

Coffea arabica

arabica coffee

LOCAL NAMES

Burmese (ka-phi); Creole (kafe); Dutch (arabische Koffieboom); English (Arabian coffee, arabica coffee, Brazilian coffee, coffee tree, Abyssinian coffee); Filipino (kafe); French (caféier, café); German (Bergkaffee, arabischer Kaffeebaum, Kaffeestrauch); Indonesian (kopi); Italian (caffee (arbusto), arbusto de caffee); Khmer (kafae); Spanish (cafeto, café); Swahili (kahawa); Thai (gafae); Trade name (arabica coffee); Vietnamese (cà phê)

BOTANIC DESCRIPTION

Coffea arabica is an evergreen, shrub or small tree, up to 5 m tall when unpruned, glabrous, with small glossy leaves.

Leaves are simple, alternate, opposite, thin, dark-green, shiny surfaced, fairly stiff; axillary and sub-axillary buds often develop into reproductive lateral branches. Leaves petiolate, sometimes bearing interpetiolar stipules. Prominent leaf midrib and lateral veins.

Flowers produced in dense clusters along reproductive branches in the axils of the leaves. White, sweet scented, star-shaped and carried on stout but short peduncles. Bracteoles united, forming a cup-shaped epicalyx at the base of the flower. There are 5 calyx segments halfway the length, spreading out very widely at the anthesis and 5 stamens inserted in the corolla tube. Anthers carried on long, slender, upright filaments. Ovary inferior, 2 united unilocular carpels, each containing a single ovule attached to the base of the carpel wall. The ovary bears a slender style, which terminates in short, pointed bifid stigmas.

Fruit a drupe; pericarp composed of shiny exocarp, fleshy mesocarp and relatively thin but tough endocarp, in which the seeds are enclosed. Immature berries dull green; on ripening the skin colour changes through yellow to bright crimson. Each berry contains 2 seeds, 8.5-12.5 mm long, ellipsoidal in shape and pressed together by flattened surface that is deeply grooved; outer surface convex. Thin, silvery testa follows outline of endosperm, so fragments are often found in ventral groove after preparation. Seeds consist mainly of green corneous endosperm, folded in a peculiar manner, and a small embryo near the base. Dried seeds, after removal of the silvery skin, provide the coffee beans of commerce.

The generic name is derived from the Arabic word used for the drink, which may have come from the region of Kefa in Ethiopia.

BIOLOGY

The plant is tetraploid, and over 30 mutations have been recognized. In the bisexual flowers, pollen is shed shortly after the flower opens, and the stigma is receptive immediately. Self-pollination can occur, as seed sets even when the flowers are bagged. Pollination is also by honeybees, which collect nectar and pollen from the flowers. Dispersal is mainly by birds and mammals.

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C. arabica flowering flush after rain. (David Boshier)



C. arabica mature fruit ready for harvesting. (David Boshier)



Ripe yellow casturi coffee (Trade winds fruit)

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ECOLOGY

C. arabica thrives in a moderately humid atmosphere and prefers deep friable soil on undulating land; it is unsuited to stiff clay or sandy soils and is considered tolerant of acid soils. It thrives at 1500-2000 m or higher, ideally with rainfall 1500-2000 mm.

BIOPHYSICAL LIMITS

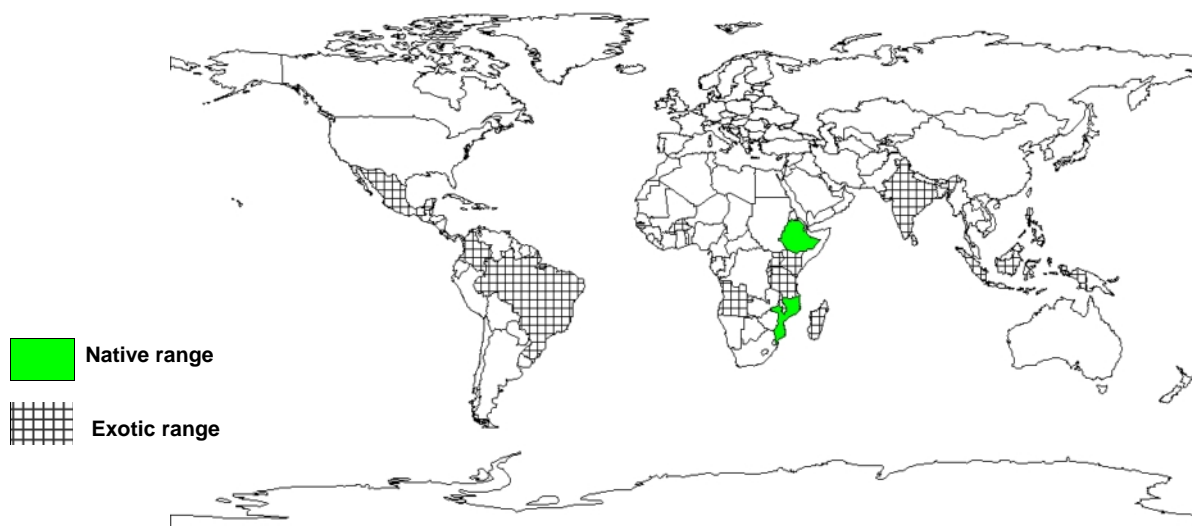
Altitude: 1 300-3 000 m, Mean annual temperature: 15-25 deg C, Mean annual rainfall: 1 500-2 000 mm

Soil type: Savannah soils of moderate acidity to neutral or slight alkalinity are suitable. Very sandy soils and shallow soils are unsuitable for growing coffee. Soils should be deep, slightly acidic, well-drained loams. They should be rich in nutrients especially potash and with a generous supply of organic matter.

DOCUMENTED SPECIES DISTRIBUTION

Native: Ethiopia, Mozambique

Exotic: Angola, Brazil, Burkina Faso, Colombia, Costa Rica, Democratic Republic of Congo, Dominican Republic, El Salvador, India, Indonesia, Jamaica, Kenya, Madagascar, Malawi, Martinique, Mexico, Philippines, Rwanda, Sri Lanka, Surinam, Tanzania, Uganda, United States of America



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

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PRODUCTS

Food: Dried seeds ('beans') are roasted, ground, and brewed to make 1 of the 2 most popular beverages in the world. In its native Ethiopia, it has been used as a masticatory since ancient times. Cooked in butter, it can be used to make rich flat cakes. Coffee is widely used as flavouring in ice cream, pastries, candies, and liqueurs. In Arabia, a fermented drink from the pulp is consumed.

Fodder: Pulp and parchment are occasionally fed to cattle in India.

Apiculture: Honeybees collect nectar and pollen from the flowers. The honey is light with a characteristic flavour. Mixed coffee-orange honey is very highly valued.

Timber: Wood is hard, dense, durable, takes a polish well, and is suitable for tables, chairs and turnery.

Poison: *C. arabica* seeds contain caffeine, which has been described as a natural herbicide, selectively inhibiting germination of seeds of *Amaranthus spinosus*.

Medicine: Reported to be analgesic, an aphrodisiac, anorexic, antidotal, cardiotoxic, CNS-stimulant, counterirritant, diuretic, hypnotic, lactagogue and nervine. Coffee is a folk remedy for asthma, tropine poisoning, fever, flu, headache, jaundice, malaria, migraine, narcosis, nephrosis, opium poisoning, sores and vertigo.

Other products: Coffelite, a type of plastic, is made from coffee beans. Coffee with iodine is used as a deodorant.

SERVICES

Soil improver: The pulp and parchment are used as manure and mulches. Annual litter fall from both shade and crop trees, including pruning residues, maintain soil organic matter levels and hence the cation exchange capacity; this reduces the risk of leaching losses and permits a more efficient use of any inorganic fertilizers applied.

Intercropping: *C. arabica* is often intercropped with food crops, such as corn, beans or rice, during the 1st few years.

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TREE MANAGEMENT

The seedlings are planted on contoured fields 2-3 m apart in 3-5 m rows. Weed control is necessary throughout the entire season. Mulches and green manure are commonly used with chemical fertilizers. Typical application consists of 175 g N, 100 g P and 175 g K per bush, the latter 2 added in 2 applications and N over a longer period (4-5 applications). Other elements are added as needed.

Shading improves leaf and shoot growth but reduces root growth; however, it may be useful when the plants are young. Done at a later stage, it may reduce yields, especially when the trees are fertilized.

Pruning has become an important maintenance operation. High productivity is directly dependent on good pruning practices.

GERMPLASM MANAGEMENT

Seed storage behaviour is intermediate. Lowest safe seed mc is 8%, unfreezable mc is 24%, viability is completely lost within 24 hours at -196 deg. C with 8% mc. Results of investigations of desiccation tolerance of 17 seed lots representing 9 cultivars received from 3 continents showed that *C. arabica* seeds tolerated desiccation to 7-12% mc, that is, in equilibrium with about 40-55% rh, but further desiccation reduced germination in all seed lots; moreover, viability was lost rapidly at cool (5 deg. C and 0 deg. C) and subzero temperatures (-20 deg. C) and at low moisture contents. Optimum air-dry storage environments for the maintenance of seed viability reported are ambient temperature with 10% mc, 10 deg. C with 50% rh (about 10% mc), 9 deg. C with 50% rh, 5 deg. C with 35-55% rh (about 7.5-11% mc), 10 deg. C with 10-11% mc. Excised embryos tolerated desiccation to 16.4% mc; viability was reduced to 56% and 8% on desiccation to 8.4% and 7.7% mc, respectively; no loss in viability after 1 hour's cryostorage in liquid nitrogen with excised embryos at 16.4% mc, little loss (by 14%) in viability with excised embryos at 8.4% mc, but no excised embryos at 7.7% mc survived 1 hour in liquid nitrogen.

There are about 3 200 seeds/kg.

PESTS AND DISEASES

Many fungi attack *C. arabica* coffee plants, among them *Colletotrichum coffeanum* and *Phoma* spp., associated with Elgon die-back and coffee berry disease. Other diseases include *Pseudomonas garcae*, a bacterial disease, and stem pitting, a viral disease.

Cuscuta and *Loranthus* spp. parasitize trees in some areas. Witches' broom also occurs.

Many nematodes have been found with *C. arabica* trees, including *Achromadora longiseta*, *Aphelenchus coffeae*, *Aphelenchoides parietinus*, *Cephalobus persegnis*, *Crictonemella curvata* and *Cryptonchus abnormis*.

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FURTHER READING

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SUGGESTED CITATION

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