



# Lychee: Postharvest Quality-Maintenance Guidelines

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Lychee, also spelled litchi, originated in southern China where it has been cultivated for at least 2,000 years. The tree has somewhat exacting requirements that vary by cultivar for flowering, hence there is substantial year-to-year variation in supply (Menzel and Waite 2005, Paull and Duarte 2011). 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 or brown 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

Prominent indices are red skin color and flesh having the optimum range of sugar to acid ratio for the cultivar. During lychee maturation, acid level declines and sugar level increases (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.



Lychee, *Litchi chinensis* Sonn.

## 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% relative humidity should result in 3 to 5 weeks of storage-life. At 20°C (68°F) with 60% relative humidity, 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 (Paull and Chen 1987).

### Controlled Atmospheres (CA) Considerations

An atmosphere of 3 to 5% O<sub>2</sub> + 5% CO<sub>2</sub> is recommended at 5 to 7°C (41 to 45°F) (Kader 1998). Higher levels of CO<sub>2</sub> (10 to 15%) can lead to off-flavors. MAP has been tried with sealed polyethylene bags, either with or without SO<sub>2</sub> pads or treatment (Paull and Chen 1987).

The effect of using polyethylene film bags is probably to prevent dehydration that leads to rapid skin browning (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

Lychee 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

Lychee have a low rate of ethylene production at less than 1 nL kg<sup>-1</sup> h<sup>-1</sup>. There are no reports on the response of this

**Table 1. Respiration Rates for Lychee**

Respiration Rate	
Temperature	mg CO <sub>2</sub> /kg <sup>-1</sup> h <sup>-1</sup>
5°C	10 to 16
10°C	19 to 29
20°C	46 to 74
25°C	75 to 128

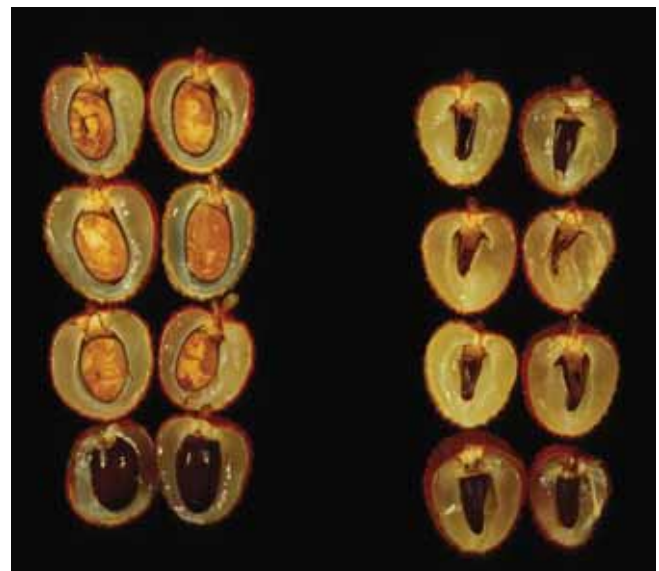
non-climacteric fruit to ethylene exposure. Ethylene may lead to early aril deterioration.

### Respiration Rates

See Table 1. To get mL kg<sup>-1</sup> h<sup>-1</sup>, divide the mg kg<sup>-1</sup> h<sup>-1</sup> 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<sup>-1</sup> h<sup>-1</sup> 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).



**Fruit structure**



**Seed sizes**

## Physiological Disorders

The major disorder is the rapid browning of shell from a bright red color (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 post-harvest skin cracking can occur. Cracked fruit should be culled.

## Postharvest Pathology

Numerous postharvest diseases can occur, and 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. Disease organisms include *Aspergillus* spp., *Pestalotiopsis* spp., *Peronophythora* spp., sour rot caused by *Geotrichum candidum*, and yeasty rots. Other organisms found to cause rots include *Botryodiplodia theobroma*, *Colletotrichum gloesporioides*, and *Rhizopus oryzae*.

## Quarantine Issues

Lychee 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<sub>2</sub> 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).

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

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