Rambutan

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Scientific Name and Introduction

Rambutan fruit (*Nephelium lappacium* L.) 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 grow 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 litchi and longan (Nakasone and Paull 1998).

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. Ripe fruit have both skin and spines red or yellow, depending on the variety. Between these two stages, sugar content increases about 20% and acid level decreases by half (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.

Precooling Conditions

Only room-cooling is recommended.

Optimum Storage Conditions

Store at 8 to 15 °C (46 to 59 °F) with 90 to 95% RH 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% RH last about 3 to 5 days.

Controlled Atmosphere (CA) Considerations

CA of 7 to 12% CO_2 and 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 effect (O'Hare et al. 1994, O'Hare 1995). Raising CO_2 levels above12% has no additional effect, and decay can begin after a few weeks' storage. The MA/CA effect appears to derive more from CO_2 elevation and minimizing water loss than through any effect of low O_2. Storage in sealed polyethylene film bags or plastic containers is effective in reducing water loss (Mendoza et al. 1972, Mohamed and Othman 1988, Ketsa and Klaewkasetkorn 1995), while wax coatings are less effective (Mendoza et al. 1972, Lam and Ng 1982, Brown and Wilson 1988). A shelf-life of 14 to 21 days can be expected.

Retail Outlet Display Considerations

Rambutan should be displayed in trays with a clear film overwrap or in clam shell containers with no perforations at 10 to 12 ºC (50 to 55 °F). Fruit should not be misted or iced.

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) to being more transparent and juicier.

Ethylene Production and Sensitivity

This nonclimacteric fruit has a very low rate of ethylene production: <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) CO_2 kg^{-1} h^{-1} at 25 ºC (77 ºF). This is a nonclimacteric fruit and the 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 ton^{-1} day^{-1} or by 61 to get kcal $tonne^{-1}$ day^{-1}.

Physiological Disorders

Chilling injury and darkening of spines and skin are major postharvest disorders. Darkening is caused by dehydration and mechanical injury (Landrigan et al. 1996). Preharvest 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 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 do not damage the flesh (Ketsa and Klaewkasetkorn 1992).

Suitability as Fresh-Cut Product

Suitability is limited, since it is difficult to separate aril and seed.

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