

# Dragon Fruit: Overview, Nutritional Significance, and Enhancing Value

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## Abstract

This article explores the multifaceted aspects of dragon fruit, also known as pitaya, emphasizing its commercial cultivation, nutritional values, medicinal properties, and antioxidant activities. Originating from tropical regions, dragon fruit is now grown globally for its adaptability and health benefits. The fruit comes in various shapes and colors, making it unique and appealing. Notably, its nutritional profile includes vitamins, minerals, fiber, glucose, and fructose, with high concentrations of vitamin C, phosphorus, and antioxidants. The medicinal properties of dragon fruit are attributed to bioactive compounds, including betalains, flavonoids, and polyphenols. These substances contribute to heart health, cancer prevention, and the reduction of cardiovascular risks. The article highlights the nutritional richness of different dragon fruit species and their varied uses, including the extraction of beneficial compounds from stems, blossoms, and peels. Moreover, the antioxidant activities of dragon fruit are underscored, with a focus on the higher antioxidant content in peels compared to pulp. The article concludes by discussing the value addition of dragon fruit in the food and cosmetic industries, showcasing its versatility in products such as jams, jellies, drinks, and cosmetics. In summary, the visually striking dragon fruit emerges as a nutritionally rich and versatile tropical plant with diverse applications, contributing to its increasing global cultivation.

**Keywords:** Pitaya, health benefits, medicinal value, antioxidant

## Introduction

The fruit of several different tropical climbing plants in the genus *Hylocereus*, family Cactaceae, is known as dragon fruit or pitaya. Despite the pitaya's native habitat being the tropical regions of North, Central, and South America, it is now grown commercially due to its low cultivation requirements, high drought tolerance, ease of adaptation to high light and temperature,



wide range of tolerance for various soil salinities and advantages to human health. More than 20 tropical and subtropical nations, including the Bahamas, Bermuda, Indonesia, Colombia, Israel, the Philippines, Myanmar, Malaysia, Mexico, Nicaragua, northern Australia, Okinawa (Japan), Sri Lanka, southern China, southern Florida, Taiwan, Thailand, Vietnam, Bangladesh, and the West Indies, cultivate it for commercial purposes. Dragon fruit, also known as pitaya, stands out for its distinctive characteristics, including its shape, vibrant flesh, and varied skin colors. It comes in different varieties such as red flesh with pink skin (*Hylocereus costaricensis*), white flesh with yellow skin (*Hylocereus megulanthus*), and white flesh with pink skin (*Hylocereus undatus*). This unusual fruit is known by various names like pitahaya, night-blooming cereus, strawberry pear, Belle of the Night, and Cinderella plant.

Beyond its appealing features, dragon fruit is recognized for its high nutritional content and bioactive compounds, including potent natural antioxidants. This exotic tropical plant offers numerous health benefits, making it valuable for conditions like diabetes, obesity, hyperlipidemia, and cancer. Extracts from dragon fruit stems, blossoms, peels, and pulp exhibit various beneficial biological actions. Additionally, dragon fruit extracts show prebiotic potential and possess preventive qualities for cardiovascular and hepatic issues. Vietnam, with its tropical climate and adaptable environmental conditions, is an ideal location for dragon fruit plantations. The plant demonstrates adaptability to factors like salinity, light intensity, and drought, contributing to its robust growth. In recent years, the economic, nutritional, and health significance of dragon fruit has spurred increased production. This growth has positioned dragon fruit as a valuable source of phytochemicals with powerful antioxidant properties.

### **Nutritional Values**

The *Hylocereus* genus comprises various species, with only a select few being commercially cultivated due to their nutritional and economic benefits. Notable members include *Hylocereus costaricensis*, *Hylocereus polyrhizus*, and *Hylocereus undatus*. Pitayas, commonly known as dragon fruit, are recognized for their rich content of vitamins, minerals, fiber, glucose, and fructose. Particularly, they are renowned for being high in vitamin C, phosphorus, calcium, and antioxidants.

The nutritional composition of dragon fruit juice varies significantly among different species. Depending on the species and their origin, 100 grams of fresh dragon fruit pulp typically contains around 80% moisture, 0.4 to 2.2 grams of protein, 8.5 to 13.0 grams of carbohydrates, and 6.0 grams of total sugar. The concentration of ascorbic acid (vitamin C) in the fruit depends on factors such as cultivation method, maturity stage, and growing conditions, with transportation



and storage conditions also impacting vitamin and mineral levels. Storage at 8°C is considered optimal for maintaining good fruit quality.

Ascorbic acid is sensitive to air and light, and its degradation occurs easily during juice preparation. Studies indicate that vitamin C concentrations range from 3.3 to 6.0 mg per 100 grams, with variations between species and regions. For instance, the Pasuruan super red pitaya exhibited the highest vitamin C concentration (6.0 mg per 100 g), while the Bantul white pitaya had the lowest (3.4 mg per 100 g). In other studies, *H. polyrhizus* and *H. undatus* were found to have concentrations of 36.65 mg and 31.05 mg per 100 g of fresh pulp, respectively. Apart from the fruits, the young stems of pitayas also possess exceptional nutritional qualities, including raw protein (10.0-12.1 g per 100 g), raw fiber (7.8-8.1 g per 100 g), and various minerals such as phosphorus, potassium, calcium, magnesium, sodium, iron, and zinc. Dragon fruit flesh and seeds are rich in fatty acids, with linoleic, oleic, and palmitic acids being the most prevalent in *H. undatus*. These fatty acids play a role in reducing low- and very low-density lipoprotein fractions associated with elevated blood cholesterol. Additionally, linoleic and alpha-linolenic acids are essential for proper nerve impulse transmission, brain function, and the maintenance of cell membranes.

### Medicinal Properties of Dragon Fruit

Phytochemicals, bioactive plant compounds with non-nutritive properties, play a crucial role in promoting positive health effects. The growing interest in dragon fruit revolves around identifying these phytochemicals and exploring their potential medical benefits. Every part of the pitaya, including the peels often considered waste, is a rich source of betalains, flavonoids, polyphenols, terpenoids, steroids, saponins, alkaloids, tannins, and carotenoids—biologically active substances with diverse applications. The peels, abundant in phytochemicals, have promising potential for herbal medicines and natural colorants, complementing the edible portions like the pulp. Notably, flavonoids contribute to cardiovascular health by influencing blood arteries and brain cells, reducing the risk of heart disease. Hydroxy cinnamates, on the other hand, play a role in cancer prevention.

Dragon fruit seeds stand out for their high content of polyunsaturated fats, including omega-3 and omega-6 fatty acids, which contribute to lowering triglycerides and mitigating cardiovascular risks. Furthermore, the fruit's richness in phosphorus and calcium supports bone strength and tissue formation. Additionally, dragon fruit serves as a natural probiotic, suppressing the growth of gastrointestinal pathogens. The multifaceted benefits of dragon fruit underscore its potential as a valuable source of health-promoting compounds.

## Antioxidant Activities

The utilization of natural antioxidant substrates found in medicinal plants, which possess preventive effects against cellular damage caused by free radicals implicated in various diseases, including cancer, has been on the rise. The increasing popularity of certain plants in disease prevention can be attributed to the antioxidant (radical-scavenging) properties of their constituent phenolic compounds, such as flavonoids, phenolic acids, stilbenes, lignans, tannins, alkaloids, and vitamin C. Phenolic compounds, including phenolic acids (e.g., gallic acid) and polyphenols (e.g., flavonoids), exhibit a strong correlation with antioxidant activity, and some have demonstrated in vitro efficacy surpassing that of vitamin C and vitamin E ( $\alpha$ -tocopherol).

Dragon fruit is widely recognized for its antioxidant properties, and extensive studies have been conducted on the antioxidant activity of various species, as well as the antioxidant content in different parts of the plant (e.g., pulp, peel, stem, foliage). Interestingly, the peels exhibit higher antioxidant activity compared to the pulp. Consequently, the antioxidant activity of pitaya peel ( $445.2 \text{ mg mL}^{-1}$ ) surpasses that of pitaya pulp ( $1,266.3 \text{ mg mL}^{-1}$ ). The presence of the highest concentration of antioxidant-active compounds in the usually discarded fruit peels underscores their value as overlooked sources rich in fiber, nutrients, and bioactive compounds.



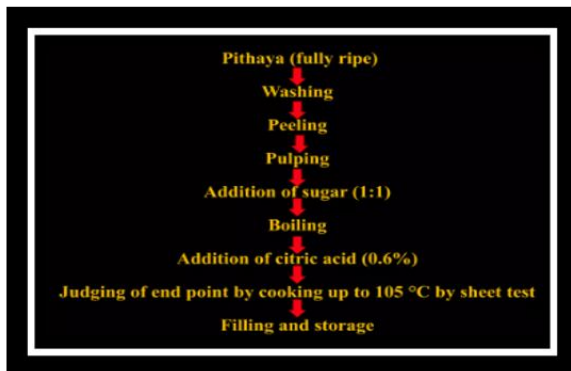
## Value addition of Dragon fruit

Dragon fruits are used for the preparation of different value-added food products due to its nutritive value and extraordinary taste, aroma and colour. They are widely used in food industry and cosmetic industry for the preparation of different value-added food and cosmetic products like ready to serve (RTS) drink, squash, nectar, candy, spread, powder, chips, jam, jelly, wine, yogurt, bakery food products, cream, soap, lipstick and lip balm etc. Dragon fruit has flesh content 65-68 % followed by peel 24-26 % and seed 7-9 %. Many bioactive molecules present in

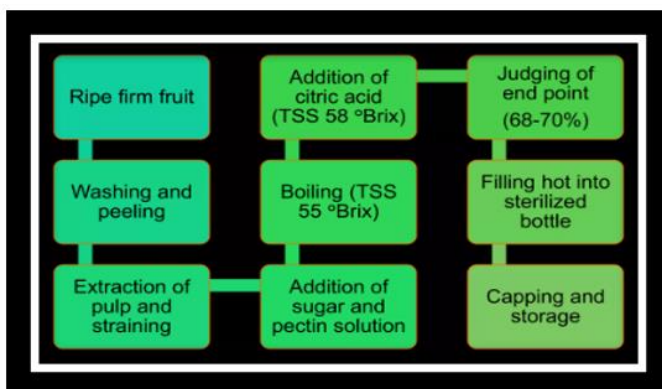


Dragon fruits have been reported as having several benefits for the human health. This fruit is an excellent for richness in antioxidant activity, phenol content, flavonoids content and betacyanin content.

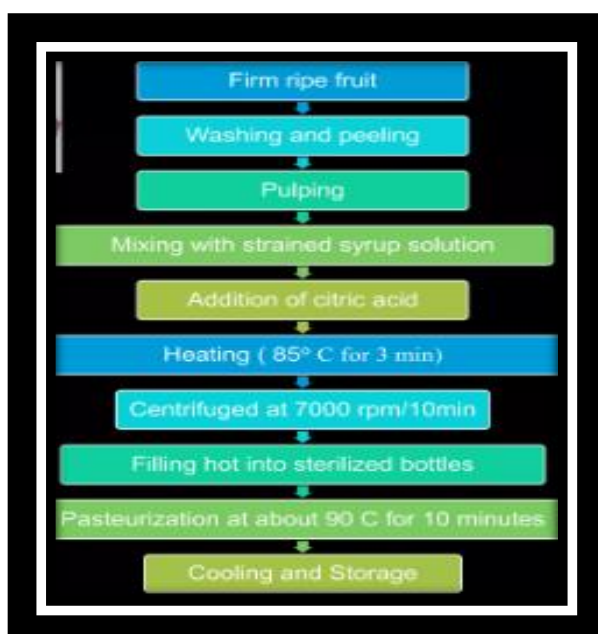
### 1. Jam



### 2. Jelly



### 3. Ready to Serve (RTS) Drink





## Conclusion

Due to its unconventional appearance, the moniker "crazy" easily befits this fruit. Despite its low-calorie content, dragon fruit is a nutritional powerhouse, boasting vitamin C, B vitamins, calcium, phosphorus, protein, fiber, capsin, and antioxidants. Its health benefits include lowering blood pressure and blood sugar levels, fortifying bones and teeth, promoting the growth of healthy blood and tissues, enhancing immune function, expediting the healing of wounds, and preventing respiratory issues. Rich in lycopene, akin to other red fruits, dragon fruit helps combat cancer and heart disease. Harnessing its visual allure and health advantages, the fruit is best enjoyed chilled, diced into cubes, and incorporated into fruit salads, smoothies, or refreshing beverages. No dragon-slaying required; prepare to make this exotic fruit your newfound favorite. With its aesthetic appeal and healthful qualities, dragon fruit cultivation is rapidly gaining widespread recognition.

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