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Pitaya

(Dragon Fruit, Strawberry Pear)

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Pitaya is the name of both a plant, *Hylocereus undatus* (Haw.) Britton & Rose, and its fruit. The fruit has been called the most beautiful in the cactus family. Other names used include pitahaya, night-blooming cereus, strawberry pear, dragon fruit (in Southeast Asia), and pāniniokapunahou or pāpipi pua (in Hawaii). The plant is native to southern Mexico, the Pacific side of Guatemala and Costa Rica, and El Salvador. It is commonly cultivated throughout the tropical American lowlands.

Pitaya is a perennial, epiphytic, climbing cactus with triangular, fleshy, jointed green stems. Each stem segment is composed of three wavy wings with horny scalloped margins. The stem segments may grow to 20 ft long. Each trough of the scalloped wings has one to three short spines, and some varieties are spinier than others. Aerial roots grow from the underside of the stems, providing anchorage for the plants to climb on walls, rocks, or trees. The night-blooming, yellowish-green flowers are about 1 foot long and 9 inches wide, bell shaped, and very fragrant; they open during the early evening and wilt by daybreak.

The type of *H. undatus* found in Hawaii, notably in a long hedge at Punahou School in Honolulu, is familiar as an ornamental that occasionally bears a few small, red fruits. Recent breeding and selection research in Taiwan and Vietnam has resulted in many self-fertile and productive pitaya varieties. Some notable selections such as 'Vietnam #1' produce large, pink fruits (averaging 14 oz, ± 3 oz) with white flesh and high levels of total soluble solids (a measure of sweetness) of 13–19%. Many selections are being evaluated from the red-fleshed fruit types belonging to two closely related species, *Hylocereus polyrhizus* and *H. costaricensis*, and their hybrids with *H. undatus*. In Southeast Asia, both the fruits and flowers are consumed.

The normal flowering and production season of pitaya is during the summer, from June to October. Three to five spherical buttons normally emerge on the stem margins; two to three of these may develop into flower buds in about 13 days. The light green, cylindrical flower buds reach approximately 11 inches after 16–17 days, when anthesis occurs. The flowers open rapidly, starting at around 6:40–7:00 p.m., and flowering is completed by about 10:00 p.m. At 2:00 a.m., with pollination completed, the flower begins to wilt. The flower petals close completely by daybreak. Pitaya is pollinated by moths in the evening, and hand pollination can enhance fruit set and size. The blooming of pitaya flowers is affected by temperature and light intensity. The flowers may open as early as 4:00 p.m. on a warm, cloudy day, while cool temperatures during off-seasons could slow flower wilting so it concludes as late as 10:00 a.m.

Pitaya fruits are nonclimacteric (they do not undergo dramatic ripening change after maturity, such as occurs with bananas, for example), and they are sensitive to chilling injury. Fruits can be harvested 30 days after fruit set, but it is better to delay harvest, to perhaps as much as 50 days after fruit set, to allow more sweetness to develop. The fruit continues to grow in size until harvested, with no noticeable change in sugar content. It was reported that fruits harvested 50 days after flowering are 50 percent heavier (average 17 oz) than at earlier harvests (30

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days, average 12 oz) (Chang and Yen 1997). Fruits can be stored in perforated plastic bags for 25–30 days at 40°F, but they will last less than 10 days at room temperature.

Culture and management

Pitaya is propagated by cuttings prepared either from an entire stem segment or from 6–8-inch stem sections. Making a slanted cut on the stem end to be inserted into the soil is said to improve rooting. Cuttings should be cured in a cool, dry area for 5–7 days before planting. Mature stems are preferred for cuttings, as they are more resistant to insect and snail damage. Cuttings may be planted directly in the field or in pots using a well drained potting medium.

Pitaya is a climbing cactus that originated in shady habitats of subtropical and tropical America, and it prefers a warm, moist climate with rich, organic soil. It is not a suitable plant for areas with extreme high temperatures (>102°F) and intense sunlight. The plant tolerates short exposures to freezing temperature and recovers rapidly. Its annual rainfall requirement is 25–50 inches; excessive rain may lead to flower drop and fruit rot. Irrigation twice a week and careful water management is essential during production; uneven soil moisture results in fruit splitting.

Commercial pitaya plantings can be found in Vietnam, Taiwan (about 2000 acres), Malaysia, and Israel. Production potential in Taiwan was estimated at 14,700–24,500 pounds per acre. Commercial plantings in Taiwan utilize single wooden or cement pillars about 6 x 6 x 78 inches set at a 9 x 15 ft spacing. The stem canopy can be trained into two layers as it develops. Other planting systems utilize structural supports including horizontal trellises (as in grape culture), galvanized fencing, and T-trellises. Pitaya can also be grown on the ground without any supports. Some farmers in Southeast Asia grow pitaya as a secondary crop on live betel palm. Pitaya is a fast-return fruit crop with production in the second year after planting and full production in 5 years.

The normal bearing period of pitaya in Taiwan is from June to October. Between September and March, flowering can be induced by breaking the dark period with supplemental lighting between 10:00 p.m. and 2:00 a.m., allowing off-season production from November to April. The fruits produced during the cool season in Taiwan are more desired in the market than fruits from summer crops because the off-season fruits are larger and sweeter. The recommend lighting utilizes incandescent light bulbs (100 watt) at about 4–5 ft spacing suspended about 6 ft above the ground.

Sections of pitaya for propagation.

Fruits of four pitaya selections.

Views of trellised pitaya plantings in Taiwan (photos, C-R Yen).

The recommended fertilizer program in Taiwan included well composted steer manure at 9 lb per plant every four months starting in April, supplemented with 3½ oz/plant of a commercial 13-13-13 fertilizer.

Diseases known to affect pitaya are few. Reports from Australia and Central America mention a stem rot caused by *Xanthomonas campestris* and brown spots on fruit caused by *Dothiorella*.

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