Litchi

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Scientific Name and Introduction

Litchi (*Litchi chinensis* Sonn.), also spelled lychee, originated in southern China where it has been cultivated for at least 2,000 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 2.5 cm (1 in) in diameter, has a thin leathery red skin with 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 and 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 have the optimum range of sugar-to-acid ratio for the cultivar. During litchi maturation, acid levels decline and sugar levels 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 holding 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.

Precooling Conditions

Room-cooling is used for precooling.

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 or decayed fruit or fruit with insect stings (Campbell 1959, Paull and Chen 1987).

Controlled Atmosphere (CA) Considerations

An atmosphere of 3 to 5% O_2 and 5% CO_2 at 5 to 7 °C (41 to 45 °F) is recommended (Kader

1994, 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). Using polyethylene film bags probably prevents dehydration that leads to rapid skin browning (Akamine 1960, Paull and Chen 1987).

Retail Outlet Display Considerations

Litchi should be displayed refrigerated, preferably in polystyrene containers or plastic bags. If litchi are left directly exposed to ambient air, the skin will rapidly brown.

Chilling Sensitivity

Litchi have low sensitivity to chilling. 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: <1 nL kg^{-1} h^{-1}. There are no reports on the response of this nonclimacteric fruit to ethylene exposure. Ethylene may lead to early aril deterioration.

Respiration Rates

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

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 CO_2 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 ton^{-1} day^{-1} or by 61 to get kcal $tonne^{-1}$ day^{-1}.

Physiological Disorders

The major disorder is the rapid browning of the 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 and loss of turgidity) of flesh occurs in senescent fruit after prolonged storage and overmaturity. 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, but most have their origins preharvest. Good field sanitation and culling of fruit that show damage from fruit-piercing insects, cracks, and sunscorch 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 organisms 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 United States 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 overwrapped.

Special Considerations

Fumigation with SO_2 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 flavors (Paull et al. 1998). Sulfites are not approved on fresh produce in the United States, except for grapes. Most other countries have sulfite residue limits for edible portions (Tongdee 1994).

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