**Croton macrostachyus** Hochst. ex Delile

**Protologue**

**Family**
Euphorbiaceae

**Vernacular names**
Woodland croton, forest fever tree, broad-leaved croton (En). Croton à feuilles larges (Fr). Mtumbatu (Sw).

**Origin and geographic distribution**
*Croton macrostachyus* occurs throughout tropical Africa, including Madagascar.

**Uses**
Throughout its distribution area a decoction, infusion or maceration of leaves, stem bark or root bark are taken as a purgative and vermifuge. Leaf sap is used similarly. The seed oil is a very powerful purgative. In West Africa different plant parts in decoction are taken to treat constipation, stomach-ache and female infertility, and are used externally to treat stitch-like pain in the side and Guinea worm sores. In Ethiopia *Croton macrostachyus* has many uses. A leaf extract is applied against itchy scalp. A decoction of the leafy twigs mixed with *Justicia schimperiana* (Hochst. ex Nees) T.Anderson is taken to
treat jaundice and smallpox. The preparation is taken with pepper, butter and milk. An infusion of the leafy branches and roots is used as a mouthwash to treat toothache. The leaves or young shoots are eaten to treat fever and oedema and mashed leaves are applied to haemorrhoids. A preparation of the seed is instilled into the ear to treat ear problems. The seeds are poisonous and are used to make fish poison, while crushed seed and leaves in water are taken to treat tapeworm infection; the seed is eaten to induce abortion and a fruit, bark or root decoction or raw fruit is taken to treat venereal diseases. A bark maceration is drunk as an abortifacient and uterotonic, to expel a retained placenta. These treatments are all considered dangerous. The root or stem bark is chewed to treat toothache, but also rabies. Ripe crushed fruits mixed with butter or honey and ground leaves are applied to skin diseases. In Kenya the Luhya people lick the ash of burnt leaves as a cough remedy. A leaf decoction is also taken to treat cough and stomach problems. A root decoction is taken to treat indigestion. The Kikuyu people take a root decoction to treat malaria; leaf juice is put on wounds to improve blood clotting, and also to treat sores, warts and ringworm. In Kenya and Tanzania a root infusion is taken to treat intestinal parasites. A decoction of the stem and root bark is used for bathing babies with skin rash. A bark infusion is taken to treat chest problems and rheumatism. Leaves made into a poultice are externally applied to treat pleurisy. A powder of leaves and twig bark is eaten to calm insanity and possession.

In Kenya *Croton macrostachyus* is commonly planted as a shade tree in villages and in coffee plantations. The wood is used in eastern and southern Africa to make tool handles, small stools, boxes, crates and plywood, as flooring and building material and in carpentry. The wood is used as fuel that burns even when green, but with a rather unpleasant spicy odour and much smoke; it is also used to make charcoal. Due to its drought hardiness and fast growth, *Croton macrostachyus* is considered useful for afforestation of shifting sand dunes, degraded waste land, hill slopes, ravines and lateritic soils. It is also grown as a hedge plant and is suitable for intercropping. In India it has been grown
successfully with *Azadirachta indica* A.Juss. in shelter belts. In Uganda sheep and goats do not browse young leaves, but old leaves are readily eaten. In Sudan the leaves are burnt to make vegetable salt. In Ethiopia the leaves are used as green manure and fodder. The fruits are very popular with birds and could be used as poultry feed. The flowers are heavily scented and give a dark-amber coloured honey with strong flavour. *Croton macrostachyus* is widely used in rituals.

**Properties**

The seeds contain about 19% oil, which is a slightly viscous, yellow-orange fluid and slightly vesicant. The seeds also contain several saponins and a resin, which is said to be more toxic to insects than rotenone. The plant also contains the chalcone crotin. The stem bark and twigs contain lupeol, betulin and several fatty acids. The fruits contain crotepoxide, a cyclohexane diepoxide, which inhibits certain tumours in animal models. Crotepoxide also shows moderate trypanocidal activity against *Trypanosoma brucei* and *Trypanosoma evansi*. Protein fractions from the leaves induced mitogenesis both in human and mouse isolated T cells.

Aqueous and alcoholic stem bark extracts are toxic when injected intraperitoneally in mice. However, after autopsy no marked pathological changes were recorded. The extracts showed taenicidal activity in volunteers with tapeworm infection. A hexane extract of the leaves showed antibacterial activity against *Bacillus subtilis*, *Micrococcus luteus* and *Staphylococcus aureus* in vitro. Root and stem bark extracts showed low antibacterial activities. An aqueous root extract showed toxicity in the brine shrimp lethality test. The crude ground seeds showed high molluscicidal activity in vitro.

In a field experiment in Ethiopia the decomposition rate of the leaves of *Croton macrostachyus* was found to be 3 times higher than those of *Millettia ferruginea* (Hochst.) Baker. The decomposition rate of naturally shed leaves was only marginally slower than the rate of leaves harvested green. In another field trial in
Ethiopia on the effect of combined inputs of green manure and urea (both at a rate of 100 kg N/ha) on maize productivity, no consistent short-term advantage of a combination of *Croton macrostachyus* green manure and urea over pure urea was found.

The wood density is about 540 kg/m³ at 12% moisture content. The wood is moderately soft, perishable and susceptible to attack by wood borers. The wood is difficult to saw. In tests, sulphate pulping gave a pulp of moderate strength; the wood can be used to make writing paper or newsprint paper after bleaching, but it is unsuitable for the production of wrapping paper.

**Description**

Monoecious or dioecious, deciduous, medium-sized tree up to 25(–30) m tall; bole cylindrical, up to 100 cm in diameter; bark grey to grey-brown, finely fissured and cracked, inner bark pale brown to reddish brown, smell peppery; crown rounded and open with large, spreading branches; young branches densely stellate hairy. Leaves alternate, simple, turning orange before falling; stipules linear, up to 15 mm long, soon falling; petiole up to 12(–20) cm long, with 2 stalked glands at top; blade ovate-elliptical to almost circular, up to 17(–25) cm × 14(–20) cm, base cordate, apex acuminate, margins irregularly toothed, densely stellate hairy on both sides, whitish green beneath. Inflorescence a slender, terminal raceme up to 35 cm long, either with only male or female flowers or male and female flowers variably mixed. Flowers unisexual, 5-merous, regular, yellowish to white, fragrant; male flowers with pedicel 3–10 mm long, calyx campanulate, lobes ovate to triangular, 2.5–3.5 mm long, margins densely white hairy, petals oblong to oblanceolate, 3–4.5 mm long, stamens 15–17, free; female flowers with pedicel 2–4 mm long, fleshy, calyx as in male flowers but lobes more triangular, persistent in fruit, petals linear or absent, up to 1.5 mm long, ovary superior, rounded, densely stellate hairy, 3-celled, styles 3, 2-fid to base, 3–6 mm long, twisted and curved. Fruit an almost globular capsule 8–12 mm in diameter, slightly 3-lobed, stellate hairy, apex centrally depressed, whitish
to pale greyish brown, 3-seeded. Seeds ellipsoid, 6–8 mm × 4–5.5 mm, flattened, caruncle lobed, cream-coloured. Seedling with epigeal germination.

Other botanical information
*Croton* comprises about 1200 species and occurs throughout the warmer regions of the world. It is best represented in the Americas; about 65 species occur in continental Africa and about 125 in Madagascar. Mature fruits of *Croton macrostachyus* split open with a sharp noise.

Growth and development
In dry regions of West Africa flowering starts at the beginning of the rainy season. In Nigeria flowering occurs in March–May. In Kenya flowering occurs almost throughout the year with peaks in March–June in western Kenya and May–June in central Kenya. Fruit development takes 4–5 months. Pollination is done by insects. The maximum growth rate is about 1.5 m/year.

Ecology
*Croton macrostachyus* commonly grows in secondary forests, especially on forest edges and along rivers or lakes, in moist or dry evergreen upland forest, woodland, wooded grassland, bushland and along roadsides, often on soils of volcanic origin, at 200–2500(–3400) m altitude. The mean annual rainfall varies from 150 to 1200 mm.

Propagation and planting
*Croton macrostachyus* is propagated by seed or wildlings. Direct seeding is preferred, and pre-sowing treatment is not necessary. The number of seeds per kg is 16,000–27,000. The seeds are sown in a mixture of sand and compost (1:2), covered lightly with fine compost and kept moist. They take 3–8 weeks to germinate. Under ideal conditions, 40–70% of the seeds germinate in 4 weeks. If planted in a nursery, transplanting should be done at the 2-leaf stage. The seeds
retain their viability for several months if kept dry and free from insects at a maximum of 20°C, and for at least 2 years when dried below 8% humidity.

Management
*Croton macrostachyus* can be lopped, pollarded or coppiced. It grows well both in shade and bright sunlight; it is vulnerable though to cold wind and frost, especially young plants, which should be protected during the first two years. *Croton macrostachyus* has a long taproot and numerous side-roots, which makes it adapted to dry climates.

Diseases and pests
In Ethiopia the leaves of *Croton macrostachyus* are attacked by a leaf spot caused by the fungus *Cylindrosporium* sp. The seeds are often damaged by insects while still on the tree.

Handling after harvest
Fruits are sun-dried to release the seeds.

Genetic resources
Although *Croton macrostachyus* occurs scattered and localized throughout its large distribution area, it is not threatened by genetic erosion.

Prospects
*Croton macrostachyus* is an important medicinal plant especially in East Africa. It is widely used as a purgative and vermifuge, but also to treat venereal diseases and to induce abortion. All parts, but especially the seeds, are considered toxic, and any medicine made from them should be used with caution. Despite the many medicinal uses, not much research has been done concerning the chemical composition and pharmacology of the different plant parts and more research is warranted. *Croton macrostachyus* has several other important uses,
e.g. to control soil erosion, as a shade tree and for its green manure and fodder, which deserve additional tests in the field.

**Major references**


Other references
• Moshi, M.J., Cosam, J.C., Mbwambo, Z.H., Kapingu, M. & Nkunya, M.H.H.,


Sources of illustration


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Editors

• G.H. Schmelzer
1, leafy twig; 2, inflorescence; 3, infructescence.

Redrawn and adapted by Iskak Syamsudin
tree habit

slash, bark and leafy branch
fruiting branch