, *Khaya anthotheca* – White Mahogany, *Leptonychia usambarensis, Macaranga kilimandscharica, Milicia excelsa* – African Teak, *Newtonia buchananii* – East African Newtonia, *Olea africana* – Wild or African Olive, *Podocarpus latifolius* – Broad-leaved Yellowwood – *Podo, Polyscias fulva, Prioria msoo* (Harms) Breteler, *Spathodea campanulata* – African Tulip Tree, and *Trichilia emetica* – Natal Mahogany.

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