Unlocking the secrets of Dragon fruit: Nutritional, Benefits and Culinary Uses

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Abstract

Dragon fruit, a vibrant and exotic fruit native to Central and South America, has been revered for its nutritional and medicinal properties for centuries. This enigmatic fruit boasts an impressive array of vitamins, minerals, and antioxidants, making it a valuable addition to a healthy diet. Rich in vitamin C, vitamin B2, and potassium, dragon fruit has been shown to boost immunity, support cardiovascular health, and even exhibit anti-cancer properties. Its unique flavor and texture have also made it a sought-after ingredient in modern cuisine, with uses ranging from salads, smoothies and desserts. This article delves into the nutritional benefits, culinary applications of dragon fruit, uncovering the secrets behind its rising popularity as a superfruit.

Introduction

Farmers are rapidly adopting dragon fruit (*Hylocerus undatus*), which was introduced as a novel crop in areas with minimal rainfall and rocky, barren terrain. Pulp, which makes up 70–80% of the ripe fruit, is a versatile and healthy fruit. Common names for numerous kinds of columnar and climbing cactus include "dragon fruit," "pitaya," and "pitahaya". The three main varieties of dragon fruit are as follows: yellow skin with white pulp (*Hylocereus megalanthus*, formerly known as *Selenicereus megalanthus*), red skin with red pulp (*Hylocereus monacanthus*, formerly known as *H. polyrhizus*), and red skin with white pulp (*Hylocereus undatus*). The fruit has a flavor similar to kiwi fruit. Fruits have an ideal Brix value of 15-18 ˚Brix and are low in fat and high in minerals. Stems: green, fleshy, jointed, branching, triangular, three-sided, occasionally four or five-sided. There are three flat, wavy ribs on each stem segment, and the corneous edges may have one or more tiny spines or none at all. Scrambling, sprawling, clambering, and scandent stems up to 10 m in length. The water-absorbing aerial roots are developed on the underside of the stems and anchor the stems on vertical surfaces. The flowers are nocturnal, perfumed, and hermaphrodite, measuring 25–30 cm in length and 15–17 cm in width. Some varieties of the flower are self-compatible. Fruit is a fleshy berry, oblong to ovoid, up to 6-12 cm long, 4-9 cm thick, red with large bracteoles, pulp white, edible, embedded with many small black seeds. Average fruit weight is 350-400 g, although may weigh as much as 900 g. Usually white in color and bell-shaped, stamens and lobed stigmas are cream colored.

Several Varieties of Dragon Fruit:

White Dragon Fruit: *Hylocereus undatus* and *Selenicereus undatus* are two other names for them. The most widely produced variety of dragon fruit has pink skin and white meat. One of these types is Thompson, the largest and most famous dragon fruit, weighing up to 1.5 pounds. Among the well-known brands of white dragon fruit are Vietnamese Jaina, David Bowie, and L.A. Woman's Seoul Kitchen.

Red Dragon Fruit: Pitaya Roja is also known as *Hylocereus costaricensis*. It's a dragon fruit, with red flesh and skin. It's a dragon fruit that tastes sweet and feels kind of like a kiwi. It can also be eaten raw or blended into smoothies. One disadvantage of eating red dragon fruits is that they stain your hands.

Yellow Dragon Fruit: Scientifically known as *Hylocereus megalanthus*, is also known by the colloquial name *Selenicereus megalanthus*. This native dragon fruit species of South America has firm white flesh with a scaling pattern of yellow skin.

Source: https://images.app.goo.gl/LbQ2zkpRdGHGBTtU8

Pink Dragon Fruit: Pink dragon fruit has excellent, soft to hot pink flesh. This variety of dragon fruit can adapt to a wide range of weather patterns and soil types. There are many varieties of pink dragon fruit, including American Beauty (*Hylocereus guatemalensis*), Delight, Voodoo Child (Voodoo Child), and Cosmic Charlie (Delight).

Source: https://images.app.goo.gl/Nbws5zUQ7JgEk1vEA

Nutritional importance

The typical nutritional value of ripen dragon fruit is as follows

Nutrient	Amount (per 100 g)	Daily value (%)
Water	87 g	-
Protein	1.1 g	2.1
Fat	0.4 g	-
Carbohydrates	11.0 g	3.4
Fiber	3 g	12
Vitamin B1 (Thiamine)	0.04 mg	2.7
Vitamin B2 (Riboflavin)	0.05 mg	2.9
Vitamin B3 (Niacin)	0.16 mg	0.8
Vitamin C (Ascorbic Acid)	20.5 mg	34.2
Calcium (Ca)	8.5 mg	0.9
Iron (Fe)	1.9 mg	10.6
Phosphorus (P)	22.5 mg	2.3

Sources: FAO (2002) and https://www.healwithfood.org

Health benefits

- The exceptionally low cholesterol content of dragon fruit lowers the risk of heart attacks and other conditions brought on by cholesterol buildup. It's the ideal fruit to keep your weight stable.
- It aids in digestive system cleaning. Because of its high fiber content, it may help relieve constipation and poor digestion. Consuming the meat and seeds will maintain the body nourished because they are high in protein.
- The high fiber content of dragon fruit can help control blood sugar levels, which in turn can help manage diabetes.
- Patients with dengue, malaria, and other vector-borne illnesses experience low platelet counts, which can be lethal if treatment is delayed. Due to its antioxidant qualities, dragon fruit helps dengue sufferers' platelet counts. For this reason, doctors advise dengue patients to eat dragon fruit.
- Consuming dragon fruit, particularly the red flesh kind with its abundance of antioxidants, might help maintain youthful, taut skin. Honey and fruit can be used to make anti-aging face masks. It might be a useful substitute for face masks.
- Boosts the Immune System: The high vitamin C content in dragon fruit helps stimulate the production of white blood cells, which are crucial in defending the body against harmful pathogens.
- Rich in vitamin B3, dragon fruit is said to help treat conditions like acne and burned skin. Dragon fruit can help lower the risk of common illnesses like colds and flu by strengthening the immune system.
- Promotes Bone Health: The minerals calcium and phosphorus found in dragon fruit are necessary for keeping strong bones and teeth. Osteoporosis and other disorders affecting the bones can be avoided with regular dragon fruit eating.
- Enhances Digestive Health: Due to its high fiber content, dragon fruit helps to avoid constipation and add bulk to stool, thereby supporting a healthy digestive system. Additionally, the fiber feeds the good bacteria in the stomach, known as prebiotics, which may improve gut health in general.

Pharmacological Activity

Antimicrobial Efficacy- It was discovered that almost 85% of mixed oligosaccharides were present in an

ethanolic extract taken from the flesh of white dragon fruit. At 70% concentration, acetone extracts from Hylocereus peels have potent antibacterial qualities, particularly against Salmonella.

Antifungal Properties - Extracts and fractions of flesh and peels of red pitaya fruits have been found to exhibit polyphenol antifungal activity against two yeasts, *Candida albicans* and *Rhizoctonia solani*, and four moulds, *Aspergillus flavus*, *Fusarium oxysporum*, *Botrytis cinerea*, and *Cladosporium herbarum*.

Anti-inflammatory properties- Joints directly impacted by arthritis experience extreme discomfort and immobility. Including dragon fruit in your diet may help to heal these conditions. The benefits of dragon fruit for arthritis sufferers are so tremendous that it is sometimes called the "anti-inflammatory fruit."

Anti-Ulcer Properties - Topical quercetin from red dragon fruit (*Hylocereus polyrhizus*) skin has antiulcer qualities. This is supported by results that reveal total discomfort in 35% of cases after 2-4 days and in 90% of cases after 4-6 days.

Activity of Antioxidants - The high betalains content of *H. polyrhizus*, often known as the red-fleshed pitaya, meets market demand for products that are both antioxidants and natural food colouring. Pitaya seed oil exhibits significant potential as a natural antioxidant source. Pitayas are noted for their high quantities of polyphenols in both the pulp and peel, in addition to their abundance of phytoalbumins, which are known for their antioxidant properties.

Anti-Diabetic Actions- People with Type II Diabetes may be able to reduce their blood glucose levels by eating red dragon fruit. Red dragon fruit contains glucose, which lowers blood sugar. Utilising dried dragon fruit as a herb with antidiabetic qualities yields special results.

Cardioprotective Intent - *H. polyrhizus* meat's already potent cardioprotective properties are strengthened by the polyphenols' anti-thrombotic action. In one study, rats were given this dragon fruit and two different heat processing methods. The results of the investigation suggested that antioxidant material and polyphenols would be the components of red pitaya that are cardioprotective.

Pain-Relieving Action- Pitaya contains gallic acid (3,4,5-trihydroxybenzoic acid), an organic molecule with antiviral, antioxidant, and analgesic qualities that is contained in plant components.

Potential Side Effects

Even though dragon fruit is usually regarded as safe to eat, it's important to be aware of any possible adverse effects that could occasionally occur:

Allergic Reactions: While rare, allergic reactions to dragon fruit might happen to some people. Hives, edoema, and itching are possible symptoms. When consuming dragon fruit for the first time, proceed with caution if you have a family history of fruit allergies or a known allergy to other fruits.

Swollen Tongue: Eating dragon fruit may occasionally result in tingling or swelling in the tongue. This is explained by the enzyme bromelain, which is found naturally in several fruits. Speak with a medical expert if you get this feeling.

Change in Urine Colour: If you consume dragon fruit and your urine turns pink or crimson, it shouldn't be a reason for alarm. The fruit's pigments are the cause of this benign side effect, which does not suggest any health problems.

Flavour Summary and Culinary Uses

- Due to its exquisite flavour profile, dragon fruit can be used as a versatile ingredient in a variety of culinary preparations. When added to food, the fruit's gently sweet and slightly lemony flesh brings out the flavours of the food itself.
- Dragon fruit is a great addition to smoothies because of its smooth, creamy texture, which adds a natural sweetness and brilliant colour. It can also be added as a topping to cakes and pastries and used in sweets such as fruit salads and sorbets.

Economic assessment of dragon fruit cultivation

With an initial expenditure of from Rs 8.0 to Rs 9.0 lakhs per hectare, dragon fruit can be a lucrative venture. Farmers can make some money in the second year of the crop, roughly Rs. 4 lakh per ha in the third year, and Rs. 6-7 lakhs in the fourth year due to the crop's low maintenance requirements and ability to fetch retail prices of more than Rs. 100–120 in the nearby city markets.

Cost of planting material: It takes about 4000 cuttings in a 1-hectare area to plant 4 around each pole structure. One dragon fruit cutting or seedling costs approximately Rs. 20 per plant. That means it costs about Rs. 80,000 for 4000 plants.

Cost of land/rental value of farm: One acre can be used to grow dragon fruit. Furthermore, very productive dragon fruits have a lifespan of 15 to 20 years. Dragon fruit is grown in arid regions or in areas with limited water resources. As a result, we may take into account a rental value of roughly Rs. 50,000 per year/ha. It might, however, differ depending on the location.

Cost of drip irrigation system: For one hectare, the average cost of a drip irrigation system including laterals and all the components is Rs. 40,000.

Cost of support systems: A 1-hectare dragon fruit farm requires the installation of 1000 support poles. To build the support, we must excavate a trench that is two feet by two feet deep and insert a pole that is two to three metres tall with an upper round or square cement construction. It costs approximately Rs. 4.40 lakh to build those supports on a 1-hectare dragon fruit field. They last for 15 to 20 years.

Labor cost in Dragon fruit farm: We might need 625-man days annually on average, including family labour, which comes out to roughly Rs. 2.26 lakh per hectare if we pay Rs. 5,000 a month. One talented worker will cost you Rs. 60,000 in labour over the course of a year.

Cost of manures, fertilizers and nutrients: We will need to apply 15 tonnes of organic manure annually in addition to chemical fertilizers, which comes to a total cost of almost Rs. 65,000 per hectare.

Cost of pesticide: The management of different dragon fruit pests and illnesses will necessitate the use of pesticides and fungicides, which might cost up to Rs. 25,000 per hectare annually.

Cost for intercultural operations: To preserve the health of the dragon fruit plants, intercultural operations include weeding in between the plants every 15 to 20 days. The annual cost of hired machinery is estimated to be Rs. 18,600.

Miscellaneous costs: They consist of the price of tools, instruction, pruning materials, maintenance, and additional supplies. Perhaps Rs. 10,000 per acre annually.

Production and price of dragon fruit

The dragon fruit grower should expect to receive roughly 2 t/ha of fruits in the second year. It rises till the fifth year. At the farm gate, dragon fruit is sold for Rs. 80 per kg (wholesale price), while prices might range from Rs. 40 to Rs. 150. A dragon fruit farmer can make up to Rs. 6-7 lakh a year per hectare starting in the fifth year.

Summary

The botanical traits, nutritional and health benefits, economic evaluation, and economic significance of dragon fruit farming in India are all covered in this article. Adopting dragon fruit in areas with limited water resources can benefit smallholder farmers alike. It is a high-yield perennial fruit with a quick payoff since gardeners can rely on consistent yields. Bioactive substances with a variety of advantageous biological functions, including anti-inflammatory, anti-microbial, antifungal, anti-ulcer, anti-diabetic, anti-platelet, cardioprotective, and pain-relieving properties, are present in these sections. The fruit, as well as the peel, of the dragon fruit have many health benefits. The characteristic red colour, soft, scaly skin, and large number of black seeds set dragon fruit apart. The fruit contains carotene, pyridoxine, niacin, thiamine, alkaloids, terpenoids, flavonoids, cobalamin, and phenolic.

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