

Dragon Fruit

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Introduction

Dragon fruit, also known as strawberry pear, pitaya, and pitahaya, is a tropical, climbing vine-like cactus native to the Tropical Central Americas (Crane & Balerdi, 2019). There are over 15 species of dragon fruit (USDA, 2019). In Guam, at least three species can be found in cultivation: *Hylocereus undatus*, *Hylocereus megalanthus* (*Selenicereus megalanthus*), and *Hylocereus spp.* (unidentified species) (Bamba, personal communication, February 17, 2017). With many varieties and cultivars, in some cases it is difficult to determine species. Depending on species and varieties, dragon fruit have several combinations of colors of skin and flesh of mature fruits. Common combinations include red or pink skin with white flesh, red skin with pink or red flesh, and yellow skin with white flesh. Figure 1 depicts common colors of fruits of *H.undatus*, *H. megalanthus*, and *H. polyrhizus*. Table 1 lists skin/flesh colors of several species of dragon fruit. Dragon fruit has become a popular fruit in recent years to Guam markets, and has the potential to be a profitable commercial local crop.



Figure 01. Fruit colors of three species of Dragon Fruit cultivated on Guam.

Source: www.mdpi.com/2624-7402/2/1/1/htm

Species	Color	
	Peel	Pulp
<i>Hylocereus undatus</i>	Red	White
<i>Hylocereus triangularis</i>	Yellow	White
<i>Hylocereus contaricenes</i>	Red	Red
<i>Hylocereus monacanthus</i>	Red	Red
<i>Hylocereus ocamponis</i>	Red	Red
<i>Hylocereus megalanthus</i>	Yellow	White
<i>Cereus triangularis</i>	Yellow	White
<i>Acanthocereus pitajaya</i>	Yellow	White
<i>Cereus ocamponis</i>	Red	Red

Table 01. Several species of dragon fruit with skin (peel) and pulp (flesh) color (Crane and Balerdi, 2019).

Growing Dragon Fruit

General plant characteristics

Dragon fruit grows best in tropical and subtropical weather (65°F–77°F), and can tolerate warmer temperatures under 100°F. The plant prefers well-draining fertile soils. Dragon fruit plants can grow well under full sun-light where temperature and moisture are adequate. Plants consist of many branched stems which are typically green and triangular-shaped with 3-5 sides. Stems also consist of flat wavy ribs with horn-like margins that may have spines and can grow over 30 ft. long (Crane and Balerdi, 2019).

Propagation and planting

Dragon fruit can be grown by seed, but cuttings is the preferred method of producing plants. Seeds germinate within 3 weeks. Plants grown from seed may take 5-7 years to produce fruit. Cuttings of healthy mature stems should be about 6-8 inches long (Figure 2) and cured in a cool dry area for 5-7 days before placing cuttings upright into plant pots (Zee et al., 2004). Although cuttings can be

planted directly into designated sites, it is recommended to plant cuttings upright in pots until roots systems are well-developed before planting into designated areas out in the field. Plants from cuttings may produce fruits within 1 year (Crane and Balerdi, 2019). Recommended plant spacing is 9-15 feet between plants and rows (Zee et al., 2004) Dragon fruit plants can also be grown on the ground without any support, but it is highly recommended to be planted with a support system (trellis) for cleaner and easier harvesting and management. Trellis support systems are recommended to be approximately 6-7 feet in height. There are many kinds of trellis systems that are adequate for supporting dragon fruit, from single posts to wires stretched across a row supported by evenly spaced posts. Materials must be strong enough to support the multi-stemmed plant. Stems growing upwards should be secured to trellis systems to prevent plants from falling. Figures 3 and 4 show examples of trellis systems adequate for dragon fruit planting.



Figure 02. Mature stem cuttings for propagation.
Source: farmingmethod.com/how-to-grow-dragon-fruits-in-pots/



Figure 03. Single post trellis system.
Source: www.agrifarming.in/dragon-fruit-farming-profit-cost-yield-project-report



Figure 04. Wire trellis system.
Source: www.garden.eco/dragon-fruit-trellis

Plant Care and Maintenance

Pruning

There are many ways to prune dragon fruit plants. For productive and manageable dragon fruit canopies growing on trellis systems, it is recommended that individual plants be initially pruned to encourage upward growth in the first year. As plants mature and branching stems hang or grow horizontally, pruning of dead stems and selective pruning of live stems for air flow is recommended (Lobo, 2007).

Irrigation

Dragon fruit is best irrigated twice a week during dry periods ensuring good soil moisture and preventing over saturation. Although the plant is known to be drought tolerant, uneven soil moisture may result in splitting of fruits. Over-watering and excess rain may lead to flower drop and fruit rot (Zee et al., 2004).

Plant nutrition

There are several recommendations on fertilizing dragon fruit plants. One general recommendation is to apply to each plant 1-1.5 ounces of NPK at 1:1:2 ratio every 4 months (Gunasena et al. 2007).

Flowering and fruiting

Depending on species and varieties, the bell-shaped flowers are usually white or pink/red (and other colors) and can be up to 14 inches long and 9 inches wide (Figure 5). It has documented in other areas that flowers are pollinated by moths and bats. Flowers have the ability to self-pollinate, but because of self-incompatibility resulting in lack of fruiting (depending on species and variety), hand pollination is recommended for improved fruit production (Crane and Balerdi, 2019). Bees can also be pollinators in early daytime hours before

flowers wither (Muniz et al., 2019). Most dragon fruit species are long day plants where longer day (sunlight) periods are required for flowering and fruiting. In Guam, flowering and fruiting can occur April-November, peaking in July-September (Bamba, personal communication, February 17, 2021).



Figure 05. Dragon fruit flower in full bloom.
Source: <https://www.gardeningknowhow.com/ornamental/cacti-succulents/dragon-fruit/pitaya-plant-wont-bloom.htm>

Common pest and diseases

Common pests that have been reported to attack dragon fruit include mites, thrips, ants, scales, leaf-footed bugs, mealybugs, and slugs has been reported. Rats and birds may also cause damage to fruit and plants. A couple common diseases known to infect dragon fruit is fruit and stem rot fungus (*Colletotrichum gloeosporioides*) and black spot bacterium (*Xanthomonas campestris*). Good sunlight exposure and air movement around plants will allow plants to dry quickly after rainfall and help reduce disease pressure (Crane and Balerdi, 2004).

Harvest and Post-Harvest Storage

Although fruits can be harvested around 30 days after fruit set, it is recommended to delay harvest to about 50 days after fruit set to allow sugars to develop. Fruits average about 4.5 inches in thickness. Skin of mature fruits are typically either pink/red or yellow with scales may consist of spines. The pulp (flesh) may be white or pink/red with many small, black seeds (Crane and Balerdi, 2019). If fruits contain spines, it is best to remove spines with hand clippers or a brush before harvesting. Fruits can be harvested

by cutting peduncles (stem of flower/fruit attached to plant stem) or twisted off by hand. Harvested fruit will likely rot within 10 days when stored at room temperature. For longer shelf life up to 14 days, it is best to store freshly harvested fruits in a chiller at 10°C (50°F) at 90% relative humidity (Paull, 2014).

Uses and Nutrition

Dragon fruit is cultivated primarily as a fruit crop. However, with attractive, fragrant night-blooming flowers and bright-colored fruits, dragon fruits plants are also planted as ornamentals. The sweet (*Holycereus spp.*) or sour (*Stenocereus spp.*) flesh of dragon fruit is consumed fresh or dried and can be used in a variety of beverages and dishes including smoothies, desserts, and salads (Figures 6 and 7). The skin of the fruit is edible but can be bitter. Dragon fruit contains beneficial vitamins and minerals that aid in combating health issues. This diverse fruit is known to be high in antioxidants and bio-active free radical scavengers known as polyphenolic compounds. These compounds play a crucial role in protecting the human body and its immunity. Dragon fruit is also enriched with beneficial vitamins and minerals that can help reduce cancer risks and regulate healthy blood and energy (Parmar et al., 2019). It is rich in many nutrients and minerals including vitamin B1, vitamin B2, vitamin B3 and vitamin C, protein, fat, carbohydrate, crude fiber, flavonoid, thiamin, and niacin (Hitendraprasad et al., 2019).



Figure 06. Dragon fruit smoothie beverage.
Source: <https://theluxuryspot.com/yum-alert-dragon-fruit-smoothie/>



Figure 07. Dragon fruit salad.
Source: <https://tinyurl.com/139d4fml>

For further information

Contact the College of Natural & Applied Sciences, Extension and Outreach at 735-2080 for help or more information. Additional publications can be found on our website at: uog.edu/extension/publications.

References

Bamba, J. (2021, February 17). Extension Agent, College of Agriculture and Natural Sciences, University of Guam, Personal interview.

Crane, J. H., & Balerdi, C. F. (2019). Pitaya (Dragonfruit) Growing in the Florida Home Landscape. Institute of Food and Agricultural Sciences Extension Service, University of Florida. HS1068. 6p.

Gunasena, H. P. M., Pushpakumara, D. K. N. G., & Kariyawasam, M. (2007). Dragon fruit (*Hylocerus undatus* (Haw.) Britton and Rose). World Agroforestry (ICRAF). 32p.

Hitendraprasad, P. P., Hegde, K., & Shabaraya, A. R. (2020). *Hylocereus undatus* (Dragon Fruit): A Brief Review. International Journal of Pharmaceutical Sciences Review and Research. Article No. 09. 60(1). 55-57pp.

Lobo, R. (2007). Pitahaya (Dragon Fruit) Research & Production in California. UC Small Farm Program, University of California, Davis Cooperative Extension, San Diego County. Power point presentation presented at UC Small Farm Program 2007 Specialty Crops Conference Davis, CA - December 12, 2007.

Muniz, J. P., Bomfim, I. G., Correa, M. C., & Freitas, B. M. (2019). Floral Biology, Pollination Requirements and Behavior of Floral Visitors in Two Species of Pitaya. Crop Science. Revista Ciência Agronômica. Vol. 50. No. 4. <https://doi.org/10.5935/1806-6690.20190076>

Paull, R. E. (2014). Dragon Fruit: Postharvest Quality-Maintenance Guidelines. College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa. Fruit, Nut, and Beverage Crops. F_N-28. 3p.

Parmar, M. Y., Pore, D., Sharma, S. K., Singh, T., & Pandya, N. (2019). Health Benefits of Dragon Fruit. Nutrition and Food Science International Journal. Juniper Publishers. Vol. 8. Issue 4. 3p.

Zee, F., Yen, C-R., Nishina, M. (2004). Pitaya (Dragon Fruit, Strawberry Pear). College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa. Fruits & Nuts. F&S-9. 3p.

United States Department of Agriculture (USDA). (2019). List of Scientific Names of Admissible Dragon Fruit. 1 p.



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