Tamarind

Elhadi M. Yahia
Facultad de Quimica, Universidad Autonoma de Queretaro
Queretaro, Mexico

Scientific Name and Introduction: Tamarind fruit (*Tamarindus indica* L., syns. *T. occidentalis* Gaertn.; *T. officinalis* Hook.) are indehiscent, bean-like, curved pods, 3 to 20 cm (1.2 to 7.9 in) long and 15 to 20 g (0.5 to 0.7 oz) in weight. Fruit have a scurfy brown, woody, fragile shell with a brown pulp and 8 to 10 blackish-brown, hard, shiny seeds (Hernandez-Unzon and Lakshminarayana, 1982a). They are composed of about 30% pulp, 40% seeds and 30% shell. The color of the pulp is due to the presence of several anthocyanins, of which vitexene is the most important (Lewis and Neelakantan, 1964). There are also fruit with red pulp, although they are not commonly cultivated. However, the reddish flesh types are distinguished in some regions, and regarded as superior quality.

The fruit is a good source of calcium, phosphorous, and iron, excellent source of riboflavin, thiamin, and niacin, but contains only small amounts of Vitamins A and C (Bueso, 1980). The two major types are "sweet-fruited" and "acid-flavored." Some cultivars have sweeter pulp, such as 'Makham Waan' in Thailand and 'Manila Sweet' in Florida (Morton 1958). Tamarind is of minor importance in the U.S. Fruit are eaten at the green-mature stage or when the shell pod has become brittle and the pulp brown. On a fresh weight basis, mature tamarind pulp has 30 to 35% sugar and 12 to 24% TA. Tamarind is considered to be both the sweetest and most sour of all fruits.

Quality Characteristics and Criteria: Both green immature and brown, ripe pods are normally marketed when 5 to 20 cm (2.0 to 7.9 in) long.

Horticultural Maturity Indices: Tamarind fruit take about 8 mo from fruit set to harvest, and growth is a typical sigmoid type (Hernandez-Unzon and Lakshminarayana, 1982a). As pods mature, skin develops into a brown, brittle shell, the pulp turns brown or reddish-brown, and seeds become covered with dry and sticky pulp. When fully ripe, the shells are brittle and easily broken. Mature fruit can be left on the tree for more than 6 mo after ripening without significant spoilage, however birds and insects become pests. Fruit should be harvested when the moisture content is < 20% to facilitate separation of the shell from the pulp.

Harvesting: Ripe fruit should be harvested to prevent improper ripening and difficulties in separation of the peel after harvest. Fruit can be pulled off the peduncle or cut using scissors (Hernandez-Tuzon and Lakshminarayana, 1982b). Fruit for immediate processing are harvested by pulling pods away from the stalk. Some can be harvested by shaking the branches, leaving the remaining fruit to fall naturally when ripe. In humid climates, fruit are readily attacked by beetles and fungi, and should therefore be harvested before they are fully ripe. Dry, ripe fruits are easily cracked, and the pulp and fibers separated from the broken shell.

Optimum Storage Conditions: The high SSC:TA and the low water content contribute to a long storage-life. Tamarind can be stored with the skin, or as a separated dry pulp. Tightly packaged pods can be stored at about 20 °C (68 °F) for several weeks. The pulp of mature tamarind is commonly compressed and packed in palm leaf mats or plastic bags and stored at 20 °C (68 °F). It can be stored for a significant length of time when processed into a paste. It can be frozen and stored for 1 year, or refrigerated for up to 6 mo. During storage, the dry, dark-brown pulp becomes soft, sticky, and almost black. The pulp can be stored for a longer period after drying or steaming.

Respiration Rates: Tamarind fruit are non-climacteric. Maximum CO_2 production occurs 4 weeks after

fruit set, and then gradually declines (Hernandez-Unzon and Lakshminarayana, 1982b).

Postharvest Pathology: Tamarind fruit are very tolerant to pathogens and insects, except for occasional incidence of scab. This resistance may be due to the low water content and high acid and sugar content, as well as high polyphenol content in the peel. Ripe fruit are susceptible to mold, insects and birds.

Quarantine Issues: Various weevils and borers can infest the ripening pods or stored fruits. Pulp separated from the peel is highly susceptible to molds. Tamarind beetle (*Pacymerus* (*Coryoborus*) *gonogra*) and tamarind seed borer (*Calandra* (*Sitophilus*) *lineris*) can infest ripening pods and persist in the stored fruits. The rice weevil (*Sitophilus oryzae*), rice moth (*Corcyra cepholonica*), and fig moth (*Ephestia cautella*) can infest fruit in storage.

Suitability as Fresh-cut Product: None at this time.

Special Considerations: Fruit are commonly processed into juices, nectars, fruit punch, concentrates, glaceéd and crystallized fruit. The pulp can withstand thermal processing without affecting the original flavor profile (Bueso, 1980).

References:

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