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## Review of Dragon Fruit: An Indian Fruit Crop for both Nutritious and Profitable

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Received Date: January 25,2025; Published Date:24, March,2025

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### Abstract

*Dragon fruit, or Hylocerus undatus (Haw.), is a climbing perennial vine that is a component of the cactaceae family. The dragon fruit's blossom is the most exquisite in the cactaceae family; it has flaming complexion red covered in vibrant scales, white or red meat, and small black seeds scattered throughout the protein inside that are both palatable and healthy. This crop, known as a fast-growing vine, can flourish for over 20 years after planting, with one hectare being able to support roughly 800 dragon fruit plants. Furthermore, following planting, it yields a elevated along with quick resume manufacturing in the next year, reaching complete manufacturing by the time it is five years old. Periodic climate change periodically places a significant strain on all of the resources found below the surface of the earth, particularly water.*

**Keywords** – Nutrient Value, Health Benefit and Dragon Fruit

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### INTRODUCTION

The dragon fruit, or Hylocerus undatus (Haw.), is a perennial climbing plant that acquired appeal as a foliage plant and then as A harvest of fresh fruit all over the world. Dragon fruit belongs to this category family Cacti, also. Its bright red exterior is dotted green-scaled, especially its Redmond or white flesh is fill with minor, nutritious dark beans that are edible. It is referred to as the “Noblewoman” or “Queen of the night” because of its exquisite blossom. Fruit has luscious, sweet flesh that tastes really good. Owing to its significance, widespread availability, and appeal, this fruit goes by several colloquial names in various nations, such as Pithaya and Strawberry Pear. The greatest accomplishment of this crop is that, once planted, it will continue to develop for roughly 20 years, with 800 dragon fruit plants being able to be grown on 1 hectare. There are extremely few farmers who have advanced the cultivation of the territories of Gujarat, Andhra Pradesh, Karnataka, and Tamil Nadu. Less than 100 acres are used for the cultivation of dragon fruit nationwide. Additionally, it has an advanced in addition quick resume to operation in the next year following cultivating as well as reaches peak creating at five years old. Less than 100 acres are used for the cultivation of dragon fruit nationwide.<sup>[1][2]</sup>

The tropical fruit known as dragon fruit, or pitaya or pitahaya, is derived from a variety of cactus species. Originally from Central America, it is currently grown in several nations, especially in Mexico, Israel, and Southeast Asia. Dragon fruit has a texture akin to a kiwi or pear and is slightly sweet. It's frequently eaten raw, mixed into smoothies and fruit salads, or added to desserts. Because it is high in vitamins, minerals, antioxidants, and fiber, it is highly prized for its health advantages. Dragon fruit comes in three primary varieties: 1 red skinned red fleshed 2red skinned white fleshed 3 yellow skinned white fleshed.<sup>[3]</sup>



*Figure 1: Cutting section of dragon fruit*

### **Types of Dragons Fruits**

Red skinned white fleshed

Red skinned red fleshed

Yellow skinned white fleshed

Purple skinned white fleshed

### **Red skinned white fleshed**

Pitaya, another name for red-skinned white-fleshed dragon fruit, is a visually arresting fruit with bright red skin and white, slightly sweet flesh flecked with small black seeds. It is a common ingredient in fruit salads, smoothies, and desserts because of its distinctive texture and pleasant flavor. It has many health advantages, including as better digestion and immune support, and is high in fiber, antioxidants, and vitamins C and B. Dragon fruit is a healthy snack choice because it is low in calories. Look Skin: Scales with a green tip, bright red or pink. White flesh with little black seeds. Profile of Nutrition

### **Calories**

Fruit with few calories.

### **Vitamins**

Rich in antioxidants, many B vitamins, and vitamin C. Iron, calcium, and magnesium are among the minerals.

### **Fiber**

A good dietary fiber source.

### **Nutrition Profile Calories**

Low, often between 60 and 70 per fruit. Vitamins: High in C, B vitamins, and antioxidants. Minerals include magnesium, calcium, iron, and phosphorus.<sup>[4]</sup>

### **Red skinned red fleshed**

Red-fleshed dragon fruit, also known as *Hylocereus costaricensis*, pitaya roja.

### **Botanical Overview**

#### **Species**

*Hylocereus costaricensis*.

#### **Family**

Cactaceae (Cactus family). Other names include Pitaya roja, Costa Rican pitaya, and red dragon fruit. Profile of Flavor Comparable to a cross between a kiwi, pear, or watermelon, the red-fleshed dragon fruit has a slightly sweet taste that is more noticeable than that of the white-fleshed types. Its flavour is further complicated by a little acidity.

**Appearance****Skin**

The exterior skin is brilliant red and covered in green scales or “spikes.” The texture is leathery, but thin.

**Flesh**

The interior flesh is a deep magenta to dark crimson and dotted with small, edible black seeds.

**Taste**

The red-fleshed dragon fruit is sweeter than the white-fleshed sibling, with a moderate tart flavour. It is frequently described as an intersection of a pear to a kiwi or watermelon, but with a deeper, more powerful flavour.

**Nutritional value****Antioxidants**

Red-fleshed cultivars contain high levels of antioxidants including betalains, which contribute to their brilliant color and aid in the fight against oxidative stress. Vitamins and minerals: They’re high in vitamin C, fiber, calcium, iron, and magnesium. Dragon fruit is minimal in calories, despite its deliciousness. [5]

**Yellow skinned white fleshed**

The yellow-skinned, white-fleshed dragon fruit (*Selenicereus megalanthus*) is a tropical fruit known for its vibrant yellow outer skin and juicy, sweet interior. Unlike its red-skinned counterparts, this variety offers a smoother, more delicate sweetness, with flavors reminiscent of pear, kiwi, and mild citrus. Its white flesh is speckled with small, edible black seeds that add a slight crunch. Often enjoyed fresh, it can also be used in smoothies, fruit salads, or as a visually striking garnish for desserts. [6]



*Figure 2: Yellow skinned white fleshed*

**Purple skinned white fleshed**

Originally from Central America, the dragon fruit, sometimes called pitaya. *Hylocereus undatus*, the purple-skinned, white-fleshed dragon fruit, is a variant of this plant. This fruit is renowned for its eye-catching appearance, including leathery skin and scales that are either vivid purple or reddish-purple. Its flesh, which resembles kiwi fruit in texture, is white with tiny black seeds strewn throughout. Because of its eye-catching beauty, health advantages, and variety of culinary uses.

**Description****Plant Type**

This type is a climbing cactus, just like all dragon fruits. It has a spreading, vine-like growth habit and anchors itself to trees or trellises via aerial roots.

**Stem**

The triangular, green stems have three noticeable ridges with short spines. Photosynthesis is carried out by these stems.

**Flowers**

The plant produces large, fragrant, white, night-blooming flowers. The diameter of these flowers can reach up to 30 cm. Since the flowers bloom at night, they are primarily pollinated by nocturnal pollinators like moths or bats.

**Fruit****Skin**

The fruit has a bright yellow skin, which is coated in small, pointed, soft thorns that normally fall off as the fruit grows. Flesh: Inside, the flesh is white.

**Flesh**

Like other dragon fruits, the inside is white and dotted with small black seeds. Juicy, sweet, and somewhat acidic, the flesh is thought to be sweeter than other dragon fruit types. Size: Compared to the red-skinned cultivars, the fruit is often smaller and more elongated, with a length of 10 to 15 cm.

**Seeds**

The fruit's delicious black seeds give it a faintly crunchy texture.



*Figure 3: Dragon fruit plant*

**Purple skinned white fleshed**

Originally from Central America, the dragon fruit, sometimes called pitaya. *Hylocereus undatus*, the purple-skinned, white-fleshed dragon fruit, is a variant of this plant. This fruit is renowned for its eye-catching appearance, including leathery skin and scales that are either vivid purple or reddish-purple. Its flesh, which resembles kiwi fruit in texture, is white with tiny black seeds strewn throughout. Because of its eye-catching beauty, health advantages, and variety of culinary uses, purple dragon fruit has become very popular in international markets. It is sold all over the world and is a significant commercial crop in many tropical countries, particularly in Southeast Asia. In addition to growing well in hot, dry settings, this cactus fruit is a sustainable and profitable crop for areas with comparable weather.

**Botanical classification****Kingdom****Plantae**

This indicates that it is a member of the plant kingdom, which encompasses all plant species. The Caryophyllales order comprises a diverse range of flowering plants, ranging from carnations to cactus.

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**Family**

Cactaceae

This is the family of cacti, which contains plants with thick, water-storing stems that are suited to arid conditions. Several varieties of dragon fruit plants belong to the genus *Hylocereus*, which is a group of cacti.

**Soil requirement**

Dragon fruit can be cultivated in a variety of soil types, but it needs well-drained soil because prolonged water logging stunts development and encourages stem rotting. Its commercial agriculture benefits from the sandy loam soil's high Natural substances content. Since its roots are typically just 40 cm deep, it is a crop with extremely shallow roots, hence soil depth may not be an issue for cultivation. It can withstand certain salts in the soil and favors slightly acidic soil. [7]

**Well-Draining**

If waterlogged, dragon fruit is extremely prone to root rot. The best soils are loamy or sandy loams with adequate drain.

**Organic Matter**

Soils that contain compost or well-rotted manure are rich in organic matter, which enhances water retention and nutrient availability.

**Low Salinity**

Steer clear of locations with a lot of salt because the plant is sensitive to salty soils.

**Aeration**

Roots may breathe and avoid compaction in loose, well-aerated soils. 5. Slightly Acidic to Neutral pH: The ideal pH range is 6.0–7.5. Soils that are neither too alkaline nor too acidic are ideal for dragon fruit. To enhance drainage and aeration, mix in some sand or gravel if the soil is overly compacted or heavy in clay. [8]

**Climate requirement**

Originating in tropical rain forest regions, dragon fruit can be grown economically in places with enough rainfall. However, throughout time, this fruit crop has also adapted well to arid locations with little rainfall. It can grow well with 500–1500 mm of rainfall that is distributed well. Young fruits and blossoms will abscise if there is too much water present. The ideal temperature range for cultivation is 20 to 30 degrees Celsius. Since it is a crop that prefers light, light intensity is also crucial to cultivation. Cladodes turn yellow at increasing temperatures, and a succulent stem wilts down due to water loss. Thus, in the first few years, the ideal colors (20–50%) must be supplied based on the circumstances. It can be grown up to 1700 meters above mean altitude. [9]

**Temperature**

Dragon fruit is not suited for areas with contemporaries because it cannot withstand frost or freezing temperatures and favors the summer during eighteen degrees Celsius and thirty degrees Celsius.

**Sunlight**

This An average of between six- and eight-hours continuous sunlight a day are required for plants each day. Partial shade during the hottest afternoon hours can help avoid sunburn in hotter climates.

**Rainfall**

The plant prefers moderate rainfall, around 500-1,500 mm annually. However, it is drought-tolerant and can survive with less water once established. Too much rain or waterlogging can cause root rot, so well-drained soil is essential.

**Humidity**

Dragon fruit can withstand brief periods of low humidity.

**Soil**

Though it is potential to expand. in a variety of soil types, well-drained, with good organic content is ideal for healthy growth. It thrives best in slightly acidic to neutral pH (around 6-7)

**Elevation**

Dragon fruit thrives at lower elevations with moderate temperatures, but it may reach elevations of roughly 1,200 meters (3,937 feet).<sup>[10]</sup>

**Planting of dragon fruit**

*Figure4: Planting*

Under the correct circumstances, dragon fruit, sometimes called pitaya, is a tropical fruit that is reasonably simple to grow. This is a detailed how-to for growing dragon fruit:

Selecting the Variety *Hylocereus costaricensis* (red or purple flesh) and *Hylocereus undatus* (white flesh) are the two primary varieties.

Depending on your climate and tastes, pick a variety.

Although it can withstand drought, it cannot withstand extremely cold conditions.

**Sunlight**

Plant in an area that gets at least six hours of sunlight per day.

**Soil**

It likes well- drained soil that has a pH of 6-7 and is slightly acidic. Steer clear of regions that are wet.

**Spreading Seeds**

Although it takes longer and yields less consistent results, you can sow seeds from a fresh dragon fruit.

**Cuttings**

This is the best approach. To avoid rot, cut a 12- to 18-inch section off of an established plant and allow it to dry for approximately a week in a shaded spot.

**Planting Time**

Spring or early summer is the ideal time of year to plant. To allow them to spread, space the cuttings or seedlings at least 1.5 to 2 meters (5 to 6 feet) apart. Dragon fruit is a climbing cactus, therefore as it grows, it will require a strong support system, such as a trellis.<sup>[11]</sup>

The Planting Process Create a hole that is 5–10 cm deep. After inserting the thicker side of the cutting into the soil, lightly cover it. After planting, water sparingly for the first week and then lightly.

Watering Make sure the soil is damp but not soggy. During dry spells, give it a thorough watering once or twice a week. Because dragon fruit is susceptible to root rot, avoid overwatering.

Applying fertilizer Once every two months, apply a balanced fertilizer (10-10-10, for example).

The soil can also be improved by adding manure or organic compost.

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Cutting back to encourage air circulation and get rid of extra growth, prune the plant.

To direct the plant's energy onto fruit-bearing stems, prune back any dead or weak branches.

### **Disease and Pest Management**

Although dragon fruit is often pest-resistant, over watering can cause root rot. Keep an eye out for mealybugs, ants, or aphids. To avoid fungal infections, make sure there is adequate airflow.

Fruiting and Blooming Fruit usually appears 30 to 50 days after flowering, with dragon fruit trees fruiting after 6 months to 1 year. When the skin becomes uniformly colored and bright, which normally happens 30 to 50 days after flowering, the fruit is ripe.

Gathering When the fruit is ready, gently twist it to harvest it. To prevent harming the plant, take care not to pull too hard. <sup>[12]</sup>

### **Support system of dragon fruit**

Poles or Trellises: Materials: Make use of sturdy, long-lasting materials like metal, wood, or concrete. The weight of the fruit and the mature plant should be supported by the structure. Design: A "T" or "H" shaped central pole with a cross-arm is frequently utilized. For the plant to climb and spread, the height can be anywhere between 5 and 7 feet. For optimal vine growth and convenient access for trimming and harvesting, space the poles 8 to 12 feet apart. <sup>[13]</sup>

### **Fastening the Vines**

Twine or soft ties can be used to secure the main vine to the pole as it grows. This aids in directing the plant upward till it reaches the support's top. To avoid damage, don't tie too tightly.

### **Management of Canopies**

Let the branches fall to create a canopy once the plant has reached the top of the support. This improves airflow and sunshine exposure, both of which are essential for the growth of flowers and fruit. <sup>[14]</sup>

### **Stability and Drainage**

Because dragon fruit plants are heavy when loaded with fruit, make sure the support system is sturdy and firmly fixed into the ground. The health of the plant also depends on proper drainage, therefore do not place the supports in soggy soil. This type of system encourages improved development and increased fruit production while assisting the dragon fruit plant in maintaining structural integrity. <sup>[15]</sup>

### **Morphology of dragon fruit plant**

The stem the plant is a climbing cactus with a green, fleshy, three-sided stem that performs photosynthesis in a manner like to that of leaves. The stem is divided into segments, each of which has distinct edges. There are tiny, short spines or thorns along the borders. Stem joints, which serve as the primary support for the plant, are usually 3 to 5 cm thick and can reach a length of 6 meters. <sup>[16]</sup>

The plant may cling to supports as it climbs thanks to these roots. In arid conditions, the plant can swiftly absorb moisture thanks to its thin but effective root system.

### **Flowers**

Dragon fruit yields night-blooming blooms, which are big, fragrant, and visually appealing. These are typically white or yellow and can reach a maximum length of 25 cm. The blooms feature lengthy pistils and stamens, and they are bell-shaped with many layers of petals. Only at night do the blooms blossom, and bees, moths, or bats pollinate them. <sup>[17]</sup>

### **Fruit**

The actual dragon fruit is ovoid to elliptical in shape and ranges in length from 6 to 12 cm. It has a dragon-like look due to the bracts or scales covering its outer skin. The skin may be yellow, red, or pink. Usually white, scarlet, or purple, the fruit's flesh has a smooth, juicy feel and is flecked with tiny black seeds.

**Leaves**

True leaves are absent from dragon fruit trees. The photosynthetic function typically associated with leaves is carried out by the flattened stems. These characteristics let the dragon fruit plant adapt to both tropical and desert environments, and its unique look helps people recognize it. <sup>[18]</sup>

**Health benefits of dragon fruit****Low in calories and high in nutrients**

Dragon fruit is a fantastic option for people who want to enhance their diet without consuming too many calories because it is low in calories and high in nutrients. A 100g portion includes roughly:

**Vitamin C**

Promotes collagen synthesis, supports healthy skin, and fortifies the immune system. regulate cell metabolism, and keep skin and nerves healthy.

**Iron**

Vital for preventing anemia and distributing oxygen throughout the body.

**Magnesium**

Supports healthy bones, neuron function, and muscular contraction. <sup>[19]</sup>

Rich in Antioxidants Antioxidants found in dragon fruit help shield the body against free radical-induced deterioration. Among the essential antioxidants are:

**Betacyanins**

The pigments that give dragon fruit its vivid red and purple hues are effective at scavenging free radicals, which may lower the risk of inflammation and cancer.

**Flavonoids**

Well-known for strengthening the immune system and reducing inflammation, flavonoids also help to maintain heart health.

**Phenolic chemicals**

By lowering the risk of chronic disease, these substances strengthen the body's defences.

Enhances Digestive Health Dietary fiber can be found in dragon fruit. Approximately 7 grams of fiber per cup is necessary for: Fiber promotes regular bowel movements by giving the stool more volume and warding off constipation. Beneficial gut bacterial nourishment: Dragon fruit's prebiotic fiber supports the gut's beneficial bacteria, boosting immunological function and digestive health. <sup>[20]</sup>

**Strengthens the Immune System**

Dragon fruit's an abundance of folic acid strengthens immunity. by encouraging the development and functionality of white blood cells, which defend the body against illnesses. Betacyanins are an example of an antioxidant that can further enhance immunological health by preventing cellular damage.

**Encourages Skin Health**

The antioxidant qualities of dragon fruit support healthy skin by shielding skin cells from UV rays and environmental contaminants. Dragon fruit's vitamin C also aids in the production of collagen, which makes the skin firmer and more elastic and less prone to fine lines and wrinkles.

Heart Health Monounsaturated fats are found in dragon fruit, particularly in the tiny black seeds that are encased in the flesh. When combined with its fiber content, these good fats can:

**Reduce bad cholesterol (LDL)**

Lowering LDL cholesterol can help lessen the risk of cardiovascular diseases and stop plaque from accumulating in arteries. Boost HDL, or good cholesterol: This kind of cholesterol aids in the removal of extra cholesterol from the blood, which promotes heart health.

Encourages Weight Control Dragon fruit is perfect for people who want to lose or maintain weight because of its high fiber content and low-calorie count. Fiber prolongs feelings of fullness, which can lower total caloric intake and prevent unhealthy snacking.



Blood sugar increases after meals are avoided because the fruit's fiber content slows down the absorption of sugar into the system. Additionally, there is evidence that dragon fruit's antioxidants may help shield the insulin-producing pancreatic cells.

### **Drinking water**

With more than 80% water, dragon fruit keeps the body hydrated, which is necessary for sustaining a healthy complexion, controlling body temperature, and assisting with a number of other physiological processes. By removing waste through urine, hydration also aids in detoxification.

**Enhances Iron Levels** Iron is a mineral that is frequently deficient in plant-based diets, and dragon fruit is one of the few fruits that has a respectable amount of it. Iron absorption is further improved by eating dragon fruit with a vitamin C source, which dragon fruit naturally contains.

**Possible Properties to Fight Cancer** The ability of dragon fruit's antioxidants, especially betalains, which give it its red hue, to stop the formation of cancer cells has been investigated. These substances may aid in shielding cells from oxidative stress-induced mutation and damage, which is one of the elements that contribute to the formation of cancer, though further study is required.

### **Disadvantages**

**Reactions to Allergies** Rare but possible: Some people may have an allergy to dragon fruit, which can cause symptoms including itching, throat discomfort, hives, tongue swelling, or even more serious symptoms like anaphylaxis. This is especially true for individuals who may experience cross-reactions due to food sensitivities to fruits like bananas or kiwis. Symptoms: Itching, rashes, or a tingling feeling on the lips or mouth after consuming the fruit are typical signs of a minor allergic response.

**Issues with the Stomach** because dragon fruit is high in fiber, which is generally beneficial for digestion, overconsumption may result in digestive problems. However, excessive consumption of it might cause problems like gas, bloating, or diarrhea, especially in those who are not accustomed to eating a lot of fiber.

### **Levels of Blood Sugar Moderation for diabetics**

Dragon fruit still contains sugar even though it has a low glycemic index, which means it doesn't significantly raise blood sugar levels. It should be used in moderation by people with diabetes or those attempting to control their blood sugar levels. Excessive eating may result in high blood sugar levels. **Interference with medications:** According to some research, those taking blood sugar-lowering drugs may need to watch how much dragon fruit they eat because it may affect how well the drug works.

### **Taking too Many Antioxidants Oxidative stress paradox**

Antioxidants such as betalains and vitamin C are abundant in dragon fruit. Although antioxidants help to neutralize free radicals, taking too many of them might have the reverse effect, leading to oxidative stress rather than reducing it.

### **Interference with Drugs Interaction with anti-hypertensive medications**

Individuals on anti-hypertensive medications should be cautious about dragon fruit consumption as it may reduce the desired blood pressure by interfering with the effects of some medications or making them less effective.

### **Blood-thinning effects**

Dragon fruit's bioactive ingredients and antioxidants may have a slight blood-thinning impact. While this is beneficial for heart health in most cases, those on blood thinners like warfarin may need to be cautious, as excessive consumption could increase the risk of bleeding.

### **Confusion of Colors Urine and stool staining**

The vivid red or purple dragon fruit variants may give your urine and stool a reddish appearance, which could create unwarranted concern. This discolouration is not harmful.

**Exposure to non-organic pesticides Danger from conventionally cultivated fruit**

Dragon fruit may be exposed to pesticides during production, much like other fruits. If taken without adequate washing, this could be harmful to your health. Choosing organic types could lower this risk.

**CONCLUSION**

Dragon fruit is becoming more and more well-known as a super fruit because of its high nutritious content and antioxidant qualities. This fruit's enormous therapeutic properties and health advantages are attracting the attention of the growing population and health-conscious peoples. It also exhibits resilience to a wide range of abiotic stressors and needs very little water for growth and development. As a healthy and profitable fruit crop, it might therefore be a profitable crop for arable lands with abundant resources as well as for degraded lands, abiotic stress, and rainfed regions of the nation.

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