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Longkong, Duku, and Langsat: Postharvest Quality-Maintenance Guidelines

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There are at least two major types of *Lansium domesticum* Jack., known respectively as langsat and duku in Malaysia and Thailand. Both types are known as lanson in the Philippines. There are also a number of intermediate types, called longkong in Thailand and duku-langsat in Malaysia (Nakasone and Paull 1998). There is considerable inconsistency in the naming of the different types (Yaacob and Bamroongrugsa 1992). The major area of cultivation is peninsular Thailand through Borneo. It is also cultivated in the Philippines, Vietnam, Burma, India, Sri Lanka, Australia, Surinam, and Puerto Rico.

Longkong

Quality Characteristics and Criteria

Langsat fruit are ovoid, roughly 30 to 60 mm (1.2 to 2.4 in) in diameter, while duku are rounder and 40 to 50 mm (1.6 to 2 in) in diameter. Longkong is intermediate, nearly seedless, with a brittle skin, and is the same size as langsat. There are 15 to 25 fruit per longkong raceme and 4 to 12 for duku. Skin of the young fruit of all types is pale green and turns yellow when ripe, frequently with brown blemishes. The langsat has a thin skin that contains a milky white sticky sap. Duku has a thicker skin (up to 6 mm; 0.25 in) and no latex. Longkong has a slightly thicker skin than langsat and less sap that is not sticky. The green seed is covered by a white translucent flesh that is slightly sour in langsat and quite sweet in duku. Both fruit have five separate segments, with one to five seeds in langsat and one or two in duku. During ripening, astringency in the flesh declines while sugars increases 6-fold (Paull et al. 1987). The skin bruises very easily, leading to brown discoloration.

Horticultural Maturity Indices

Fruit are harvested at the full-ripe stage, indicated by the skin color change from light to dark yellow, dryness of the sepals, and loss of most of the green color from the peduncle (stem). The flesh is translucent when ripe. Fruit on the bunch generally ripen together, and over a very short period. Four to five harvests are necessary to harvest a tree. It is essential to harvest as soon as possible, as overripe fruit abscise from the peduncle. Fruit to be shipped long distances are harvested when 70 to 80% ripe to avoid excessive fruit drop. Fruit should be picked when dry, as they can become moldy if packed wet.

Grades, Sizes, and Packaging

There are no U.S. or international standards. Fruit are generally graded by size and color and normally sold in single layer fiberboard cartons of 2.25 kg (5 lb) with padding, sometimes in trays with liners.

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Pre-Cooling Conditions
Room-cooling is recommended due to the moisture loss caused by forced-air cooling.

Optimum Storage Conditions
The most recent recommendation for storage is 18°C (46°F) with 90% RH (Piyasaengthong et al. 1997), giving about 21 days of storage-life. Previously, 11 to 14.4°C (34 to 58°F) with 85 to 90% RH for 2 weeks was recommended, which gave 24.3% weight loss (Pantastico 1975). Others have recommended 11 to 13°C (52 to 55°F) with 85 to 90% RH for 14 days (Srivastava and Mathur 1955).

Controlled Atmospheres (CA) Considerations
Fruit stored at 14.4°C (58°F) in 3% O_2 + 0% CO_2 had 16 days of postharvest life, compared to 9 days for fruit held in air (Pantastico et al. 1975). High CO_2 aggravated postharvest skin browning especially at 10% O_2; that can also occur in fruit held in polyethylene film bags. Holding in plastic bags (0.08 mm thick) reduces weight loss but increases surface browning (Brown and Lizada 1984). Preliminary recommendations are 5% O_2 + 0% CO_2 (Yahia 1998).

Retail Outlet Display Considerations
Display in over-wrapped trays or closed styrene clam shell containers with no holes at 15°C (59°F). Do not mist.

Chilling Sensitivity
Chilling leads to skin browning; at 15°C symptoms develop after 21 days (Piyasaengthong et al. 1997).

Ethylene Production and Sensitivity
Fruit produce low amounts of ethylene, with internal concentrations of 2 to 6 μL kg^{-1}. There are no reported responses to ethylene treatment; it may lead to premature senescence.

Respiration Rates
See Table 1. Respiration rates decline after harvest, and small fruit have a higher rate than large fruit (Srivastana and Mathur, 1955; Pantastico et al., 1968). To get mL kg-1 h-1, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0°C (32°F), 1.9 at 10°C (50°F), and 1.8 at 20°C (68°F). 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.

Table 1. Respiration Rates

Temperature	mg CO_2 kg^{-1} h^{-1}
9°C	40 to 50
20°C	50 to 90

Physiological Disorders
Abrasion and impact injury, water loss, and chilling injury are the three major disorders. Mechanical injury (abrasion, impact and compression) leads to skin darkening and browning. Chilling injury symptoms are pitting and brown scalding of the skin.

Postharvest Pathology
Anthracnose, aspergillus, and rhizopus surface rots on the skin have been reported. Packing dry fruit and the use of fungicides can be used to minimize losses.

Quarantine Issues
Longkong is a fruit fly host; irradiation at 300 Grays has potential for disinfestation.

Suitability as Fresh-Cut Product
No current potential.

Special Considerations
None.

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

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