Litchi

Robert E. Paull, Ching Cheng Chen, and Nancy Jung Chen
Department of Tropical Plant and Soil Sciences
Univ. of Hawaii at Manoa, Honolulu, HI

Scientific Name and Introduction: Litchi (*Litchi chinensis* Sonn.), also spelled lychee, originated in southern China where it has been cultivated for at least 2000 years. The tree has somewhat exacting requirements that vary with cultivar for flowering, hence there is substantial year-to-year variation in supply (Nakasone and Paull, 1998). The round to egg-shaped fruit, about 2.4 cm (1 in) in diameter, has a thin leathery red skin which has blunt or sharp spines. The edible, translucent-opaque flesh (aril) encloses a large, occasionally small, black seed.

Quality Characteristics and Criteria: Skin color and fruit size are external quality criteria. Internal criteria are seed size and flesh sweetness/juiciness. A bright red fruit with no browning is preferred along with freedom from bird, insect, and mechanical damage, cracking and decay.

Horticultural Maturity Indices: Red skin color and flesh having the optimum range of sugar to acid ratio for the cultivar. During litchi maturation acid level decline and sugar level increase (Paull et al., 1984). Fruit do not continue to ripen after harvest.

Grades, Sizes and Packaging: There are no U.S. or international standards. One piece fiberboard boxes 2.25 kg (5 lb) or 4.5 kg (10 lb) with polyethylene film liners are used. Fruit are also packed into 0.5 pint (0.12 L) styrene containers.

Pre-cooling Conditions: Room-cooling is used for pre-cooling.

Optimum Storage Conditions: Storage at 2 to 5 °C (36 to 41 °F) with 90 to 95% RH should result in 3 to 5 weeks of storage-life. At 20 °C (68 °F) with 60% RH, fruit will last only 3 to 5 days. Fruit need to be carefully sorted before storage to remove any damaged/decayed fruit or fruit with insect stings (Campbell, 1959; Paull and Chen, 1987).

Controlled Atmospheres (CA) Considerations: An atmosphere of 3 to 5% O_2 + 5% CO_2 is recommended at 5 to 7 °C (41 to 45 °F) (Kader, 1993, 1998; Vilasachandran et al., 1997). Higher levels of CO_2 (10 to 15%) can lead to off-flavors (Vilasachandran et al., 1997). MAP has been tried with sealed polyethylene bags either with (Ragnoi, 1989) or without SO_2 pads or treatment (Scott et al., 1982; Paull and Chen, 1987). The effect of using polyethylene film bags is probably to prevent dehydration that leads to rapid skin browning (Akamine, 1960; Paull and Chen, 1987).

Retail Outlet Display Considerations: Display refrigerated, preferably in polystyrene containers or plastic bags. Do not leave directly exposed to ambient air, because the skin will rapidly brown.
Chilling Sensitivity: Litchi have low sensitivity to chilling temperatures. However, dehydration during storage often leads to loss of skin color and browning and is referred to as chilling injury.

Ethylene Production and Sensitivity: Litchi have a low rate of ethylene production at < 1 nL kg^{-1} h^{-1}. There are no reports on the response of this non-climacteric fruit to ethylene exposure. Ethylene may lead to early aril deterioration.

Respiration Rates:

Temperature	mg CO_2 kg^{-1} h^{-1}
5 °C	10 to 16
10 °C	19 to 29
20 °C	46 to 74
25 °C	75 to 128

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. Fruit do not continue to ripen after harvest (Joubert, 1986), and respiration rate declines during storage (Akamine and Goo, 1973).

Physiological Disorders: The major disorder is the rapid browning of shell, from a bright red color (Paull and Chen, 1987; Holcroft and Mitcham, 1997). The browning is associated with water loss and injury (insect stings). The browning associated with insect stings may go through to the pinkish-white inner surface of the shell. A breakdown (softening, loss of turgidity) of flesh occurs in senescent fruit after prolonged storage and over-maturity. The condition starts at the blossom end. Field and sometimes postharvest skin cracking can occur. Cracked fruit should be culled.

Postharvest Pathology: Numerous postharvest diseases can occur, most have their origins pre-harvest. Good field sanitation and culling of fruit that show fruit piercing insects, cracks and sun-scorch are effective in minimizing losses (Prasad and Bilgrami, 1973; Scott et al., 1982). Disease organisms include *Aspergillus* spp. (Roth, 1963; Prasad and Bilgrami, 1973; Scott et al., 1982), *Pestalotiopsis* spp. (Prasad and Bilgrami, 1973), *Peronophythora* spp. (Ho et al., 1984), sour rot caused by *Geotrichum candidum* and yeasty rots (Roth, 1963). Other organism found to cause rots include *Botryodiplodia theobroma*, *Colletotrichum gloesporioides*, and *Rhizopus oryzae* (Roth, 1963; Prasad and Bilgrami, 1973; Scott et al., 1982).

Quarantine Issues: Litchi is a fruit fly host and requires treatment before entry into the U.S. from fruit fly infected areas. Potential treatments include irradiation, heat and cold treatments.

Suitability as Fresh-cut Product: There are no published data. The skin and seed can be removed with little damage to the aril flesh. The aril can be placed on trays and over-wrapped.

Special Considerations: SO_2 fumigation followed by a dip in hydrochloric acid can preserve red skin color (Paull et al., 1994). Careful application can avoid an increase in aril sulfite residues and avoid off-flavor (Paull et al., 1998). Sulfites are not approved on fresh produce in the U.S., except for grapes. Most other countries have sulfite residue limits for edible portions (Tongdee, 1994).

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