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Rambutan: Postharvest Quality-Maintenance Guidelines

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Rambutan fruit are large ovoid or globose fruit about 4.5 cm (1.8 in) long and 2.5 to 3.7 cm (1 to 1.5 in) wide that occur on woody stalks in clusters of 10 to 18. The outer skin is 2 to 4 mm (0.1 to 0.2 in) thick and covered with soft, long spines (spinterns) that turn red or yellow when ripe. The edible aril flesh is attached to a single large seed. The fruit is related to lychee and longan (Paull and Duarte 2012).

Rambutan, *Nephelium lappacium* L.

Quality Characteristics and Criteria

Quality criteria include fruit size, shape, and weight; bright skin and spine color; uniformity; absence of defects; and freedom from disease and insects. High SSC and low TA are desirable (Ketsa and Klaewkasetkorn 1992). Mechanical injury and dehydration are major causes of appearance loss.

Horticultural Maturity Indices

Skin and spine coloration is the main horticultural maturity index. Fruit having green skin and greenish-red spines are sour. Fruit have both skin and spines red or yellow, depending upon variety. Between these two stages, sugar content increases about 20%, and acid levels are half those at the green stage (Mendoza et al. 1982). The acceptable stage is 16 to 28 days after color break, at which time skin and spines are brightly colored (O'Hare 1992). Over-ripe fruit have a watery texture (Somboon, 1984), which may be a senescence-induced tissue breakdown.

Grades, Sizes, and Packaging

There are no U.S. or International grade standards. Fruit are sold in 2.25 kg (5 lb) and 4.5 kg (10 lb) one-piece, fiberboard cartons. Sometimes fruit are prepacked in punnets. In Southeast Asia, clusters of fruit are sold in bunches still attached to the stem.

Pre-Cooling Conditions

Only room-cooling is recommended.

Optimum Storage Conditions

Store at 8 to 15°C (46 to 59°F) with 90 to 95% relative humidity to achieve a storage-life of 14 to 16 days. There may be changes in the skin and spine coloration after storage, but the flesh is unaffected. Temperature recommendations vary for different cultivars (O'Hare 1992). Fruit held at 20 °C (68 °F) with 60% relative humidity last about 3 to 5 days.

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Controlled Atmospheres (CA) Consideration

CA of 7 to 12% CO_2 + 3 to 5% O_2 at 10°C (50°F) is recommended (Kader 1993). At 9 to 12% CO_2, color loss is reduced and shelf-life extended by 4 to 5 days, while low O_2 (3%) has little affect (O'Hare et al. 1994, O'Hare 1995). CO_2 levels >12% have no additional effect, and decay can begin after a few weeks' storage. The MA/CA effect appears to be more via CO_2 elevation and minimizing water loss than through effect of low O_2. Storage in sealed polyethylene film bags or plastic containers is effective in reducing water loss (Mendoza et al. 1972, Ketsa and Klaewkasetkorn 1995, Mohamed and Othman 1988), while wax coatings are less effective (Mendoza et al. 1972, Brown and Wilson 1988, Lam and Ng 1982). A shelf-life of 14 to 21 days can be expected.

Retail Outlet Display Considerations

Display preferably in trays with a clear film over-wrap or in clamshell containers with no perforations at 10 to 12°C (50 to 55°F). Do not mist or ice.

Chilling Sensitivity

If maintained at 5°C (41°F), fruit can be stored for up to 3 weeks, but the skin and spines change from red to brownish-red; the edible aril is white and remains in good condition (Lam and Ng 1982). Somboon (1984) reported that after 3 days at 5°C (41°F), the aril turned from white (translucent) and became more transparent and juicier.

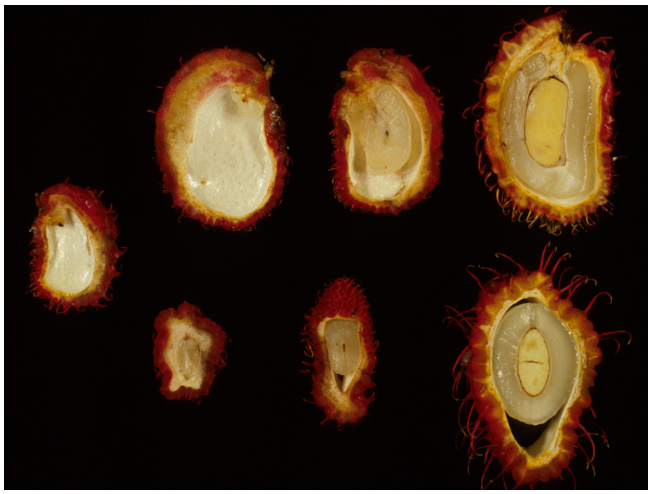
Ethylene Production and Sensitivity

This non-climacteric fruit has a very low rate of ethylene production, at less than 0.04 µL kg^{-1} h^{-1} (O'Hare et al. 1994). Higher rates of up to 3 µL kg^{-1} h^{-1} can occur if there is a fungal infection. The presence of 5 µL L^{-1} ethylene in CA (9 to 12% CO_2) or the presence of an ethylene absorber does not influence rate of skin color loss (O'Hare 1995).

Respiration Rates

Respiration is 40 to 100 mg (about 23 to 57 µL) CO2 kg^{-1} h^{-1} at 25°C (77°F). Rates are for mature fruit; immature fruit respiration rates are higher (Mendoza et al. 1972). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per metric ton per day.

Rambutan in punnets (above), loose rambutan for sale (top).



Examples of poor fruit growth and filling.

Physiological Disorders

Chilling injury and darkening of spines and skin are major postharvest disorders. Darkening is due to dehydration and mechanical injury (Landrigan et al. 1996). Pre-harvest disorders include skin splitting and poor filling of fruit (O'Hare 1992). Skin splitting occurs in thin-skinned cultivars, often following heavy rains during the last phase of fruit growth. Poor filling has been associated with poor nutrition and dry conditions just after flowering.

Postharvest Pathology

Postharvest losses due to disease are low (Ketsa and Klaewkasetkorn 1992), though stem end rot and fruit rots are found. Sangchote et al. (1992) found that the spectrum of fungi associated with rambutan decay varied with storage temperatures. *Collectotrichum gloeosporioides* and *Botryodiplodia theobromae* are considered the most serious pathogens. Other pathogens recorded include *Pestalotiopsis* spp. and *Phomopsis* spp. (Farungasang et al. 1991).

Quarantine Issues

Rambutan is a fruit fly host, and the available treatments are irradiation and heat treatment. Heat treatment leads to rapid loss of skin color. Mealy bugs are often found on the fruit, but no damage to the flesh occurs (Ketsa and Klaewkasetkorn 1992).

Suitability as Fresh-Cut Product

Limited, since it is difficult to separate the aril and seed.

Special Considerations

None.

An earlier version of this article was published at the USDA's website: www.ba.ars.usda.gov/hb66/contents.html

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