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Garcinia kola Heckel

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Garcinia kola Heckel

Taxonomy and nomenclature

Family: Clusiaceae
Synonyms: *G. dinklagei* Engl., *G. conrauana* Engl.
Vernacular/common names: rock-elm (Eng.); ioko (Hausa); iroko (Yoruba); mvule (Swahili); iroko, onie, munjari, bo nya (trade names).
Related species of interest: there are more than 600 species in the genus Garcinia throughout the tropics, one is the mangosteen. Most are upper-storey trees, and some are large trees useful for timber. There are only 16 species in West Africa.

Distribution and habitat

G. kola is a widespread tree of evergreen forests and is found from the Democratic Republic of Congo to Ghana, where it occurs in the wet and moist semi deciduous forest zones, in savannah as well as forest. Currently, only a few trees are left in forest reserves and on private farms. The natural regeneration of the species is poor, and seedlings are uncommon and slow-growing.

A recent inventory revealed that, *G. kola*, which is harvested mainly from the wild, is close to commercial extinction in Ghana. Due to the actual and/or potential levels of exploitation, as well as the rarity and slow growing nature of the seedlings, the species is facing a high risk of extinction in the wild in the medium-term future. The status of *G. kola* in the IUCN red list was re-assessed in 2004, as 'Vulnerable'. There is clearly an urgent need to domesticate this species and to preserve its biodiversity.

Uses

It is probably the most important source of chew-sticks in West Africa. Split stems and twigs are used as chewing sticks in many parts of Africa, and have been commercialized in the major cities for years, offering natural dental care. In addition, the seeds together with other parts of the plant are used in medicinal preparations. The seeds are known as 'bitter kola' (used for food and in medicine). Particularly exciting is the recent observation that a *G. kola* extract can prevent the Ebola virus from replicating itself. The bark is used for tanning. Natural trees are often felled to facilitate both removal of the bark and harvest of chew-sticks. The tree is also planted in agroforestry and used as shade tree in cocoa plantations.

Botanical description

Medium sized evergreen tree, about 15-17m tall and with a fairly narrow crown. The leaves are simple, 6-14cm long and 2-6cm across, shiny on both surfaces and spotted with resin glands. The small flowers, in umbel-like inflorescences are covered with short, red hairs.

Mature (orange) fruits of *G. kola* Photo: C. Kouame

Fruit and seed description

Fruit: the fruit is a drupe of 5-10cm in diameter and weighs 30-50g. It is usually smooth and contains a yellow-red pulp. The fruit changes colour during maturation from green to orange, and each fruit contains 1-4 seeds.
Seed: the oval-shaped seeds are c. 3cm long with a mass of c. 8g and a thin leathery testa surrounding the endosperm. The thin seed coat is brown with branched lines, the kernels pale and penetrated with pockets of resin. The embryo is not well differentiated into cotyledons and embryonic axis. Rather, most of the seed is a mass of undifferentiated tissue. The seeds contain carbohydrate (10%), crude fat (>10%), and crude protein (5%), the most abundant mineral being sodium (215.10ppm).

Flowering and fruiting habit

Fruiting generally takes place towards the dry season between September and December.

Harvest

Mature orange fruits are harvested from the canopy (avoid collecting from the ground, though there is often a competition with the wild life) from September to December. A mature tree can yield about 500 fruits, providing c. 1700 nuts per year.

Processing and handling

The fruits are usually left to soften in open air under shade for 2 to 4 weeks before the pericarp is removed to extract the seeds.

Storage and viability

The seeds do not exhibit orthodox storage behaviour and should be treated as carefully as recalcitrant seeds. The fleshy fruits have a moisture content of about 50% mc at harvest. The species occurs naturally in evergreen moist forests where temperatures are uniformly c. 30 to 32°C and the relative humidity ranges between 76 and 93%. Such moist and warm conditions can be recommended for handling and short-term storage of the seeds. If the seeds are to be stored in short term moist conditions, it is vital that they are ventilated frequently.

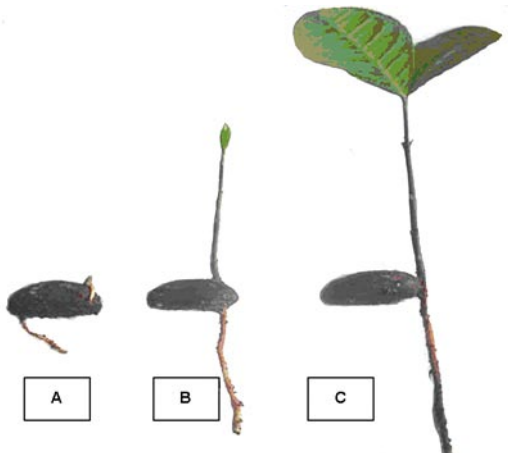
Dormancy and pretreatment

Fresh, mature seeds of *G. kola* are dormant but viable, creating difficulties with rapid and uniform germination within seed lots.

The thin leathery seed cover is not a barrier to water penetration in the embryo, however, de-coating or ethanol treatments (soaking in 70% ethanol solution for 1 to 2 hours) can increase germination to >90% after c. 5 months.

Sowing and germination

Germination of intact, fresh seeds is about 50%. Germination starts after about 3 months at ambient temperature (25-28°C) and most seeds will have germinated 7-8 months after sowing (in river sand). However, in nursery trials, the seeds continued to germinate for 18 months, reaching a final germination level of 75%, illustrating that *G. kola* seeds exhibit a high degree of dormancy.



Germinated seed and seedlings of *G. kola*
Photo: C. Kouame

Selected readings

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