Nephelium lappaceum

L.

Sapindaceae

rambutan

LOCAL NAMES
English (ramboostan,rambutan); Filipino (usan,rambutan); French (litchi chevelu); German (Rambutan); Indonesian (chorogol,rambutan,gente,kakapas); Khmer (saaw maaw,ser mon); Malay (rambutan,buah abong,rangalau); Mandarin (hooun mo daon shau tsz); Swahili (mshokishoki); Thai (phruan ngoh,ngoh paa,ngoh); Trade name (rambutan); Vietnamese (vai thi[ee][uf],vai thieu,saaw maaw,chom chom,ch[oo]m ch[oo]m)

BOTANIC DESCRIPTION
Nephelium lappaceum is an evergreen tree about 10-12 m tall; principal trunk is erect with an open crown of large branches; bark is slightly rugose, greyish or red.

Leaves are alternate, pinnately compound without an end-leaflet. On the lower surface of each leaflet are the domatia, small crater-like hills located in the axils between the mid and secondary veins. The function of the domatia is unknown.

Inflorescence pseudo-terminal to usually terminal; flowers either male (only stamens well developed; trees dioecious) or hermaphrodite (trees monoecious), the latter either effectively female (stamens small, anther not dehiscing) or male (stigma not opening), actinomorphic, whitish, yellowish or greenish; sepals 4-5(7), nearly free to more than halfway connate, 0.7-2.1 mm long; petals usually absent, sometimes up to 4 reduced ones, not exceeding 1.6 mm; disk complete, hairy or glabrous.

Fruit an ellipsoid to subglobular schizocarp, up to 7 x 5 cm, weighing 20-95 g, usually consisting of only 1 nutlet, yellowish to purplish-red, hardly stalked, often finally dehiscing (at least the apical part), glabrous, usually densely set with filiform, curved, 0.5-2 cm long appendages; wall coriaceous, up to 2.5 mm thick. Seed covered by a usually thick, juicy, white to yellow, translucent sarcotesta.

The specific name stems from the Latin word ‘lappaceus’ meaning ‘bur-like’ and refers to the fruit appendages. The word rambutan is derived from the Malay word ‘hair,’ which describes the numerous, characterizing, long, soft, red or red and green coloured spine-like protuberances (spinterns) on the surface of the fruit.

BIOLOGY
The perfect flowers are functionally pistillate or staminate. Most commercial cultivars behave hermaphroditically and are self fertile, with 0.05-0.9% of the functional females possessing functional stamens. Insect pollination is necessary. Depending on the cultivar, flowering may spread over a period of 23-38 days, with an average of 3.4% setting fruit. Fruits may be produced in large bunches, with 40-60 fruits/panicle, but most often only 12-13/panicle are retained to maturity. Final fruit set is usually between 0.7-1.45%. Time required from fruit set to harvest is about 105-115 days.

N. lappaceum tree with fruits. (Chris Gardiner)

(Manuel Bertomeu)

(manuel Bertomeu)

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ECOLOGY
N. lappaceum thrives in humid tropical lowlands within about 17 degrees from the equator. The trees occur in the lower or middle storey in different types of primary and secondary forest ranging from dryland to swamp. Exposure to dry winds leads to browning of the leaf margins; sheltered locations or wind screens are recommended. Low relative humidity and strong wind during fruiting could cause excessive moisture loss from fruit spinterns and result in poor fruit appearance. It is intolerant to frost, especially during the juvenile stage. Mature trees may survive a brief period of temperatures as low as 4 deg. C but with severe defoliation.

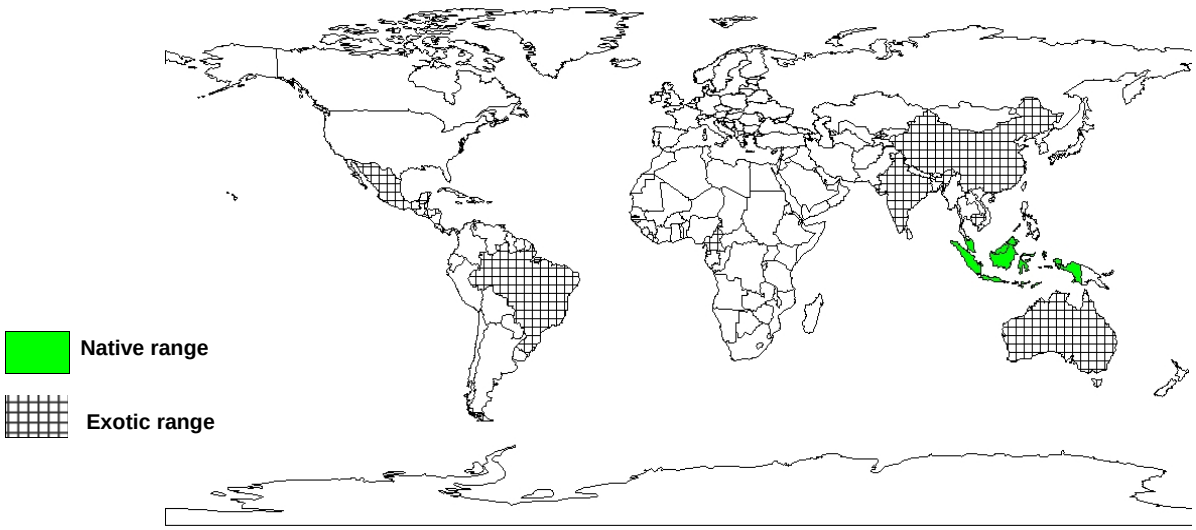
BIOPHYSICAL LIMITS
Altitude: 0-600 (1 950) m, Mean annual temperature: 22-35 deg. C, Mean annual rainfall: 2 000-3 000 mm

Soil type: It prefers clay loam soil, pH 5-6.5, but can be grown in a wide range of soil types, even ones with poor drainage, but not water-logged.

DOCUMENTED SPECIES DISTRIBUTION

Native: Indonesia, Malaysia

Exotic: Australia, Brazil, Cambodia, Cameroon, China, Honduras, India, Liberia, Mexico, Panama, Papua New Guinea, Philippines, Seychelles, Singapore, Sri Lanka, Tanzania, Thailand, US, Vietnam, Zanzibar



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: The trees are cultivated for their very popular fruit. The usually juicy sarcotesta around the seed is eaten. The sweet-tasting fruits are consumed fresh, the more sour ones are eaten stewed. The sarcotesta can be canned or used in jam, but loses much of its flavour. Seeds are edible when roasted, they are bitter and said to be narcotic. Edible tallow similar to cacao butter, with a high level of arachidic acid, can be rendered from the seeds. The colourful fruits are frequently used in displays with flower and fruit arrangements.

Timber: The wood of N. lappaceum is liable to splitting during seasoning. It is moderately hard to very hard, strong and tough. The wood is easy to work and can be finished well. It is durable under cover and generally resistant to insect attacks, but susceptible to fungal attacks. The reddish coloured rambutan wood is usually too small to be valued as timber. The average fibre length of wood is 1.07 mm.

Tannin or dyestuff: Young shoots are used to produce a green colour on silk that is first dyed yellow with turmeric. The fruit walls are used, together with tannin-rich parts of other plants, to dye silk black after a preliminary red staining. Leaves are used, together with mud, as an impermanent black dye.

Lipids: Seeds contain an oil formerly used for illumination and a fat used formerly for soap.

Wax: The seed kernel can be used for the production of rambutan tallow, a solid fat similar to cacao butter, which is used for soap and candles.

Poison: The fruit wall contains a toxic saponin; cases of poisoning are known.

Medicine: Fruit is said to be astringent, stomachic, and anthelmintic; the leaves are used in poultices for headaches. In Java the toxic saponin is dried and used as medicine. In Malaysia, the roots are used in a decoction for treating fever; and the bark as an astringent for tongue diseases.

SERVICES

Ornamental: Rambutan is beautiful, especially when in full fruit, making it a popular ornamental tree for backyards and public streets.

Intercropping: The planting of cash crops or green manure crops among young trees can be beneficial, but crops should not be planted too near to the trees. Legumes with low growth habits such as Canavalia, Crotalaria and Vigna can also be intercropped with rambutan.

TREE MANAGEMENT
Trees should be planted at distances of 10-13 m, with sufficient wind protection. Rambutan trees exhibit strong apical dominance and have a tendency to produce long, upright growth. Early pruning and training to form an open centre tree is recommended. After harvesting, fruited twigs are pruned back to stimulate new growth of up to 4 new side shoots, of which 22% of the shoots will bear fruit in the following season. Dead branches and water suckers should be removed regularly.
Mulching is essential during establishment and dry periods but should not be applied prior to flowering. For growing trees, a fertilizer rate of 200 g nitrogen, 25 g of phosphate and 100 g potassium per tree per year of age is recommended. For the first 4 years, the fertilizers should be applied in 4 equal dressings, every 3 months. For fruiting trees, 200 g N, 25 g P and 130 g K per tree per year of age is recommended. Maximum fertilizer rate is reached at 12 years, and should remain constant thereafter. For fruiting trees, a quarter of the yearly fertilizer should be applied 4 weeks after fruit set; half the amount should be applied immediately after harvest, and the remaining quarter at 9 weeks after harvesting. Additionally, 0.4 kg of dolomite/tree/year of age, maximum at 10 years and constant after, is applied during slow growing months. At any stage, glyphosate herbicide should not be used near the drip line of rambutan, it could cause a severe yellowing and abscission of the lower leaves. Economic life of a tree is about 15-20 years and may be up to 30 years. Depending on the location, rambutan can produce up to 2 crops a year.

GERMPLASM MANAGEMENT
Seed storage behaviour is recalcitrant, whole seed mc at shedding is 36%, viability is reduced by 12% on desiccation from 36% to 25% mc, and no seeds remain viable when the mean mc is reduced to 13%. However excised embryos tolerate desiccation to 14-15% mc, 67% survive desiccation to 8-9% mc; and 40% survive overnight in liquid nitrogen when excised embryos are treated with 10% DMSO plus 3% sucrose followed by partial desiccation (1-2 hours).

PESTS AND DISEASES
Botryodiplodia theobromae, Gliocephalotrichum bulbilium and Colletotrichum spp. cause the major post-harvest diseases. A survey conducted in Bangkok markets identified about 30% of the post-harvest diseases caused by Colletotrichum spp., 10% by Gliocephalotrichum bulbilium, and 5% by Botryodiplodia theobromae. Post-harvest storage of fruit in the dark, with low temperatures, may discourage fruit rot.
Rambutan is host to 118 different species of insects, but only 17 were identified as attacking rambutan fruits. The following pests are listed in the order of importance: Acrocercops cramerella, Phenacaspis spp., Planacoccus citri., Dichocrocis punctiferalis, Dacus dorsalis, Carpophilus dimidatus and Carpophilus marginelius. Rambutan infested with Acrocercops cramerella, cacao pod moth, showed no external symptoms, with up to 40% infestation observed in some cultivars and damage generally between 10-15%.

FURTHER READNG

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SUGGESTED CITATION

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