Arazá

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Scientific Name and Introduction

Eugenia stipitata Mac Vaugh, known as the arazá (Morton 1987, Arkcoll 1990), is a berry from a perennial tree of the *Myrtaceae* family. Two subspecies were described by McVaugh (1956): *stipitata* from Brazil and Peru (also known as araçá-boi in Brazil or as pichi in Peru, "the wild one") and *sororia* from Peru (also called *rupina caspi*, "the domesticated one"). One landrace occurs in the western Amazon (Gentil and Clement 1997). Arazá is primarily grown in the western Amazon as well as in Costa Rica. There can be four flowering periods per year with 2-mo harvest periods followed by a 1-mo break (Swift and Prentice 1983). The main harvest season is February to May for subsp. *stipitata* in Belem, Brazil (Morton 1987). There are two main production seasons (March to May and October to December) in Colombia's northern Amazon, whereas production is year-round in the southern Amazon.

Quality Characteristics and Criteria

High-quality arazá fruit are juicy with bright, canary-yellow flesh; bright yellow to orange rind; and no signs of shriveling, bruises, or skin scald. The edible portion is slightly fibrous with an exquisite fragrance but has an extremely sour taste (Arkcoll 1991). Arazá fruit are known for their high acidity (mostly malate, followed by succinate and, to a lesser extent, citrate), minerals, a high ascorbic acid content, and low concentrations of reducing sugars (Gentil and Clement 1997, Hernández et al. 2001, 2002a, 2002b). Quality defects include susceptibility to anthracnose, scab (*Sphaceloma* sp.), rust (*Uromyces* sp.), soft fruit texture, loss of aroma, skin scald at suboptimum temperatures, and high weight losses, particularly at low RH (Arkcoll 1991, Galvis and Hernández 1993b, Tai Chun 1995). The average number of seeds per fruit and seed length depends on the subspecies (Swift and Prentice 1983, Morton 1987, Rodriguez 1990, Ferreira 1992,). Thirty volatile compounds have been identified in ripe arazá fruit, with sesquiterpenes and particularly germacrene D as the most abundant compounds (Franco and Shibamoto 2000).

Horticultural Maturity Indices

Fruit are harvested green (Hue angle values above 100°) to avoid fruit softening (Arkcoll 1991, Galvis and Hernández 1993a,b). Harvest criteria are primarily size and color, and texture to a lesser extent. If arazá fruit mature on the tree, shelf-life is only about 3 days after harvest.

Grades, Sizes, and Packaging

Average fruit range from 100 to 200 g, and equatorial diameters range from 4 to 10 cm (Ferreira 1992). The domesticated round to oblate fruit from subspecies *sororia* reach 50 to 800 g, while the wild subspecies *stipitata* reaches 20 to 56 g (Morton 1987, Rodriguez 1990). In Colombia,

markets pack fruit in baskets of small (smaller than 100 g), medium (150 to 200 g), and large (200 to 350 g) fruit.

Precooling Conditions

Arazá should be cooled to around 13 °C (55.4 ºF) within 24 h of harvest in a refrigerated chamber using air with 90 to 95% RH to maximize storability.

Optimum Storage Conditions

The recommended conditions are 12 to 13 °C (53.6 to 55.4 ºF) and 90 to 95% RH. Arazá fruit can be kept in good condition for 2 weeks at 12 °C (53.6 ºF), 7 days at 10 °C (50 ºF), and 5 days at 20 °C (68 ºF) (Hernández et al. 2001, 2002b).

Controlled Atmosphere (CA) Considerations

MA reduces weight loss, shriveling, development of skin scald, decay, softening, and the loss of TA (Hernández et al. 2001). Low-density polyethylene (LDPE) films have been used for MA. However, the effectiveness of MA storage depends on maturity, cultivar, temperature, and atmosphere. Storage under passive MA using PE film resulted in a steady state reached after 6 days at 10 °C (50 ºF) and gas composition of 5 to 6% CO_2 and 13% O_2, depending on the LDPE film used (Hernández et al. 2001). The use of active MA with 5% O_2 and 5% CO_2 with LDPE of 38 μm thickness results in maximum quality, but no recommendation can be made for MA storage. If O_2 decreases to below 2%, subsequent ripening in air may be irregular or inhibited.

Retail Outlet Display Considerations

Use of molded plastic trays, as well as individual seal packaging with high OTR films, is acceptable. Weight loss at RH under 90% and bruising are serious problems.

Chilling Sensitivity

Arazá fruit are sensitive to chilling below 13 °C (55 ºF). At 8 to 10 °C, fruit should be stored less than 5 days to avoid chilling injury.

Ethylene Production and Sensitivity

Ethylene production and sensitivity have not been determined. The fruit are climacteric.

Respiration Rates

Temperature	Preclimacteric	Climacteric
	-------*mg CO_2 kg^{-1} h^{-1}*-------	
10 ºC	40 to 323	601
13 °C	60 to 337	861
20 °C	140 to 310	1,283

Data from Galvis and Hernández (1993a,b) and Hernández et al. (2002a).

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 per ton per day or by 61 to get kcal per tonne per day.

Physiological Disorders

The main disorders are skin scald, browning partly due to bruises, abnormal ripening or uneven to ripe symptoms (blotchy green color, high flesh firmness), lack of flesh juiciness, increase in acidity, and green skin spots (Tai Chun 1995, Hernández et al. 2002a). $CaCl_2$ application, particularly at higher than 4% (w/v), can result in abnormal ripening. Green skin spots remain on the fruit and small brown spots develop that later expand into necrotic lesions that become sites for fungal infection.

Postharvest Pathology

The main rot in arazá is anthracnose *(Gloesporium album)* on wounds or chilling-injured (scalded) areas (Arkcoll 1991, Hernández et al. 2002a,b). *Cylindrocladium scoparium* rot is characterized initially by small, light-brown lesions, which evolve to severely damaged areas that can reach about 0.3 cm of pulp depth (Nuñes et al. 1995). The pathogenicity of *Curvularia* spp. isolated from rotted fruit is under study, though symptoms are fruit softness and pink spot areas in the pulp that lack juice and fermentative degradation. The incidence of rust (*Puccinia psidii* or *Uromyces* sp.) has been recorded in Manaus and Costa Rica (Moraes et al. 1994, Tai Chun 1995). Yeasts are a minor problem with fruit bruises and/or chemical-scalded areas caused by calcium dips of 4 to 8% (Hernández et al. 2003).

Quarantine Issues

Quarantine pests include *Anastrepha obliqua* and *A. striata* (Diptera:Tephritidae) (Saldanha and Silva 1999). The coleoptera *Conotrachelus eugeniae* and *Atractomerus immigrans* have been reported on arazá rinds. *Neosilba zadolicha* (Diptera: Lonchaeidae) larvae are seldom present on fruit blemishes caused by these insects (Couturier et al. 1996). Mediterranean fruit fly (*Ceratitis capitata* Wied) has been identified in Costa Rican orchards (Swift and Prentice 1983, Moraes et al. 1994, Tai Chun 1995).

Special Considerations

Fruit are highly susceptible to dehydration and shriveling. A warming treatment of 18 h at 20 °C (68 ºF) with 90% RH after 6 days at 10 °C (50 ºF) reduces skin scald and associated decay and extends shelf-life up to 2 weeks (Hernández et al. 1999, 2002b).

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