

Acacia mellifera**Fabaceae (Mimosaceae)****Indigenous**

COMMON NAMES: Boran: Sabansa gurach; Embu: Muthigira; English: Honey acacia; Gabra: Sa'pans gurrach; Kamba: Muthiia; Kikuyu: Muthigira; Maasai: Oiti, Oiti orok; Malakote: Sampasa; Marakwet: Belel; Orma: Habakoles; Pokomo: Musawasa; Pokot: Panyarit, Talamoghion, Talamoh; Rendille: Bilahen; Samburu: Iiti; Somali: Bilil; Swahili: Kikwata; Taveta: Kezia, Kizia; Tharaka: Muthigira; Tugen: Ngoronet; Turkana: Ebenyo; Wardei: Belel.

DESCRIPTION: Usually a low shrub, sometimes a tree up to 9 m. **BARK:** Pale grey-brown, smooth. **THORNS:** Distinctive, small to 6 mm long, **hooked prickles, in pairs, grey with black tips.** **LEAVES:** Only 2-3 pairs of blue-green leaflets each to 2 cm. **FLOWERS:** White or creamy spikes to 4 cm, attracting bees. **FRUIT:** Short and wide pods, tapering abruptly at both ends, **flat, papery, pale brown-yellow, splitting; rarely to 8 cm,** veined, 3 seeds within.

ECOLOGY: A widely distributed acacia found from western Asia, the Middle East and Egypt south to South Africa and Angola. Widespread in all arid and semi-arid areas of Kenya, 0-1,800 m. Not recorded in the Lake Victoria basin. Rainfall 400-900 mm. May be dominant in dry *Acacia-Commiphora* bushland. Thrives in a variety of soils including gravelly, loam, volcanic and sandy. Agroclimatic Zones I-VI (riverine in VII). Flowers in February-March (Mwingi).

USES: Firewood, charcoal, timber, pestles, clubs, sticks, carvings, edible gum (sparingly), **medicine (bark)**, fodder (pods, twigs, leaves, flowers browsed by camels and goats), bee forage, nitrogen-fixing, soil conservation, live fence, dead fence, veterinary medicine.

PROPAGATION: Direct sowing at site, seedlings, wildings.

SEED: Germination: 60-80% in 2 weeks with good seed; 17,000-20,000 per kg.

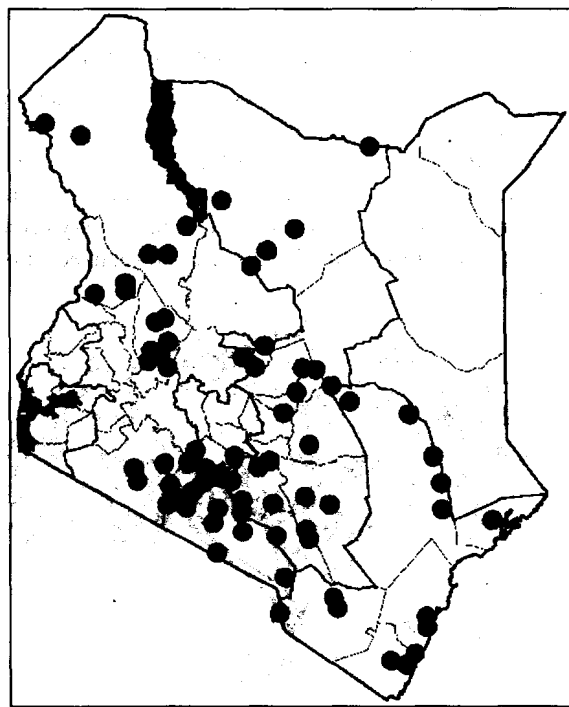
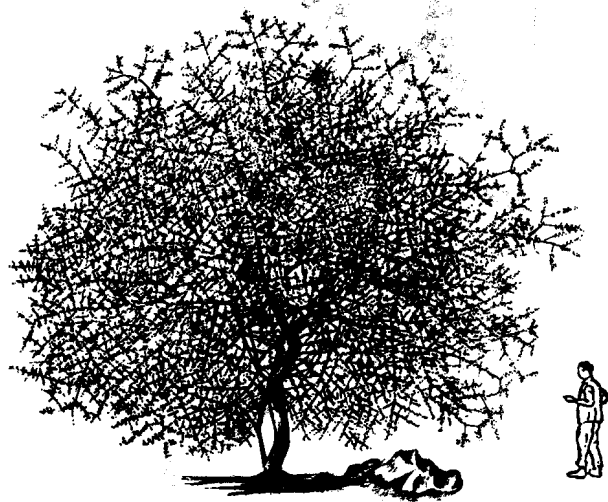
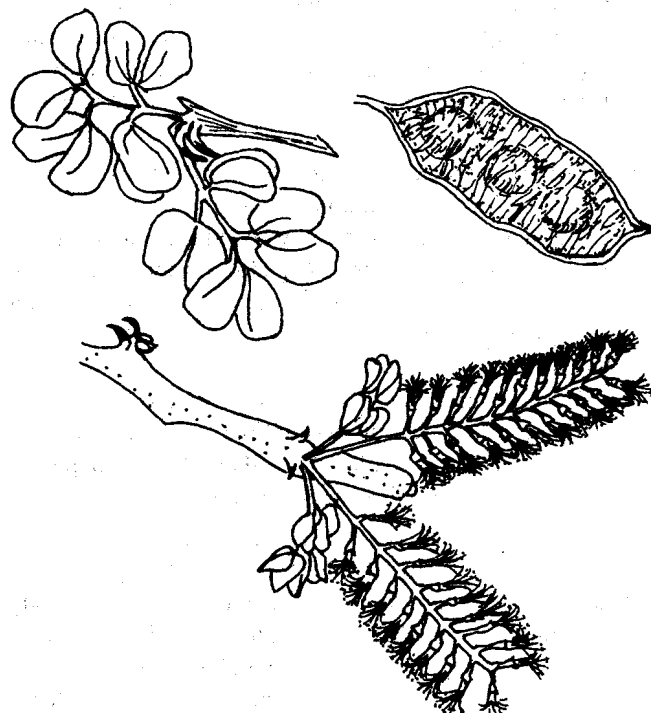
treatment: No treatment is required for fresh seed. For stored seeds immerse in hot water, allow to cool and then soak for 24 hours before sowing to break seed dormancy.

storage: Seed can be stored for long periods.

MANAGEMENT: Pruning in pastures, lopping, thinning if too dense. Trim as fence.

REMARKS: The flowers produce excellent-quality honey ('mellifera' = producing honey). Heavily browsed by game and goats in areas where few trees grow. Can make impenetrable thickets. The dark heartwood is very heavy, strong and termite resistant. The black Maasai clubs and sticks are made of such wood. Stingless bees like to live in it. The tree occasionally hosts an edible root parasite, *Hydnora abyssinica*.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Beentje, 1994; Bein et al., 1996; Blundell, 1987; Dharani, 2002; ITDG and IIRR, 1996; Katende et al., 1995; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; National Academy of Sciences, 1979; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; von Maydell, 1990.



Acacia nilotica

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: **Bajun:** Mtetewe; **Boran:** Burguge, Burquqe, Burquqis; **Digo:** Chigundigundi, Kigundi; **Duruma:** Mgundi; **English:** Nile thorn; **Gabra:** Burkuke, Bur'uk'e, Burquqe; **Giriama:** Mtsemeri, Muhegakululu; **Ilchamus:** Lkiloriti; **Kamba:** Kisewa, Musemei (Machakos), Musemeli (Kitui); **Keiyo:** Kiprutyt; **Kikuyu:** Mugaa, Ngiloliti; **Kipsigis:** Chebitet, Chepitet, Kopko; **Maasai:** Olkiloriti; **Mbeere:** Mulemeti, Mucemeri; **Nandi:** Sertwet; **Orma:** Chalado; **Pokot:** Kopkwo, Kopko, Kapka; **Rendille:** Ilgiliti; **Samburu:** Ikilositi; **Somali:** Tuger, Tuwer, Marah; **Swahili:** Mgunga, Mjungu, Mtetewe; **Taita:** Shighiri; **Teso:** Ekapelimen; **Tharaka:** Mwemba; **Tugen:** Chebiwo; **Turkana:** Ekapilimen.

DESCRIPTION: Usually a small tree seldom exceeding 6 m. Crown scattered when young, later umbrella shaped. **BARK:** Brown-black, rough, deeply grooved; young shoots red-brown, hairy. **THORNS:** Greyish, to 10 cm long, usually shorter. **FLOWERS:** Fragrant, round heads, bright yellow to orange. **FRUIT:** Straight or slightly curved pods that do not split open, 12 cm long to 1.2 cm wide.

ECOLOGY: Distributed from India to North Africa and south to South Africa and Namibia. Widely distributed in Kenya in acacia bushland and wooded grassland, e.g. growing in Kaputei Plains (Kajiado), Kedong Valley and Kerio Valley, 0–2,500 m. Common in both dry lowlands and highlands. Often a dominant species. Soils variable from sandy to black cotton. Usually in areas with 500–1,000 mm rainfall. Agroclimatic Zones III–VI. Flowers in January (Kitui), May–June (Laikipia) or September–October (Naivasha, Kajiado). Seeds in August–September (Kitui, Kajiado) or October (Laikipia).

USES: Firewood, charcoal, poles, tools, carving, tenderizer for meat (bark), drink (boiled bark or fruit pulp drunk like tea), medicine (sap, fruit and bark), fodder (leaves, pods), bee forage, shade, dune fixation, nitrogen-fixing, soil conservation, soil stabilization, windbreak, gum, tannin (bark), dye (bark), live fence, dead fence, toothbrushes, veterinary medicine.

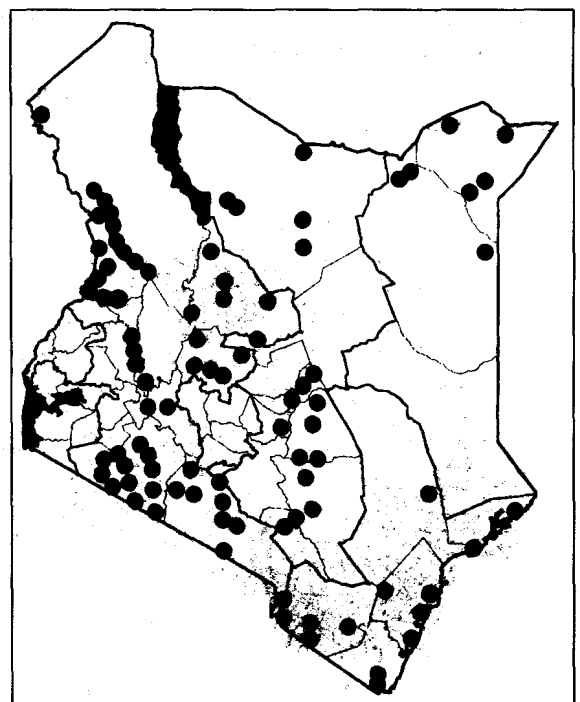
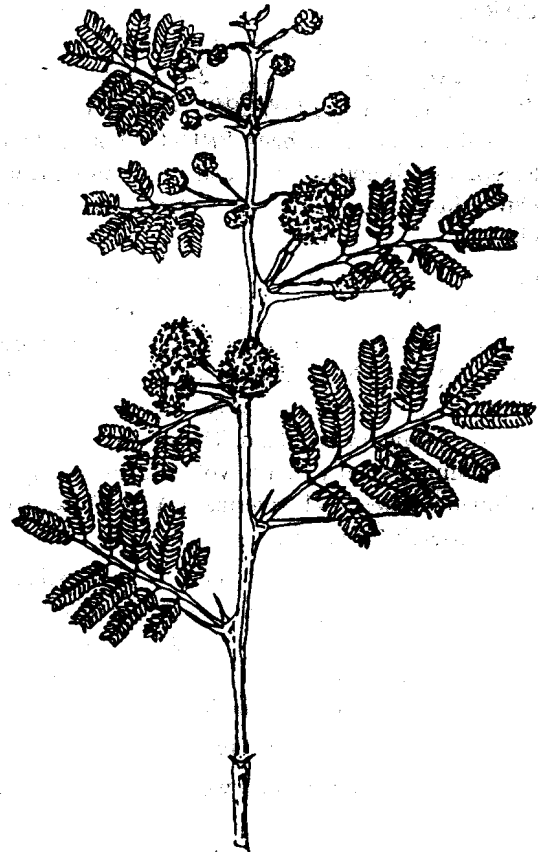
PROPAGATION: Seedlings, direct sowing at site.

SEED: Separate through immersion in water; bad seeds float. Germination rate 60–90%; 7,000–11,000 per kg. **treatment:** Not necessary for fresh seed. For stored seed only, nick or soak in cold water for 24 hours. Immersing in hot sulphuric acid for 8–10 minutes is very effective. Germination rates of 75–95% can be realized in one week.

storage: Seed can be stored for long periods.

MANAGEMENT: Fairly fast growing on good sites: Lopping, pollarding, pruning in pastures.

REMARKS: The bark is commonly used as a substitute for tea. Juice from the fruits gives a black dye that is rubbed on the eyelids by Digo women. The bark is used for

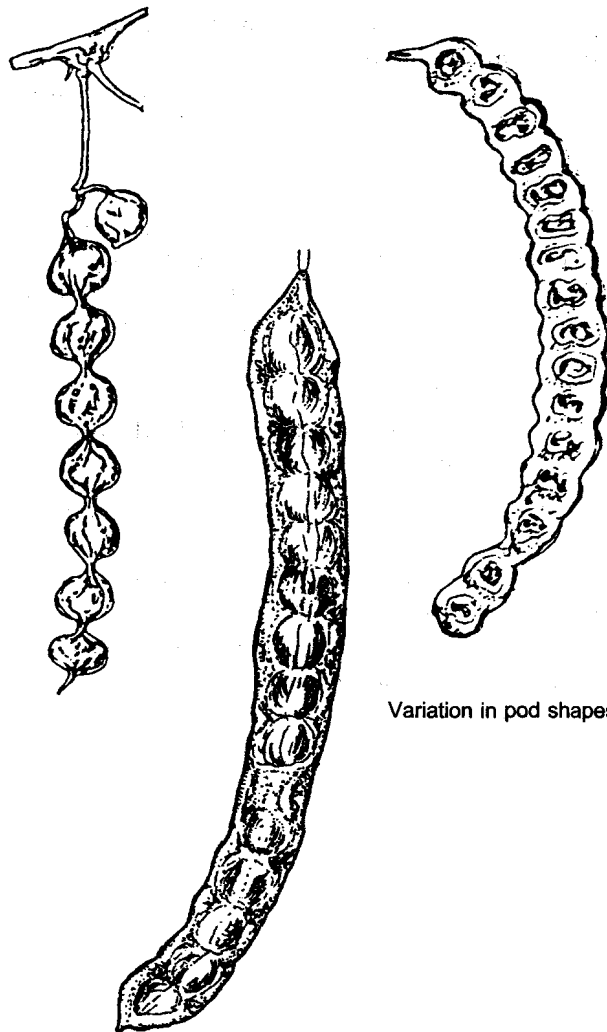
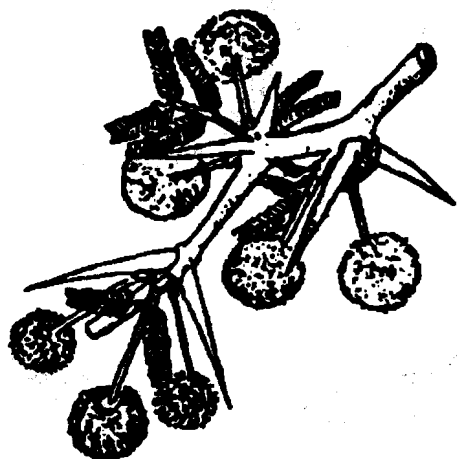


Acacia nilotica (cont)

tanning and dying leather (red-brown colour). Thorns used for piercing ears and as plugs for gourds. The wood is hard, tough, termite resistant and durable, used as posts for grain stores and as roof support in traditional Maasai homes. Young trees do not compete well so weeding is necessary. Can form thickets.

One of the most widespread acacias. An extremely variable species in its entire range, with at least 7 subspecies.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Blundell, 1987; Dharani, 2002; ITDG and IRR, 1996; Katende et al., 1995; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; National Academy of Sciences, 1980; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Ruffo et al., 2002; Storrs, 1979; von Maydell, 1990.



Acacia paolii

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: **Boran:** Chachane, Wanga; **Gabra:** Chachane; **Malakote:** Chyachyaneh; **Orma:** Chachane; **Rendille:** Gomor; **Somali:** Gammur, Gommor, Jerin, Jahjahneh; **Turkana:** Eyelel.

DESCRIPTION: A multi-stemmed deciduous shrub or small tree with spreading flat-topped crown to 4.5 m high. **BARK:** Smooth, dark green, dotted with white lenticels. **THORNS:** Straight, in pairs up to 5 cm long. **LEAVES:** Grey-green, twice-divided, usually 4–9 pairs of pinnae; leaflets in 7–15 pairs. **FLOWERS:** In round heads, cream, produced when tree is leafless. **FRUIT:** Red or brownish pods with spreading white hairs. Splits open.

ECOLOGY: Found only in north-eastern Uganda, Sudan, Ethiopia, Somalia and Kenya. Widespread in acacia bushlands or dwarf shrub grasslands of northern and eastern Kenya, 100–1,250 m. May be locally common near Lake Turkana, in Isiolo, Tana River and in Mandera Districts in depressions with clay soil and on gently undulating slopes with clay-loam soils, mainly in lowlands. Agroclimatic Zones VI–VII.

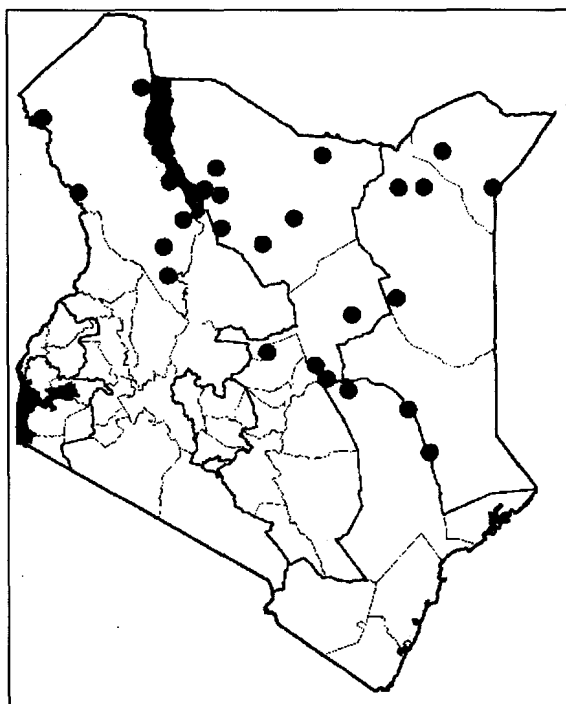
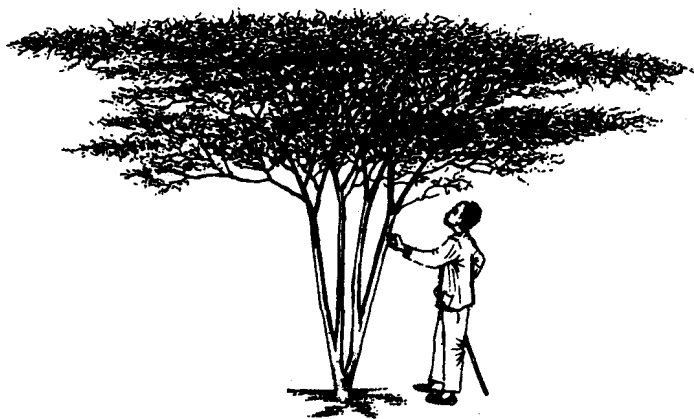
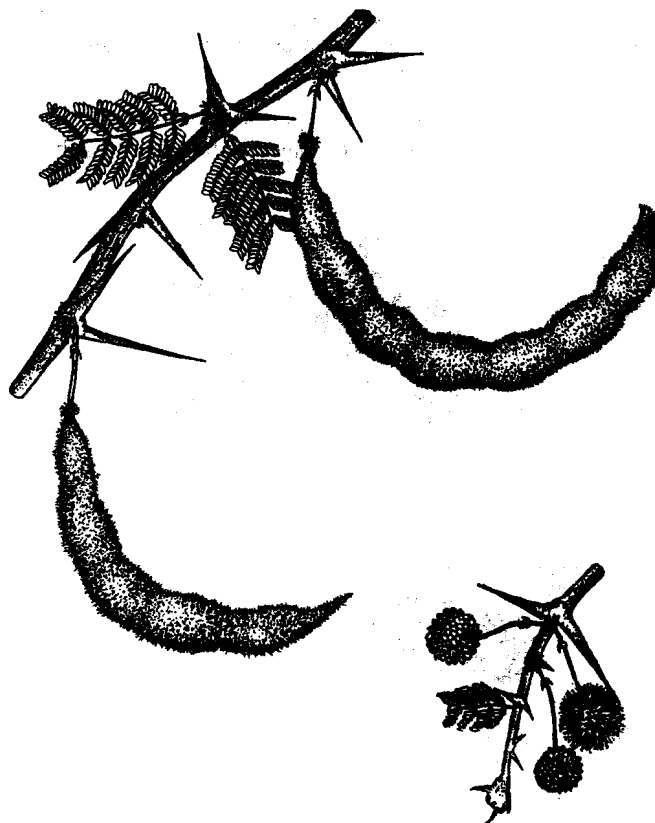
USES: Firewood, edible gum, medicine, fodder (leaves), bee forage, dead fence (thorny branches).

PROPAGATION: Seedlings, wildings. Seed germinates easily after fire.

MANAGEMENT: No management practice is commonly applied. Can be pruned if needed.

REMARKS: The species is an indicator of areas that can be cultivated. Used for making bomas (Somali).

FURTHER READING: Beentje, 1994.





Acacia abyssinica, Loita highlands, Narok District



Acacia brevispica, Mwala, Machakos District



Acacia drepanolobium, Kaputei plains, Kajiado District



Grassland with scattered *Acacia gerrardii* at Corner Baridi, Ngong, Kajiado District



Acacia gerrardii, Ong'ata Rongai, Kajiado District; (inset) pods

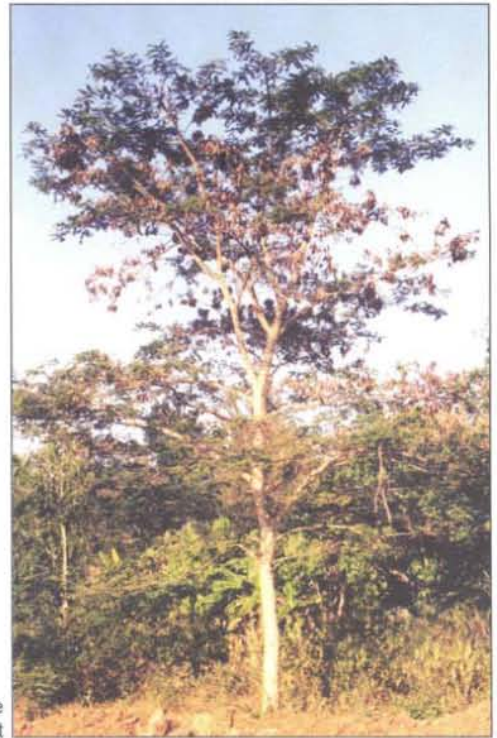


Acacia kirkii woodland is common around Nairobi; (inset) bark





Acacia seyal, Mbiuni, Machakos District;
(inset) var. *fistula*, thorns with ant galls

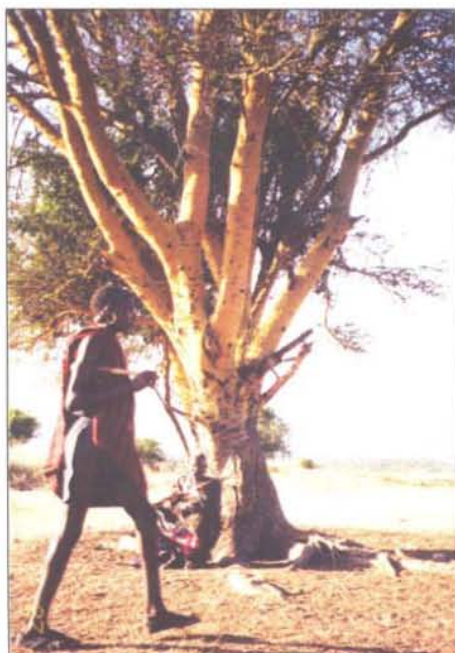


Acacia polyacantha with mature pods, Kyanika, Kitui District

Acacia nilotica pods; the coastal variety, Lamu District

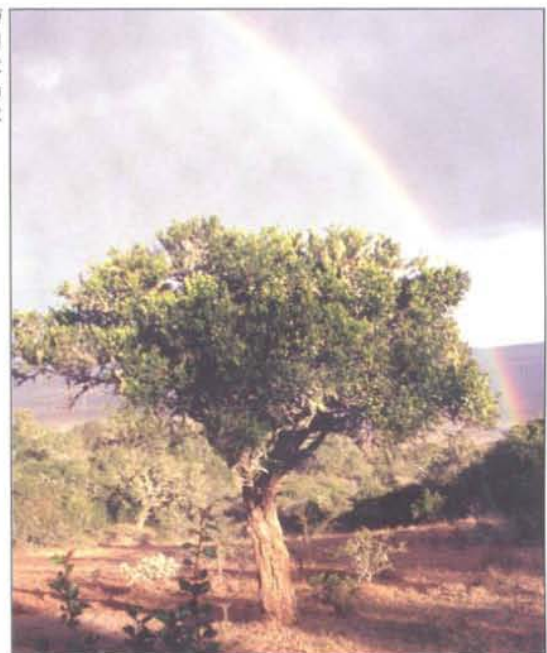


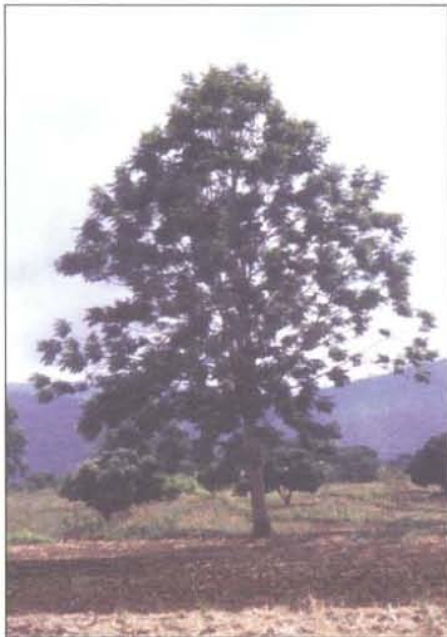
Acacia tortilis trees are often left in cropland, Mwea, Mbeere District; (inset) pods, which are important fodder



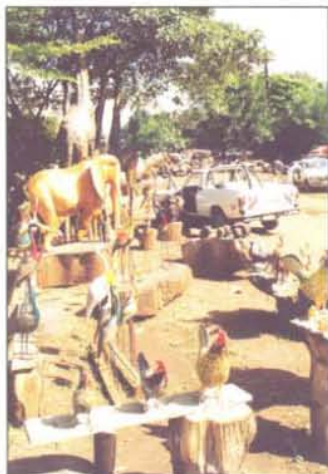
Acokanthera schimperi (arrow-poison tree), typical of wooded grasslands at higher altitudes, Loita highlands, Narok District

Acacia xanthophloea (fever tree) is easily recognized by its yellow bark and great size, Loita, Narok District





Acrocarpus fraxinifolius; young tree, Kamuuw'ani, Machakos District



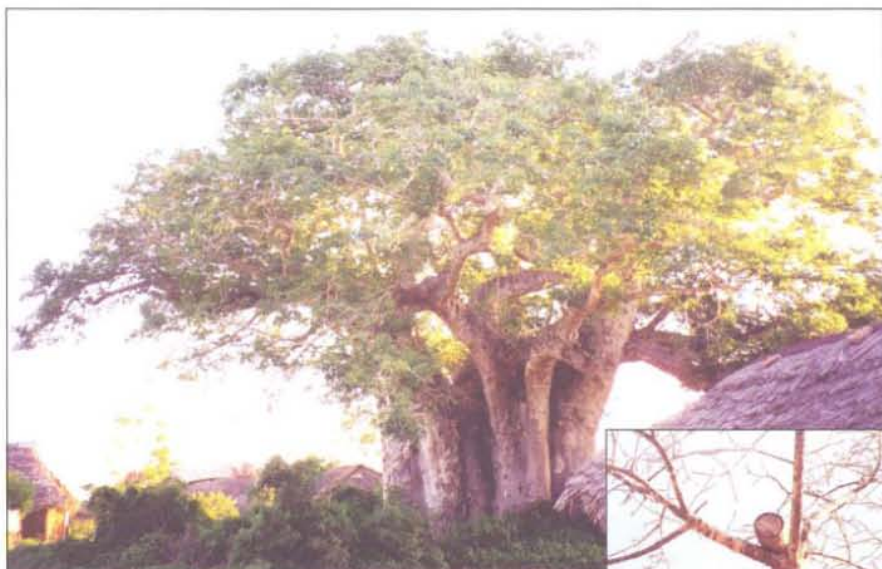
Woodwork products in an open-air market, Nairobi; the large carvings are from *Acrocarpus fraxinifolius*



Adenium obesum (desert rose), near Wenje, Tana River District



Antiaris toxicaria trunk, Kaya Kinondo, Kwale District



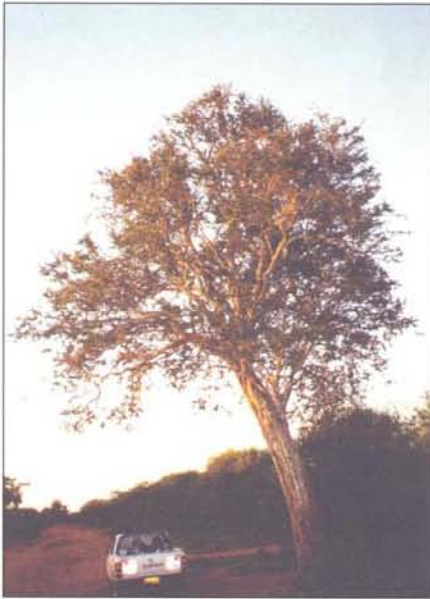
Adansonia digitata (baobab), Kibaoni, Malindi District; (inset) a traditional hive placed in the fork of baobab branches



Neem (*Azadirachta indica*), leaves and flowers, Kilifi District; (above) a trunk stripped of bark for medicine



Neem wood for carving in Mombasa



Boscia angustifolia can be recognized from the thick-barked, grooved and often leaning trunk, Katangi, Yatta, Machakos District



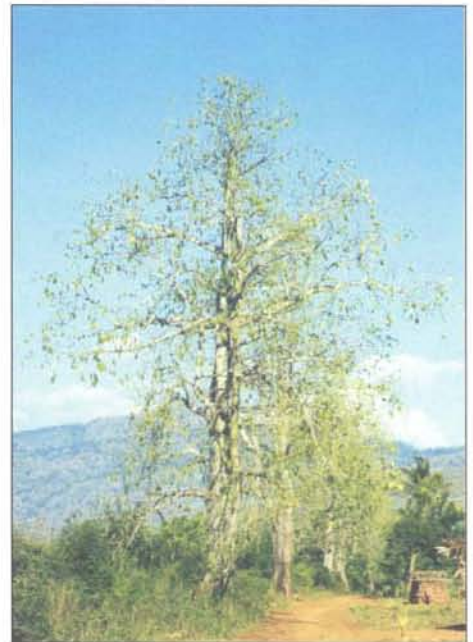
Calodendrum capense (Cape chestnut), Nairobi



Cassia abbreviata near Mzima Springs, Tsavo West, Taita Taveta District



Balanites aegyptiaca fruit, West Pokot District



Ceiba pentandra



Ceiba speciosa (bombax), Nairobi; (inset) flowers



Cussonia holstii, Loita highlands, Narok District



Dalbergia melanoxylon (mpingo or African blackwood) was an important woodcarving species in Kenya; (inset) close-up of trunk

A. Njenga



Delonix regia, Sagana, Kirinyaga District; (inset) the bright red flowers have earned it names like 'flame tree', 'flamboyant' and 'flame of the forest'



Dovyalis macrocalyx, Nairobi; the fruits are edible



Dobera glabra, Tana River District



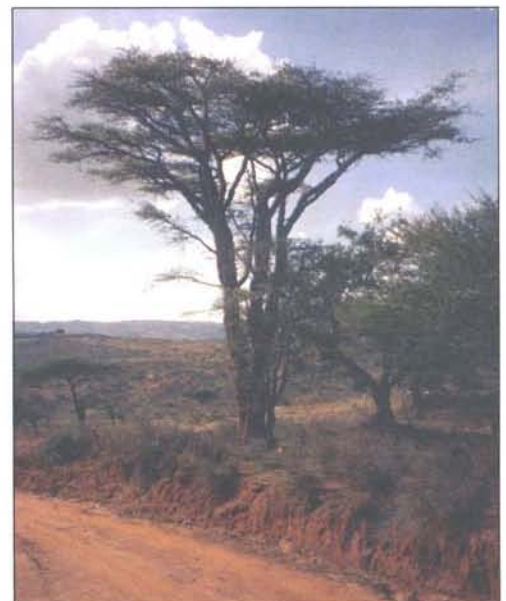
Dracaena steudneri, Chiromo, Nairobi



Entada rheedii, Kilifi District; the pods can be over a metre long



Encephalartos hildebrandtii, Kilifi District



Erythrina burtii, Katumani, Machakos



Euphorbia candelabrum; (inset) branches planted as a fence, Chepararia, West Pokot District



Ficus sycomorus (sycomore fig), Mzima Springs, Tsavo West, Taita-Taveta District



Making a canoe from the trunk of *Ficus sycomorus*, Mnazini, Tana River District



A fig tree in lowland rain forest, Kaya Kinondo, Kwale District



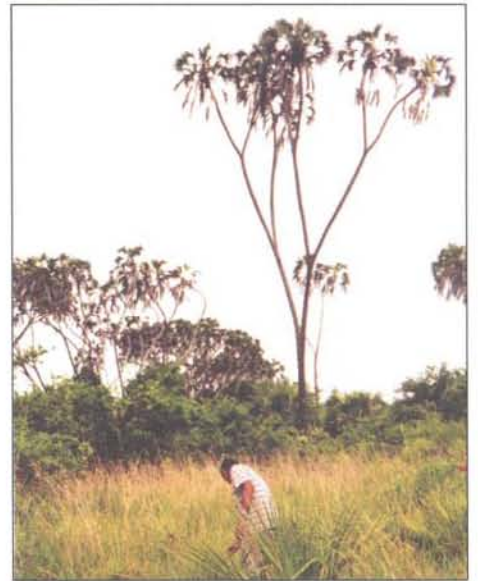
Garcinia livingstonei in riverine forest, Mchelelo, Tana River District



Fuelwood harvested from a *Grevillea robusta* woodlot at a homestead in Kyangwithya, Kitui



Gardenia volkensii has beautiful large flowers; Ramogi Hill, Bondo District



Hyphaene compressa (doum palm) in wooded grassland, Lake Kenyatta, Lamu District



A. Njenga

Jacaranda mimosifolia in bloom, Machakos District



Juniperus procera (East African cedar); this tree was felled illegally by loggers, Loita, Narok District



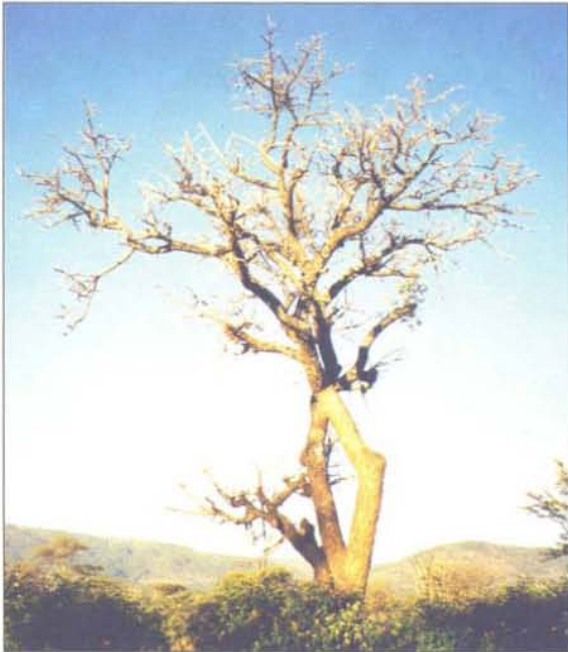
Jatropha curcas (physic nut), National Museums of Kenya, Nairobi



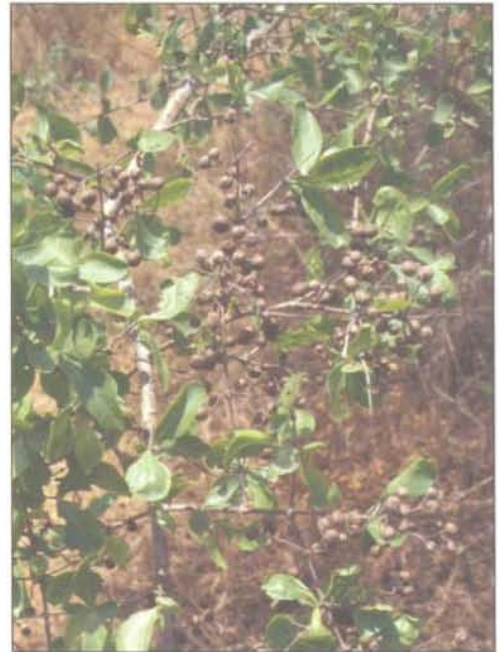
Kigelia africana (sausage tree), Bondo District



Lannea rivae, Matuu, Machakos District



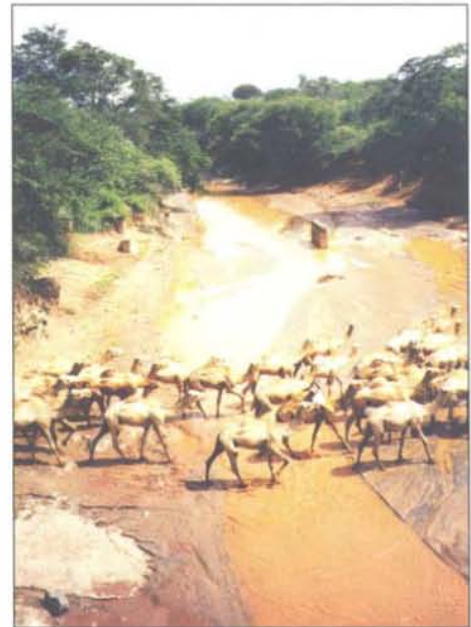
Lannea schimperi, West Pokot District; this tree sheds all its leaves in the dry season



Lawsonia inermis (henna), Tana River Primate Reserve



Leptadenia hastata, West Pokot District; the leaves are used as a vegetable



Seasonal rivers are called luggas in north and north-eastern Kenya; Tyaa lugga, Mwingi District



Macadamia integrifolia, Embu

A. Njenga



Melia volkensii, Tsavo near Mtito Andei, Makeni District; (inset) fruits



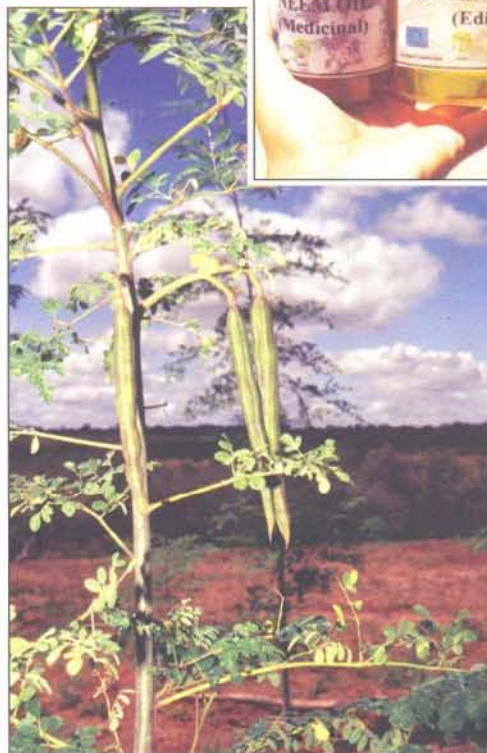
Manilkara sulcata, Kilifi



Mimusops obtusifolia, Kitere, Tana River District



Mondia whytei; edible roots on sale, Kakamega District; (inset) roots also have medicinal uses



Moringa oleifera fruiting branch; (inset) edible oil extracted from seed, Sokoke, Malindi District



Morus sp. (mulberry), Karaba, Mbeere District



Pandanus kirkii growing on the sea shore, Ukunda, South Coast; (right) fruit





Pappea capensis, Kitui District



Parkinsonia aculeata (Jerusalem thorn), Mbeere District



Pithecellobium dulce (Madras thorn), Bombolulu, Mombasa



Phoenix reclinata (wild date palm) in fruit, Ong'ata Rongai near Nairobi



Podocarpus latifolius (podo) in subhumid highland forest, Mt Elgon District



Prosopis juliflora (mesquite) near the banks of the Tana at Wenje, Tana River District



Rhizophora mucronata (common mangrove or *mkoko*) with prop roots; (inset) seedling germinated on the tree (viviparous), Mkowe, Lamu District



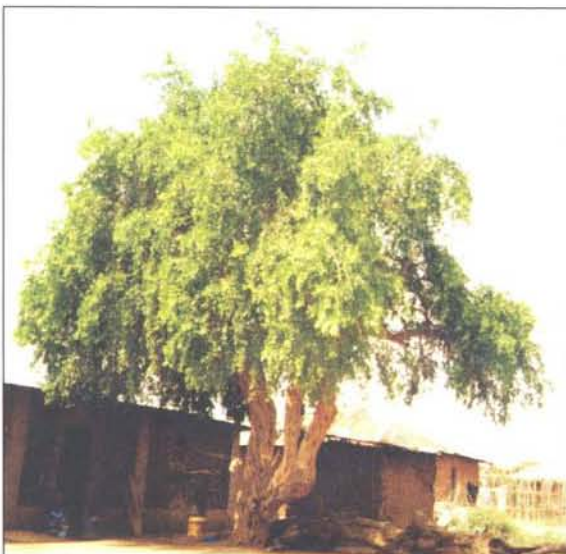
Rhus natalensis (Natal rhus), Nairobi Museum; fruits are edible



Ricinus communis (castor oil plant), Makutano, Machakos District



Saba comorensis, Kitui Hills, Kitui District; the fruits are edible



Salvadora persica (toothbrush tree) near Hola, Tana River District



Senna singueana, Siathani, Machakos District



Senna siamea, Got Ramogi, Bondo District



Sonneratia alba fruit, Chale area, Kwale District



Sterculia appendiculata, Baricho, Malindi District



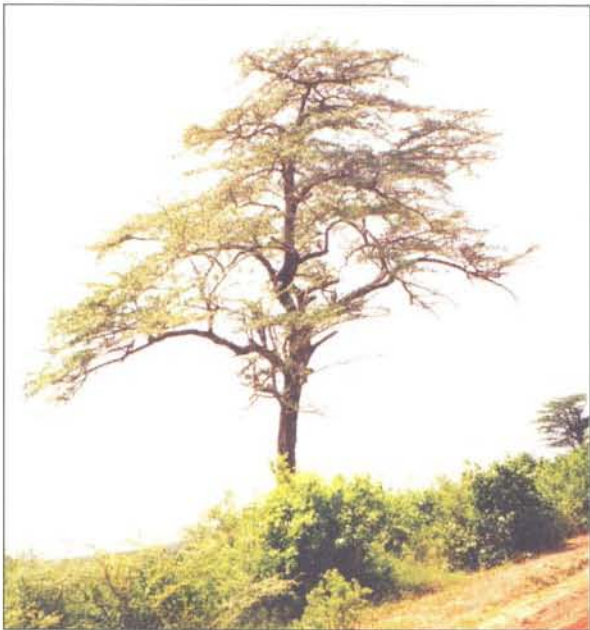
Syzygium cumini (mzambarau or jambolan), Mt Elgon District; (inset) leaves and flowers



Terminalia brownii fruits, Karaba, Mbeere District



Terminalia catappa (Indian almond); young tree, Rabai Museum, Kilifi District



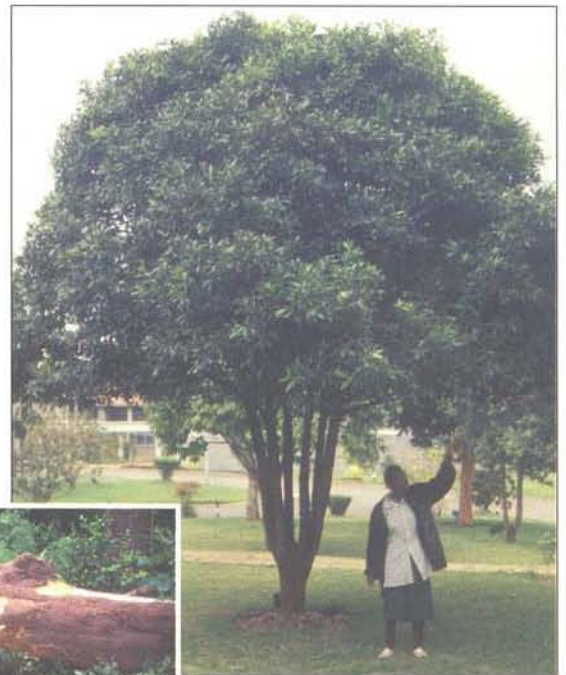
Tithonia diversifolia, Masinga reservoir, Machakos District



Terminalia spinosa, Hola, Tana River District



Vitex payos; unripe fruits, Kitui District



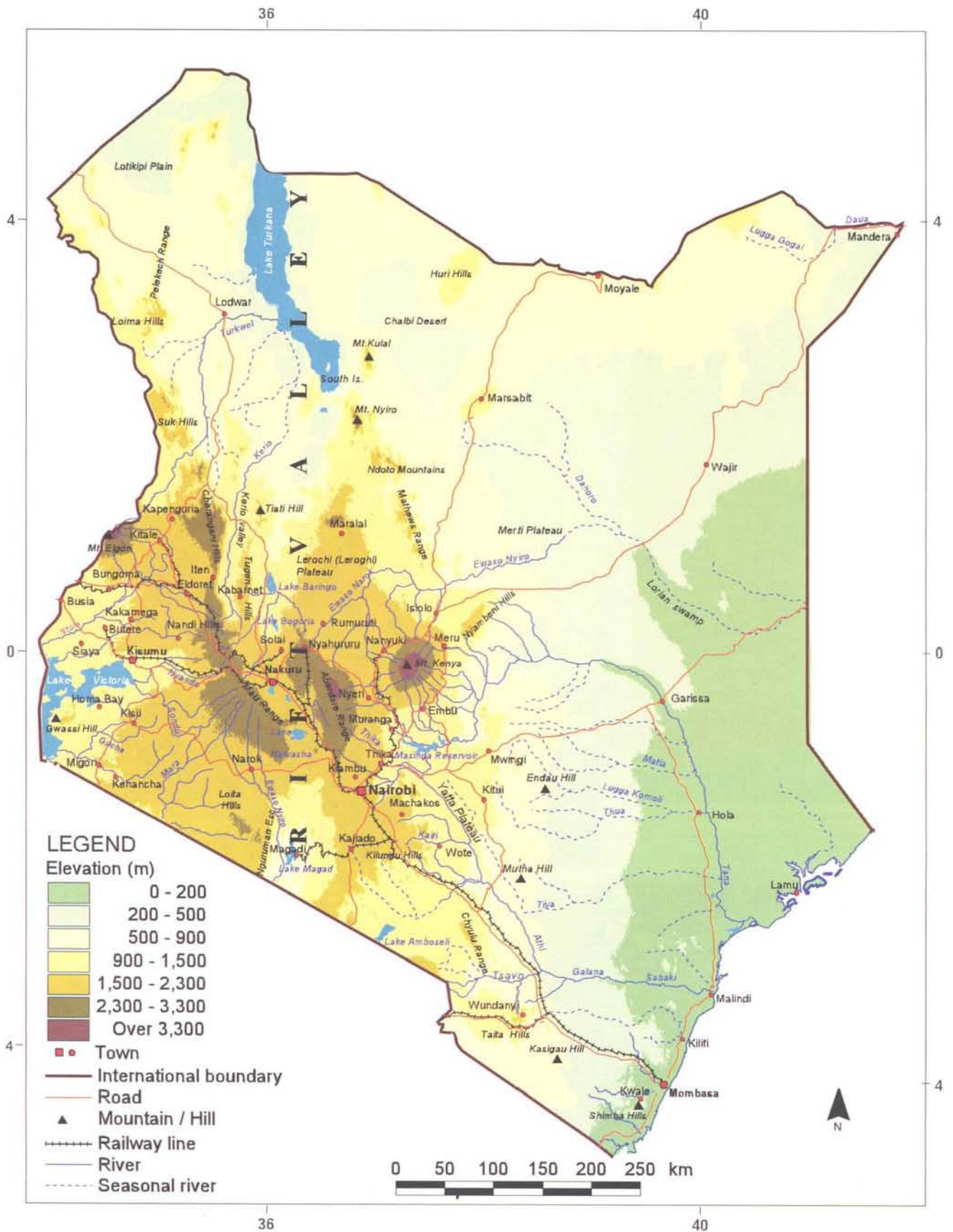
Warburgia ugandensis (East African greenheart); (inset) tree felled for medicine, Loita, Narok District



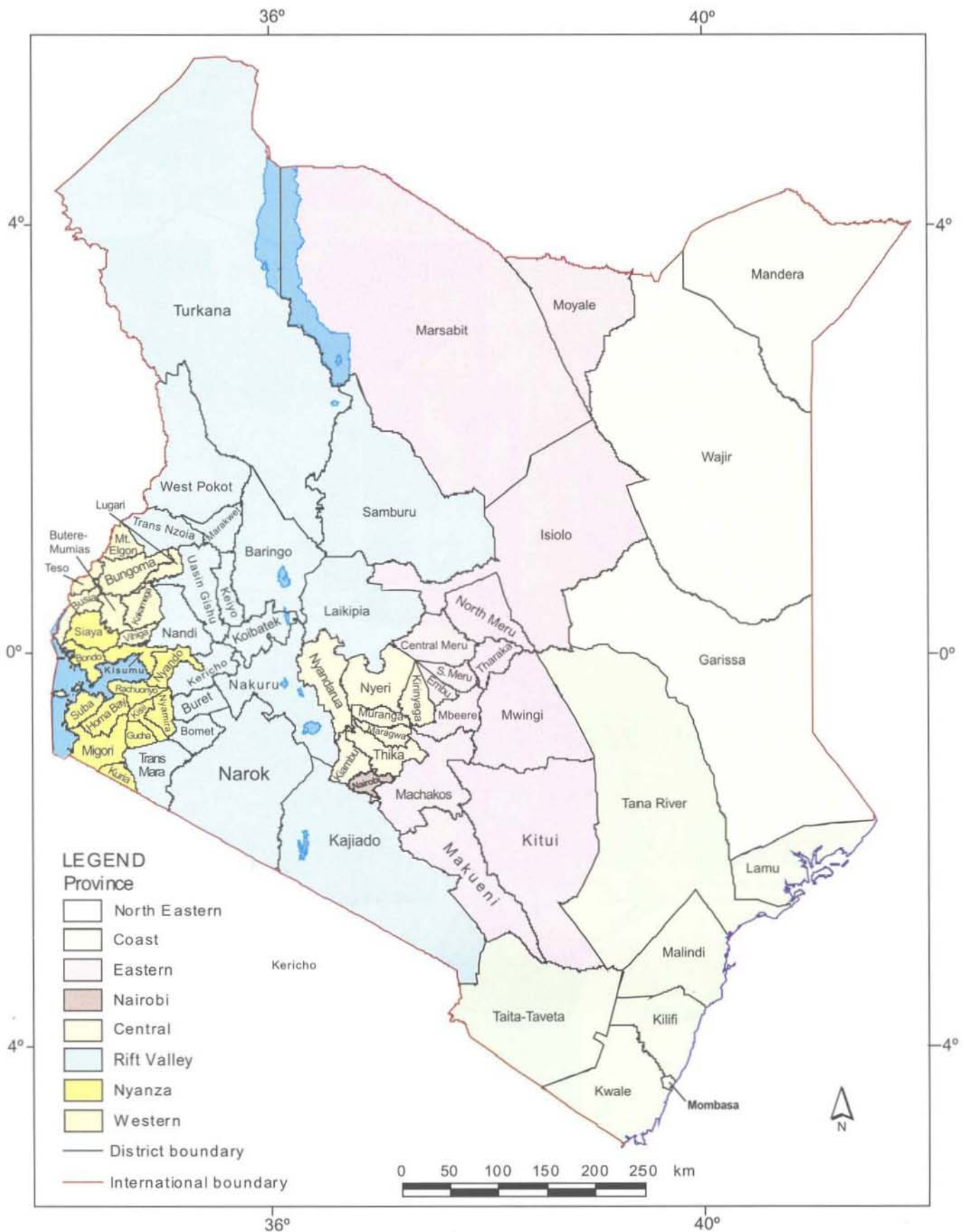
Ximenia americana, Ramogi Hill, Bondo District



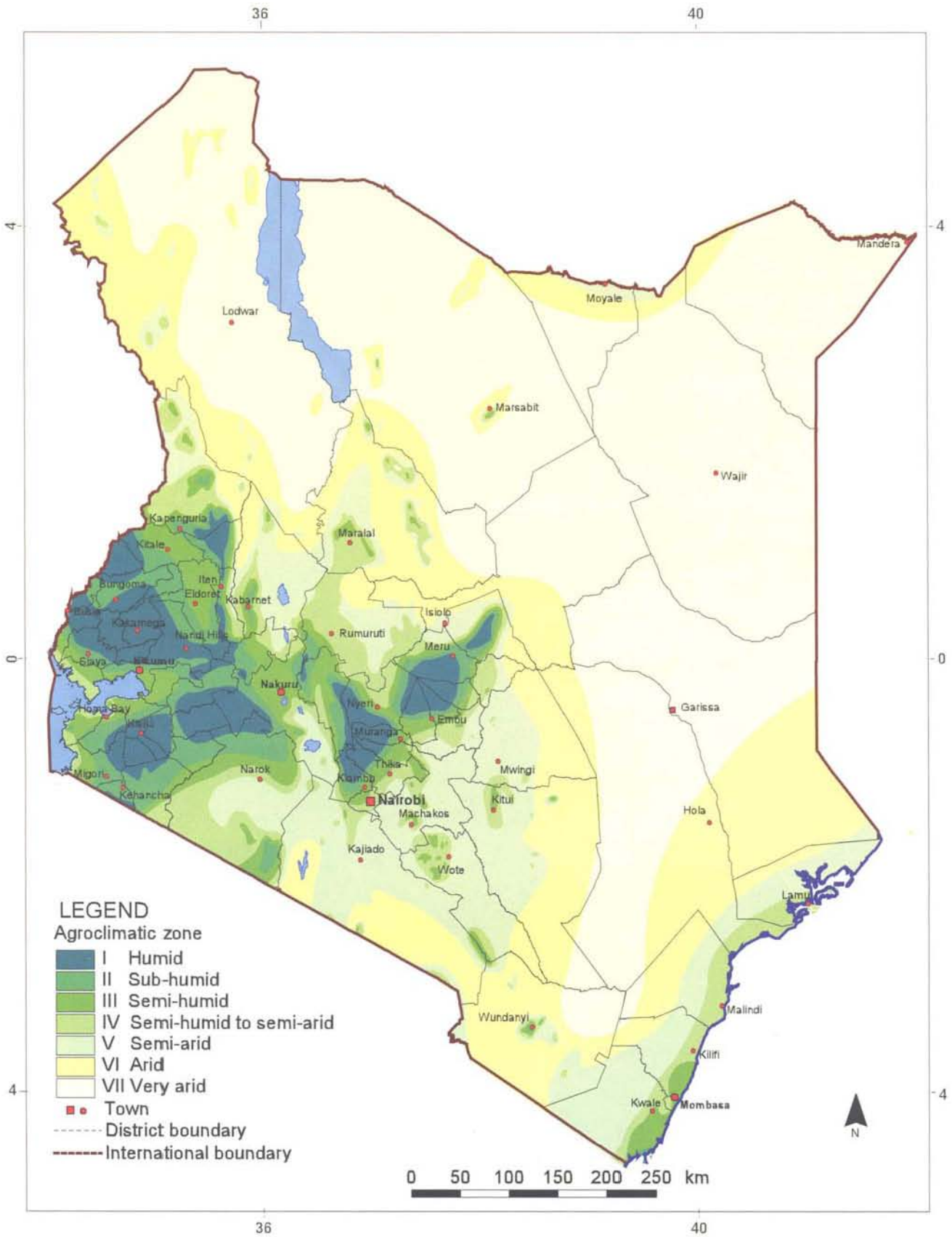
Ximenia americana; variation in fruits



Physical features of Kenya



Administrative divisions of Kenya



Agroclimatic zones of Kenya

Acacia polyacantha* subsp. *campylacantha

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: **Bajun:** Mkengewa; **English:** Falcon's-claw acacia; **Kamba:** Kivovoa, Mwelele, Musewa (Kitui); **Luhya (Bukusu):** Kumukokwe; **Luo:** Ogongo, Suahowe, Swaruri; **Swahili:** Mkengewa.

DESCRIPTION: A tree to 18 m with an open canopy. **BARK:** Ash-grey to yellow brown, scaling, old trees deeply grooved. **THORNS:** In pairs, just below the nodes, brown with black tips, small, to 10 mm and hooked, sometimes absent. **LEAVES:** Leaflets very small, numerous and narrow, leaf stalk hairy with glands. **FLOWERS:** Large, cream-white spikes, to 12 cm, 2 or 3 together, fragrant. **FRUIT:** Straight and flat smooth pods, brown, to 18 cm, tip pointed, splitting open.

ECOLOGY: A widespread acacia found from India to tropical Africa. In Kenya, found in wooded grassland and riverine woodland, 200–1,800 m, often in poorly drained soils. May indicate fertile soil and ground water but can also grow on stony soil. Common along Nairobi–Thika road, in Kisumu, South Nyanza, Narok, Taita-Taveta, Machakos and Kilifi. Agroclimatic Zones III–IV.

USES: Firewood, charcoal, timber, tool handles, farm implements, medicine, edible gum, fodder (pods, leaves, seeds), bee forage, ornamental, nitrogen-fixing, soil conservation.

PROPAGATION: Seedlings, wildings, direct sowing at site.

SEED: Seeds prolifically; 14,000–16,000 seeds per kg. Good seeds germinate in 10–20 days, germination rate 60–90%.

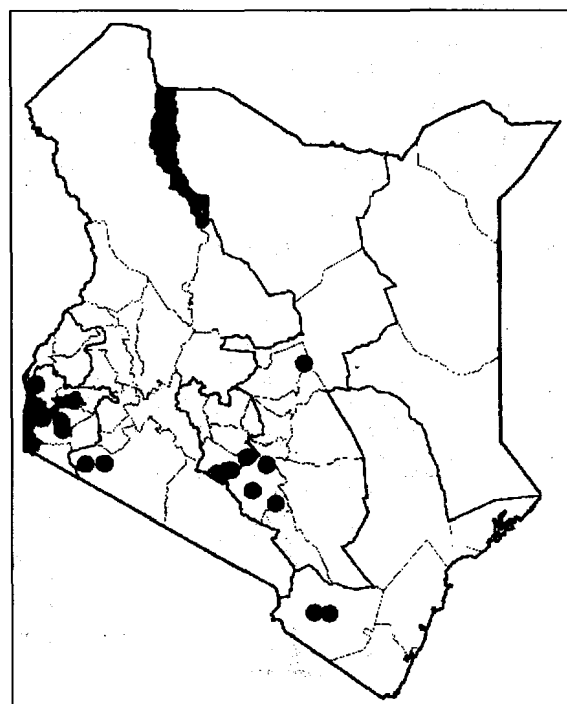
treatment: Immerse in hot water, allow to cool and soak for 24 hours or nick seed at cotyledon end.

storage: Seed can be stored for long periods if kept insect free.

MANAGEMENT: Fast growing on good sites; pollarding, coppicing, pruning to avoid large branches breaking with heavy winds.

REMARKS: Wood is resinous, hence termite resistant. The tree is a host to many insects. Subsp. *polyacantha* is found in India.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Backes and Ahenda, 1998; Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Dharani, 2002; Fichtl and Adi, 1994; Kokwaro, 1993; Mbuya et al., 1994; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Storrs, 1979; von Maydell, 1990.



Acacia senegal

Fabaceae (Mimosaceae)

Indigenous

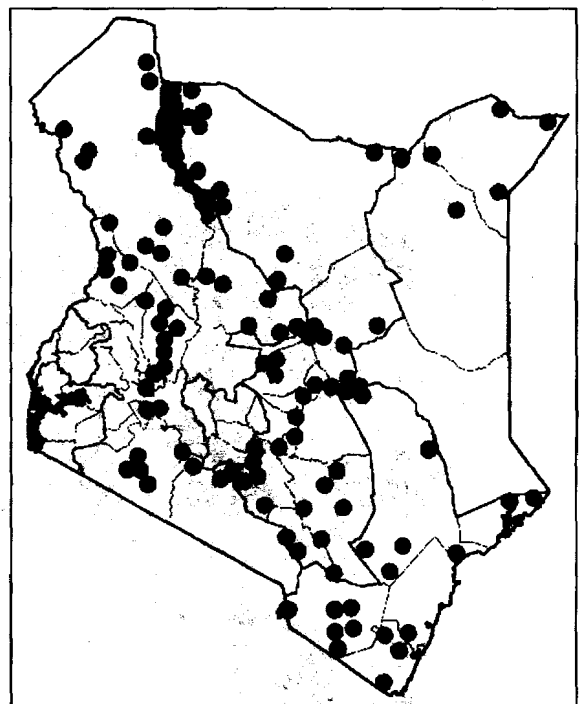
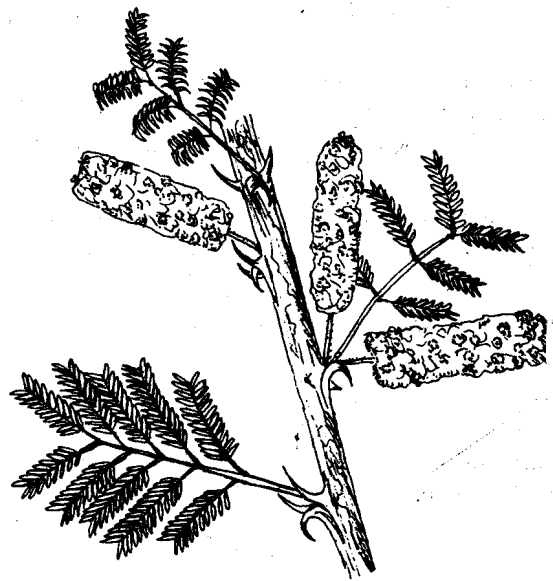
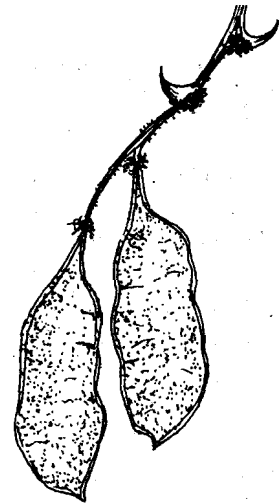
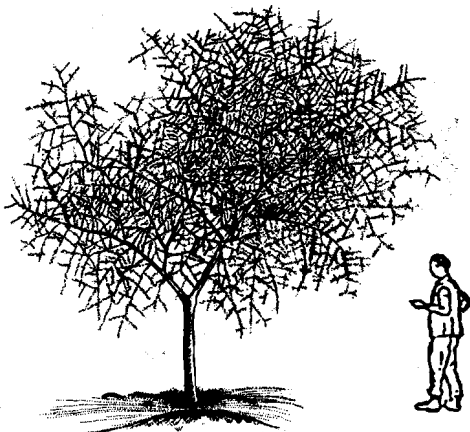
COMMON NAMES: **Bajun:** Mtengewwa; **Boran:** Baabido (gum), Burra diima, Iddaado, Sadeema, Sapans; **Daasanach:** Dang'ite; **Digo:** Chikwata, Kikwata; **English:** Gum arabic tree, Gum arabic acacia; **Gabra:** Idaado; **Ilchamus:** Lderkesi; **Kamba:** Kikole, King'olola, King'ola (Mwingi), King'ole (Machakos); **Luhya (Bukusu):** Kumung'ang'a; **Luo:** Kiluor, Otiep; **Maasai:** Enderkesi, Interkes (plural), Olterkesi; **Mbeere:** Mung'ora; **Orma:** Bura diima; **Pokot:** Chemanga, Chemangayan; **Rendille:** Hadhaadh, Mirgi; **Samburu:** Lderkesi, Manok (gum); **Somali:** Adad, Edad; **Swahili:** Kikwata, Mgunga; **Teso:** Ekodokodoi, Ekunoit; **Tharaka:** Mung'oor; **Turkana:** Ekunoit; **Wardei:** Cadaad.

DESCRIPTION: Shrub or small tree up to 9 m, more often 2–4 m, usually with many low branches. Flat-topped crown in mature trees. **BARK:** Waxy, smooth, then **peeling and papery from red-brown base**. **THORNS:** Usually in 3s, the central one hooked downwards, the 2 laterals curved up, brown to black. **FLOWERS:** Buds red, opening to long white or cream spikes, borne in 2s or 3s or sometimes singly, 8 cm long, fragrant, usually develop before the rainy season. **FRUIT:** Variable pods, flat, oblong to 10 cm, **tapering both ends**, often constricted between seeds, soft grey-yellow becoming **papery brown, veins prominent, splitting** to release usually 3–5 greenish brown, flattened seed with a circular outline.

ECOLOGY: A common acacia in dry parts of Africa and Asia. Found from West Africa and North Africa south to South Africa. Widespread in most arid and semi-arid zones of Kenya in dry *Acacia-Commiphora* bushland, also wooded grassland often found at edges of luggas (dry riverbeds). Very common in the dry northern districts. Often a dominant species on raised rocky ground in very dry areas, 0–1,900 m. Prefers well-aerated soils, especially rocky, loam or sandy soils. Rainfall: 200–800 mm. Agroclimatic Zones III–VII. Flowers in July (Kitui); fruits in August–September (Turkana, Baringo, Ngong); flowers in March–May and seeds in October–November in Bungoma.

USES: Firewood, charcoal, poles, posts, tools, handles, edible gum, medicine (roots), fodder (pods and leaves for camels and goats), bee forage, soil conservation, sand stabilization, fibre, commercial 'gum arabic' (food stabilizer, glue, pharmaceutical uses), veterinary medicine.

PROPAGATION: Direct sowing at site.



Acacia senegal (cont)

SEED: Not a prolific seeder; 8,000–11,000 per kg. Seed susceptible to beetle attack. Germination rate is uniform and good, up to 80–90% after 15 days.

treatment: Soak seed in cold water for 24 hours or nick seed coat. Treatment not necessary when seeds are sown fresh.

storage: Seed store well. Prolonged storage increases seed-coat dormancy.

MANAGEMENT: Slow growing in arid lands; lopping, coppicing, pruning and appropriate injury for production of gum arabic.

REMARKS: Clear to pink or yellow edible gum produced when the tree bark is wounded. It is picked and eaten casually by people living in the dry north of Kenya, and extensively cultivated in Sudan for its gum, which may ooze out spontaneously during periods of stress, or a long strip of bark is removed to induce exudation. Gum production is best when the tree is grown on poor soils.

This gum is the commercial gum arabic. Gum arabic contains neutral sugars (rhamnose, arabinose and galac-

tose), organic acids and mineral salts and has numerous applications in the food industry. It is also used widely in the manufacture of dyes, polish, glue, thickeners in confectionery and the manufacture of emulsions and tablets.

The tree has extensive, long surface roots that absorb water from showers, but also a deep taproot. It is very drought resistant and therefore useful for afforestation and soil stabilization in arid lands. The species is extremely variable with at least 3 varieties in Kenya. It often hosts the root parasite *Hydnora abyssinica*.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Backes and Ahenda, 1998; Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Blundell, 1987; Dharani, 2002; Fichtl and Adi, 1994; ITDG and IIRR, 1996; Katende et al., 1995, 1999; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; National Academy of Sciences, 1979, 1980; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Ruffo et al., 2002; Sommerlatte and Sommerlatte, 1990; von Maydell, 1990.

Acacia seyal**Indigenous**

COMMON NAMES: **Boran:** Waachu adi, Waachu hallu; **English:** White-thorn acacia, White thorn; **Gabra:** Iddado; **Ilchamus:** Lera; **Kamba:** Mweya, Kisewa (Machakos); **Kikuyu:** Mugaa; **Kipsigis:** Mugurit; **Luhya:** Okulu; **Luhya (Bukusu):** Kumunyanya; **Luo:** Alii; **Maasai:** Olerai, Elereta, Elereta nanyokie, Oljerai (Ngong), Olerai oibor; **Marakwet:** Rena; **Mbeere:** Mureera; **Nandi:** Murigat; **Pokot:** Chooch, Chowogh, Rena; **Rendille:** Fulai; **Somali:** Fulay; **Swahili:** Mgunga; **Teso:** Ekoromai; **Turkana:** Echekereng, Ekoramait; **Wardai:** Kigaba gaolo.

DESCRIPTION: Thorny medium-sized tree up to 10 m high with an open flat-topped crown at maturity. **BARK:** Distinctive powdery greenish white to pale green or orange-red. **THORNS:** Diverging pairs, white, stout, to 8 cm, sometimes smaller or none. Some trees bear ant galls. **FLOWERS:** In very many bright yellow to orange round, fluffy heads; fragrant. **FRUIT:** Narrow, curved, shiny light brown pods, in bunches, slightly constricted between seeds, splitting on the tree.

ECOLOGY: A typical savanna acacia. Widespread in semi-arid areas of Africa from Senegal to Egypt south to Malawi and Zimbabwe. Found in Kenya in open or bushed grassland and woodland, especially at the foot of hills and on plains, often as the dominant tree. Thrives in seasonally flooded plains with black-cotton soil and in river valleys, 200–2,200 m; most common at about 1,500 m. Common also on rocky soils, less frequently on red soils. Agroclimatic Zones III–V. Flowers in September–October (Naivasha, Narok, Kajiado) and February–March (Mwingi, Kitui). Flowers in March–May, August–November and seeds in November–March in Bungoma.

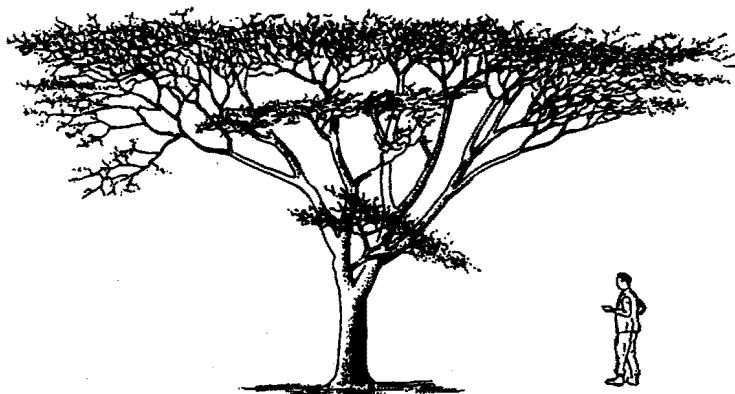
USES: Firewood, charcoal, poles, posts, edible gum, edible inner bark, drink (tea from ground bark), medicine (bark), fodder (leaves, pods, flowers, also bark in dry season, mainly for goats and camels), bee forage, nitrogen-fixing, windbreak, dead fence (thorny branches), gum, tannin, dye (ground bark).

PROPAGATION: Seedlings, wildings, direct sowing at site; produces root suckers.

SEED: 15,000–22,000 seeds per kg. Germination rate: 70–80%.

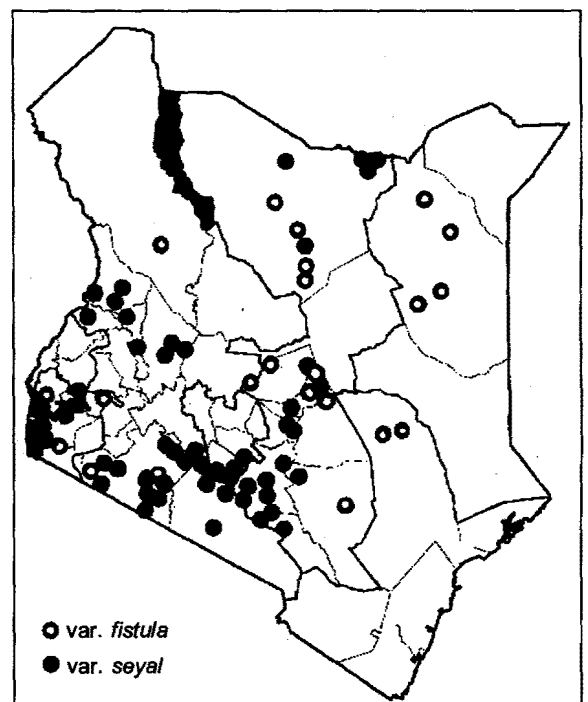
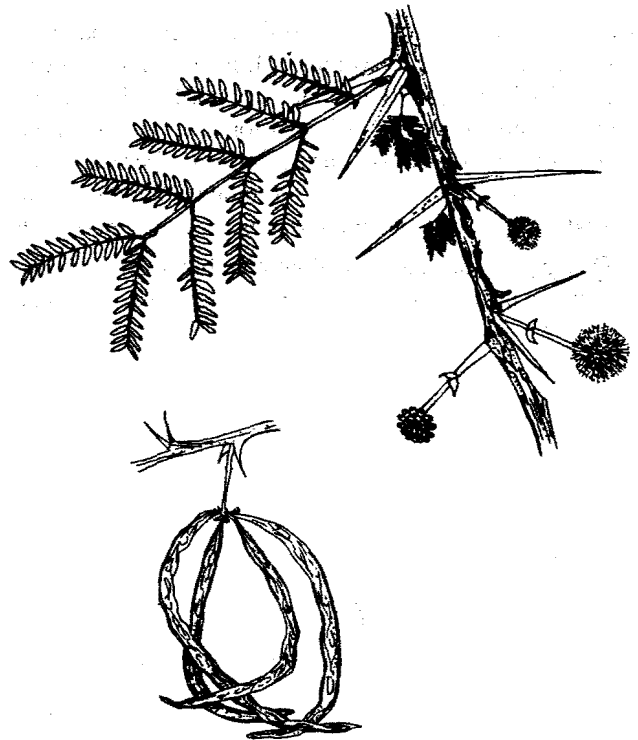
treatment: Not necessary for fresh seed. For stored seed, nick or soak in cold water for 24 hours.

storage: Seed can be stored for long periods if kept free of insects.

**Fabaceae (Mimosaceae)**

MANAGEMENT: Medium to fast growing; lopping, pollarding, coppicing, pruning.

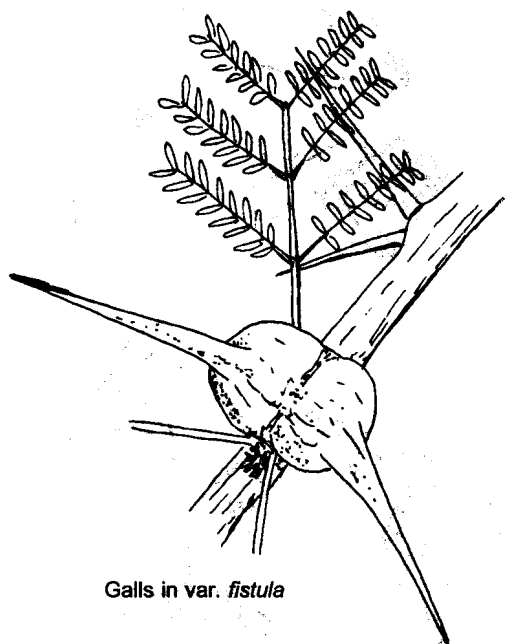
REMARKS: The tree produces a clear edible gum sold to generate income, although of less value than that of *A. senegal*. A local wood preservative called 'asal' is derived by boiling the bark in water. In the Luo community it is believed that planting the tree within the homestead causes the elder wife either to die or to remain childless. The Boran extract a red dye from the bark.



***Acacia seyal* (cont)**

Two varieties of this species occur in Kenya: var. *seyal* is the more common and has no galls, while var. *fistula* (Boran: Waachu dima; Somali: Fulay wajol; Tugen: Lelnet) has ant galls.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Backes and Ahenda, 1998; Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Blundell, 1987; Dharani, 2002; Fichtl and Adi, 1994; Katende et al., 1995; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; National Academy of Sciences, 1979, 1980; Noad and Birnie, 1989.



Galls in var. *fistula*

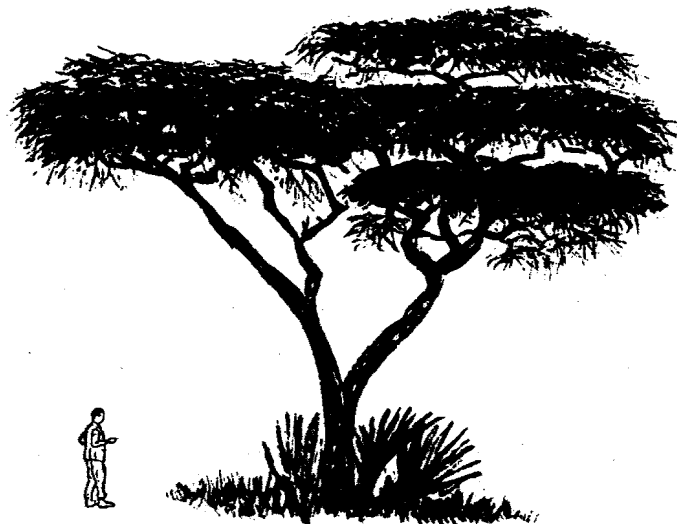
Acacia tortilis**Indigenous**

COMMON NAMES: **Boran:** Dadach, Dadacha; **Daasanach:** Seechgeebe, Sies-geebe (plural); **English:** Umbrella thorn; **Gabra:** Daddach, Diaddaca; **Ilchamus:** Lkunyi, Ltepes; **Kamba:** Muaa, Mulaa; **Kipsigis:** Chebitet; **Luo:** Otiep; **Maasai:** Oltepesi, Sagararam (fruit); **Malakote:** Dadacha; **Marakwet:** Ses; **Mbeere:** Mugaa; **Nandi:** Sesya; **Orma:** Dabaso, Dadech, Gudis (young); **Pokot:** Ses, Sesoy (plural); **Rendille:** Dahar, Gahar; **Samburu:** Ltepes; **Somali:** Abaa, Abak, Qura; **Swahili:** Mgunga, Munga; **Tharaka:** Mugaa; **Tugen:** Sesya, Sesiet, Sisiet; **Turkana:** Ewoi, Etir (young); **Wardei:** Abaq.

DESCRIPTION: A spiny acacia, usually 5–8 m high in dry land but attaining a height of up to 20 m in riverine vegetation. Crown narrow when young, spreading, flat-topped or umbrella-like at maturity. **BARK:** Longitudinally fissured, dark grey. **THORNS:** Pairs of small hooked thorns, also pairs of long white thorns to 8 cm, sometimes mixed pairs. **FLOWERS:** In white-to-cream heads, fragrant. **FRUIT:** Greenish yellow to yellow-brown pods, each containing up to 10 brown seeds, hang in dense bunches spirally twisted, sometimes in rings. Seeds smooth, greenish grey.

ECOLOGY: A common acacia in most of dry Africa from North and West Africa to South Africa. Widespread in lowland arid and semi-arid areas of Kenya, particularly in the northern and eastern parts. Dry bushland, bushed grassland, wooded grassland, riverine vegetation, along luggas, and in arid scrub. Tolerates a wide range of soils, from sandy, silty to black-cotton soils. May be dominant on dry red soils and prefers slightly alkaline conditions. Often in stands along rivers, 0–1,650 m. Can grow in shallow soils. Among the most drought-resistant of the acacias in Kenya, it produces enormous, deep roots (up to 35 m deep) penetrating a wide area to collect water. Rainfall 150–900 mm. Agroclimatic Zones IV–VII. Flowers in February (Mwingi); fruits in September–October (Machakos, Kajiado, Kitui, Tharaka).

USES: Firewood, charcoal, timber, poles, edible pods, medicine, fodder (pods and leaves, especially for goats and camels), bee forage, shade (meeting place for Turkana), ornamental, dune fixation, nitrogen-fixing, soil conservation, fibre (strings made from bark), live fence, tannin, dye, thorn used as pins or needles, veterinary medicine.

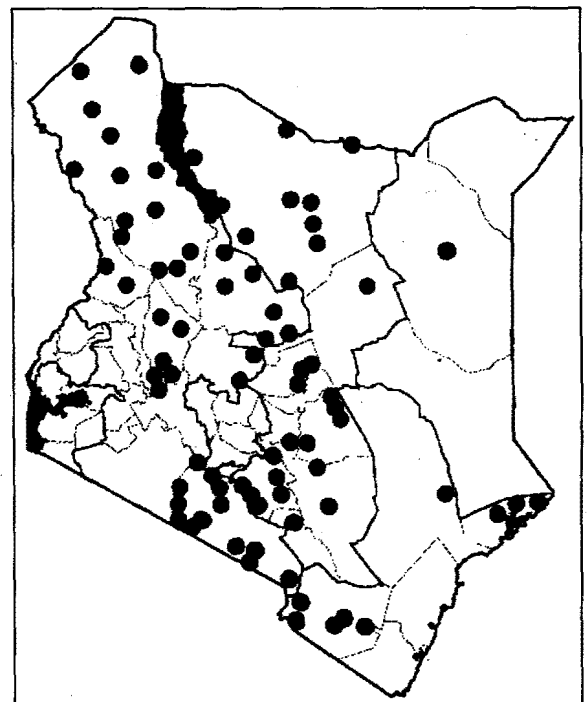
**Fabaceae (Mimosaceae)**

PROPAGATION: Seedlings, wildings, direct sowing at site.

Seeds taken straight from the pod seldom germinate due to seed dormancy.

SEED: Smooth, greenish; 21,000–31,000 seeds per kg.

Germination rates up to 80–90% if pre-treated but germination may be slow, within 30 days. Beetle infestation lowers germination rate.



***Acacia tortilis* (cont)**

treatment: Dormancy is broken when seeds pass through an animal gut or by bushfire or hot-water treatment. Immerse in hot water, allow to cool and leave to soak for 24 hours. Nicking the distal end of the seed is another option. Immersing in cold sulphuric acid for one hour or in hot sulphuric acid for 3–5 minutes is also very effective.

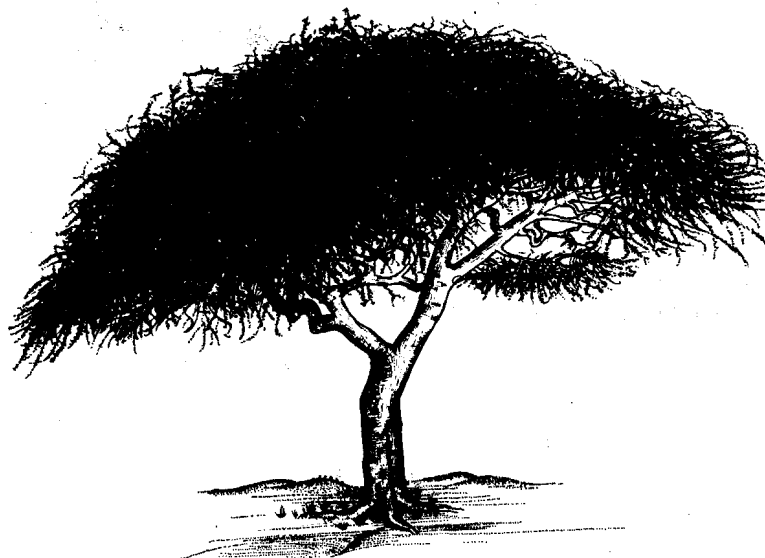
storage: Seed can be stored for long periods. Add ash to reduce insect damage.

MANAGEMENT: Slow growing but may grow relatively fast on dry sandy soils if weeding is done and goats are kept away. Withstands moderate lopping. Does not coppice well, prune when young.

REMARKS: Often indicates the tree limit into desert areas. Pods very popular feed for livestock. They are collected and stored for dry-season fodder and even sold in northern Kenya for livestock feed. Dry pods are edible (Turkana, Daasanach, Pokot, Maasai, Somali, Gabra). The gum is also eaten (Pokot, Turkana, Somali) but is of

inferior quality, sticky and may cause choking. Should not be planted near homes because of its thorns and the likelihood of attracting caterpillars that feed on the tree at certain seasons. Protection of some areas for some time to give young plants time to grow above the reach of goats may be the simplest way to propagate this useful tree. This is the most important acacia among the pastoral communities. Two subspecies occur in Kenya: subsp. *spirocarpa* (fruit rather hairy, most common) and subsp. *raddiana* (fruit non-hairy and non-glandular; coastal islands of Faza and Manda and along the Kenya coast, Somalia to North Africa).

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Dharani, 2002; Fichtl and Adi, 1994; ITDG and IIRR, 1996; Katende et al., 1995; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; National Academy of Sciences, 1979, 1980; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Storrs, 1979; van Wyk, 1998; von Maydell, 1990.



Acacia xanthophloea

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: **Boran:** Hwacho dima; **English:** Fever tree, Yellow-barked acacia, Naivasha thorn; **Kamba:** Kimweya, Musewa, Mwea, Mweya; **Kikuyu:** Murera; **Kipsigis:** Ochmnyalilit; **Luo:** Kuth ataro; **Maasai:** Olerai; **Marakwet:** Reno; **Meru:** Murera; **Taveta:** Mwelela.

DESCRIPTION: A large tree to 25 m with a flat crown and light foliage. **BARK:** This acacia is easily recognized by its **yellow-green bark**, smooth and powdery, cracked when older. **THORNS:** Conspicuous when young, straight, white, in pairs, up to 10 cm long. May be missing in old branches. **FLOWERS:** Round heads, white, or pink in Kenya. **FRUIT:** Yellow-brown pods, to 13 cm, flat, slightly constricted between seeds, breaking into segments.

ECOLOGY: A tree found from Kenya south to South Africa. Often many grow together where the groundwater table is high, beside lakes or rivers, 600–2,300 m, often on black-cotton soil. Can be grown as an ornamental in much drier soils. Found mainly inland but not recorded in the Lake Victoria basin, or in extreme northern and eastern parts of Kenya. Only riverine in very dry areas. Very common around Nairobi, Naivasha, Kajiado, Nakuru and Narok. Agroclimatic Zones III–V.

USES: Firewood, charcoal, timber, poles, posts, edible gum, inner bark chewed, medicine (bark), fodder (foliage and pods), bee forage, ornamental, nitrogen-fixing, river-bank stabilization, dead fence (dry branches).

PROPAGATION: Seedlings, wildings, direct sowing at site.

SEED: Germination is good and fairly uniform, reaching 70% after 14 days; 24,000–30,000 seeds per kg.

treatment: Not necessary for fresh seed. Stored seed should be soaked in cold water for 24 hours or nicked at the cotyledon end.

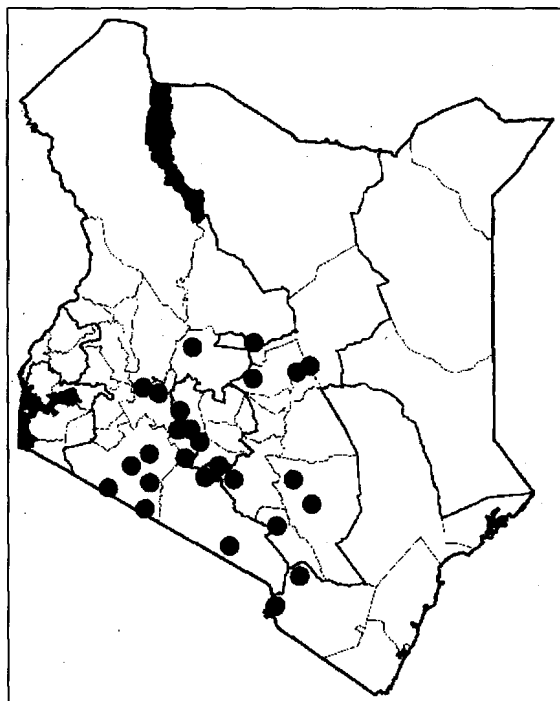
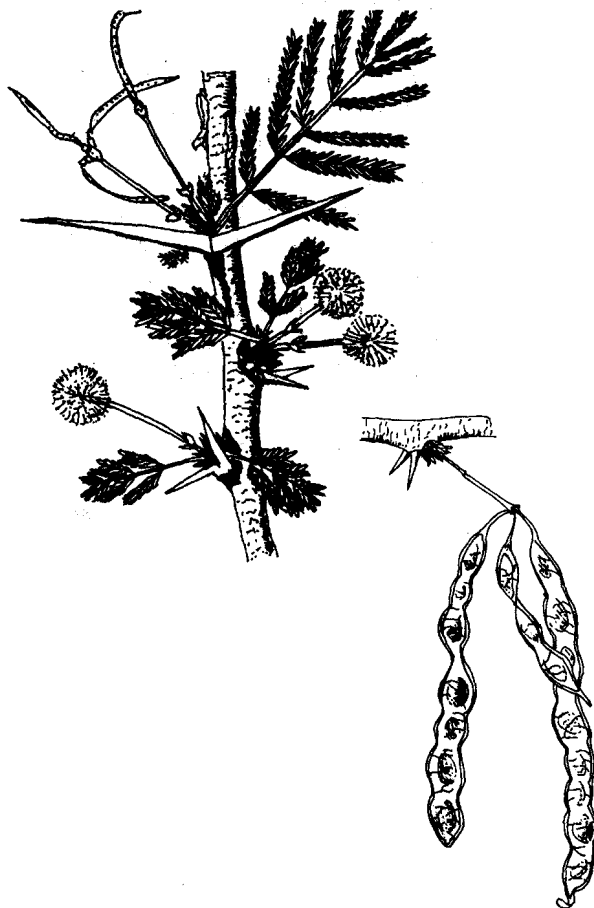
storage: Seed very susceptible to insect damage.

MANAGEMENT: A fast-growing tree. Lopping, pruning and thinning in pastures. Also tolerates pollarding.

REMARKS: Bark extract traditionally used for malaria treatment. A useful tree for protection of watercourses.

Good in pastures due to its light crown. The wood is susceptible to attack by wood borers. Planted at the coast as an ornamental.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Beentje, 1994; Dharani, 2002; Mbuya et al., 1994; Noad and Birnie, 1989; Maundu et al., 1999; Palgrave and Palgrave, 2002; van Wyk, 1998.



***Acokanthera oppositifolia* (A. longiflora)**

Apocynaceae

Indigenous

COMMON NAMES: **Kamba:** Mukweo, Muvai wa ngo, Ngweo (fruit); **Kikuyu:** Kiruru, Kiururu, Mururu; **Maasai:** Olmorijoi; **Mbeere:** Mururu; **Meru:** Mururu; **Swahili:** Msunguti; **Taita:** Msungusungu, Usungu; **Taveta:** Rumbara.

DESCRIPTION: An evergreen shrub, forest scrambler or small tree, normally 3–5 m high with **white latex and reddish branchlets**. **BARK:** Grey, rough, deeply fissured in older trees. **LEAVES:** Opposite, **shiny**, to 13 cm long with a sharp tip, veins conspicuous. **FLOWERS:** In clusters, made up of 5 parts, with a pink tube and white lobes, sweet smelling. **FRUIT:** Oval, 2–3.5 cm long, green with purple tinge turning red or purple and fleshy when ripe.

ECOLOGY: Distributed from southern Kenya and Democratic Republic of Congo south to South Africa. In Kenya, for example, in Taita, Kajiado, Kanzalu Range and Kalama (Machakos), Kiambu and around Nairobi. Bushland (especially on rocky hillsides) and riverine forest edges and margins of dry highland forests and forest remnants, usually from 1,000 m (rarely lower) up to 2,400 m. Thrives in rocky soils, red clay and clay-loam with rainfall 600–1,000 mm. Uncommon. Agroclimatic Zone III. Fruits in February–March (Machakos).

USES: Edible fruit (when ripe), shade, ornamental, live fence.

PROPAGATION: Seedlings, wildings.

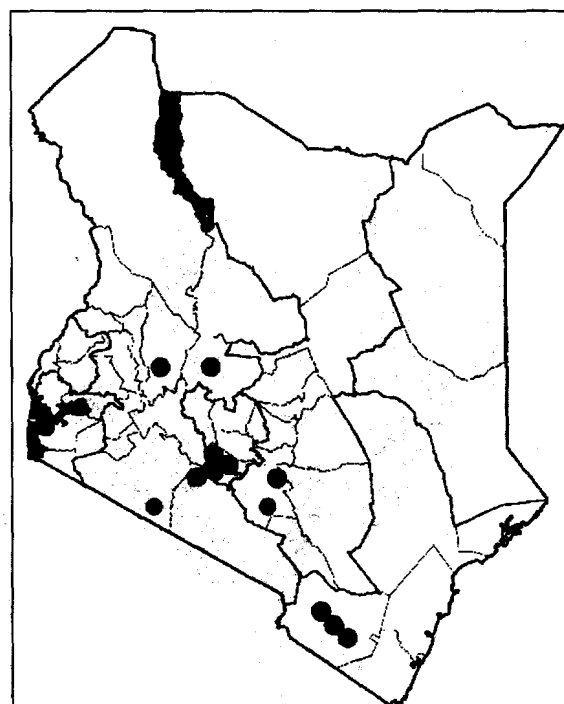
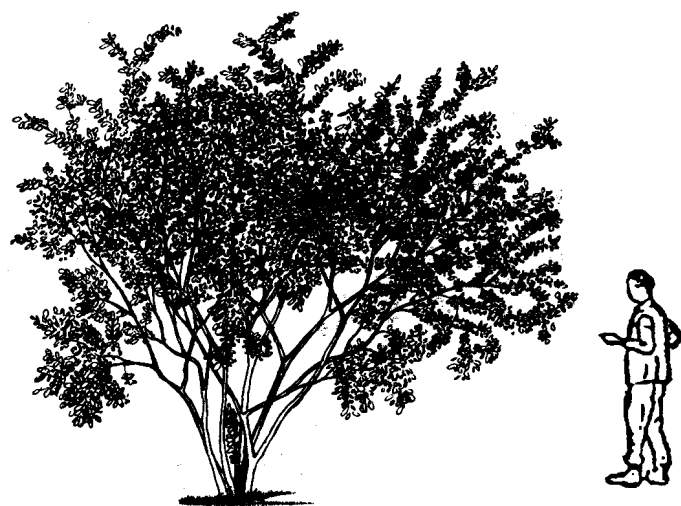
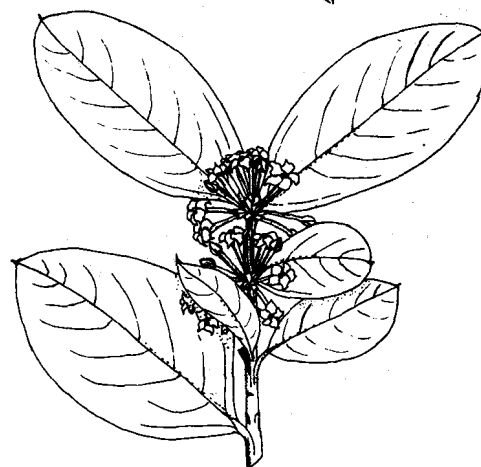
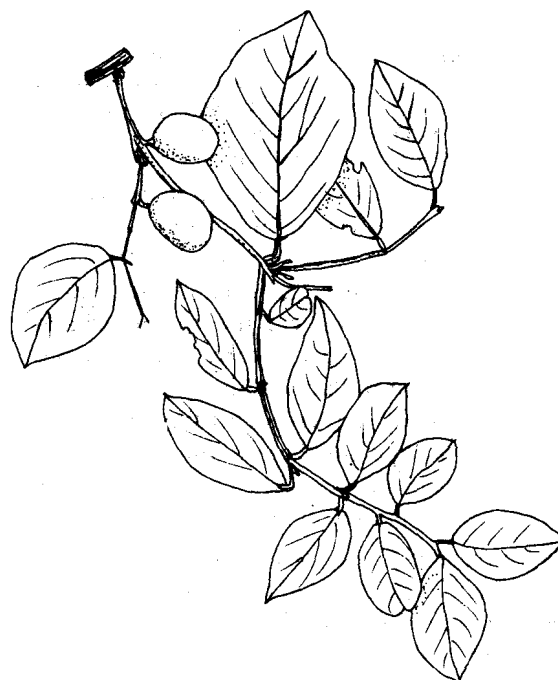
SEED:

treatment: Not required, seeds should be sown fresh.

storage: Seeds have a high natural water content and therefore lose viability if stored.

REMARKS: Usually with fruits and leaves larger than those of *A. schimperi*. Plant roots and other plant parts may be poisonous. Fruit edible, but only when ripe, sweet but rather bitter. Latex from fruit used as chewing gum by children. Its large shiny leaves, numerous pinkish white and fragrant flowers and the purplish red fruits render this species an ideal ornamental.

FURTHER READING: Beentje, 1994; Dharani, 2002; Kokwaro, 1993; Noad and Birmie, 1989; Palgrave and Palgrave, 2002; Ruffo et al., 2002.



Acokanthera schimperi* (A. friesiorum)*Apocynaceae****Indigenous**

COMMON NAMES: **Boran:** Karraru; **English:** Arrow-poison tree; **Gabra:** K'arraaru; **Giriama:** Utungu; **Kamba:** Kivai; **Kikuyu:** Muricu; **Kipsigis:** Keliot, Kelyot; **Maasai:** Olmorijoi; **Meru:** Mururu; **Nandi:** Keliot; **Pokot:** Kolion, Kolyon; **Samburu:** Ilmorijoi; **Somali:** Get mariid; **Tugen:** Kelyon, Kelwon.

DESCRIPTION: An evergreen shrub or small tree to 10 m with a dense rounded crown and a short bole. **BARK:** Dark brown, grooved with age, young twigs flattened. **LEAVES:** Opposite, dark shiny green above, stiff and leathery, oval to rounded, 4–7 cm, the tip pointed and sharp. **FLOWERS:** Appearing with early rains, in dense, fragrant clusters, almost stalkless, white–pink tubular. **FRUIT:** Oval berries to 2 cm, green, turning green–yellow to purple, on ripening the ripe fruit is edible and also eaten by birds and monkeys. Seeds are cream with an ivory appearance, compressed on one side.

ECOLOGY: Widespread in East Africa and south to Zimbabwe, Mozambique, Swaziland and north-eastern South Africa. Grows in Kenya in bushland on rocky hillsides, especially on red or black rocky soils, e.g. at Muumandu (Machakos), Ongata-Rongai, Oloosaiyeti Hill (Kajiado), Rumuruti (Laikipia), Loita and Chepelion (north Baringo). Found in dry woodland, thickets and grasslands, often at the margins of dry forest or forest remnants, as at Ngong. Prefers rich well-drained forest soil but also grows on black-cotton soil and poor soils of dry sites, 1,100–2,400 m. Common in dry highland forests and bushed grasslands. Rainfall: 500–900 mm. Agroclimatic Zone III. Fruits in February–March (Machakos).

USES: Spear shafts, edible fruit (when ripe), shade, ornamental, veterinary medicine, arrow poison.

PROPAGATION: Seedlings.

SEED: Seed germination is good but sporadic; 400–450 seeds per kg.

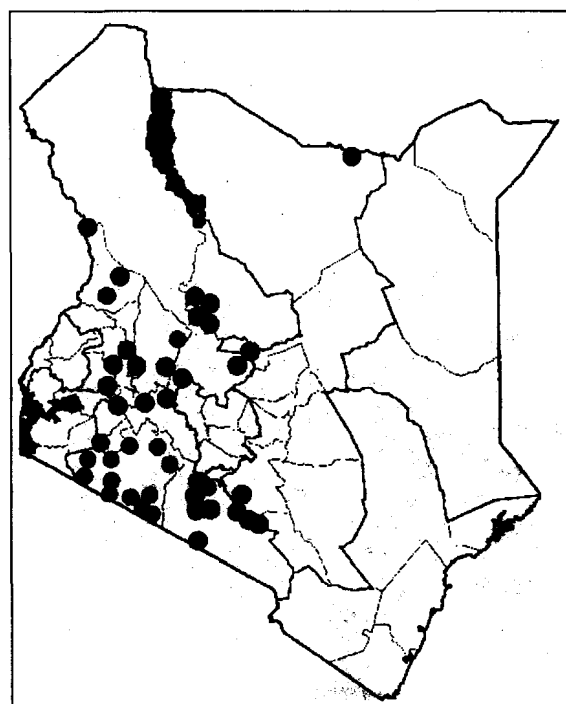
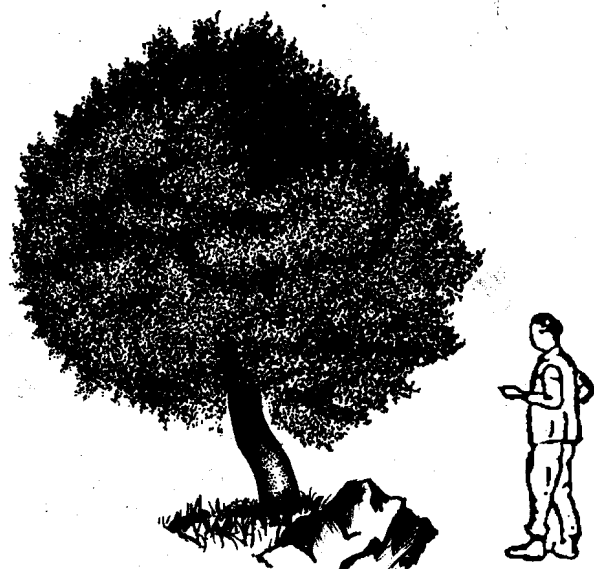
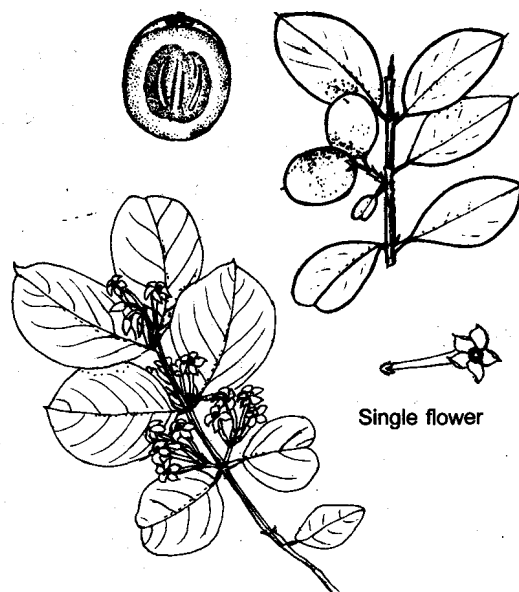
treatment: None.

storage: Seeds have a high natural water content and therefore lose viability if stored.

MANAGEMENT: The growth rate is medium; pruning.

REMARKS: A species more widespread and better known than *A. oppositifolia*. This is the plant used to make arrow poison (Pokot, Kamba, Kipsigis, Embu, Tharaka, Maasai) and by many other communities in Central, eastern and southern Africa. Roots (or other parts of the plant) are boiled in a secluded place for up to 10 hours when the poison is prepared. Ripe fruits are edible. They are sweet with a slightly bitter taste, but should be eaten only when ripe. Otherwise the whole plant is poisonous. Birds have been known to drop dead on sucking nectar from the flowers.

FURTHER READING: Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Blundell, 1987; Dharani, 2002; ITDG and IRR, 1996; Katende et al., 1995; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Ruffo et al., 2002.



Acrocarpus fraxinifolius

India, South East Asia

COMMON NAMES: **English:** Indian ash, Shingle tree.

DESCRIPTION: A very large deciduous or semi-deciduous tree, to 40 m, with a clean, usually straight trunk. **BARK:** Pale grey, rather smooth, buttressed, trunk and branches bear leaf scars. **LEAVES:** Large, compound (twice-divided) in distinctive fan shapes to 1 m, leaflets oval, wavy and pointed to 14 cm, thin and shiny. **Young red leaves** look like blossoms. **FLOWERS:** Appear on the bare tree along the branches and twigs, up to 20 dense heads hang down from branch ends, each 12 cm long, dripping nectar from the red-green or scarlet flowers, short-lived. **FRUIT:** Big bunches of dark brown flattened pods persistent on the tree. They split easily.

ECOLOGY: An Asian tree widely planted in tropical areas in Asia, Africa and Latin America. Also widely planted in eastern and southern Africa, originally introduced as a plantation shade tree. Does best with good rainfall at medium altitudes to 1,900 m, but will stand some drought. Prefers red soils. In Kenya, it is mainly grown in urban areas and quite common in Nairobi. Agroclimatic Zones II–V. Seeds in February–March (Machakos).

USES: Firewood, timber (boxes, light construction), furniture, beehives, bee forage, shade, ornamental, mulch, windbreak.

PROPAGATION: Seedlings, wildings.

SEED: 24,000–29,000 seeds per kg. Germination rates up to 60–80% but often much lower.

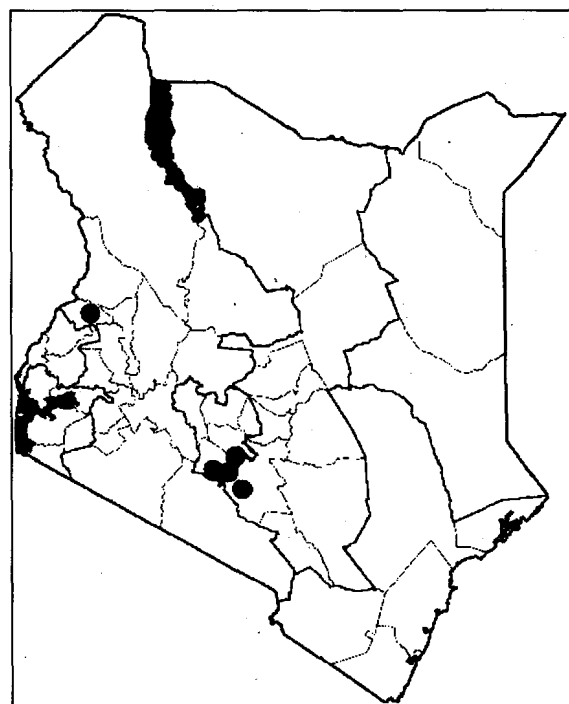
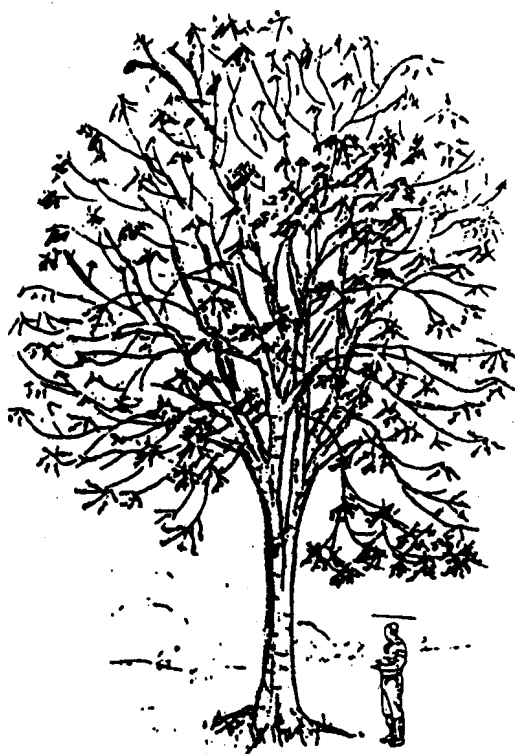
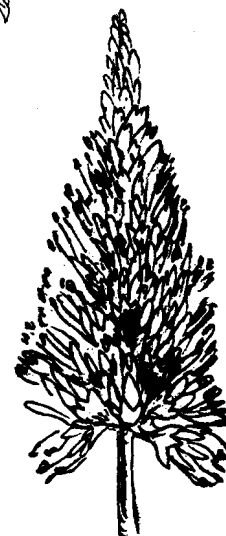
treatment: Nick, or soak seed in cold water.

storage: Seed loses viability gradually during storage. Best to use fresh seed.

MANAGEMENT: Very fast growing, attaining up to 5 m in less than 2 years; pollarding, coppicing.

Caesalpiníaceae (Fabaceae)

Flower head

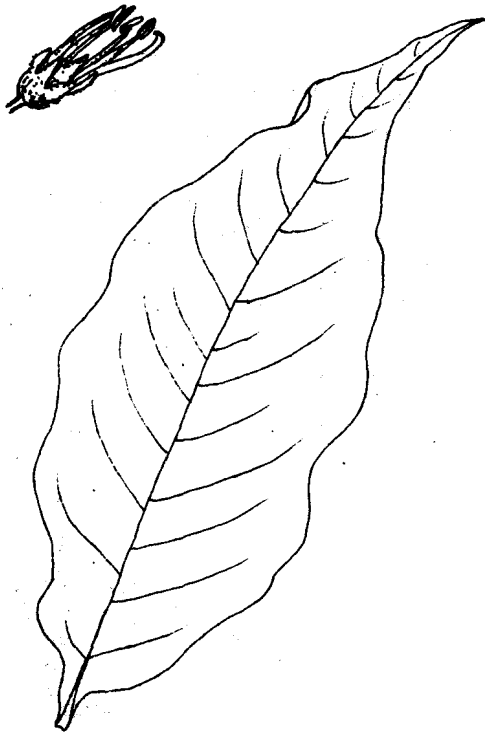


Acrocarpus fraxinifolius (cont)

REMARKS: Young trees may resemble palms due to the single stem and large leaves. The tree should not be planted near houses as dry branches drop off. In addition, it should not be planted in cropland as it competes with crops for nutrients. Young plants susceptible to termite attack. In its original home, the tree is said to reach 60 m

with a massive trunk. The genus *Acrocarpus* consists of only 2 species.

FURTHER READING : <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Dharani, 2002; Katende et al., 1995; Mbuya et al., 1994; National Academy of Sciences, 1979; Noad and Birnie, 1989.



Adansonia digitata**Bombacaceae****Indigenous**

COMMON NAMES: **Bajun:** Muyu; **Boni:** Jah; **Chonyi:** Muyu; **Digo:** Muuyu; **Embu:** Musemba; **English:** Baobab; **Giriama:** Muuyu, Mauyu (fruit); **Kamba:** Muamba, Mwaamba, Namba (fruit); **Maasai:** Olmesera; **Malakote:** Mubuyu; **Mbeere:** Muramba; **Meru:** Muiramba, Muramba; **Orma:** Yak; **Samburu:** Lamai; **Sanya:** Yak; **Somali:** Yak, Yaaq; **Swahili:** Mbuyu, Muuyu; **Taita:** Mlamba; **Tharaka:** Muguma kirindi, Muramba.

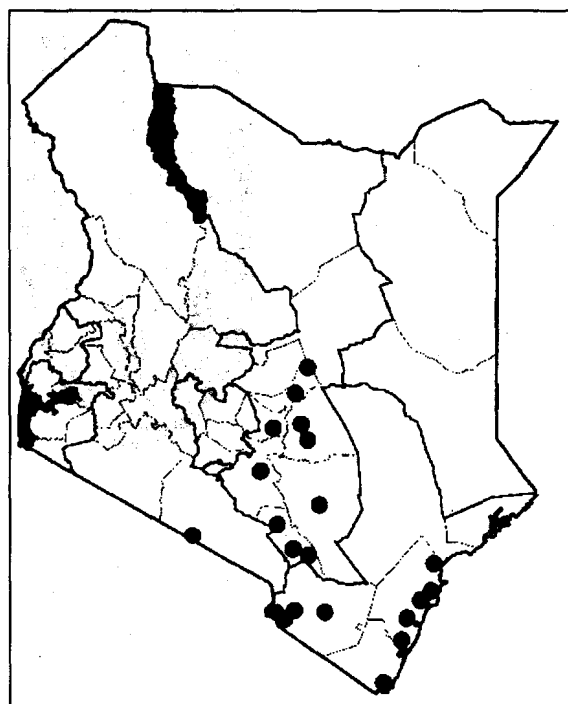
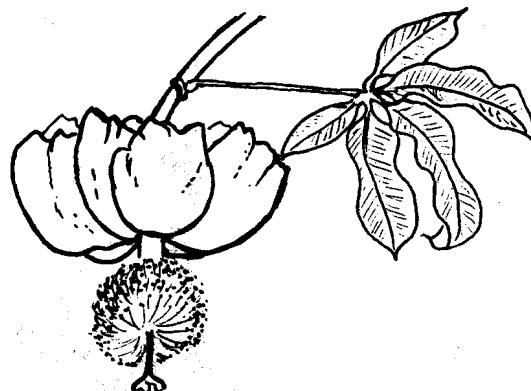
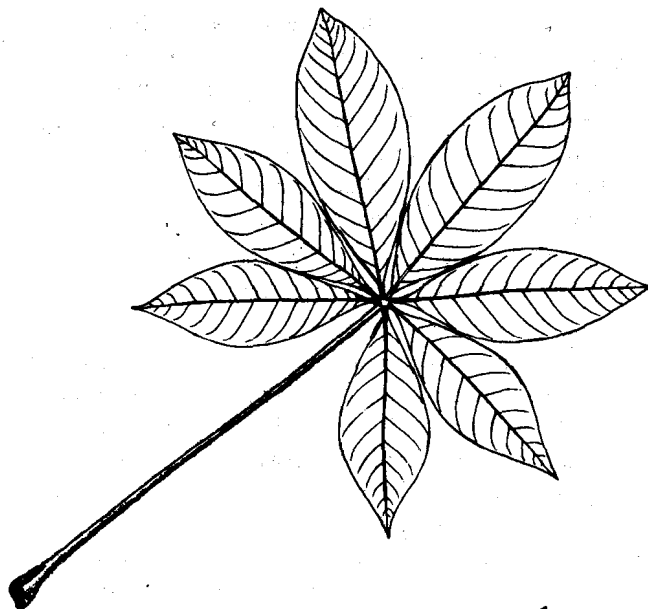
DESCRIPTION: A large deciduous tree with a hugely swollen trunk, and often branching near the ground. The trunk diameter may reach 6 m, the girth 20 m, and up to 20 m high. Bare for up to 9 months, the stiff bare branches resemble roots (upside-down tree). The trunk is sometimes hollow. **BARK:** Smooth, shiny, grey to 10 cm thick, young spongy wood can hold much water.

LEAVES: Seedlings have simple leaves, mature leaves with up to 9 leaflets, usually 5. **FLOWERS:** Large and white, opening at night, the unpleasant-smelling nectar attracts pollinating fruit bats. **FRUIT:** Very big, hairy, yellow-brown capsules, hanging on long stalks, usually on the bare tree. Many seeds embedded in white-pink, dry, edible pulp.

ECOLOGY: A well-known tree of tropical Africa, from West Africa and Somalia to southern Africa. In Kenya, a common tree in the coastal region but it also grows further inland, e.g. Taveta, Kibwezi, south-eastern Makueni, dry parts of Kitui, Meru National Park and at Torosei in Kajiado, 0–1,300 m. Also planted as an ornamental outside this range. Grows in dry low country in *Sterculia–Delonix alata–Acacia–Commiphora* bushland and in low, hot, high-humidity coastal areas. Grows in most well-drained soils, deep rooted, drought hardy, prefers a high water table. Common on red soils, sandy loam and in rocky areas. Rainfall: 300–900 mm. Agroclimatic Zones II–VI.

Uses: Edible fruit pulp (sweet–sour to taste), edible fried seed, vegetable, flavouring (fruits dissolved in water), medicine (bark, roots, fruit juice, leaves), fodder (leaves,

shoots and fruits), bee forage, ornamental, mulch, snares, fibre (ropes, baskets, fibre cloth, musical-instrument strings, waterproof hats), roofing (bark), resin, gum, dye, veterinary medicine, water storage in the trunk.



***Adansonia digitata* (cont)**

PROPAGATION: Seedlings, direct sowing at site.

SEED: Germination is fair but sporadic in up to 3 months; 1,500–2,500 seeds per kg. Germination rates 30–40%; good and well-treated seeds can germinate in 30–50 days. **treatment:** Nick, or pour boiling water over seed, remove at once and cool to room temperature. Naturally the seed may take several years to germinate and be induced by fire, hence the observation that it only germinates after people abandon a current homestead (Giriama). Passing through the digestive tract of large mammals such as elephants also breaks seed dormancy.

storage: Seed can be stored for long periods.

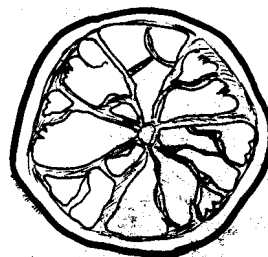
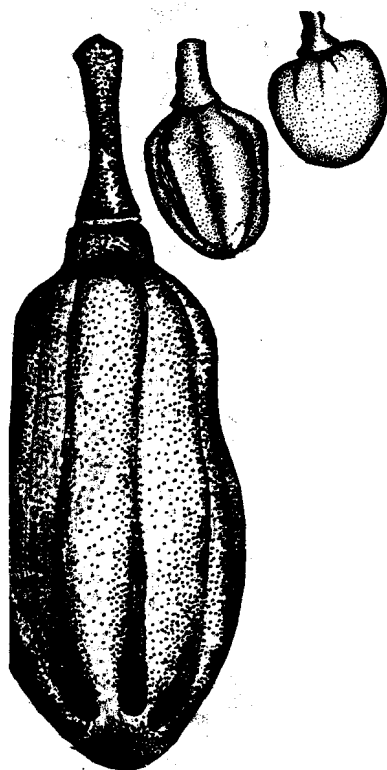
MANAGEMENT: A slow-growing tree. The tree should not be planted near houses. Lateral roots may reach out over 100 m.

REMARKS: The tree is fire resistant. Despite its soft wood, it is one of the longest-living trees in the world—to 3,000 years. The baobab tree is surrounded by myths and beliefs among most peoples in areas where it grows. Fruits and strings have a commercial value. It is said to produce its first fruits after 60 years (Kitui). The dry, cream-coloured pulp is eaten raw or is dissolved in water and used as sauce (*mboga*) or added to sour porridge. Young leaves are used as a vegetable (Giriama, Mbeere).

The pulp-coated seeds (*mabuyu*) are coloured, sugar-coated and sold as sweets in coastal towns (Swahili). Fibre from the trunk is used as a string and for weaving baskets and ropes. The tree is used for placing beehives. Appearance of new leaves or flowers signals the start of the rainy season (Kamba, Mbeere). Fallen trees improve the soil quality considerably and are a substrate for edible mushrooms. Fruit shells are used as firewood, containers, bowls and for making a variety of items, including rat traps (Giriama). The shoots and trunks are eaten by elephants. Fallen leaves are eaten by livestock. Too many baobab trees together in cropland may be a problem as they take up a large amount of space. There are 9 species in this genus, 7 of which are endemic to Madagascar. Two species are found in north-western Australia: *A. gregorii* (Australian baobab or dead rat) has a strong resemblance to the African baobab but does not usually grow as high.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Beentje, 1994; Bein et al., 1996; Bekele-Tesemma et al., 1993; Blundell, 1987; Dharani, 2002; Fichtl and Adi, 1994; ITDG and IIRR, 1996; Kokwaro, 1993; Maundu et al., 1999; Mbuya et al., 1994; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Ruffo et al., 2002; Storrs, 1979; van Wyk, 1998; von Maydell, 1990.

Variation in fruit



Cross-section of fruit

Adenanthera pavonina

Fabaceae (Mimosaceae)

India, South East Asia

COMMON NAMES: **English:** Circassian bead tree, Red sandalwood tree.

DESCRIPTION: A deciduous, spreading tree, 4–20 m, with low leafy branches; hard, reddish heartwood. **LEAVES:** Compound, alternate, to 40 cm, the leaflets oval, 4 cm long, 2 cm wide, the tip rounded, short stalks. **FLOWERS:** Very small, yellow-brown on slender drooping stalks, fragrant. **FRUIT:** Brown, narrow pods, about 20 cm long, curved and bulging with seeds. Pods split into 2 twisted halves to show shiny scarlet seeds against the yellow inner pod. Seeds are flat, like pills, very hard.

ECOLOGY: A thornless tree from India and South East Asia. It has long been planted in the coastal areas of East Africa as an ornamental and shade tree, often naturalized, 0–300 m. Agroclimatic Zones II–III. Flowers in April, pods emerge in June and seeds ripen in September (coast).

USES: Firewood, timber, edible leaves, bee forage, shade, ornamental, beads, tannin, dye (red).

PROPAGATION: Seedlings, cuttings, direct sowing at site.

SEED: Hard seed; about 4,000 seeds per kg. Germination is good, up to 80–90% after only 7 days provided the seeds are treated. Germination of untreated seeds is erratic, may take 12 months.

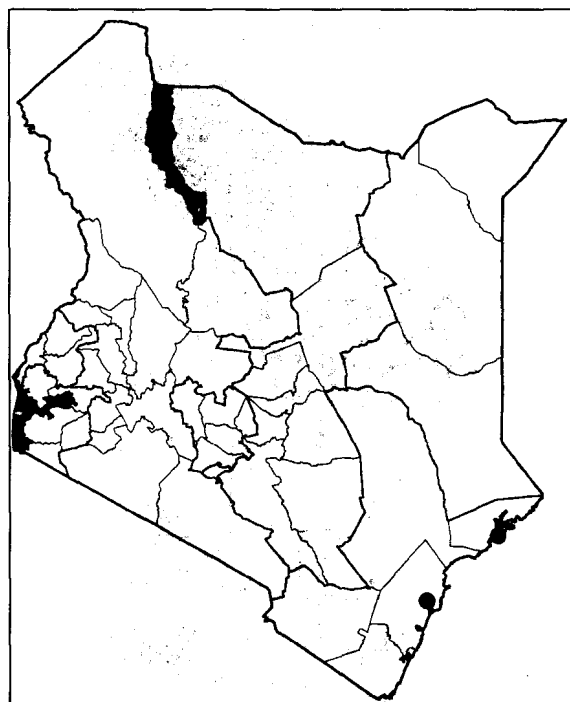
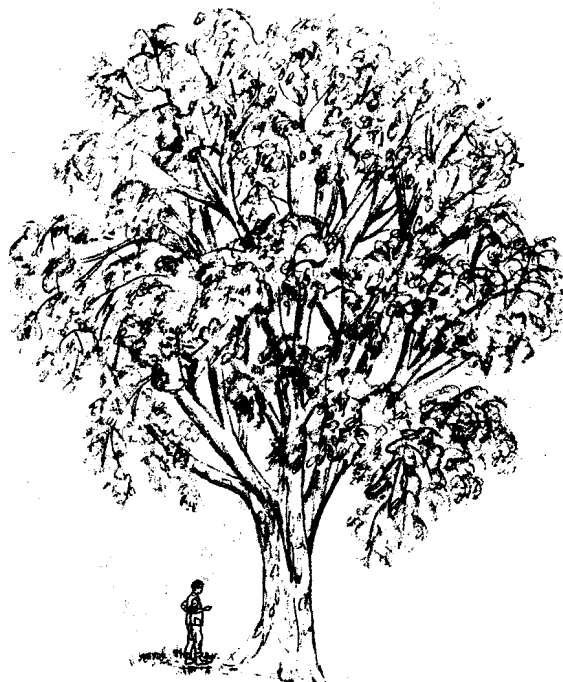
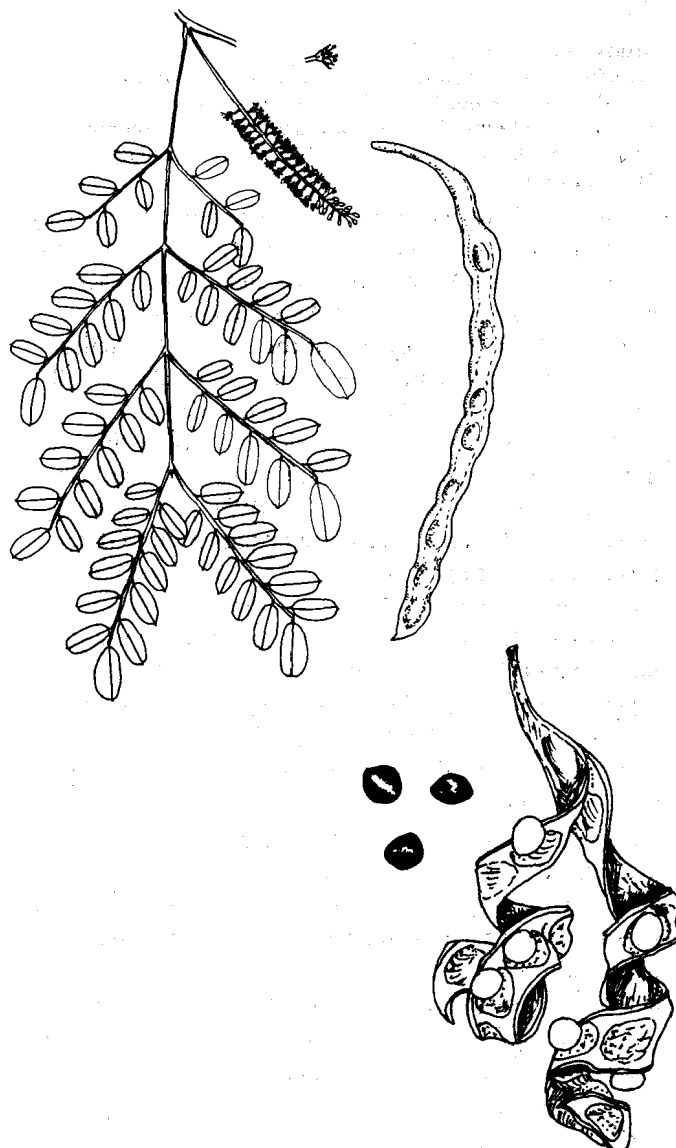
treatment: Nick the hard seed coat, or immerse seed in hot water, allow to cool and soak for 24 hours.

storage: Seed can be stored for long periods.

MANAGEMENT: Fast growing on good sites.

REMARKS: Seeds are used as beads in South East Asia (Circassian seeds) and at one time as weights by goldsmiths, and roasted seeds are eaten. Raw seeds are poisonous. They are high in oil (25%) and protein (39%). The young leaves are used as a vegetable in India. The heartwood is hard and red.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Mbuya et al., 1994.



Adenium obesum

Apocynaceae

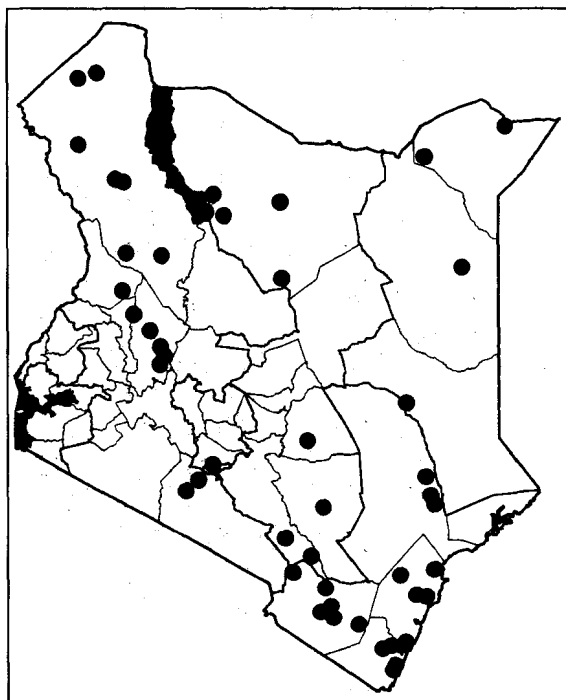
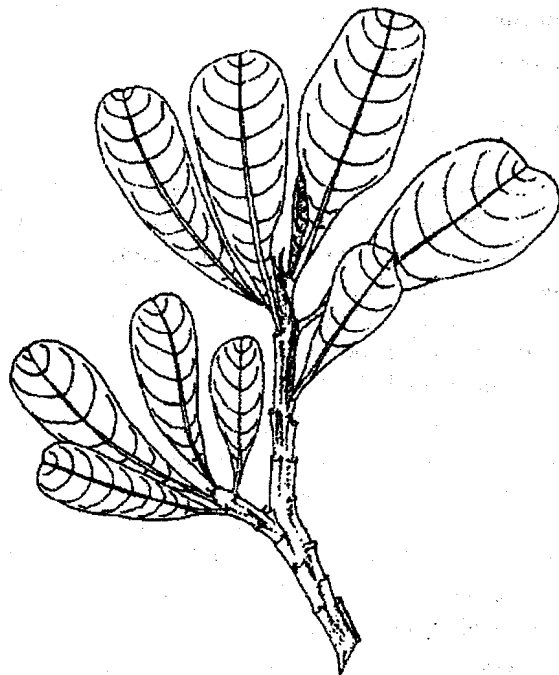
Indigenous

COMMON NAMES: Boran: Obbe; Digo: Mwadiga; Duruma: Mwadiga; English: Desert rose; Gabra: Obbe; Giriama: Mwadiga; Malakote: Tulata; Maasai: Oleteti; Orma: Mukfadjie; Pokomo: Koliya; Samburu: Ipirintai; Somali: Obe, Uba, Feyid, Marud; Swahili: Mwadiga; Taita: Igandaiyu; Turkana: Egales.

DESCRIPTION: A succulent deciduous shrub or tree, usually less than 2 m but may occasionally reach 6 m. The stem-base may be swollen and bulbous and up to 1 m across, branches strong and upright. **BARK:** Grey-green, smooth. **LEAVES:** Crowded at the ends of branches, rather fleshy, shiny dark green to blue-green above, dull below, usually about 12 cm long, tip rounded, often notched or with a sharp point, wider towards the tip then narrowed to the base, veins conspicuous. When cut, clear or white latex drips out at once. **FLOWERS:** Very showy, especially on the bare tree, white or pale pink to deep rose, trumpet-shaped, to 5 cm across, the edge darker pink or red, often tightly wavy; 3–5 flowers together, all parts in 5s. **FRUIT:** Long thin pink-green capsules, in pairs to 24 cm long by 2 cm, tapering at both ends, drying brown. They split to release cylindrical seeds 1 cm long. These have tufts of long silky white or golden hairs at each end so seed is blown along the ground (the hairs acting like 2 wheels on the 'axle' of the seed).

ECOLOGY: A conspicuous succulent plant found from Arabia to South Africa. Widespread in hot areas of Kenya, in dry bushland and coastal hinterland woodland, often on rocky sites and along runnels that have gravel, sand or loam, 0–1,500 m. It sometimes develops a fleshy taproot. Does not tolerate waterlogging. Agroclimatic Zones III–VI.

USES: Medicine (latex and roots), bee forage, ornamental, live fence, arrow poison (sap), fodder, fish poison (pounded roots), rat poison (pounded seeds or roots), veterinary medicine.



Adenium obesum (cont)

PROPAGATION: Cuttings, wildings, direct sowing at site. It is easy to transplant but seeds germinate only if protected against insects. Seedlings are easily killed by over-watering.

SEED: Good germination.

treatment: None.

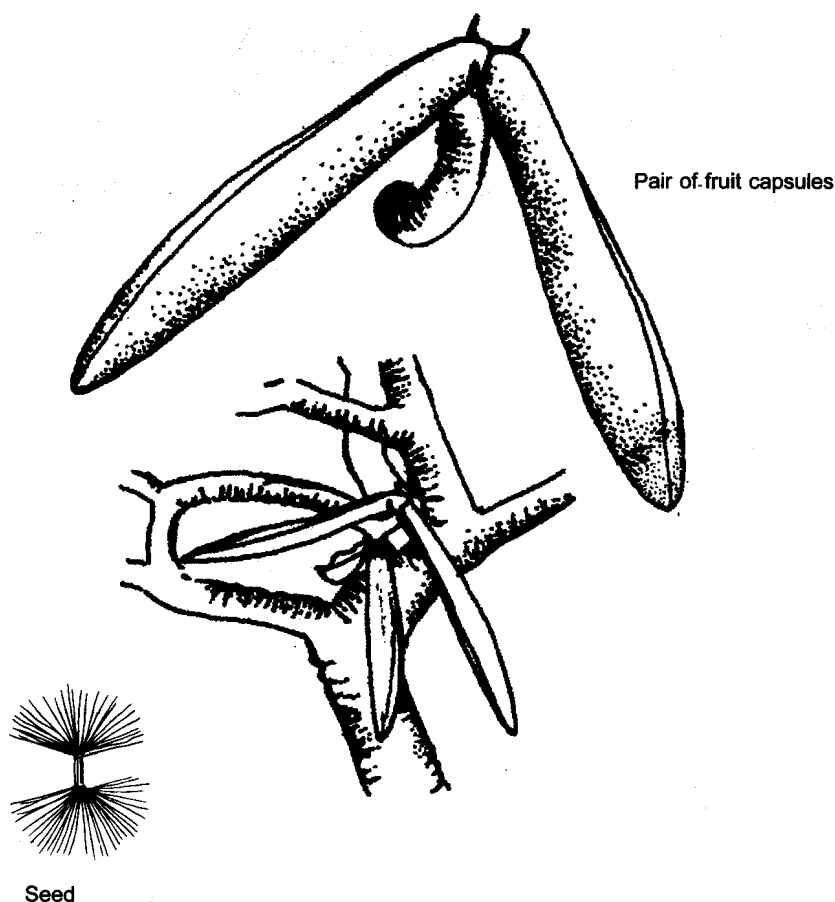
storage: Store in sealed containers in a cool place.

MANAGEMENT: Slow growing. Soil must be very well drained or the stems will rot.

REMARKS: This is a very popular plant in gardens. Planted for its decorative value or for hedges. The sap is used as a component of arrow poison. Latex and roots are used to

treat boils and venereal diseases. All parts may be heavily browsed by game and stock. Caution must be exercised in medical applications since the latex is very poisonous. This plant may easily fall victim to collectors for ornamental purposes and so needs to be protected. The species is very variable along its geographical range, leading some scientists earlier on to consider these variants as separate species. The genus name is derived from its Arabic name *aden*.

FURTHER READING: Beentje, 1994; Blundell, 1987; Dharani, 2002; Fichtl and Adi, 1994; ITDG and IIRR, 1996; Katende et al., 1995; Kokwaro, 1993; Lötschert and Beese, 1983; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; von Maydell, 1990.



Azelia quanzensis**Indigenous**

STANDARD/TRADE NAME: Azelia.

COMMON NAMES: **Boni**: Yam ed; **Digo**: Mbambakofi; **English**: Mahogany bean, Pod mahogany; **Giriama**: Mwamba; **Pokomo**: Mgombakomfe; **Sanya**: Yamicha; **Swahili**: Mbambakofi.

DESCRIPTION: A large spreading leafy semi-deciduous forest tree, usually to 12 m but can reach 20 m. **BARK**: Grey-brown, flaking in large pieces leaving **pale patches below**. **LEAVES**: To 30 cm, divided into 4 pairs of leaflets, each one to 13 cm long, oblong, **tip rounded**. **FLOWERS**: Distinctively **bilobed at apex**, green outside, pink-red inside, 2–3 cm wide, sweet-scented, in small groups on erect heads. **FRUIT**: Dark-brown, flat **woody pods to 3 cm long, 10 cm wide, with shiny black seeds** in a soft orange-red cup at their base (fleshy aril).

ECOLOGY: Distributed from Somalia to South Africa. In Kenya it is only coastal. Typical of coastal forests, including Arabuko-Sokoke, Shimba Hills, Lower Tana, Boni and Witu. Also found in coastal woodland, 0–450 m. Deep roots. Prefers medium light soils. Agroclimatic Zones I–III. Flowers at the coast in March–April, seeds in October–December.

USES: Timber (construction, doors), poles (for main support in houses, very hard), furniture, boat building (canoes and dhows), medicine, shade, ornamental, curios, necklaces (seeds).

PROPAGATION: Seedlings, wildings, direct sowing at site.

SEED: 200–500 seeds per kg. Germination good, reaching 90% after 28 days.

treatment: The aril should be removed, no other treatment needed.

storage: Seed can be stored for up to a year. Add ash to reduce insect damage.

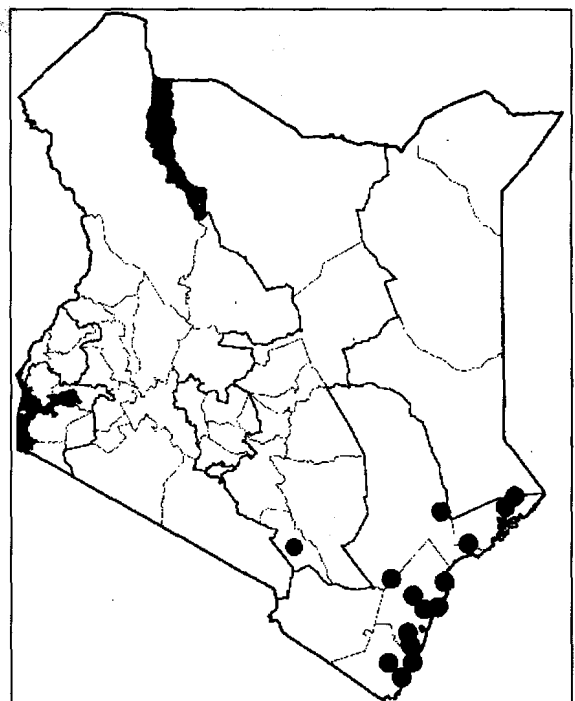
MANAGEMENT: Slow growing, fast at early stages; lopping, pollarding. Prune to give clear bole. It withstands lopping and pollarding but does not coppice.

REMARKS: The wood is termite and fire resistant. The tree is becoming rare in unprotected areas due to exploitation for timber. Timber light brown, hard and heavy. It works well taking a fine polish, durable. An excellent shade

**Fabaceae (Caesalpinaceae)**

tree. Leaves are food for butterfly larvae, reaped by coastal farmers for export.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Albrecht, 1993; Beentje, 1994; Kokwaro, 1993; Mbuya et al., 1994; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Storrs, 1979; van Wyk, 1998.



Albizia amara**Mimosaceae (Fabaceae)****Indigenous**

COMMON NAMES: **Boran:** Boria; **English:** Bitter albizia; **Kamba:** Kiundua, Kiundwa, Kyundua; **Luo:** Ruga; **Maasai:** Orperelon'go; **Pokot:** Panan; **Somali:** Gessreb; **Tharaka:** Mutinda; **Tugen:** Gotutwet, Kotutwo, Kukutwo.

DESCRIPTION: A deciduous tree to 15 m, often smaller, with spreading crown, fairly dense canopy, trunk often crooked, usually single-stemmed. **BARK:** Dark brown, cracked. **LEAVES:** Have a feathery appearance with numerous small leaflets. **FLOWERS:** Numerous, small cream-pink heads, half-spherical about 2.5 cm across. **FRUIT:** Large pods, to 20 cm or more long, 3 cm wide, thin, bulging over few seeds, purple when young, later brown and papery.

ECOLOGY: An attractive deciduous tree found in India and Sri Lanka and in East Africa south to north-eastern South Africa. Widespread in Kenya in bushland, in wooded grassland, bushed grassland, often with *Combretum*, *Terminalia* and *Tarchonanthus*, especially in red and sandy soils, 500–2,000 m. Rainfall: 400–1,000 mm. Agroclimatic Zones IV–V.

USES: Firewood, charcoal, timber (construction), farm implements, furniture, poles, soup additive (wood extract), edible gum, medicine, fodder (leaves), bee forage, ornamental, green manure, nitrogen-fixing, soil conservation, tannin, resin, detergent (roots and leaves), live fence.

PROPAGATION: Seedlings, direct sowing at site.

SEED: 10,000–13,000 seeds per kg. Germination of treated seed is good, up to 80% in 7–10 days.

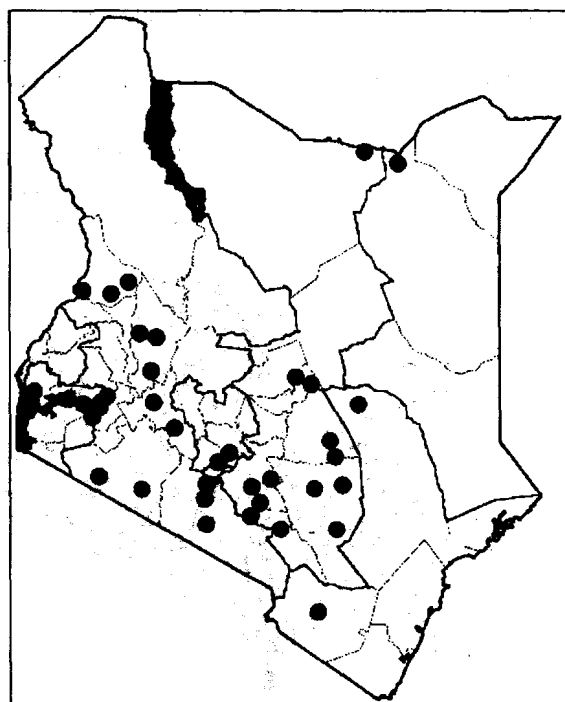
treatment: Immerse in hot water, allow to cool and soak for 12 hours, or nick the seed.

storage: Seed can be stored for long periods but are susceptible to insect damage. Add ash.

MANAGEMENT: Coppicing, lopping, pollarding.

REMARKS: The wood is hard and good for charcoal and firewood and it is an excellent shade tree. Pieces of stem wood are used in the preparation of soup (Maasai). There are 2 subspecies in Kenya: subsp. *amara*, with fewer pinnae (to 12 pairs) and leaflets, is only found in the central and northern parts of Kenya, while subsp. *sericocephala* (numerous pinnae, to 46 pairs) and leaflets (48 pairs) is more widespread in the country.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Beentje, 1994; Bein et al., 1996; Dharani, 2002; Maundu et al., 1999; Mbuya et al., 1994; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Storrs, 1979.



Albizia anthelmintica

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: **Boni:** Hobocho; **Boran:** Hawacho; **Kamba:** Kyowa, Mwowa; **Maasai:** Olmugutan; **Marakwet:** Kitangwa; **Orma:** Habacha; **Pokot:** Kamakitan, Mukotonwo; **Samburu:** Olmukutan; **Somali:** Reidep, Reidup; **Swahili:** Mporojo; **Tharaka:** Mwaawra, Muguta; **Wardei:** Habasho.

DESCRIPTION: A deciduous shrub or, more usually, a small tree about 4 m, but can reach 10 m. **BARK:** Smooth, pale grey, later red-brown, rough. **Branchlets** often sharp-tipped. **LEAVES:** Twice-divided, 2–4 pairs of smaller leaves each with 1–4 pairs of leaflets, 1–4 cm long and almost as wide, the tip wider and usually blunt; clear net veins, shiny above, dull and pale below. The leaf stalk ends in a characteristic stiff, hooked point. **FLOWERS:** Half spherical fluffy heads about 2.5 cm across appear on leafless twigs, white stamens reach beyond the pale green calyx and corolla, 1–2 cm. **FRUIT:** Bright green when young, turning into pale yellow, shiny, papery pods 8–16 cm long, narrowed both ends, containing 3–5 flat, round seeds.

ECOLOGY: A tree widely distributed in Africa from Sudan and Eritrea southwards to Natal and Namibia. In Kenya, widely distributed in drier and hot parts of the country in dry bushland and scrub, often along seasonal rivers, even on lava; locally common. Often on strongly saline deep soils. Very common in Tsavo, lower parts of Kajiado, Kitui, Machakos and along the coast, 0–1,350 m. Less often in wooded or bushed grasslands or woodlands. Agroclimatic Zones III–VI.

USES: Firewood, timber (construction), furniture, medicine (bark as vermifuge), fodder, bee forage, shade, nitrogen-fixing, tannin, veterinary medicine.

PROPAGATION: Seedlings. Regenerates well naturally.

SEED: 10,000–20,000 seeds per kg. Germination rate may be 30% in 3 weeks.

treatment: Fresh seeds do not need pretreatment. With stored seeds, immerse in hot water, allow to cool and soak for 24 hours.

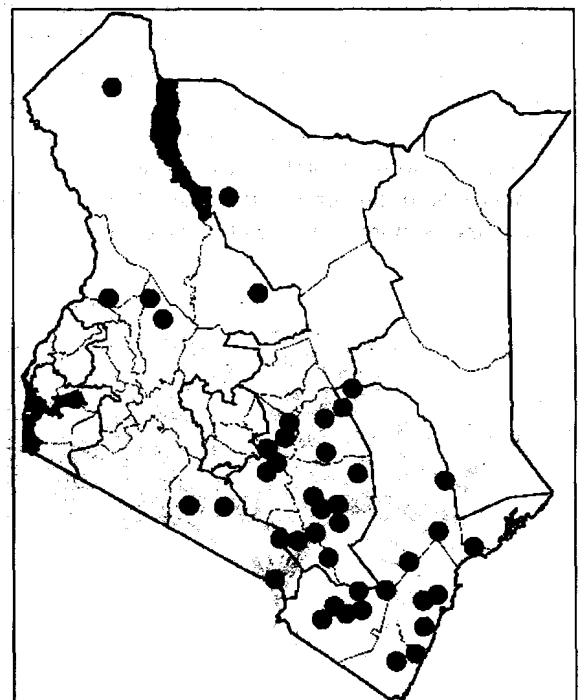
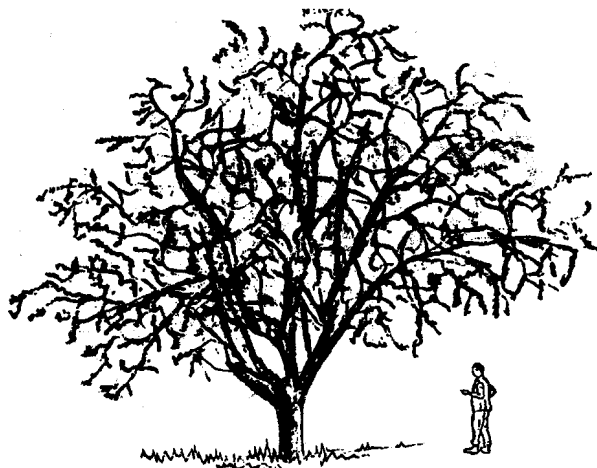
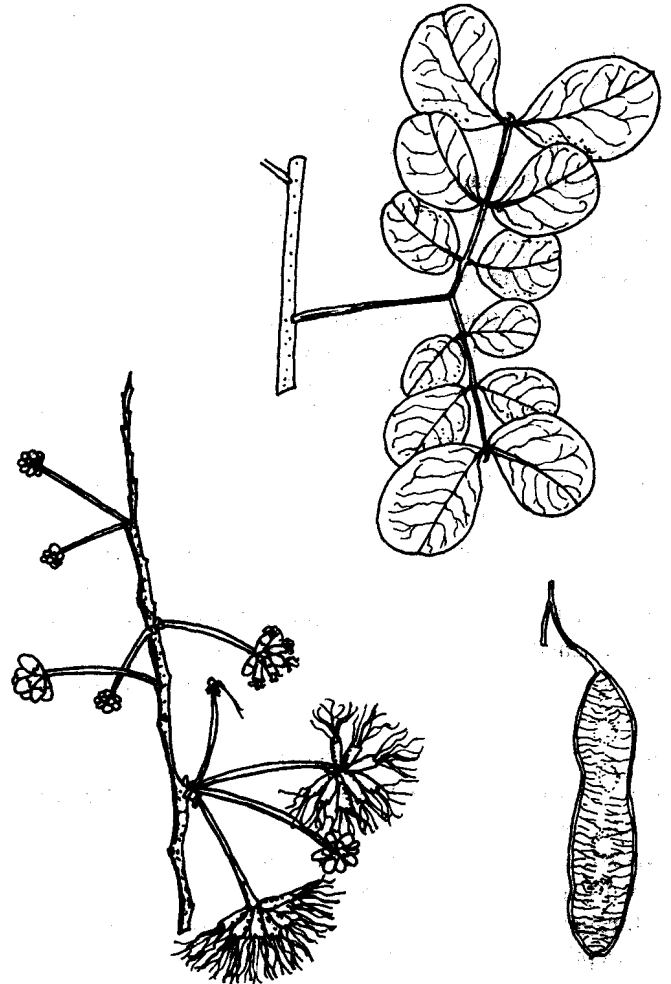
storage: Can be stored for about a year in airtight containers.

MANAGEMENT: Pollarding, coppicing when young.

REMARKS: A bark extract has been used in many areas to expel worms, hence the meaning of the specific name. It

is especially effective against tapeworms. The hard red-brown wood is a useful timber.

FURTHER READING: Beentje, 1994; Bein et al., 1996; Blundell, 1987; ITDG and IIRR, 1996; Kokwaro, 1993; Palgrave and Palgrave, 2002.



Albizia coriaria

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: Luhya: Omubele; Luhya (Bukusu): Kumupeli, Kumuyebeye; Luo: Ober; Teso: Etekwa.

DESCRIPTION: Usually a large, spreading tree to 15 m, often smaller, trunk twisted. **BARK:** Grey-black rough, flaking. **LEAVES:** Bright green when young, leaflets 6–11 pairs, to 3 cm long, oblong, tip rounded. **FLOWERS:** Very many, sweet-smelling, pink-white, half-spherical heads, stamen threads red above, white below. **FRUIT:** Flat purple-brown pods, often shiny, 10–21 cm, long base pointed, flat rounded seeds about 1 cm.

ECOLOGY: From West Africa to Sudan and south to Angola. In Kenya, only in the Lake Victoria region, 1,140–1,700 m. Widespread in riverine and lakeside forest to open or wooded grassland. Often left in crop fields. Grows in a variety of soils including gravel. Agroclimatic Zones II–III. Flowers in March–May and seeds in October–December in Bungoma.

USES: Firewood, charcoal, timber, furniture, poles, boat building, medicine (roots and bark), fodder, bee forage, shade, ornamental, nitrogen-fixing, toothbrushes, veterinary medicine, leaves used to speed up ripening of bananas.

PROPAGATION: Seedlings, wildings.

SEED: Seed is susceptible to beetle attack, often while still on the tree, which lowers germination to 30–40%. A prolific seeder; 14,000–16,000 seeds per kg.

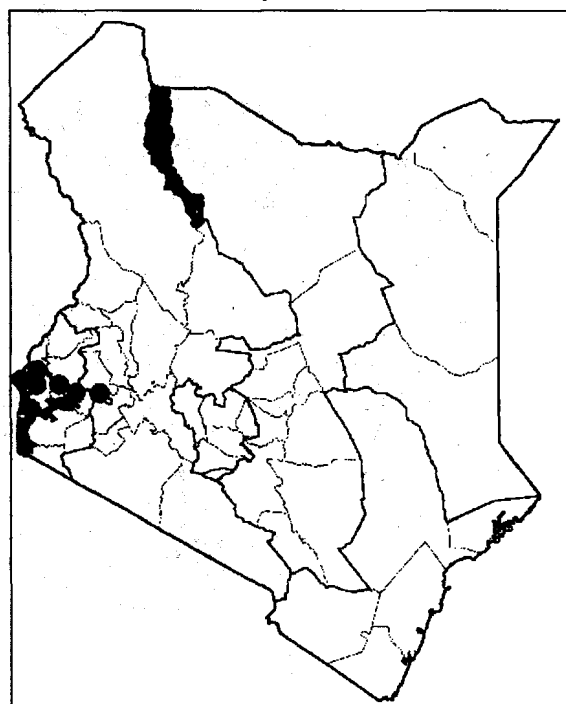
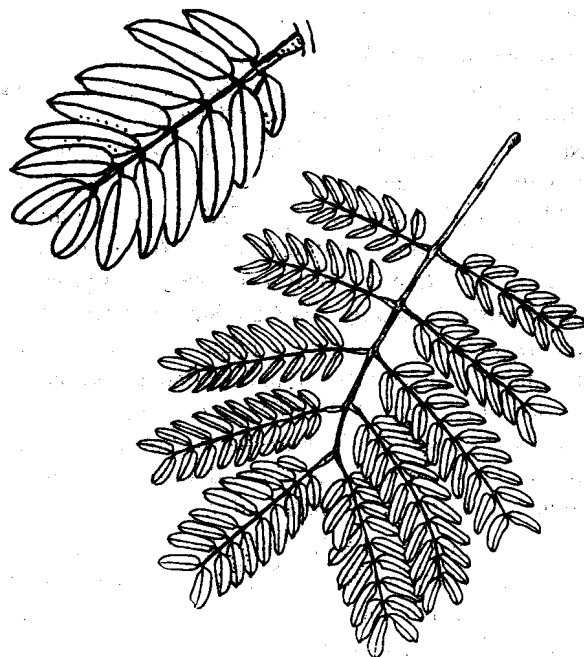
treatment: Not necessary for fresh seed. Nick stored seeds for better germination or soak in cold water.

storage: Seed can be stored for long periods.

MANAGEMENT: Slow growing; lopping, pollarding, pruning.

REMARKS: The species is highly regarded in the Luo community. The heartwood is particularly hard and durable.

FURTHER READING: Backes and Ahenda, 1998; Beentje, 1994; ITDG and IIRR, 1996; Katende et al., 1995; Kokwaro, 1993.



Albizia glaberrima

Fabaceae (Mimosaceae)

Indigenous

STANDARD/TRADE NAME: White nongo, Mchani mbao.

COMMON NAMES: **Kamba:** Isavi; **Pokomo:** Mchachampili; **Swahili:** Mchani, Mkumba mbega; **Taveta:** Mfurugaji.

DESCRIPTION: An evergreen forest tree, 15–30 m, the cylindrical bole spreading to a somewhat flattened crown. **BARK:** Finely fissured, grey. **LEAVES:** Twice-divided with only 1–4 pairs pinnae, having 3–6 pairs of medium-sized leaflets. **Leaflets widest towards the tip, very one-sided, curved, usually 2.5–5 cm long and 1.5–3.5 cm across** (even bigger in young plants—up to 10 cm long), the midrib nearly diagonal and continued into the leaf tip, which is blunt. **FLOWERS:** In half-spherical heads, small and white. **FRUIT:** **Red-brown flat pods, 12–26 cm long and 3–4 cm wide, tip rounded, dull and well veined, 6–12 flat oval seeds within.**

ECOLOGY: A tree found at low altitudes from Senegal to Sudan and south to Angola, mainly in coastal or riverine forests. In Kenya, found in coastal and adjoining inland areas, 0–900 m. Agroclimatic Zones III–IV.

USES: Firewood, charcoal, timber, fodder (leaves), shade, nitrogen-fixing.

PROPAGATION: Seedlings, wildings.

SEED: When the pod splits open the seeds remain on one side of the pod and are blown long distances by the wind. Difficult to collect.

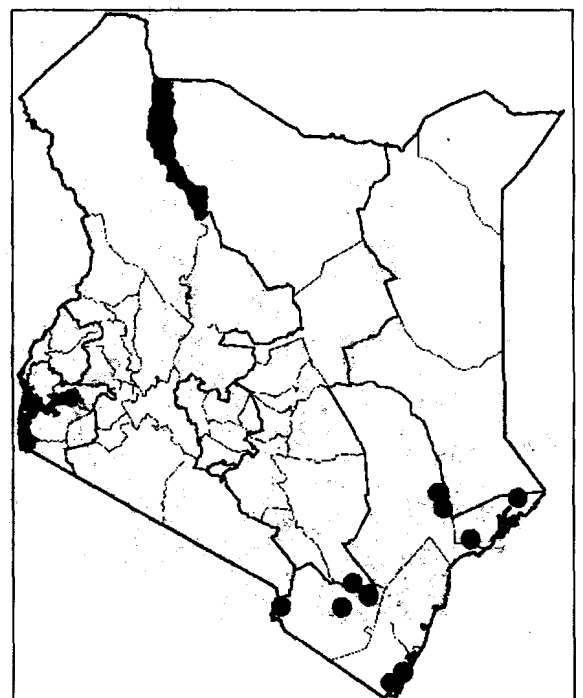
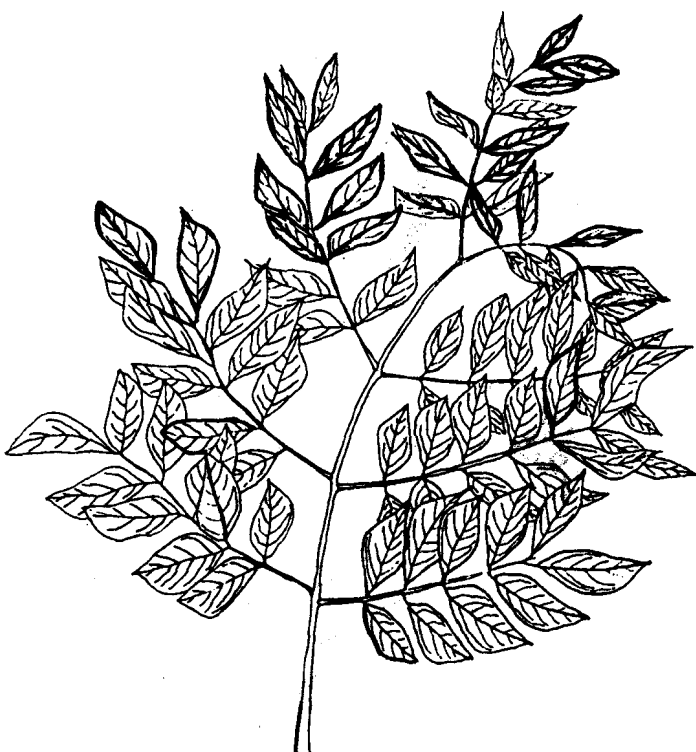
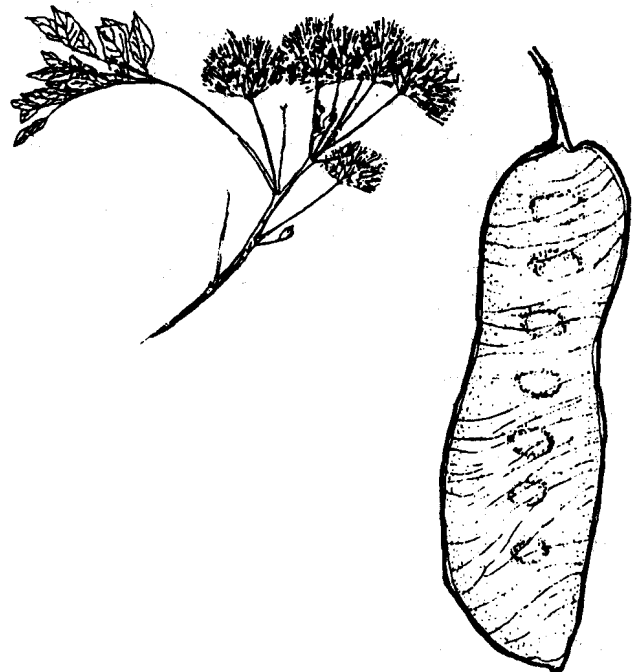
treatment: Immerse in boiling water, allow to cool and soak for 24 hours.

storage: Seed can be stored for a few months, but are very susceptible to insect attack. Add ash to reduce insect damage.

MANAGEMENT: Slow growing; coppicing, pollarding.

REMARKS: Produces good durable timber. *A. versicolor* (Swahili and Digo: Mtsani ndovu, Mchani ndovu) is another useful species found only at the southern part of the Kenyan coast in wooded grassland.

FURTHER READING: Beentje, 1994; Katende et al., 1995; Palgrave and Palgrave, 2002.



Albizia gummifera

Fabaceae (Mimosaceae)

Indigenous

COMMON NAMES: **Kamba:** Kisya, Musya, Mwethia; **Kikuyu:** Mukurue; **Kipsigis:** Seet, Seyet; **Kisii:** Omugonjoro; **Luhya:** Mukhonzuli; **Luhya (Bukusu):** Kumulukhu; **Malakote:** Motemwelo; **Maasai:** Ormoso, Olsamakupe, Osapukupes; **Marakwet:** Se, Set, Ste; **Meru:** Mukuruwe; **Nandi:** Seet, Seyet; **Pokomo:** Mchachampili; **Pokot:** Ses; **Samburu:** Sogore, Sogorogurri; **Swahili:** Mchani mbao; **Taita:** Msarawachi; **Taveta:** Kiririgiti, Kiririgwi; **Tugen:** Se, Set, Seot; **Turkana:** Ekakwait, Ekewait.

DESCRIPTION: A large deciduous tree, branches ascending to a flat top, to 20 m or more, trunk up to 75 cm in diameter. **BARK:** Grey and usually smooth. **LEAVES:** Shiny, dark green leaflets, almost rectangular, usually less than 3 cm long, midrib diagonal, one outer corner rounded. **FLOWERS:** White-pink clusters, long stamens hang out, tips crimson. **FRUIT:** Very many pods in bundles, shiny brown, flat with raised edges, 20 cm long, 3 cm wide, often shorter.

ECOLOGY: A forest tree found from West Africa east to Ethiopia and south to Zimbabwe, Mozambique and Madagascar. The most common *Albizia* in humid and subhumid parts of Kenya, 0–2,400 m, from coastal hills to western Kenya. Very common in Nairobi and adjoining districts. Also found in Marsabit, Kakamega and Mara at forest edges and in riverine forests. Agroclimatic Zones II–IV. Very common in Zone III. Flowers in March–May and seeds in October–November in Bungoma.

USES: Firewood, timber, bee hives, utensils (mortars, water troughs), boat building, medicine (pods, roots, bark), fodder (mainly goats), bee forage, ornamental, mulch, nitrogen-fixing, soil conservation, leaves used to speed up the ripening of bananas.

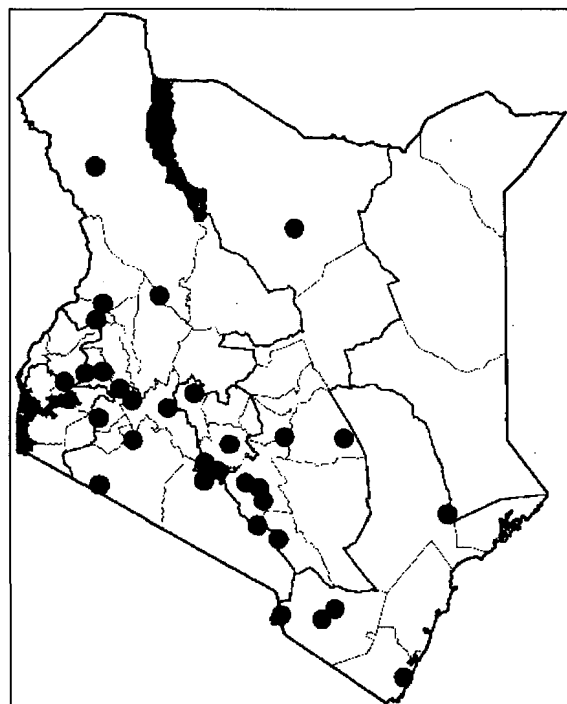
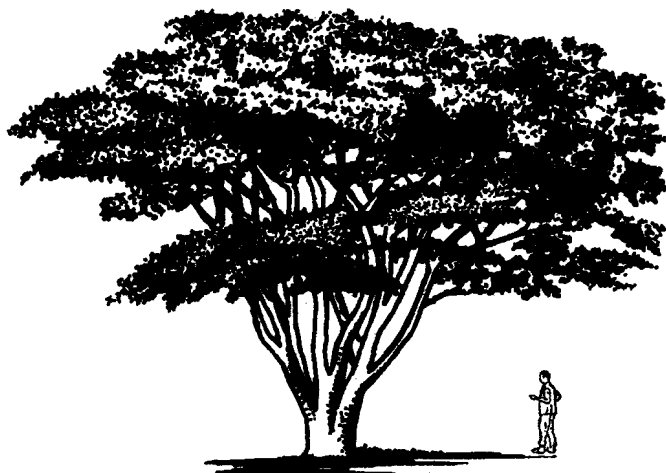
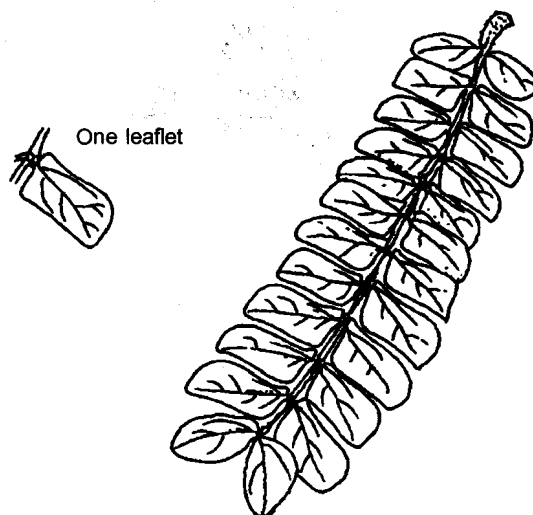
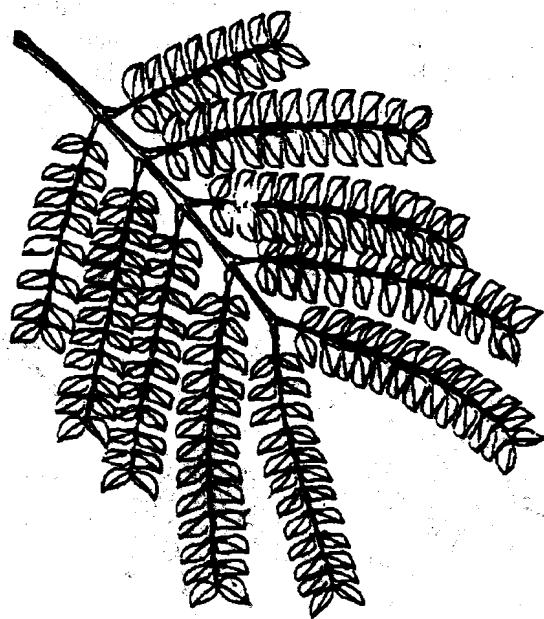
PROPAGATION: Seedlings, produces root suckers.

SEED: 10,000–14,000 seeds per kg. Germination rate 40–60%.

treatment: Fresh seed requires no pretreatment. Previously stored seeds should be nicked or soaked in cold water for 24 hours.

storage: Seed can be stored for long periods but very susceptible to insect attack.

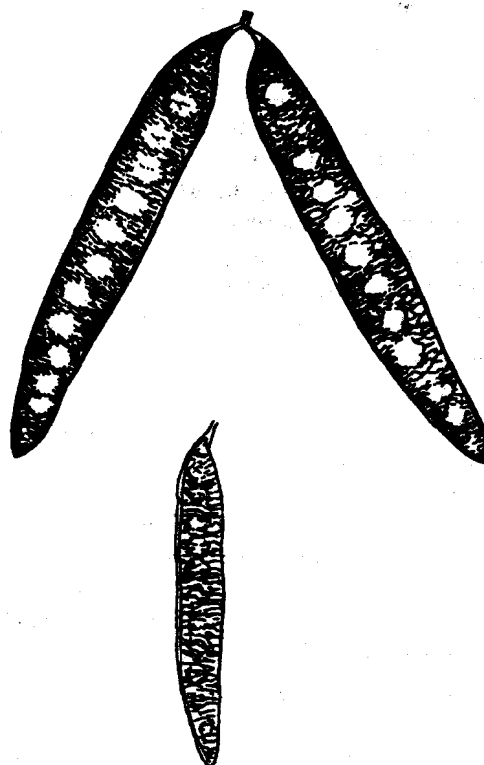
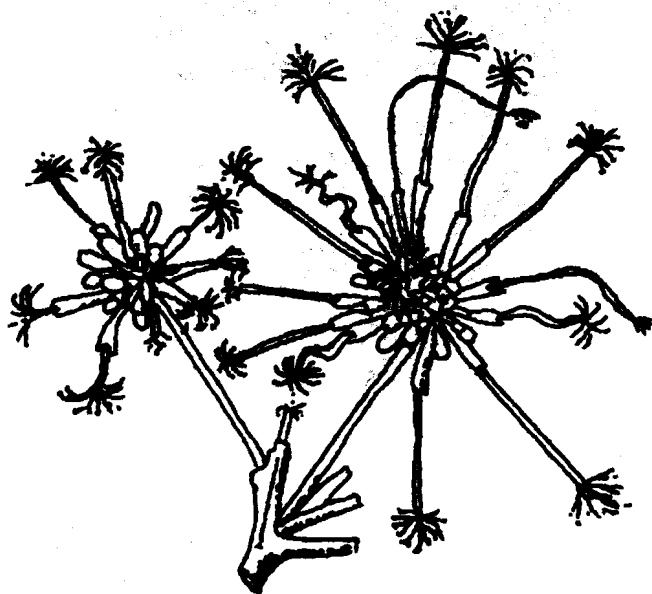
MANAGEMENT: Fairly fast growing, lopping, pollarding, coppicing while young.



***Albizia gummifera* (cont)**

REMARKS: Seed should be collected while still on the tree to prevent insect damage. Timber is not very durable, rather soft and light. Bees are often found inhabiting holes within the trunk. The trunk exudes clear gum. The *A. gummifera* found in Kenya belong to var. *gummifera*.

FURTHER READING: Albrecht, 1993; Backes and Ahenda, 1998; Beentje, 1994; Bekele-Tesemma et al., 1993; Dharani, 2002; Fichtl and Adi, 1994; Katende et al., 1995; Kokwaro, 1993; Mbuya et al., 1994; National Academy of Sciences, 1979; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Sommerlatte and Sommerlatte, 1990; Storrs, 1979.



Albizia lebeck**Fabaceae (Mimosaceae)****Tropical Asia**

COMMON NAMES: **Digo:** Mchani; **English:** Woman's-tongue tree, Siris, East Indian walnut; **Luo:** Oturbam; **Maasai:** Ortuba; **Swahili:** Mkungu.

DESCRIPTION: An attractive deciduous tree that may reach 20 m, usually 8–14 m; the trunk often short. **BARK:** Grey-violet with rusty-brown breathing pores. **LEAVES:** 3–11 pairs of leaflets, each oblong, tip rounded, usually 2–3 cm. **FLOWERS:** Green-yellow, fragrant brush heads on a stalk; short lived. **FRUIT:** Shiny yellow-brown pods in clusters decorate the tree for a long time; each pod up to 30 cm long, bulging over seeds, the seeds and pods 'chatter' in the wind.

ECOLOGY: Naturalized in parts of Africa and the Caribbean. Commonly planted in the tropics as a shade tree. Found in the Lake Victoria basin and at the coast, 0–1,800 m, in some places naturalized. Extensive roots near the surface. Prefers black-cotton soil but will grow in a wide range of soils, acid, alkaline and saline. Agroclimatic Zones II–III.

USES: Firewood, charcoal, timber, furniture, poles, posts, flooring, fodder, bee forage, shade, ornamental, mulch, green manure, soil conservation, nitrogen-fixing, gum, tannin, detergent (dried and pounded bark).

PROPAGATION: Seedlings, direct sowing at site, produces root suckers.

SEED: A prolific seed producer; 7,000–12,000 seeds per kg. Seed germination is good. Seed collection is done at the coast from February to March.

treatment: Not necessary, but soaking in cold water for 24–48 hours or immersing and soaking in boiling water for a few seconds may hasten germination.

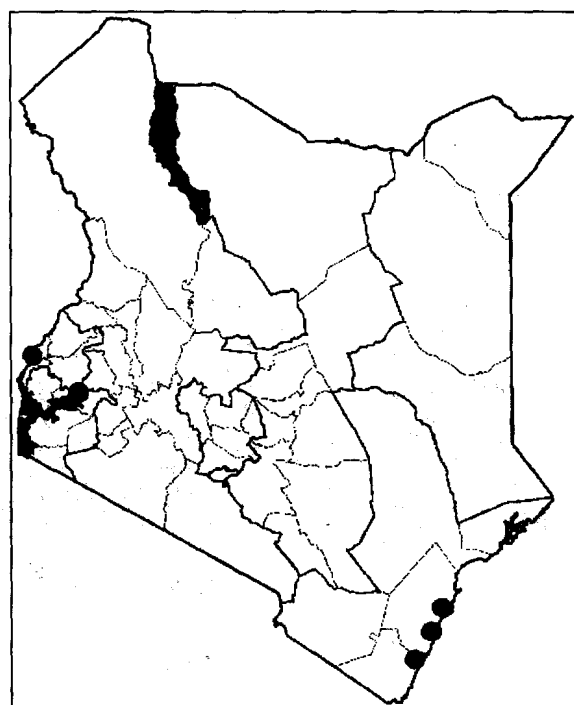
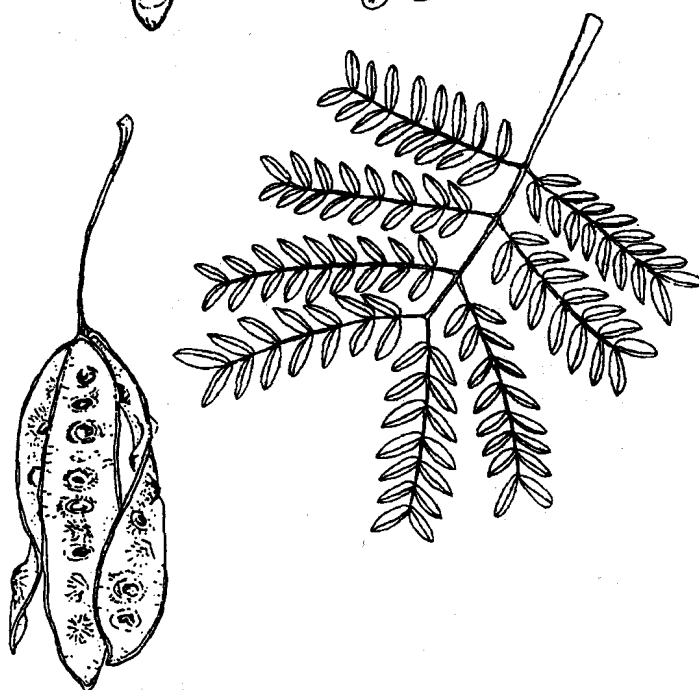
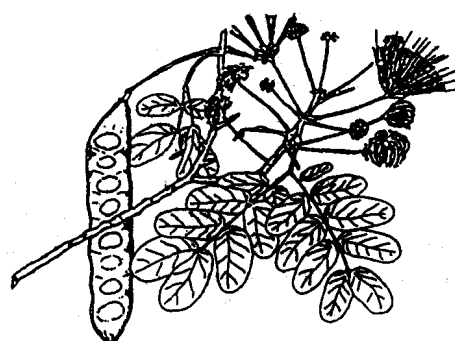
storage: Seed can be stored for long periods if kept free from insects.

MANAGEMENT: Fast growing on good sites; lopping, pollarding, coppicing, pruning.

REMARKS: Hard and heavy wood. Introduced and became an invasive species in Venezuela and the Caribbean.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Bein et al., 1996; Bekele-Tesemma et al., 1993; Fichtl and Adi, 1994; Jensen, 1999; Katende et al.,

1995; Mbuya et al., 1994; National Academy of Sciences, 1979, 1980; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; von Maydell, 1990.



***Albizia saman* (*Samanea saman*)**

Fabaceae (Mimosaceae)

Tropical America**COMMON NAMES:** English: Saman, Rain tree, Monkey pod.

DESCRIPTION: A conspicuous **semi-deciduous tree** to 25 m tall when mature with a **short, thick trunk**. Its **branches spread horizontally** reaching an amazing 30 m occasionally. **BARK:** Distinctive yellow- to cream-brown, smooth or shallowly grooved. **LEAVES:** **Fern-like foliage**, twice-divided leaves at the end of branches, 25–40 cm long, with 2–4 pairs of leaf branches, and 3–8 pairs of leaflets that are bright green, oblong, to 6 cm long, longest pairs at the end of the stalk. **FLOWERS:** **Large stalked heads**, each flower with **fluffy pink stamens** from a cream-yellow base, 3–5 cm across, often in flower in the dry season. **FRUIT:** **Pods to 20 x 2 cm, thick, straight, green then black, with an edible sticky pulp** around the seeds. Pods do not break open.

ECOLOGY: Occurs naturally in open country and along streams in forests in the northern parts of South America. Does well at the Kenyan coast, preferring humid lowlands, 0–1,300 m, and well-watered soils. Tolerates a wide range of soils. Agroclimatic Zones I–III.

USES: Firewood, charcoal, timber, tools, carvings, utensils, edible fruit (sweet pulp of the pods), medicine (bark, leaves), fodder (pods), shade, ornamental, avenue tree, nitrogen-fixing, soil improvement, gum.

PROPAGATION: Seedlings.

SEED: 5,000–7,400 seeds per kg.

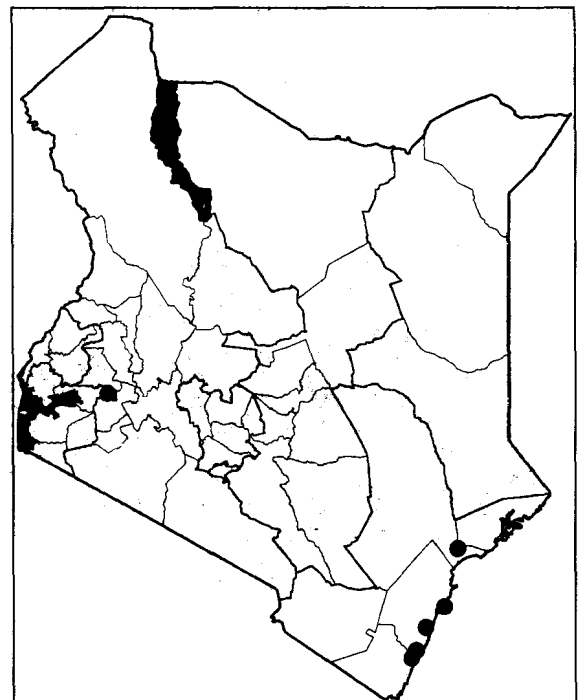
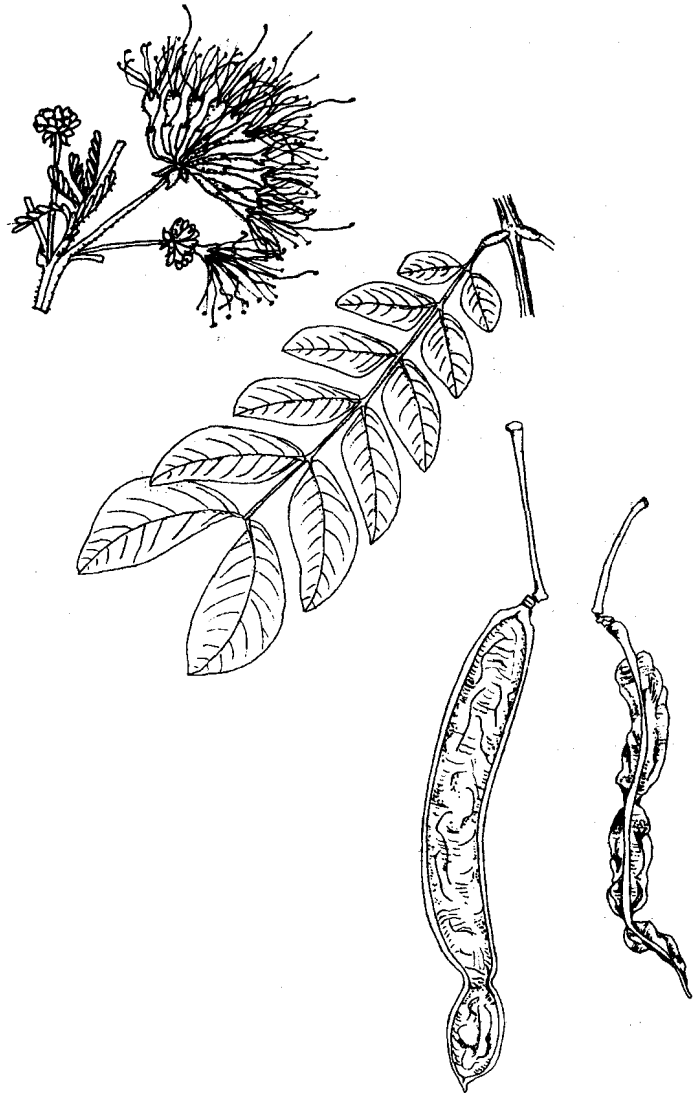
treatment: Immerse seed in hot water for 3 minutes, transfer to cool water and soak for 12–24 hours.

storage: Seed can be stored if well dried. Viability is maintained for more than 3 years if stored in airtight containers at room temperature.

MANAGEMENT: Fast growing in best conditions, mature in a few years; coppicing.

REMARKS: Widely grown as a street tree. Gone wild and now naturalized in lower parts of Tana River at the site of an old irrigation scheme. A popular tree at the coast. Provides excellent shade, and in some countries the timber is valued for furniture and carving. The leaves fold inward at night and in cool weather.

FURTHER READING : <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Beentje, 1994; Jensen, 1999; Katende et al., 1995; National Academy of Sciences, 1979; Storrs, 1979.



Allophylus africanus

Sapindaceae

Indigenous**COMMON NAMES:** **Boran:** Gadida; **Luhya (Bukusu):**Kumunyanyakhanu; **Luo:** Nyaludhi, Nyamoch, Ochond atego, Oludh kuon, Oseklele, Oswekele; **Sabaot:** Mongunyet.

DESCRIPTION: An evergreen shrub or small tree up to 6 m high with **spreading branches** and fairly dense foliage. **BARK:** Grey and smooth. **LEAVES:** Divided into **3 leaflets** on a stalk to 7 cm long, very variable, dark shiny green above, **leaflets wider beyond the middle, without stalk, margin toothed**. **FLOWERS:** **Small, cream-white, fragrant**, arranged in heads from leaf axils or at the tip of the shoot, heads up to 12 cm long. **FRUIT:** Soft berries arranged in **bunches, orange, turning dark red to black** when ripe, 6 mm in diameter, without hairs. Many small seeds inside.

ECOLOGY: Found from Sierra Leone in West Africa through Central Africa and Uganda and western Kenya south to Mozambique and Zimbabwe. In Kenya it is found in Western Province, Trans Nzoia, Uasin Gishu, where it is common in moist wooded grassland, often along rivers or on termite mounds. Agroclimatic Zones III–IV. Flowers in May–September in Rift Valley and western Kenya; fruit October–January.

USES: Medicine, fodder, bee forage, fibre (thin fibrous stems used for granaries), soil conservation.

PROPAGATION: Seedlings.

SEED: Collect mature fruit and allow to dry.

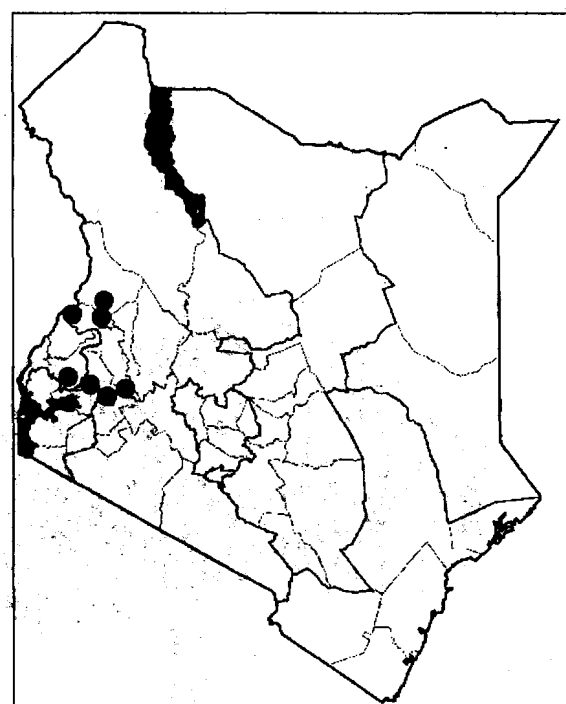
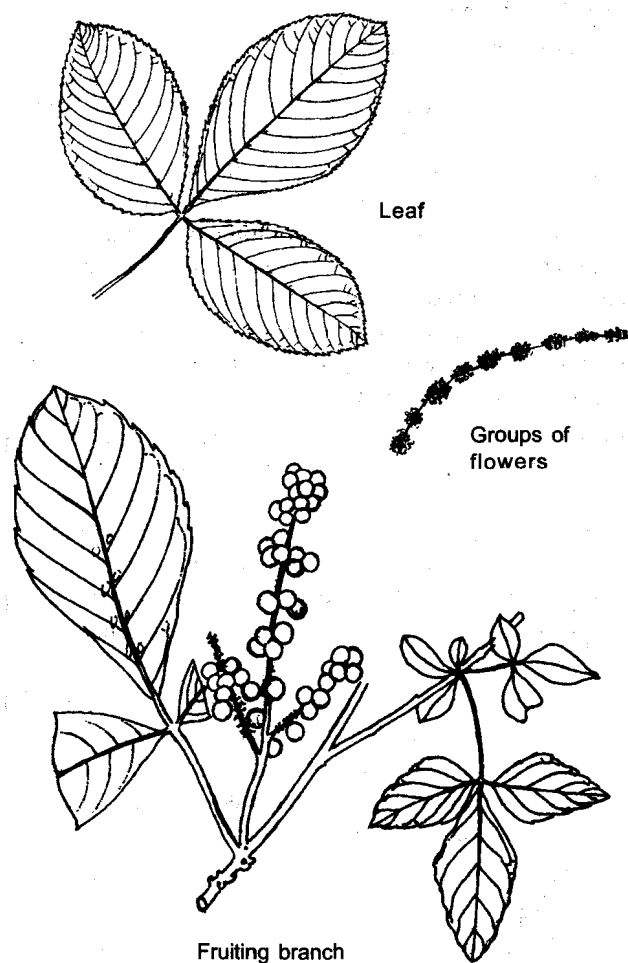
treatment: Not necessary.

storage: Seed can be stored for long periods.

MANAGEMENT: Fairly fast growing.

REMARKS: Tolerates trampling by livestock, but susceptible to browsing. Another species, *A. rubifolius* (**Digo:** Mbanda tchitswa, Muvudza kondo; **Giriama:** Munyanga kitswa; **Kipsigis:** Chekeleliet, Borowet; **Luo:** Nyamwoch; **Maasai:** Osyaiti orok; **Malakote:** Mwenze banya; **Pokot:** Chepkokai; **Somali:** Idi shibel bured; **Swahili:** Mlishangwa, Mkona chuma; **Tharaka:** Mutengerete; **Turkana:** Ekarai) is more widely distributed in Kenya. It is usually shrubby, very variable, occupying a great variety of habitats, 0–2,000 m. It is used for medicine.

FURTHER READING: Backes and Ahenda, 1998; Beentje, 1994; Kokwaro, 1993; Palgrave and Palgrave, 2002; Storrs, 1979.



Anacardium occidentale**Anacardiaceae****Brazil, Caribbean**

STANDARD/TRADE NAME: Cashewnut.

COMMON NAMES: **Digo:** Mbibo, Mbibu; **English:** Cashewnut; **Giriama:** Mkanju; **Kamba:** Mukoloso, Ngoloso (fruit); **Sanya:** Maibo; **Swahili:** Mkanju, Mkorosho, Mbibo.

DESCRIPTION: A medium-sized, spreading tree to 15 m but usually smaller. **BARK:** Rough dark brown. **LEAVES:** Leathery dark green, **oval, 15 cm long, 8 cm wide, rounded tip**, wavy. **FLOWERS:** In terminal clusters, **small and star-like, cream-pink coloured**. **FRUIT:** Hard, **kidney-shaped nuts** attached to the base of a shiny **orange-yellow 'cashew-apple'**, or 'bibo' (swollen flower stalk). Nuts fall to the ground when mature.

ECOLOGY: A tree now naturalized at the Kenya coast. One of the oldest cash crops, widely planted all over the tropics. Prefers deep sandy soils but not saline or poorly drained ones. Found where there is groundwater in the drier areas. It has been grown on poor eroded soils with unreliable rainfall and can be intercropped. Agroclimatic Zones I-IV. Flowering in May-August, occasionally October-November.

USES: Firewood, charcoal, timber, furniture, posts, edible nut and cashew-apple, livestock feed (cake after oil extraction from fruit), medicine, shade, ornamental, dune fixation, soil conservation, windbreak, gum (for book binding), resin and nut-shell oil (varnish, inks, tiles).

PROPAGATION: Direct sowing at site, grafting, air layering, ground layering.

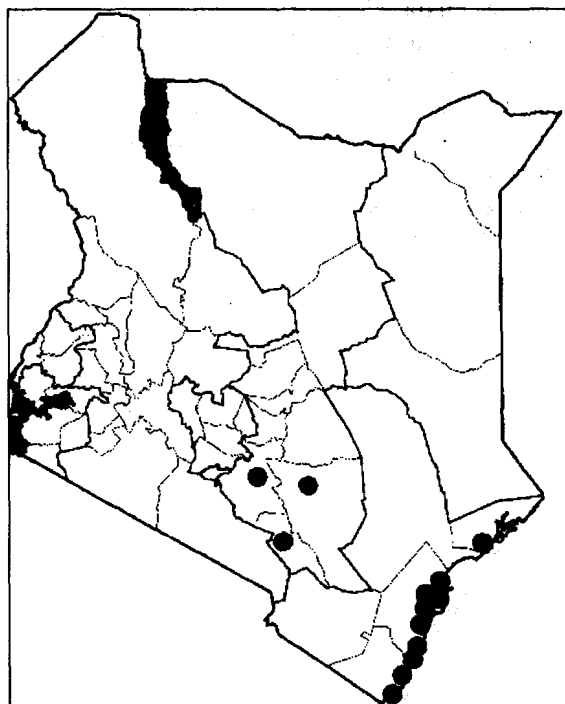
SEED: 150-300 seeds per kg. Germinate in 10-12 days.
treatment: Immerse seed in cold water, allow to cool and soak for 24 hours. Not necessary for fresh seed.
storage: Seed can be stored but viability is gradually reduced, 50% after 10 months and total loss after 13-14 months. Dry nuts in the sun for several weeks before storing or sowing.

MANAGEMENT: Slow growing; lopping, coppicing.

REMARKS: The outer covering of the nuts contains an irritating poisonous oil, so the cover must be removed before the nuts can be eaten. Grown in plantations at the coast for its nuts. Occasionally found in upland areas but mainly as an ornamental. Cashew apples are favourite food for baboons and vervet and Syke's monkeys. Bees

enjoy nectar from the flowers but the honey from this plant is bitter. This is the only species among the 11 in the genus that has been cultivated extensively for commercial purpose.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Beentje, 1994; Dharani, 2002; Jensen, 1999; Katende et al., 1995; Lötschert and Beese, 1983; Mbuya et al., 1994; Noad and Birnie, 1989; Palgrave and Palgrave, 2002; Verheij and Coronel, 1993; von Maydell, 1990.



Annona cherimola**Annonaceae****Ecuador, Peru**

COMMON NAMES: **Digo:** Mtomoko; **English:** Cherimoya, Custard apple; **Giriama:** Mtomoko; **Kamba:** Kitomoko, Mutomoko; **Sanya:** Mtomoko badah; **Swahili:** Mstafeli, Mtomoko, Mtopetope.

DESCRIPTION: A small deciduous tree, 3–10 m, often branched from the base. **LEAVES:** Alternate, light green, oval and pointed, sometimes narrow, 12–20 cm long with few hairs above but characteristic **golden-brown hairs below**. **FLOWERS:** Fragrant, usually solitary (or 2–3), hang down on short hairy stalks, 3 outside **petals narrow to 3 cm, pale yellow** with a purple spot at the base, 3 inner petals red-purple, tiny. **FRUIT:** **Green and compound, 8–15 cm across**, variable, heart-shaped, round or oval with regular **overlapping fleshy scales** or the surface patterned with U-shaped depressions, spirally arranged like fingerprints. The ripe soft flesh is **cream-white, granular**, acid-sweet, easily separated from numerous seeds, each one brown, about 1.5 cm long.

ECOLOGY: A tree growing at 800 m or higher in the Andes of Peru and Ecuador where the well-flavoured refreshing fruit was known to the ancient people of the area. It cannot tolerate a hot lowland climate and is grown commercially in Chile, Spain, USA and New Zealand. In East Africa the name 'custard apple' has been used for 2 different *Annona* species (*A. cherimola* and *A. squamosa*) and hybrids. They grow best in cooler tropical uplands over 1,000 m. *A. cherimola* tolerates lower temperatures for growth and fruiting than *A. squamosa* (custard apple or sweetsop). Agroclimatic Zones I–III.

USES: Edible fruit.

PROPAGATION: All annonas can be grown from seed and cuttings. Budding or grafting is recommended. *A. cherimola* or *A. squamosa* are usually used as rootstock.

SEED: Extracted by hand or after maceration from ripe fruits collected off and below existing trees. Germination takes 2–4 weeks.

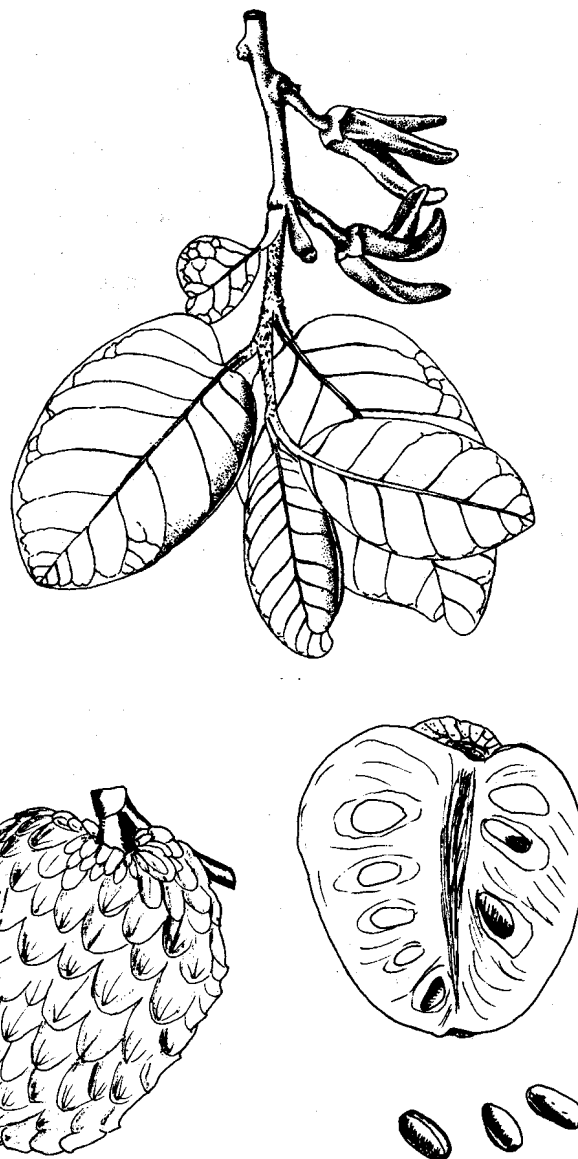
treatment: Not necessary.

storage: If stored in cool dry conditions the seed can retain viability for 6–12 months.

MANAGEMENT: Bud or graft. Small beetles usually pollinate the flowers. Hand pollination improves fruit set. Fruit ripens 4–5 months after pollination.

REMARKS: The genus *Annona* belongs to the family Annonaceae and produces aggregate fruits, usually fleshy and edible. Green fruit, seed and leaves of *Annona* spp. are reported to have insecticidal properties. Fruit and seed are effective against worms. Fruit are eaten fresh and the pulp can be used to flavour ice cream. Fruits of annonas are commonly seen in markets.

FURTHER READING: Löttschert and Beese, 1983; Maundu et al., 1999; Mbuya et al., 1994; Verheij and Coronel, 1993.



Annona muricata**Annonaceae****West Indies, Tropical America**

COMMON NAMES: **English:** Soursop; **Kamba:** Mutumoko, Mtumoko; **Swahili:** Mstafeli.

DESCRIPTION: A slender evergreen tree 5–7 m in height, usually less, with a bole that may be 30 cm in diameter, the **branches very low** and wide, giving an open shady crown. In drought conditions it may lose all its leaves. **BARK:** Grey with a pattern of shallow grooves. **LEAVES:** Alternate, **dark green, shiny** and leathery, 8–15 cm long, **oval with a sharp tip**, dull or yellowish below where there are **small pits in vein axils**. Crushed leaves have a strong, unpleasant smell. **FLOWERS:** **Solitary and large**, 2–5 cm across, often opposite leaves and hanging down, **3 outer fleshy petals**, curved, almost triangular, **3 inner yellow-green petals**, thinner and rounded, edges overlapping. **FRUIT:** Kidney- or **heart-shaped to 25 cm long**, the leathery dark green skin covered with **soft curved spines**. Inside **woolly white fibrous pulp** covers many large brown-black seeds. The flesh and fruit walls are edible and have a distinctive acid-sweet taste. (Single fruits grown together making one 'compound' fruit, but the outline of individual fruits can be seen on the skin, each with its own spine. As pollination is often incomplete the fruit may have a distorted shape.) It has large 'fruit' of 0.5–5 kg in weight.

ECOLOGY: An exotic fruit tree planted throughout the warm tropical lowlands. In Kenya, it is grown in semi-arid and arid lowland areas of Eastern Province (mainly Ukambani) and at the coast, where it is grown along water courses through irrigation. When young, it requires frequent watering of about 5 litres per week but becomes tolerant to drought once it establishes. Agroclimatic Zones I–III.

USES: Fruit, drink, flavouring, medicine, ornamental, insecticide, fish poison.

PROPAGATION: Seedlings (sow seed in pots), grafting and budding.

SEED:

treatment: Not necessary.

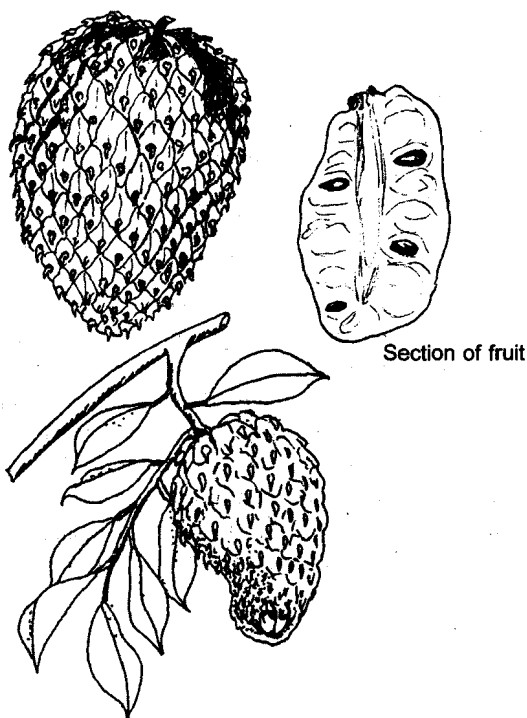
storage: Seed can be stored for long periods.

MANAGEMENT: Slow growing. Application of manure may be necessary in the early stages. Mulching will reduce weeds. Bud or graft. Manage crown above 1 m height to encourage branching. Protect fruit from birds.

REMARKS: One of several *Annona*, this species has the largest fruit. The flesh is highly acid. This is a desirable tree in home gardens as the delicious fruit can earn good cash and can be used for juice and ice cream. However, one tree rarely produces more than a dozen fruits, which take 3 months to ripen, and are often attacked by birds such as mousebirds. All parts have insecticidal properties and can also be used to kill fish—a fruit can be used as bait. A powder or oil from the seeds has been used to kill lice and bedbugs. Contact with the eyes causes great irritation. It may be attacked by mealybugs and scale insects, resulting in a reduction of yield or even com-

plete failure. In Machakos and Makueni Districts yields are reliable and make a large contribution to farmers' incomes.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Bein et al., 1996; Bekele-Tesemma et al., 1993; Jensen, 1999; Katende et al., 1995; Lötschert and Beese, 1983; Mbuya et al., 1994; Verheij and Coronel, 1993.



Section of fruit

Annona senegalensis* subsp. *senegalensis* (*A. chrysophylla*) Annonaceae*Indigenous**

COMMON NAMES: **Boni:** Malamuti, Mlamote; **Digo:** Mbokwe; **English:** Wild custard apple; **Giriama:** Mutakuma; **Kamba:** Makulo, Kitomoko, Matomoko (fruit), Mutomoko wa kitheka; **Luhya:** Muvulu; **Luhya (Bukusu):** Kumufwora; **Luo:** Nyabolo, Obolobolo, Obolo (Migori); **Sanya:** Bombo; **Swahili:** Mkonokono, Mtomoko mwitu.

DESCRIPTION: A spreading shrub or small tree to 6 m, rarely higher. **BARK:** Grey and smooth, thick and folded when old, young stems hairy and orange-red. **LEAVES:** Broadly oval, to 15 cm x 10 cm wide, blue-green, hairy below, fragrant when crushed. **FLOWERS:** 1–2 small flowers hang down below twigs, yellowish with petals and sepals in 3s. **FRUIT:** Rounded, 2–7 cm, smooth, with divisions. Green when unripe, turning orange-yellow and smelling like pineapple on ripening. The sweet pulp is edible. Seeds smooth, shiny brown.

ECOLOGY: The species is widespread in tropical Africa, from Senegal to South Africa and Madagascar in semi-arid to subhumid regions. In Kenya, in wet lowland savanna at the coast, in the Lake basin and in the highlands east of Mt Kenya, including Kitui Hills, in bushed grassland, humid, riverine woodland, coastal bushed grassland and forests, mostly as an understorey shrub, 0–2,400 m. Grows well in a variety of soils: deep sandy, alluvial or light red loam. Agroclimatic Zones I–III. Very common in Zone III. Flowers in February–March and seeds in June–August in Bungoma.

USES: Firewood of low quality, edible fruit, medicine (bark, root, gum, fruit), fodder (leaves), ornamental, windbreak, fibre (bark), brown dye (bark).

PROPAGATION: Seedlings (sow seeds in pots), wildings, root suckers from exposed or injured roots.

SEED: 2,500–3,000 seeds per kg. Germination is good but sporadic.

treatment: Not necessary.

storage: Seeds susceptible to insect damage and lose viability within 6 months. Add ash to reduce insect damage.

MANAGEMENT: Very susceptible to fire and weeds. Needs shade from other trees but cannot live under tropical

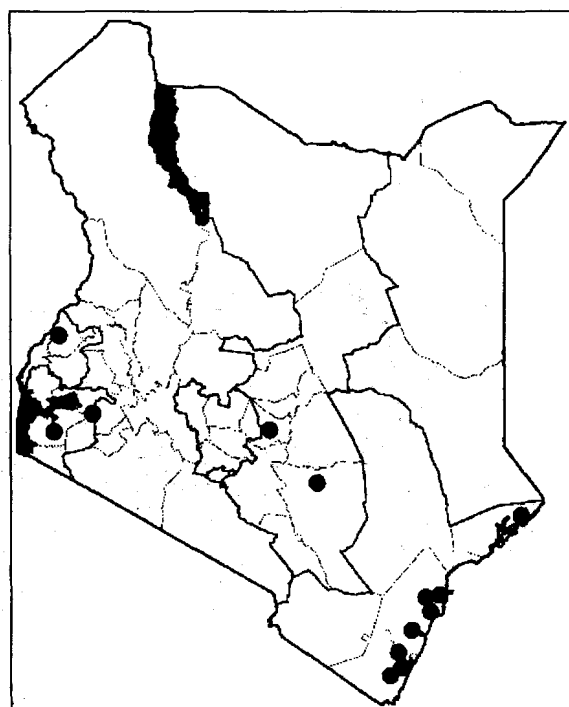
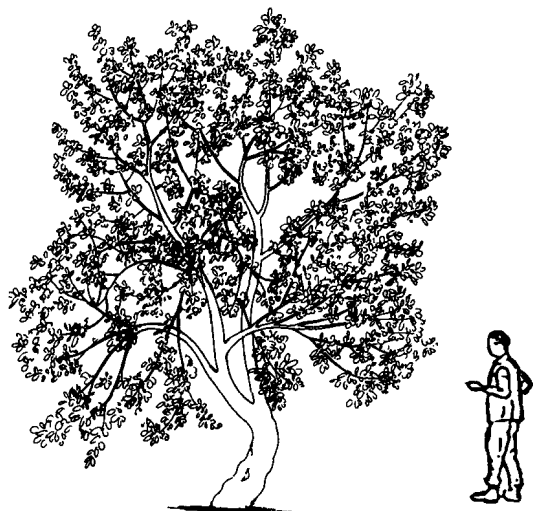
forest conditions. Plant under trees with light shade. Slow growing. Coppices well. Pick fruit green and slightly unripe and keep it indoors for ripening to avoid bird damage.

REMARKS: Fruit eaten raw. It has an acid-sweet taste.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Backes and Ahenda, 1998; Beentje, 1994; Bekele-Tesemma et al., 1993; Katende et al., 1995, 1999; Kokwaro, 1993; Mbuya et al., 1994; Palgrave and Palgrave, 2002; Ruffo et al., 2002; Sommerlatte and Sommerlatte, 1990; von Maydell, 1990.



Section of fruit



Annona squamosa**Annonaceae****Tropical South America**

COMMON NAMES: **English:** Custard apple, Sweetsop; **Swahili:** Mtopotope, Mtomoko; **Taita:** Matomoko.

DESCRIPTION: A small tree to 7 m, the bole less than 1 m high and up to 20 cm in diameter. Branches spread widely and typically their tip ends bend over or touch the ground. Crown open. **BARK:** Grey with **interlaced pattern of shallow fissures**. **LEAVES:** Simple, alternate, dull green, **long oval in shape, 7–17 cm**, a few hairs below. The tree may keep its leaves or shed them for a brief period each year. **FLOWERS:** Individual flowers produced **singly or in pairs** beside leaves or on the other side of the shoot from a leaf. They **hang down**, yellow-green and **about 2 cm across when open, parts in 3s**. **FRUIT:** **Compound, heart-shaped, 8–10 cm across, surface green-yellow with a papery bloom, having the appearance of scales**. When ripe it has a white pulp containing seeds within each section. The flesh is aromatic with a sugary sweet taste, surrounding the shiny brown-black seeds.

ECOLOGY: A tree that is very widely distributed through the tropics and particularly well known in Africa, Australia and South East Asia. It performs well in lowlands up to 1,200 m with medium rainfall (over 800 mm), and is tolerant of a wide range of soils provided drainage is good. Slightly acid soils (pH 5.5–6.5) are best. Grows well near Lake Victoria. Agroclimatic Zones I–III.

USES: Firewood, edible fruit, ornamental, windbreak.

PROPAGATION: Seedlings (sow seeds in pots). Budding and grafting.

SEED: Extracted by hand or after maceration from ripe fruits collected off and below existing trees. Germination takes 2–4 weeks.

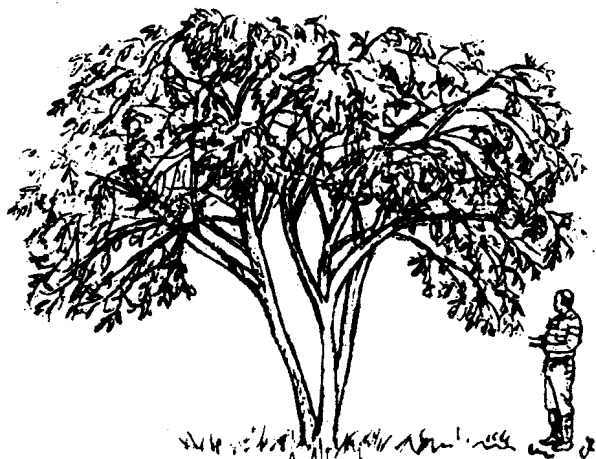
treatment: Not necessary.

storage: If stored in cool dry conditions the seed retain viability for 6–12 months, although this period is reduced if stored at room temperature.

MANAGEMENT: Plant the trees 5–6 m apart; when combining with mango 10–12 m. Weeding; slow growing. Pick fruit green and slightly unripe and keep it indoors for ripening to avoid bird damage.

REMARKS: A fruit tree worth growing more in Kenya.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Jensen, 1999; Katende et al., 1995; Lötschert and Beese, 1983; Maundu et al., 1999; Mbuya et al., 1994; Verheij and Coronel, 1993.



Antiaris toxicaria**Moraceae****Indigenous**

STANDARD/TRADE NAME: Antiaris, False iroko.

COMMON NAMES: **Digo:** Mnguunguo; **English:** False mvule; **Giriama:** Mnguunguo; **Luhya:** Mulundu; **Luo:** Olua madhako, Olua; **Swahili:** Mkunde.

DESCRIPTION: A magnificent deciduous tree of the forest canopy, often 20 m, up to 40 m, the crown rounded, branchlets drooping. A large tree may have a **tall clear bole** with some buttresses at the base. **BARK:** **Smooth, pale grey**, marked with lenticel dots and ring marks. When cut, **thin cream latex** drips out, becoming darker. **LEAVES:** Variable, usually oval, 5–16 cm x 4–11 cm, often widest towards the apex with a blunt or pointed tip, **the base unequal and rounded**. Saplings and coppice shoots have long narrow leaves, the **edge toothed**, but rarely in mature leaves. Leaves **rough, papery with stiff hairs above** but softer below. **FLOWERS:** Small male flowers **yellow-green**, in clusters about 1.5 cm across, growing just below leaves. Female flowers in **disc- or kidney-shaped heads** to 3 cm across. **FRUIT:** **Bright red, dull and furry, 1.5 cm long**, scarlet and velvety when mature; the swollen receptacle contains just **one seed**. The soft fruit is liked by birds, bats, monkeys and antelope and therefore dispersed by them.

ECOLOGY: A tree found from Sierra Leone, east to Sudan and south to Angola in moist forests. In Kenya, found in the Lake basin and at the coast (Shimba Hills, kaya forests, Gede Forest), mainly in remnant forests, 0–400 m (coast) and 1,350–1,700 m inland in moist forests (Kakamega Forest, Kisii). Agroclimatic Zones I–II. Fruits December–March (Coast, Kakamega) also August–September at the coast (less common).

USES: Timber, veneer, boat building (canoes), medicine (leaves, roots), fodder, barkcloth.

PROPAGATION: Wildings and seedlings (sow seeds in pots).

SEED: Large amounts of seed; easy to collect from the ground.

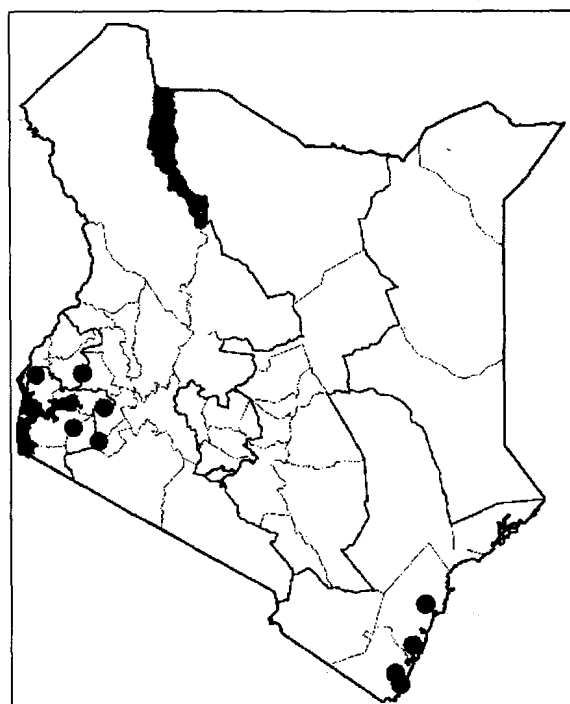
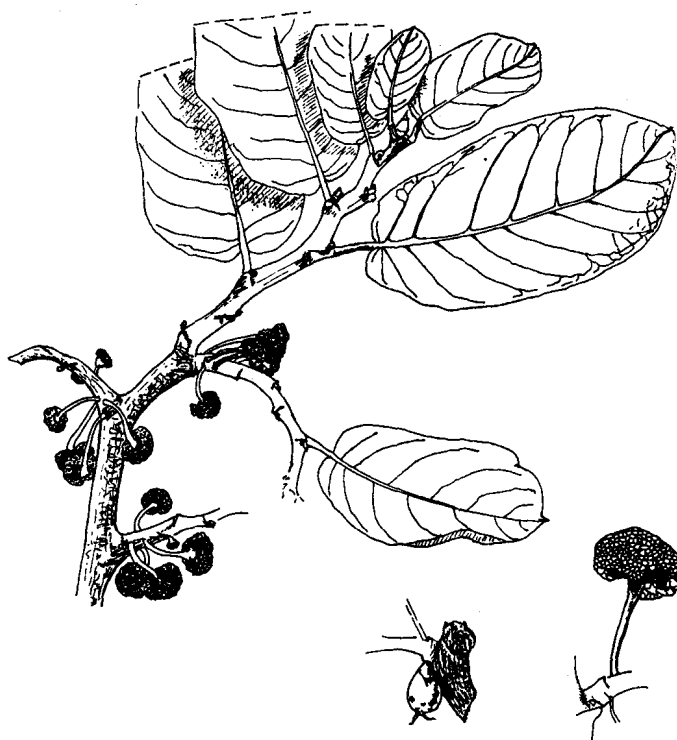
treatment: None.

storage: Loses viability quickly; sow as soon as collected.

MANAGEMENT: Fast growing, attaining full size within 20 years.

REMARKS: The tree does not compete with crops. Plant individual trees for shade, as avenue trees or as a pure stand. There is little difference between heart and sapwood; it is yellow-white and soft, easily attacked by termites and borers. It can make a tough veneer for the plywood industry.

FURTHER READING: Beentje, 1994; Katende et al., 1995; Sommerlatte and Sommerlatte, 1990.



Antidesma venosum

Euphorbiaceae

Indigenous

COMMON NAMES: **Boni:** Ngogaje, Mulilago; **Chonyi:** Musumbiji; **Digo:** Mzengatsongo, Kihuro, Chikuro; **Embu:** Muthithio; **Giriama:** Mhirono, Msimbiji; **Kamba:** Mukala (Kitui), Kitelanthia, Kitolanthia (Makueni), Ngala, Ndelanthia (fruit); **Kambe:** Musimbiji; **Kikuyu:** Mukondwe, Muhoigwa; **Luhya (Bukusu):** Kumukhaku, Bukhaku (fruit); **Luo:** Oguambula, Oguombula; **Malakote:** Musigisigi; **Mbeere:** Mukanga arithi, Muthithio, Muthethuka; **Meru:** Mutonye; **Pokomo:** Musasusi; **Sanya:** Harki thokochi; **Swahili:** Mbua nono, Mbua ya nuno msasuzi, Karacha, Mziwaziwa, Mwinamia ziwa, Msuaga.

DESCRIPTION: A shrub or, less often, a small tree to 6 m tall, with **spreading branches**. **BARK:** Rough. **LEAVES:** Large, elliptic, **densely hairy and light green to reddish brown beneath**. **FLOWERS:** Male and female separate, yellow-green in axillary and terminal spikes. **Flowering head often galled, drooping**. **FRUIT:** Numerous in bunches, **light green, turning red to reddish purple** to almost black on ripening.

ECOLOGY: Widespread in Africa from Gambia east to Ethiopia and south to Namibia, South Africa and Madagascar. In Kenya, in Boni Forest, Thui Hill (Makueni), Kitui Hills, Nzau Hills (Makueni), Mavuria (Embu) and in Central, Coast and Nyanza Provinces, in bushed grassland, coastal bushland, forest edges, riverine bushland, 0–1,900 m. In Coast Province it is found in farmland, at forest edges and also along the seashore on coral outcrops. Rainfall: 850–1,000 mm. Agroclimatic Zones III–IV. Two fruiting seasons at the coast: July and November–December. Fruits mainly in March in Makueni, but also less abundantly at other times.

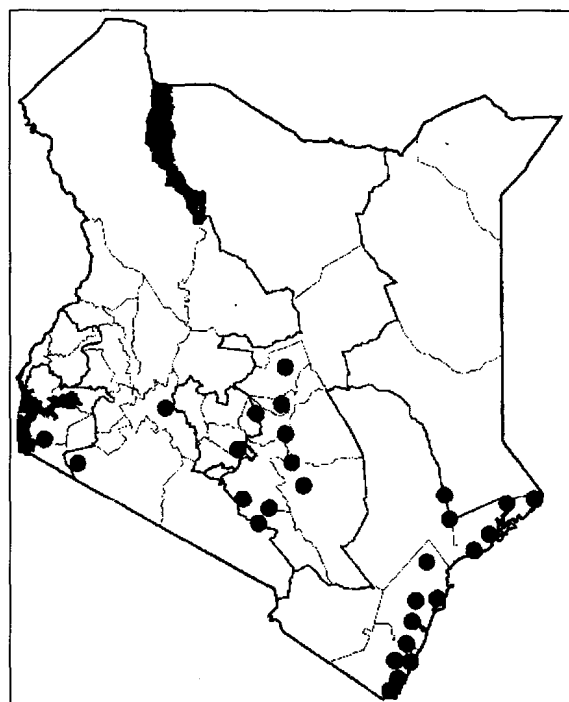
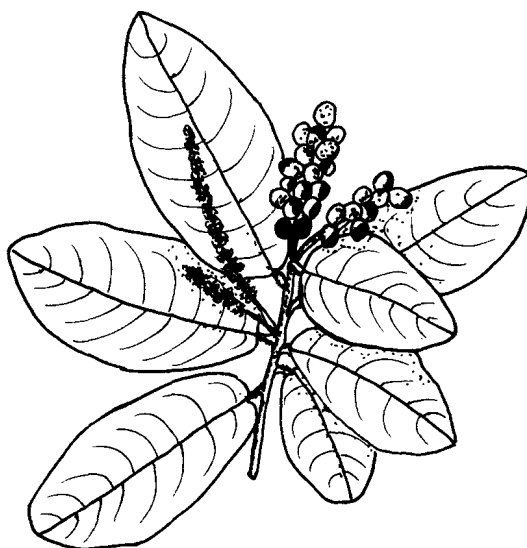
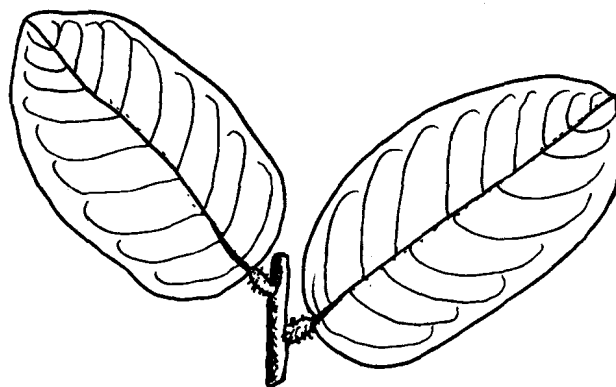
USES: Firewood, tool handles, knife sheaths, edible fruit, medicine (leaves, seeds, twigs and roots), bee forage, shade, ornamental, dye (fruit used by children as an ink substitute).

PROPAGATION: Seedlings, cuttings. Easy to propagate by seed.

MANAGEMENT: Produces suckers.

REMARKS: The Sanya believe that the fruit must be eaten with only one hand, otherwise it will lose its sweetness. Roots are said to be poisonous. Reported to be an invasive weed in fallows in Tanzania.

FURTHER READING: Beentje, 1994; Kokwaro, 1993; Maundu et al., 1999; Palgrave and Palgrave, 2002; Ruffo et al., 2002.



Apodytes dimidiata

Icacinaceae

Indigenous

STANDARD/TRADE NAME: Pear wood, White pear.

COMMON NAMES: **Bondei:** Mfret; **Digo:** Mungowengowe, Mtsunga mbuzi; **English:** Pear wood, White pear; **Kikuyu:** Mugonyoni, Muchogi; **Kipsigis:** Chesimboliet; **Luhya:** Masaba, Wanda; **Luo:** Lemo, Luochuoga, Ochond obok; **Maasai:** Oldiasimbol; **Meru:** Mwiramwanki; **Samburu:** Arakaulu, Eyaonet; **Swahili:** Mlambusi mbage; **Tugen:** Orisuet; **Turkana:** Epikororok.

DESCRIPTION: A tall evergreen forest tree, growing to 25 m in high-rainfall areas but elsewhere smaller and more rounded, often branching at the base. **Trunk often ridged in large trees**, branchlets generally thin and **rather right-angled**. **BARK:** Pale grey-brown, fairly smooth, darker, flaking and slightly fissured with age. **LEAVES:** Alternate, **shiny dark green above, drying black**; shape variable, usually oval, up to 13 cm long but often smaller; tip tapering, edge very regularly wavy, sometimes slightly toothed, midrib paler, ridged only below, other veins inconspicuous, dividing irregularly. **Young leaf stalks and part of the midrib are reddish**. **FLOWERS:** Small, delicate, white, **star-like** with black anthers, fragrant, in striking sprays at the end of branches over much of the tree. **The flowering branchlets persist after the flowers fade**, giving the tree a twiggy appearance. **FRUIT:** Small, 8 mm, flattened, black, with a **fleshy scarlet appendage on one side** giving the fruit a kidney shape.

ECOLOGY: Distributed in most countries in eastern and Central Africa southwards to Mozambique and South Africa. Also on Madagascar, the Comoros and Mascarene Islands, India, tropical Asia and as far east as south-western China and the Moluccas. In Kenya, widely distributed from the coast to 2,400 m, in forest ranging from the Shimba Hills to Kakamega Forest; common in the wet regions of southern and eastern Mt Kenya and occasionally found around Nairobi. Also in dry forests, forest edges, remnants, in clump bushland and in coastal woodland. May be locally dominant in dry forest. Agroclimatic Zones I-III.

USES: Firewood, charcoal, timber (construction, indoor carpentry, doors, veneer), tool handles, medicine (bark), bee forage, ornamental.

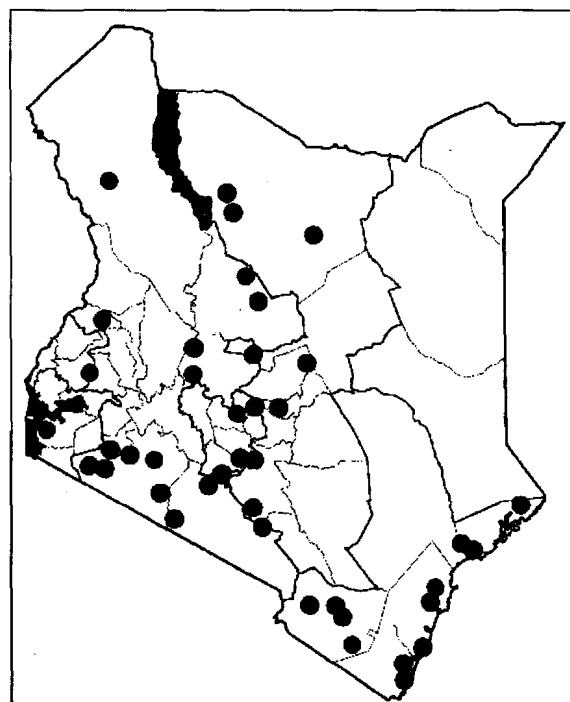
PROPAGATION: Seedlings.



MANAGEMENT: Slow growing.

REMARKS: The wood is light pink and very hard, earlier much favoured for making wagon wheels; easy to plane and polish. Pieces of wood are used as earplugs by the Maasai. Honeybees forage vigorously for the abundant nectar and pollen from the flowers. The pollen is valuable for stimulating brood rearing and is important for strengthening the colonies. A good yield of honey is produced when many trees are available. Recommended for planting.

FURTHER READING: Beentje, 1994; Fichtl and Adi, 1994; Kokwaro, 1993; Noad and Birnie, 1989; Palgrave and Palgrave, 2002.



Araucaria cunninghamii**Araucariaceae****Eastern Australia, New Guinea**

COMMON NAMES: English: Hoop pine, Moreton Bay pine.

DESCRIPTION: A tall evergreen tree up to 36 m with **spreading, widely spaced upcurved branches bearing dense tufts of branchlets**. The trunk can reach a massive 3 m in diameter. **BARK:** Shiny with a copper hue when young. With age, rough, **flaking, exposing shiny brown underbark, hoop-like rings made by horizontal cracking**. **LEAVES:** Young leaves rather triangular, sharply pointed, 1–2 cm long, but mature leaves softer, narrow and curved inwards, overlapping, crowded along the branchlets, all dark green. **CONES:** Male cones soft, to 7 cm long, in hanging clusters, turning orange-red with pollen; female cones hard and green about 8 cm and erect, covered with scales, each with a sharp recurved tip.

ECOLOGY: A native of rainforests in eastern Australia and New Guinea. It has been introduced into East Africa mainly as an ornamental and avenue tree, but also planted in plantations at low altitudes in central Uganda. Occasional in Nairobi. Agroclimatic Zones I–III.

USES: Timber, ornamental, Christmas tree.

PROPAGATION: Seedlings.

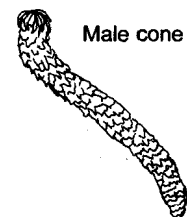
SEED: Mature cones collected and seed collected by shaking out. Seedlings are difficult to raise as germination and survival rates are low. Sow seeds in beds and transplant into pots; 2,400–4,000 seeds per kg. **treatment:** Street nurseries in Nairobi soak seeds in water until they send out a radical (about 5 days later). They are then transplanted individually into pots. **storage:** Seeds can be dried and stored but it is best to sow as soon as possible after collection.

MANAGEMENT: A moderately fast-growing tree. Some pruning may be required.

REMARKS: Occasionally used as a Christmas tree. Several other araucarias are found in Kenya. Probably the most noticeable is Chile pine (*A. araucana*) or the monkey puzzle, so named due to its spiny nature that 'would

puzzle a monkey to climb'. This Chilean tree can grow to 24 m with a trunk diameter of 1.2 m. Leaves glossy, dark green, rigid, long lasting and fiercely prickly. Branches long and interwoven, especially in young trees. Cones globular, to 15 cm long, bearing edible seeds (Chile nuts). It does well in cool humid climates. Young trees need pruning. Another fairly common species is *A. bidwillii* (English: Bunya pine, Bunya bunya) originally from the rainforests of south-east Queensland, Australia. This rather slow grower can reach a height of 36 m, developing a domed crown as it matures. Branches are long, rather sparse and arising from the main trunk almost at right angles. Leaves are up to 5 cm long, flat, dark and prickly. Cones are large, pineapple-like and weighing up to 7 kg or more with large edible seeds. Needs good rainfall in warm areas but does well in dry cool highlands. Does not thrive well at seashores. Other araucarias include *A. heterophylla* or Norfolk Island pine, a beautiful fast-growing tree to 30 m with a regular branching pattern. This can thrive well near the shore. *A. cunninghamii* is less regular in shape than other araucarias, the wide-spreading branches having tufts of leafy branchlets. Altogether, the genus has about 18 species.

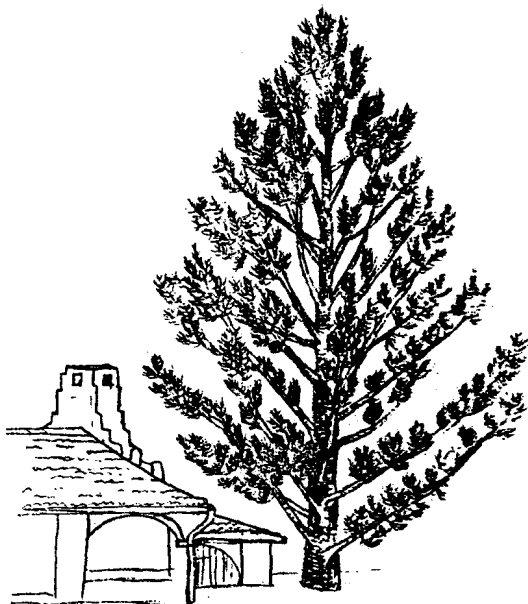
FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Bein et al., 1996; Jensen, 1999; Katende et al., 1995; Noad and Birnie, 1989; Storrs, 1979.



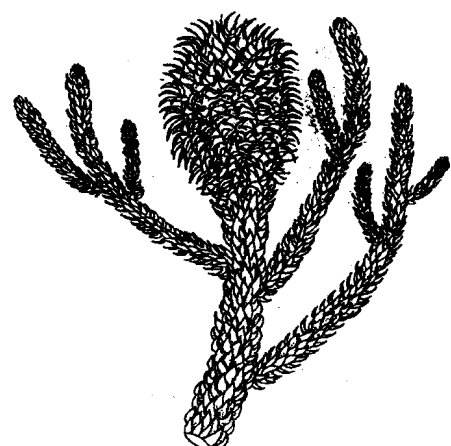
Male cone



Seed



Female cone



Areca catechu

Arecaceae (Palmae)

South East Asia

COMMON NAMES: **English:** Betel nut, Areca palm, Areca nut.

DESCRIPTION: A slender, erect palm to 30 m tall and 25–40 cm in diameter. Crown about 2.5 m in diameter. **TRUNK:** Straight, green when young, later becoming greyish brown, with rings from leaf scars. **LEAVES:** 8–12 leaves, up to 2 m long. Each leaf divided, with 30–50 leaflets, each 30–70 cm long and 3–7 cm wide, with 3 or more folds. **FLOWERS:** A single-branched bunch of flowers from the trunk under the crown. Male flowers numerous, small, borne above female flowers. Female flowers on thickened base of branches, 1.2–2 cm long, green and creamy white. **FRUIT:** Oval or almost round, to 10 cm long and 5 cm wide, variable in shape, yellow to orange when ripe, 50–400 fruits on one stand.

ECOLOGY: Origin unclear, but probably in Indonesia. Now also found in most parts of South East Asia and in many other tropical regions, including Tanzania and Kenya. Grows from sea level to about 900 m, particularly in coastal climates where evenly distributed annual rainfall of 1,500–5,000 mm ensures ample soil moisture throughout the year. In Kenya, planted but also naturalized in Coast Province, especially around Lamu and the lower Tana River area. Riverine in very dry areas. Agroclimatic Zones III–V.

USES: Fruit (chewed as a stimulant), tannin (fruit), red dye (fruit), medicine (chewing fruit acts as a vermifuge and strengthens gums), soil improvement.

PROPAGATION: Seedlings, direct sowing at site.

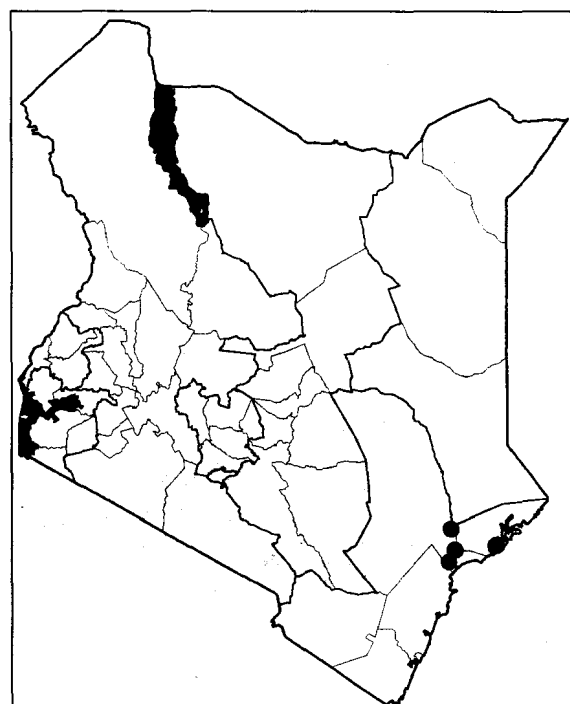
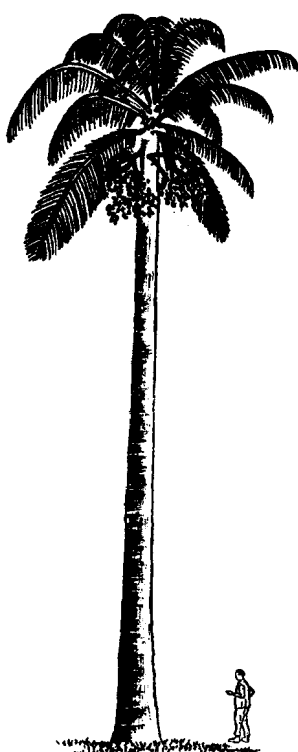
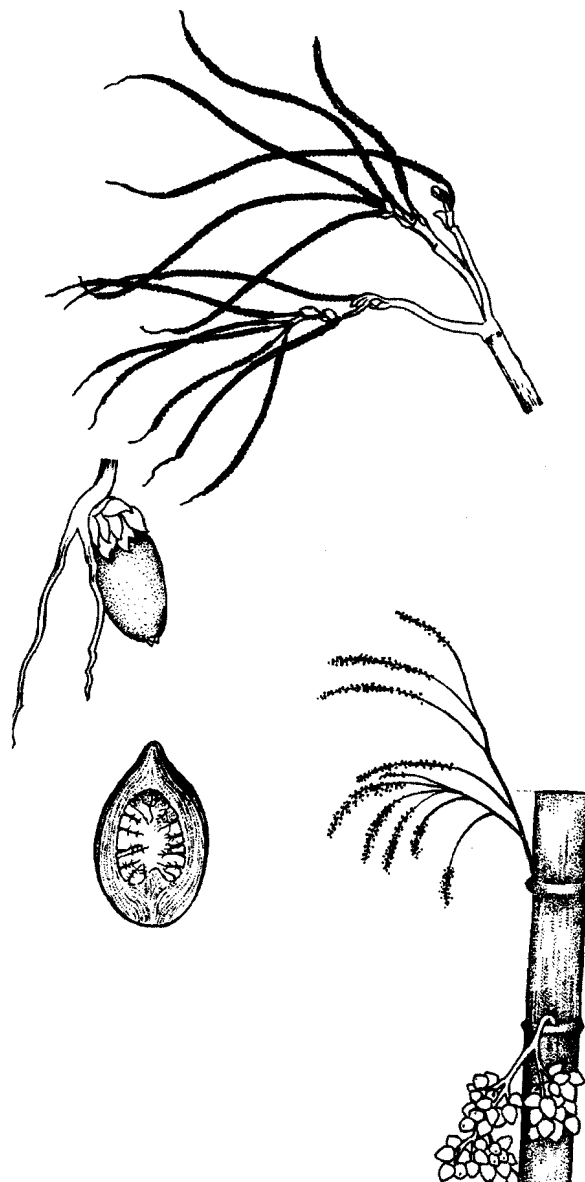
SEED: About 60 seeds per kg.

treatment: Nuts should be allowed to ripen fully on the tree. Drying of seeds for 1–2 days before sowing improves germination.

MANAGEMENT: Young seedlings need protection from sunlight. Areca nut is sensitive to drought.

REMARKS: Grown in Kenya mainly for aesthetic and landscaping purposes. In Asia, cut slices of the seed mixed with lime and wrapped in leaves of *Piper betle* (Betel pepper) are chewed as a stimulating masticatory. It turns saliva, lips, tongue and teeth red or black. The skin of the fruit of betel nut is edible.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Beentje, 1994; Jensen, 1999; Lötschert and Beese, 1983.



Artocarpus heterophyllus

Moraceae

India

COMMON NAMES: Digo: Mfenesi; **English:** Jackfruit; **Giriama:** Mfenesi; **Swahili:** Mfenesi; **Teso:** Efenesi.

DESCRIPTION: A medium-sized tree with thick branches, to 25 m. The **bole is short**, cylindrical and straight, up to 1 m in diameter in old specimens, branching less than 2 m from the ground. **BARK:** Rough bark on the bole, grey but smooth on the branches. **LEAVES:** **Glossy, oval to 15 cm long** and 10 cm wide. **FLOWERS:** Separate male and female, all very small but the female flowers have a stronger smell. The **flowers are borne on the trunk** or on large branches where the fruit—the largest known—develops. **FRUIT:** Massive and irregular 'cauliflowery', **yellow-green compound fruit with a spiky rind**, reaching a record 20 kg in weight and **1 m in length**. The flesh is sweet and edible but definitely an acquired taste. Seeds, up to 5 cm, are edible when roasted.

ECOLOGY: Originates from Asia, probably in the forests of the Western Ghats in India. Today it is widespread in other parts of the tropics and most popular in Sri Lanka. Introduced in East Africa and now widely planted in the coastal areas of Kenya and Tanzania in places. Grows in sandy soil but prefers well-drained and fertile soils and will not tolerate coral rag, shallow soil, drought or waterlogging. Agroclimatic Zones I–II. Flowers during rainy seasons, April–May and October–November at the coast.

USES: Firewood, charcoal, timber (carts, doors, etc.), furniture, edible fruit and seed, medicine (leaves and roots), fodder (leaves and rind), shade, gum.

PROPAGATION: Direct sowing at site, wildings. Vegetative propagation (bud grafting, air layering, root cuttings) to get good varieties. Direct sowing at site is better than to raise seedlings in a nursery due to early growth of the taproot. Seedlings do not tolerate root pruning well. Add ash around young seedlings and newly sown seeds to keep insects away.

SEED: Seeds are hand picked individually from the fruit flesh. Wash to remove the flesh and sow. About 400 seeds per kg. Germination starts within 10 days and 80–100% germination can be achieved within 35–40 days.
treatment: Not necessary.

storage: Seed should not be allowed to dry. Use fresh seed.

MANAGEMENT: For good fruit productivity, a spacing of 10–12 m is needed. Fast growing; most cultivars fruit in about 8 years. Cut back fruiting twigs after harvesting.

REMARKS: Suitable around homesteads as a shade tree or support for climbing crops like yams and passion fruit. The fruit may be especially important in times of drought and crop failure. A related species, *A. altalis* (**English:** Breadfruit) is probably of Malaysian origin. It grows to about 18 m, in other countries even taller, and has a round dense crown and ascending branches with large, deeply incised leaves. Flower spikes are inconspicuous. Fruit is globular, yellow-green with starchy flesh eaten after baking or boiling. The tree is grown at the coast. *Artocarpus* is a large genus of evergreen trees of tropical Asia. They exude a milky sap when damaged. Female flowers are crowded on short spikes that, after fertilization, develop into an aggregation of many fleshy fruits.

FURTHER READING: <http://www.worldagroforestrycentre.org/Sites/TreeDBS/AFT/AFT.htm>; Dharani, 2002; Jensen, 1999; Katende et al., 1995; Lötschert and Beese, 1983; Mbuya et al., 1994; Noad and Birnie, 1989; Verheij and Coronel, 1993.

