



A Review of Asam Kumbang (*Mangifera quadrifida* Jack.)

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The mango, *Mangifera indica* L. (Anacardiaceae), is the best known and most widely cultivated species in the genus *Mangifera*. *M. quadrifida* is a species endemic to Malaysia and commonly known as a Rancha-rancha or Asam Kumbang. It is ultra-tropical and grows in undisturbed lowland forests, often in inundated land or along riversides. Tribal and local people use it for food (either unripe or ripe) as well as for medicinal purposes. There is increasing interest for ex situ and in situ conservation, but currently this is an International Union for Conservation of Nature (IUCN) red listed species. *M. quadrifida* has the potential for use as part of breeding programs to improve mangos and to produce new hybrids with reduced susceptibility to disease that may flower naturally in the tropics with no cold induction. A general review, recording experiences with local communities in Borneo, and horticultural remarks includes its adaptability to modern cultivation and its potential as a commercial crop.

Although *Mangifera indica*, is the most common commercially grown species, there are many other species of this genus that are used for food. Borneo, the third largest island in the world, has a vast tropical rainforest and is an indispensable source for food for the local people. Street markets in Borneo, Malaysia, and Indonesia seasonally display wild mangos for sale. Most have edible fruit with the potential for breeding and as rootstock. For over a decade, the author has traveled to these remote areas to identify their potential for use in breeding (Ledesma et al., 2014).

Surveys on *M. quadrifida* were carried out by visiting markets, and home gardens in Sarawak (Malaysia), where indigenous people have planted trees of their favorite fruit around their traditional longhouses for generations. Edible wild mangos are in critical danger of extinction and represent an important resource for the future of mangos. However, there is still lot of confusion of their taxonomic descriptions as little has been done to advance those goals. There is a possibility of wild hybridization between species, which may be detected with genetic analysis.

Asam Kumbang (Sarawak) is a fruit appreciated throughout Borneo with markets having different phenotypes. Fruit characteristics can vary in size and shape. Fruit is deep purple.

Origin

The species is endemic to Brunei, Malaysia (Sabah and Sarawak), and Indonesia (Sumatra, Kalimantan, and Java) (Lim, 2012). There are different common names according to region/country of origin. In Malaysia, it is called: Asam Kumbang, Sepam, Lekub, or Damaran; in Brunei: Rancha-rancha; while in Indonesia: Asam Rawawa, Rawa-Rawa, Ubab, or Balangan. It is a tropical species. Its range is from sea level to 1000 m. The tree grows naturally in lowland forests, often inundated, along riverbanks or in undisturbed forest.

M. quadrifida has been reported in official and private collections, as well referenced as herbarium specimens. *M. quadrifida* was introduced to south Florida in 2004, and it is also in Hawaii and Puerto Rico.

TREE DESCRIPTION. The tree is large and can reach up to 25 m tall and 112 cm trunk in diameter with a dense canopy. Juvenile leaves are bronze to purple (Fig. 1); and soften in color as they age to a glossy deep green with woody twigs (Fig. 2); The trees grow in acidic soils in swamps.

FLOWERS. Flowers are white to light cream very fragrant and pollinated by honeybees (Ledesma et al., 2015) (Fig. 2).

FRUIT. The fruit averages 150 g and deep is purple with a rubbery skin and yellowish lenticels. The pulp is bright orange, acidic and fibrous. Seeds are hard and reddish. The fruit is used immature as pickles and ripe to prepare “Sambal belacan” [chile sauce]. There are fruits of different shapes and sizes commonly found for sale in the markets in south Kalimantan (Fig. 1).

Status of *Mangifera quadrifida* in South Kalimantan, Indonesia

The Borneo rainforest is the oldest rainforest in the world, and one of the most biodiverse (Saw, 2010). There have not been many efforts to save wild mangos.



Fig 1. Characterization *M. quadrifida* (A): fruit, (B) seed, and (C) juvenile leaves.

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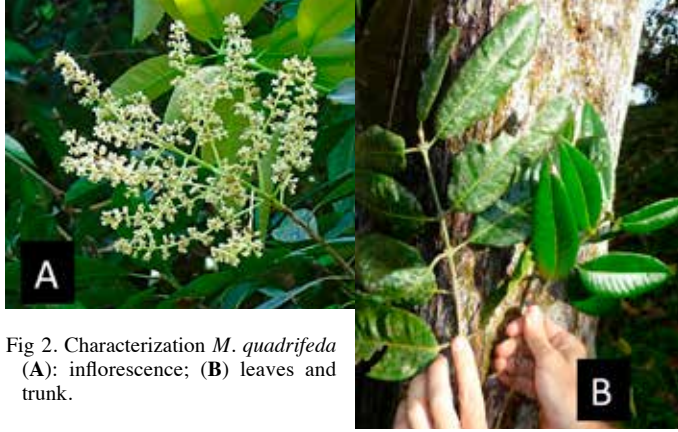


Fig 2. Characterization *M. quadrifeda* (A): inflorescence; (B) leaves and trunk.

Tunas Meratus is a small nonprofit institution in south Kalimantan which collects material for propagation and distribution. Their objective is to incentivize forest gardens as part of a broader land-use spectrum that contains farms and home gardens, to protect the forests (Shaffiq et al, 2013). Tunas Meratus works with several fruit species in the region including *Artocarpus*, *Durian*, and *Mangifera* species. As part of the project, a survey was conducted over the past five years to identify *M. quadrifeda* trees in Marajai village, Halong district, Kalimantan, Indonesia.

The results of the survey showed only few mature trees left in the village. They reported no more than 15 *M. quadrifeda* growing in the lowlands forest, about 20–30 m tall and more than 60 cm diameter. Working with the community, seeds and cuttings are collected from the trees for propagation.

Horticultural Remarks

PROPAGATION. *M. quadrifeda* (Asam kumbang) seeds are used in south Kelamatan, but often *M. casturi* is used as a rootstock for Asam kumbang trees. Other reports state that *M. quadrifeda* is propagated by seed and it is used as a rootstock for *M. casturi*. In-situ conservation programs in the south Kalimantan, Indone-

sia are using *M. quadrifeda* trees are grafted on ‘Hampalam’ (*M. casturi*) (Nove Arisandi, 2020, personal communication).

In south Florida *M. quadrifeda* has been propagated on to *M. rubropatela*, *M. casturi* and *M. indica* ‘Turpentine,’ the latter was not successful.

Breeding. Asam Kumbang has potential for breeding to improve mangos and produce new hybrids with reduced susceptibility to disease, that will naturally flower in the tropics without cold induction (vernalization) and produce good quality, marketable fruit.

TREE SIZE AND FRUIT PRODUCTION. *M. quadrifeda* can be a huge tree reaching up to 25 m high, with a trunk diameter over 100 cm and a dense and spreading canopy. Compared to *M. indica*, *M. quadrifeda* is adapted to higher humidity and wetter soils.

For planting under south Florida conditions, soils should be made as fertile as possible, and the young trees benefit from mulching. Such amendments improve water-holding capacity, nutrient retention and availability, and soil structure. Low humidity is detrimental to the health of young trees. The tree grows well in south Florida, but it has not bloomed for the past six years.

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