

## Averrhoa carambola

L.

Averrhoaceae

### LOCAL NAMES

Creole (blinblin long, ziblinn long, karambola, kònichon peyi); English (foreign peach, carambola, five corners, star pickle, star fruit); Filipino (balimbing); French (cornichon du pays, blinblin longue, carambolier, Carambolier vrai); German (Karambolaßaum); Hindi (kamrakh, kamranga); Indonesian (belimbing manis); Khmer (spö); Lao (Sino-Tibetan) (fūang); Malay (belimbing manis); Mandarin (yongt'o); Spanish (carambole, Carambolo, carambold, jalea, carambola); Swahili (mbirimbi wa kizungu); Thai (ma fueang); Vietnamese (khê)

### BOTANIC DESCRIPTION

*Averrhoa carambola* is a small, evergreen, multistemmed tree 3-5 m high or rarely 10 m high, attaining 15 cm diameter at the base; bark light brown, smooth or finely fissured.

Leaves alternate, pinnate, 15-25 cm long, disposed more or less in a horizontal plane, shortly petiolate with 7-9 pendant leaflets; leaves have the peculiarity of being sensitive to touch in the same way as certain *Mimosa* species.

Inflorescence in panicles 2-5 cm long in the axils of old leaves; flowers pentamerous, with a calyx of 5 pink sepals surrounding the purple corolla; androecium contains 5 fertile stamens and 5 staminoids; gynoecium bears 5 slender united styles.

Fruit a large, indehiscent berry, 5-8 cm long; with a characteristic shape in cross-section resembling a 5-pointed star; yellowish-green, becoming orange-yellow when ripe. Each cell of the fruit contains 5 arillate seeds.

The generic name is after Averrhoes (1126-98), the widely known Arab Philosopher. The specific name, 'carambola', is said to have come from Malabar and was adopted early by the Portuguese.

### BIOLOGY

Heterostyly and self-incompatibility occur in *A. carambola*. Pollen grains are elongated or spherical; a suitable pollen viability test would be in vitro pollen germination. *A. carambola* is insect pollinated, the pollinators being honeybees and Diptera species. Flowering continues throughout the year and fruit is available most of the year. Seedling varieties should crop in 3-8 years, selected grafted varieties in only 1-2 years.



Star fruits in the market. Thanks to The Foundation of Agricultural Development and Education for permission to use this picture (Tanaka Y.)



Habit at State nursery Kahului, Maui, Hawaii (Forest and Kim Starr)



Leaves at State nursery Kahului, Maui, Hawaii (Forest and Kim Starr)

**ECOLOGY**

Grows best in the hot, humid tropics but will tolerate some cool weather. Young plants may be killed or badly damaged by frost, while mature specimens can withstand temperatures as low as -3 deg. C for short periods, with some damage to branches and leaves. They can also tolerate dry periods and some wind if it is not too cold.

**BIOPHYSICAL LIMITS**

Altitude: 0-900 m

Temperature: 20-35 deg. C

Rainfall: annual 1800 mm

Soil type: Prefers deep, well-drained clay loams but can grow successfully on sandy soils and heavy clays.

**DOCUMENTED SPECIES DISTRIBUTION**

Native: Indonesia, Malaysia

Exotic: Australia, Brazil, Cambodia, China, Colombia, Dominican Republic, India, Israel, Japan, Laos, Myanmar, Philippines, Singapore, Taiwan, Province of China, Thailand, Trinidad and Tobago, Uganda, US, Vietnam



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.

**PRODUCTS**

**Food:** Fruits are refreshing eaten fresh, mixed with other fruits, in salads, or processed into drinks. They are also stewed, pickled or used for chutney and jam. The fruit flavour is enhanced by peeling off the 'wing' edges, which removes most of the oxalic acid. Because the fruit is extremely perishable it must be consumed locally. Some Brazilian cultivars have a very high content of vitamin C as well as an applicable amount of provitamin A.

**Fuel:** The wood is a suitable candidate for firewood.

**Timber:** The soft, whitish wood is sometimes used for timber.

**Tannin/dyestuff:** Unripe fruit of *A. carambola* contains potassium oxalate, which is used in dyeing.

**Medicine:** Fruit can be a laxative on account of the oxalic acid it contains. It is also used in traditional medicine for skin disorders and fevers.

**Other products:** In some countries, the fruit juice is used to remove stains, for example iron rust from linen cloth.

**SERVICES**

**Ornamental:** With its delicate, light-green foliage, small, pink flowers and prolific golden-yellow fruits, *A. carambola* is popular in homegardens and parks.

**TREE MANAGEMENT**

When young, *A. carambola* is delicate and requires careful attention. Because it is a fast-growing tree, it requires pruning and thinning of excess fruit at an early stage. Good crops are harvested from grafted varieties when they are 2-3 years old. Yields of up to 900 kg/year are common for 10-year-old trees.

**GERMPLASM MANAGEMENT**

Seed storage behaviour is intermediate. The lowest safe mc is 12.3%; further desiccation reduces viability. Cool temperatures damage the seeds. Viability can be maintained for 6 months with partially dried seeds at 5 deg. C. There are approximately 15 000 seeds/kg.

**PESTS AND DISEASES**

Caterpillars (*Diacotrichia*, *Pingasa* and *Pseudoterpna*) attack the flowers and young leaves. *A. carambola* fruit suffers from fruit fly maggots, particularly *Dacus dorsalis* (Southeast Asia), and fruit-piercing moth (*Othreis* spp., Australia); bagging prevents infestation. Leaf spot (*Cercospora averrhoa*) and pink diseases (*Corticium*) affect the tree in Southeast Asia, but postharvest rots are more serious: the slightest blemish invites infection by *Ceratocystis*, *Colletotrichum*, *Dothoriella* and *Phomopsis* fungi.

**FURTHER READNG**

- Anon. 1986. The useful plants of India. Publications & Information Directorate, CSIR, New Delhi, India.
- Crane E, Walker P. 1984. Pollination directory for world crops. International Bee Research Association, London, UK.
- FAO. 1982. Fruit-bearing forest trees: technical notes. FAO-Forestry-Paper. No. 34. 177 pp.
- Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.
- Katende AB et al. 1995. Useful trees and shrubs for Uganda. Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).
- Nicholson B.E, Harrison S.G, Masefield G.B & Wallis M. 1969. The Oxford Book of Food Plants. Oxford University Press
- Perry LM. 1980. Medicinal plants of East and South East Asia : attributed properties and uses. MIT Press. South East Asia.
- Popenoe W. 1974. Manual of the tropical and subtropical fruits. The Macmillann Company.
- Rice RP, Rice LW, Tindall HD. 1987. Fruit and vegetable production in warm climates. Macmillan Press, London.
- Sedgley M, Griffin AR. 1989. Sexual reproduction of tree crops. Academic Press. London.
- Tankard G. 1987. Tropical fruit. A guide to growing and using exotic fruits. Viking O'Neil.
- Timyan J. 1996. Bwa Yo: important trees of Haiti. South-East Consortium for International Development. Washington D.C.
- Verheij EWM, Coronel RE (eds.). 1991. Plant Resources of South East Asia No 2. Edible fruits and nuts. Backhuys Publishers, Leiden.
- Williams R.O & OBE. 1949. The useful and ornamental plants in Zanzibar and Pemba. Zanzibar Protectorate.

**SUGGESTED CITATION**

Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestry Database:a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/af/treedb/>)