



# Nutritional and Therapeutic Potential of Dragon Fruit

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## ABSTRACT

In this review, nutritional value, therapeutic uses, and health benefits of dragonfruit. Popular as a nutritious fruit, an excellent source of minerals, glucose, fructose, fiber and vitamins. This strengthens the human body's immune system, treats diabetes, heart disease, and maintains healthy weight. Yield and nutritional value of dragon fruit vary by species, cultivation method, cultivation area, harvest time. On the skin of the dragon fruit potential as a natural dye. The number of commercial producers is gradually increasing in different countries as they receive favorable prices market product. Currently there is little information about production side of dragon fruit. Various studies on cultivation and health. The benefits of this fruit help maximize profits for growers worldwide, growing consumers and the dragon fruit market most importantly, being rich in various nutrients, vitamins and minerals and according to high medicinal values, it is believed to be able to lower cholesterol concentration, to balance blood sugar concentration, to prevent colon cancer, to strengthen kidney function and bone, to strengthen the brain workings, increasing the sharpness of the eyes and even used in cosmetic ingredients.

## Keywords

Dragonfruit, nutritional composition, nutritional value, therapeutic activities, toxicity .

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## INTRODUCTION

According to the World Health Organization [WHO]: The world's population, especially in developing countries, depends on traditional plants. Medicines based on primary health care needs. Use of plants for treatment of various afflictions of humans and animals are as old as humans themselves [1]. These plants are widespread in all sectors of society. Therapeutic or indirect as pharmaceutical of modern medicine [2]. Recently, there has been a massive increase in interest in plant research worldwide. Collected evidence of the immense potential of medicinal plants used in various traditional systems (Ayurveda, Siddha, Unani) [3] and also a major source of therapeutically valuable biodynamic compounds [4]. *Hieracium* is usually the most cultivated vine cactus belonging to the cactus family. Cactus family known as 'dragon fruit' covered with bright red skin. It has green scales and white flesh with tiny black seeds. The flowers are so beautiful. An intriguing woman called "noble lady" or "queen of the night". It has been the subject of many researchers, mainly because of its unique taste, shape and flesh color [6]. There are three types of commercialized pitaya: *Hylocereus polyrhizus*, *Hylocereus undatus*, *Hylocereus megalanthus* [7-10]. From its center of origin, the dragon fruit has spread to tropical and subtropical America, Asia, Australia, and the Middle East. At least 22 cultivated tropical countries such as Australia, Cambodia, China, Israel, Japan, Nicaragua, Peru, Philippines, Spain, Sri Lanka, Taiwan, Thailand, Southwest America, Vietnam, etc. [11]. Contains a lot of water [85.30%], Protein [1.10 g], Fat [0.57g], Dietary Fiber [11.34g]. Plus Vitamin C and Minerals. This species includes calcium, phosphorus, magnesium, and sodium. Fructose, and



sucrose contained in fruits are about 64.3-104.3, 40.1-64.9 and 5.47.5 mg/ [12]. Plants in this family can tolerate Extreme heat and cold, dry weather and nutrient-poor soils. or the structures of these plants are used for water storage, reduction, or no leaves, natural waxy surface, nocturnal stomata. An opening for carbon dioxide uptake [CAM metabolism]. This allows plants to Withstands the most difficult conditions [13]. White pitaya is a nutritious fruit, versatile use. The most valuable and commonly used edible parts of the fruit are pulp that makes up 70-80% of the ripe fruit and may taste similar to kiwi. It is often used in restaurant fruit salads [14]. Young stems of *H. undatus* is edible and the fresh flower buds are eaten as a vegetable. The dried ones are used in homemade medicines. Shells can be used for crafting colored pigments and slimes used in the food or cosmetics industry. Dragon fruit trees are grown for their large, attractive flowers and for ornamental purposes. Bonsai specimen. Dragon fruit trees are grown as ornamental vines. It is also a fast-growing cactus, especially in gardens and landscapes, reaching 1.5 to 2.5 height in meters [13]. Dragon fruit is oval and has a sweet and sour taste [15]. These fruits exhibit suitable growth in most dry tropical and subtropical climates regions that can withstand temperatures up to 40°C in humid tropical climates. Fruit trees grow well, but sometimes have problems with fruiting [13]. Not only fruits, but very fresh to eat. The fruit can be chilled, peeled and used as dried fruit. Beverages, juices, sherbets, smoothies, flavorings for alcoholic beverages Pastries [3]. The benefits of cultivating Dragon fruit trees last about 20 years once planted. It is a perennial crop with a rapid return to production starts the year after planting and reaches full production within 5 years of planting. dragon fruit is perishable cultivation, harvesting, handling, storage, Processing and transportation to reach the market. transport has the key most of the dragon fruit production is consumed as fresh fruit. The fruit is a seed, so the fruit resembles a kiwi. It is embedded in the pulp and is edible in nature.

### HISTORY:

Literature dates dragon fruit to the 13th century. that is the fruit was believed to have been introduced to Vietnam by the French. The average yield per hectare is 20-25 tons. Pre-Columbian era, *H. undatus* Widespread in many tropical regions of the Americas and the Caribbean. Dispersal by Birds and Breeding and Cultivation of Seeds by Humans for its edible fruit. introduced to the Philippines by the Spaniards in the 16th century. Hawaii has a locally famous cactus hedge over a lava rock Wall of Punahou School, Honolulu, Kapunahou Hedge [15]. 1836, Mrs. Bingham planted her *Hylocereus undatus* hedge [16], a famous cactus known as Paniniō Kapunahou in Hawaii. people were out in the evening 'Rent' a cutting now to see it bloom across the island. This type is everywhere. In South Africa it was introduced into the country. Can be grown in gardens due to its ornamental invasiveness. But, only with permission [rarely allowed]. usually limited and localized, mainly Explosion from homestead garden affects native plant communities and local ecology. [23,24]. Malaysia is another region where dragons can be reliably found. It was first introduced in 1999 in Sitiawan, Johor and Kuala Piraregions. Colombia and Nicaragua are other places where the pitaya fruit is grown for commercial purposes. These regions prove that pitaya is a cactus fruit. It grows well in semi-arid areas as it requires a warm climate. to plant fruit Very promising due to industrial use in juice, wine and wine. At a time loved by many people without forgetting its medicinal properties. *H. undatus* is widely naturalized in eastern Australia. Considered an environmental weed in open forests, dry rain forests and dikes. Regions and coastal vegetation in temperate regions. It has been recorded from coastal counties in south-east and central Queensland and then northern New South Wales; on local weed list in Byron Shire in northern New South Wales Redland Shire in southeastern Queensland. continue to grow normally.

### Taxonomy Classification

Domain	Eukarya
Kingdom	Plantae
SubKingdom	Trachebionta
Division	Magnoliopsida



SubDivision	Spermatophyta
Class	Magnoliopsida
Order	Caryophyllales
Family	Cactaceae
SubFamily	Cactoideae
Tribe	Hylocereae
Genus	Hylocereus
Species	HylocereusUndatus

Table.No.1.1TaxonomyClassificationOfDragonFruit  
Fig.1.DragonFruit



**Synonyms:** *Cereus guatemalensis* (Eichler) A. Berger, *C. tricosatus* Rol. - Goss

**Common Names:** Pitaya, Night-blooming Cereus, Strawberry Pear, Belle of the Night, Cinderella Plant, Jesus in the Cradle, Queen of the Night.

#### Origin and Distribution

*H. undatus* is found in Brazil, Colombia, Costa Rica, Curacao, Ecuador, El Salvador, Guatemala, Mexico, Panama, Venezuela, Uruguay. Originally it is now commercially and widely cultivated in Central and South America. Distributed in many countries with tropical and subtropical climates, including USA [South Florida, California, Hawaii], Australia, Taiwan, Vietnam, Malaysia and Israel. Degenertell show this species reached Hawaii in his 1830 shipment from Hawaii. Plants being loaded onto a ship going from Boston to Canton at a port in Mexico China. He says most of the plants died and were discarded during the stopover in Hawaii, the captain noticed that the white pitaya was still partially alive. Cuttings were planted and thrived, and cacti were widely propagated. Houseplants of the island. It blooms splendidly there, but rarely bears fruit. This artist often used as a rootstock to which various ornamental cacti are grafted. Examples include *Zygocactus*

*us*, *Epiphyllum*, and *Rhipsalis*. Mainly flowers and bears fruit August and September.

#### Morphology:

Dragon fruit is a vast or tangled terrestrial or epiphytic cactus. It climbs with aerial roots and can reach heights of over 10 meters and sits on rocks and trees. The morphology of dragon fruit is root, stem, thorn, flowers and fruits.

#### Roots:

Dragon fruit has a hairy root that grows in the topsoil plant.

#### Stem:

Green 3-winged, from a few cm up to 5 m long [in mature plants], 4 to 7.5 cm margin, undulate and horn wide with wings that are 2, 5 to 5 cm wide. Stem is triangular in shape, prickly very short and inconspicuous, so often considered "spineless cactus".

#### Spines:

1 to 3 conical spines up to 1 cm long [but usually about 2-3 mm long].

#### Flowers:

Flowers are ornate, fragrant and beautiful 25-35 cm long by 30 cm across, white with green outer tepals and bracts. Flowers bloom in the evening when the buds grow about 30 cm. The



outer petals are cream colored and bloom around 9 o'clock, then followed by a crown of white areas containing yellow lines stamens. The funnel-like flowers were finally in full bloom at midnight. Dragon fruit is known as the night-blooming Cereus. Let's go when it blooms. The berries give off fragrance. The scent is said to attract pollinating bats and dragon fruit flower.

**Fruit:**

Flowers grow into fruits and do not fall off. Dragon fruit is round and slightly oval shape into the size of an avocado. Bright red fruit leather for white varieties and red dragon fruit, red dragon fruit is dark to black, yellow to yellow Pitaya. Its skin was stuffed with tassels that rival dragon scales. That is why this fruit is called dragon fruit.

**Nutritional Constituents**

The typical nutritional values per 100 g of raw pitaya [of which 55 g are edible] are as follows:

NUTRIENTS	AMOUNT
Water	80-90 gm
Ascorbic acid (vitamin C)	0.4-25 mg
Ash	0.4-0.7 gm
Calcium	0.6-10 mg
Calories	35-50 gm
Carbohydrates	0.9-14 gm
Phosphorous	1.6-36 mg
Fat	0.1-0.6 gm
Fiber	0.3-0.9 gm
Iron	0.3-0.7 mg
Niacin	0.2-0.45 mg
Protein	0.15-0.5 gm

Table 1.2 Nutritional Constituents

**Nutritional value**

There are several species and varieties of the *Hylocereus* spp that are being cultivated for their commercial and their nutritional values vary depending on the different parameters such as, region to region, cultivation practices and species [12]. The proximate values in gram or mg per 100g edible portion of white-flesh dragon fruit are moisture (85.3% average), protein (1.1), fat (0.57), crude fiber (1.34), energy (67.7) (Kcal), ash (0.56), carbohydrates (11.2), glucose (5.7), fructose (3.2), sucrose, sorbitol (0.33), vitamin C (3.0), Mg, K, Na, Zn and P, according to the author Tamanna Perween. Whereas in red flesh dragon fruit varies from the white-flesh dragon fruit in moisture content, fat content and others [18]. Vitamin C has been obtained in the studies where the antioxidant properties explained that it varies in varied factors such as ascorbic acid concentration varies and depends on the type of cultivation of dragon fruit crop. Many authors have examined the

vitamin C content of dragon fruit of three species such as *Hylocereus costaricensis* (super pulp), *Hylocereus polyrhizus* (red pulp) and *Hylocereus undatus* (white pulp), collected from different regions and vitamin C concentration was oscillated from 3.3 to 6.0 mg 100 g<sup>-1</sup> and summarized that the vitamin C concentration varies according to the origin, species, crop, extracting process and the maturity level of the fruit [12]. Every part of the dragon fruit has its own nutritional value. The young or tender stem has high nutrition which includes the raw protein, the raw fiber and some minerals like Ca, Mg, Zn, P, K and Fe. Whereas the pulp and seeds have some of fatty acids, in which the author that the pulp of *Hylocereus undatus* and found that it contains the most predominant fatty acids in which linoleic acid (50.8%), oleic acid (21.5%) and palmitic acid (12.6%) and analyzed the phenolic compounds such as quinic acid, cinnamic acid and many other minerals which includes carbohydrates, proteins and organic acids.



Nutrient	Amount Per 100 g	% Daily Value	Comment
Water	87 g	NA	Very high water content
Protein	1.1 g	2.1 %	
Fat	0.4 g	NA	Contains practically no fat
Carbohydrates	11.0 g	3.4 %	
Fiber	3 g	12 %	Very good source of dietary fiber
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 %	Contains more than 3 times the amount of vitamin C found in carrots
Calcium (Ca)	8.5 mg	0.9 %	
Iron (Fe)	1.9 mg	10.6 %	A good source of iron
Phosphorus (P)	22.5 mg	2.3 %	
Zinc (Zn)	NA	NA	

Table 1.3 Nutritional value Dragon Fruit

### Proteins-Aminoacidsandorganicacids

By one of the scientists, part of its content wasIt contains more nutrients such as amino acids and organic acids. Dragon fruit peel and dragon fruit pulp [9]. Contains essential amino acids such as tyrosine, glutamic acid and leucine, tryptophan, valine, alanine, serine, aspartic acid, organic acids Tartaric acid, malic acid, citramalic acid, fumaric acid, propanedioic acid, talonic acid and mannonic acid.

### Carbohydrates

Dragon fruit is high in carbohydrates, mainly glucose, fructose, and some Study of oligosaccharides. especially dragon shells Fruit have the most macronutrients, found in pectin and fibers [9]. The peel is also used for pectin extraction. A survey of the physicochemical properties of pectin has been carried out dragon fruit skin. The pectin contained in the pericarp has high absorbability, cholesterol, which helps reduce the effects of blood cholesterol [9].

### VitaminsandMinerals

The pulp of dragon fruit contains essential vitamins such as vitamin C, vitamin B1, vitamin B2, vitamin B3, vitamin E, vitamin A [9]. Also phosphorus, calcium, iron, magnesium, and zinc [12]. The amount of dragon fruit skin is limited.

### Antioxidants

Dragon fruit is very rich in antioxidants and has

been used to fortify prebiotics and as a natural coloring agent in the food industry [7]. betalains, betacyanins, flavonoids, hydroxycinnamates, polyphenols, etc. Polyphenols are found in dragon fruit seeds, skin and pulp, but seeds and skin contain more polyphenols compared to the pulp. [7]. This is a group of plant-derived antioxidants that include flavonoids, phenolic acids, lignin, and more. They have a high free radical scavenging capacity that reduces the risk of chronic diseases.

### Fattyacids

Dragon fruit seeds are composed of important essential fatty acids close to about 50% [4], such as linoleic acid, which has a laxative effect against gastroenteritis (Yanyi Huang et al., 2021) [7] and other fatty acids. B. Palmitic Acid (17.5%), Oleic Acid (22.7%), cis- vaccinic acid (3.0%) [12]. is ascorbic acid Especially in early systems of dragon fruit, its main function is to reduce disease risk factors such as: B. Anaemia, scurvy and was ting.

### LipidsandBetacyanins

Many analyses have been done showing red dragon fruit peeling Contains essential lipids such as stearic acid, pentenoic acid, docosanoic acid, propanoic acid and butanoic acid [9]. Betacyanin Anti-obesity, natural pigment with as many bioactivities as anti-obesity Cancer, Antioxidants, Antimicrobials. These help prevent reduction of coronary artery disease and oxidative liver injury [18]. Betacyanin is used in food as a natural coloring agent Also yogurt, ice cream and biscuits. Betacyanin was extracted from dragons Dragon fruit has more skin than pulp, Food as Functional





Ingredient or Natural Colorant in Food. [19]

### Alkaloids

The dragon fruit peel has been extracted to detect the alkaloids present in the dragon fruit, it is composed of choline, dopamine hydrochloride, amaranthin, amine and N-benzylmethylamine [29]. In which N-benzylmethylamine and choline are most common alkaloids found in dragon fruit peel.

## HEALTH BENEFITS OF DRAGON FRUIT



Fig.3 Health Benefits Of Dragon Fruit

### Therapeutic activities of Dragon fruit

Dragon fruit is rich in minerals and vitamin C. Vitamin A, Vitamin B, Fats, Carbohydrates, Antioxidants, Flavonoids, Betacyanins, Polyphenols with high antioxidant properties, carotene iron, phytoalbumin properties [6].

### Antimicrobial activity

Every plant has physiological and biochemical resistance to counteract different pathogens when infection occurs [12]. Recent studies tested the anti-cancer [28]

### Anticancer

The anticancer properties of *Hylocereus* species have recently been studied [19]. There is some evidence that the polyphenols, flavonoids and betanins contained in *Hylocereus* species are responsible for the anticancer effects [39,49,50]. *H. undatus* shells extracted with the solvent system ethanol-water [35]. 50, v/v exhibited a dose-dependent antiproliferative activity against a human hepato cellular carcinoma. The anticancer properties of *Hylocereus* species have recently been studied [19]. There is some evidence that the polyphenols, flavonoids and betanins contained in *Hylocereus* species are responsible for the anticancer effects [39,49,50]. *H. undatus* shells extracted with the solvent system ethanol-water [35].

50, v/v exhibited a dose-dependent antiproliferative activity against a human hepato cellular carcinoma cell line [HepG2] [21]. An IC<sub>50</sub> value of 81±0.01 mg/ml was recorded after 48 hours of incubation. Nitric oxide [NO] free radicals are bacterial activity of dragon fruit peel extract, betacyanin's, phenolics, fatty acids, terpenes and tannins can be responsible for the dragon fruit antimicrobial activity [12]. Dragon fruit was under a study which found that the antibacterial activity of chloroform, ethanol and hexane extract were obtained from the exhibited inhibition zone is about 7 to 9 mm against the gram-negative and gram-positive bacteria [6]. Betalain also plays a wider role in the mechanism of microbial inhibition, but only specific cellular and molecular mechanism of antimicrobial activity of betalain should be investigated. The stem of *H. polyrhizus* MeOH extract has strong antimicrobial activity against *S. aureus*, *P. aeruginosa*, *C. albicans* [21].

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### Prebiotic activity

Prebiotics are indigestible oligosaccharides that have beneficial effects on nutrition. Attacks the host by stimulating the growth of normal intestinal flora [26]. Various studies on prebiotics have been shown to provide and mitigate protective effects against colon cancer. Trends in inflammation-associated bowel disease. Microbiota growth. For example, the



colon prevents the invasion of lactobacilli and bifidobacterial. Allows pathogens to enter the digestive tract and promotes good health. Digestive system [27]. Mixed oligosaccharide content of *H. undatus*. About 85% of the ethanolic meat extract was detected. These oligosaccharides were resistant to human salivary  $\alpha$ -amylase by polyphenols [21]. Promotes tumor growth and metastasis. The disallowed compound NO is a potential anticancer drug. On the other hand, flavonoids are highly valued for their anticancer properties due to the presence of three hydroxyl groups next to the C2-C3 double bond [22]. Betacyanin, its molecular structure resembles that of flavonoids, and probably does. Anticancer activity [24]. In addition, *H. undatus* extracts have anticancer effects on other cells. A significant reduction in cell viability was observed in human breast tissue. Different amounts [0-600 g/mL] were pre-treated with cancer cells [MCF-7]. *H. undatus* meat extract from ethanol. Notably, an extract from *H. undatus* at 600 g/mL reduced proliferation of MCF-7 cells by nearly 85% [22]. Another *in vitro* anti-proliferative study on melanoma cell [B16F10] suggested that the peel and flesh of *H. polyrhizus* that extracted with 80% acetone inhibited the cancer cell growth in a dose-dependent manner. [33].

#### Anti-Parkinson's activity:

Anti-Parkinson's disease activity was present in ethanol extracts of *Holocentrus undatus* pulp with high levels of flavonoids and amino acids. Alkaloids have been studied recently [34]. This activity is done with a mouse. Results showed that they have this activity.

#### Laxative activity:

Several recent studies have shown that ethanol extracts of fruit. The pulp of *Hylocereus undatus* has a laxative effect. This research was done on mice by number and weight of faeces.

#### Other Therapeutic activities of Dragonfruit

Dragon fruit has many health-promoting in addition to the bioactivities as well as anxiolytic effect, anti-inflammation activity, antiaging, photoprotective property etc. as follows;

- Hepatoprotective activity

- Anti-Obesity activity
- Wound healing activity
- Ageing activity and Weight loss activity

#### Application of Dragonfruit

- Dragon fruit strengthens the immune system. Dragon fruit is rich in vitamin C, fiber that contributes to an overall healthy body.
- Dragon fruit promotes healing of wounds and cuts.
- Dragon fruit improves eyesight.
- Dragon fruit aids digestion. Due to its fibre content, dragon fruit helps digest food. Studies also suggest dragon fruit promotes growth of probiotics.
- Dragon fruit helps lower blood sugar levels in type 2 diabetes. The study also suggests that the glucose in dragon fruit may help control blood sugar levels. Blood sugar level in diabetic patients.
- Dragon fruit helps control cholesterol levels. Plenty of dragon fruit flavonoids known to have beneficial effects on cardiovascular disease illness.
- Dragon fruit is also rich in flavonoids that have anti-cardiopathy properties. Dragon fruit can help treat bleed in problems associated with vaginal discharge.

#### Toxicity of dragonfruit

Toxicology research is particularly relevant to demonstrate and support food safety. Ingredients as it helps identify possible side effects [35]. Definition of the exposure conditions necessary to produce these effects; evaluation of dose-response relationships for adverse reactions, including dose definitions. The risk of not producing such an effect, and the interpretation of experimental data about risk. Evaluation of information on mechanism of action and relevance to humans. Metabolic and toxicity data to extend results from animals to humans [36]. A study on the safe exposure of pitaya fruit. In this context, the potential. The toxicity of the methanol extract from this fruit is acute and subchronic.



onic administration in rats. In acute toxicity studies, a single dose Oral administration of fruit extract [1250, 2500, 5000 mg/kg] to rats He then monitored the animals for 14 days by oral gavage. In subchronic studies Toxicity, pitaya extract was also orally administered to rats at doses of 1250, 2500 and 5000 mg/kg/day he for 28 days. The authors did not observe mortality or signs No significant differences in the presence or absence of acute or sub chronic toxicity, body weight, and organs Body weight or hematologic parameters in subchronic studies. [34] No abnormality Viscera were observed between the treatment and control groups, Lethal oral pitaya extract has been determined to exceed 5000 mg/kg, Dose at which no side effects of the extract are observed for male and female rats 5000 mg/kg per day for 28 days was considered. Luo's research and others. We used the MTT Assay [3-[4,5-dimethylthiazol-2-yl]-2,5-tetrazolium bromide] Supercritical carbon dioxide extract by gas chromatography-mass spectrometry of H. Bark of polyrhizus and H. undatus in human tumor cell lines prostate cancer cell line [PC3], human breast cancer cell line [Bcap-37] and human Gastric cancer cell line [MGC-803].

## CONCLUSION

This review is a compilation of exotic fruits, dragon fruit being one of the expensive ones. It is a nutritious fruit and one of the most commonly consumed around the world. I have dragon fruit 18 kinds of fruits with different nutritional value Hylocereus genus therefore has a wide range of minerals and nutrients available, Phytochemicals such as B. Antioxidant, antibacterial, and anticancer effects Properties with the use of dragons, anti-aging properties and many more. In recent years, fruit has become important both economically and nutritionally. Its diet has dietary supplement parameters and helps prevent Strengthen nutrition-related diseases and the human immune system. there is Various dietary supplement properties such as antioxidant activity, anti-diabetes activity, antibacterial activity, anticancer activity, anti-obesity activity, prebiotics Such as activity and wound healing properties may be known at home. Phytochemicals that promote health and economic development. but, Further research on identification, purification and quantification of bioactive substances Connection from Pitaya is required. and determination of its mechanism Steps should be taken to better understand the medicinal properties

of feature. Widely used in various traditional medical systems. medicine. It has been used as an ingredient in food and medicine for centuries. Further study of this fruit will give you various benefits. even a dragon The peel of the fruit is used for the extraction of pectin and betalain and used as a natural product. Dyes in the food industry.

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