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Forest & Landscape

SEED LEAFLET

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MILLENNIUM SEED BANK PROJECT Kew

Cola nitida (Vent.) Schott & Endl.

Taxonomy and nomenclature

Family: Sterculiaceae
Synonyms: *C. vera* K. Schum., *C. acuminata* var. *latifolia* K. Schum., *Sterculia nitida* Vent. Jard. Malm.
Vernacular/common names: bitter cola, kola nut. Colatier (French), goro (Fula), bugurabu, woro (Jola), goro (Wolof), gure (Moore), kuruo (Mandinka).
Related species of interest: Cola is a large African genus, with about 50 species occurring in West Africa.

Distribution and habitat

C. nitida is native to tropical West Africa, but has been spread across Africa by man and is now cultivated from Senegal to Nigeria, as well as in the West Indies and South America. It is a tropical rainforest tree, requiring a hot, humid climate; however, it can survive the dry season on sites with high ground water. It is present in areas where the annual rainfall is 1200mm to 1800mm, with well marked wet and dry seasons. *C. nitida* has long been domesticated from its natural stand and is now found mainly planted in pure stands and sometimes as an important stand in natural habitats. These trees are usually destroyed during forest clearing.

C. nitida mature fruits. Photo: C. Kouame

Uses

The 'kola nut' is economically important and is derived from two species: *C. nitida* and *C. acuminata*. Seeds of *C. nitida*, which contain caffeine, are eaten as a stimulant and at cultural ceremonies all over West Africa. The fresh seed is chewed and the juice swallowed as a stimulant, preventing fatigue, and replacing a cup of coffee. It is an important commercialised crop, widely exported across West Africa, usually packed in containers made of moist leaves. For all purposes, fresh seeds are mainly the best. However, commercial kola consists of dried cotyledons. The presence of alkaloids and other chemicals in the seeds of *C. nitida* makes them suitable for use in medicinal preparations. They are locally used for healing swellings and wounds and to treat diarrhoea. Kola nuts are used in the preparation of non-alcoholic beverages. It is also used to manufacture a type of 'chocolate' with a high melting point, in wine, and for dyeing textiles.

Botanical description

C. nitida is a large-leaved, evergreen tree. The adult trees are up to 20m tall, with a rather short stem and a dense low crown with few thick main branches. The leaves are variable in shape and size, generally oblong or elliptic, abruptly and shortly acuminate at apex, up to 33 by 13cm, usually smaller.

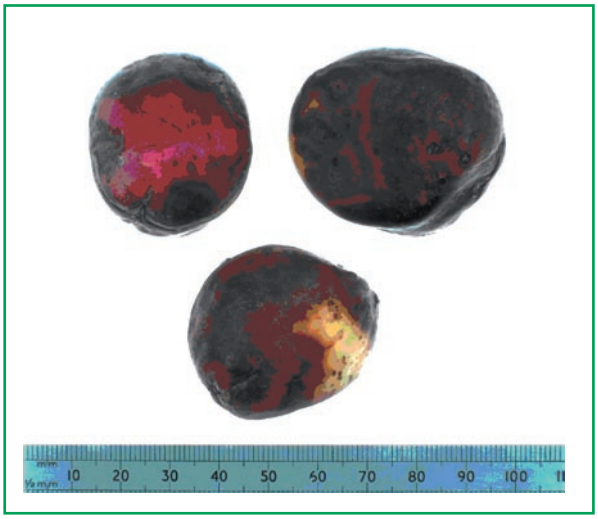
Fruit and seed description

Fruit: the kola fruit is a pod consisting of 5 ellipsoid, warty pods (follicles), c. 7 by 13cm, and containing up to 10 seeds per carpel.
Seed: the red seeds are known as 'cola nuts'. They are c. 2.5cm long and are surrounded by a tough thin white fleshy skin. An average seed weighs 10-20g. The seeds have a crude protein content of 9.5%, a caffeine content of 2.8% and a fat content of 1.4%. Fresh seeds contain 1-2% caffeine, while drying the seeds increases the caffeine content to up to 5%.

Flowering and fruiting habit

The flowers are off-white with dark red stripes and grow in axillary clusters. They are unisexual and male and female flowers appear on separate trees. The male trees often set flowers before the female. After wind or insect pollination, the fruits take 5-6 weeks to mature. The ripe fruits are dispersed by bats, birds and squirrels, which readily eat the fruits. The

male trees flower annually whereas some female trees only flower once every two years. Fruiting generally takes place during the wet season between June and October, and mature fruits can be harvested after the trees have shed their leaves. Usually new leaves develop at the same time.



C. nitida seeds. Photo: H. Vautier.

Harvest

When they are ripe, the dark green pods turn a paler green. This occurs approximately when the moisture content of the seeds is c. 55%. The seeds are harvested mainly between September and January, with a second harvest also during June and July, just after the rainy season. Ideally pods should be harvested about 18 weeks after the fruit sets, and before the pods begin to dehisce.

Processing and handling

The pods are broken open to release the seeds. The seeds can be removed from their fleshy seed coats by 'skinning', i.e. soaking in water for 24 hours followed by drying in the sun for 24 hours. Immediate removal of the seed coat without pre-skinning often results in physical damage to the seeds. The cultivation, processing and storage of the nuts takes place in the warm, humid rain forest zone where there is high mould infection.

Storage and viability

Seeds of this species are recalcitrant, i.e. they are sensitive to drying and low temperatures. They do not tolerate drying to less than c. 30% moisture content. Seeds can be maintained for one year or more without loss in viability, with seeds wrapped in banana leaves at room temperature.

Dormancy and pretreatment

The seeds are thought to require a period of dormancy for effective germination and growth. Higher germination levels were achieved when the cotyledons were parted before sowing. The improved germination could be a result of the removal of this mechanical constraint. Pre-soaking for 24 hours prior to sowing can also improve the level of germination.

Sowing and germination

Germination is hypogeal and takes place within 10 days for stored seed (moist storage for up to 11 month), as compared to 18 days for a fresh seed. To achieve optimum results, seeds should be sown at 30°C. High temperatures and light appear to have no direct effect on germination. Increased seed weight has been reported to improve germination, which also seems highest and most rapid with white seeds, followed by pink and red seeds. To improve the rate and level of germination farmers cut off the tips of the closely adpressed cotyledons before sowing. Germination of fresh seed is generally good in nursery and seedlings can be transplanted after about a year.

Selected readings

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