# An Overview: Ethnobotanical and Phytochemical Activities of Dragon Fruit

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**Abstract: Dragon fruit is organic product is an outlandish organic product, rich in dietary benefit and bioactive mixtures. The organic products are low in calories and high in cell reinforcement and L-ascorbic acid. Handled results of winged serpent natural product offer worth by differentiating food decisions, lessening waste, and advancing monetary development while holding nourishing benefits. The current trial named "Worth expansion in winged serpent foods grown from the ground of the items (Hylocereus costaricensis)" was led during the year 2022-2023 in Tamil Nadu Horticultural College, Coimbatore. The review was about arrangement of different worth added items like jam, jam, jujube, squash, RTS, treats and frozen yogurt by utilizing mythical serpent organic product mash and powder. Later arrangement, the worth added items were assessed for different physico-synthetic boundaries, for example, TSS, pH, sharpness, L-ascorbic acid, complete sugars, diminishing sugars and betalain compounds. Based on tangible assessment, it was inferred that mythical serpent organic product jam was viewed as the best of all items as it recorded the higher tangible score of 8.6 with regards to generally worthiness.**

**Keywords: Hylocereus polyrhizus, tropical fruit, peel, nutraceutical value, Dragon Fruit, Phytochemicals**

## INTRODUCTION

Dragon fruit natural product (Hylocereus polyrhizus) or red pitaya is one of the stunning tropical natural products that has a place with the group of Cactaceae. Pitaya is local to the tropical areas of Mexico, north focal and south America, it is currently developed overall because of its business. Dragon fruit natural products have been grouped in view of the shade of tissue and strip, Hylocereus undatus assortment has white tissue with pink skin known as white winged serpent natural product, tissue of Hylocereus polyrhizus was red in variety with pink skin known as red pitaya. Furthermore, Hylocereus megalanthus with white mash and yellow skin know as yellow pitaya(1). Particularly red pitaya (Hylocereus polyrhizus) developed in Malaysia, Thailand, Vietnam, Australia, Tiwan, and another pieces of world. The natural products frequently polished off new or by making into juices, welcoming, sticks and frozen yogurtby handling it. The shade that is liable for the red shade of the organic product is Betacyanin (2).

It is additionally plentiful in supplements and minerals, including L-ascorbic acid, B1, B3, dietary strands, making expansion to a wellbeing cognizant eating regimen. The strip holds back betasianin, flavonoids, and phenol. Furthermore, mythical serpent natural product skin toocontains L-ascorbic acid, vitamin E, vitamin A, terpenoids, flavonoids, thiamine, niacin, pyridoxine, cobalamin, phenolic, carotene, and Phyto albumin which are remembered to have reinforcement benefits and can likewise bipotential for antimicrobial exercises (3).

Red-tissue winged serpent natural product is rich in battalias shade comprising of water solvent betacyanin and betaxanthin dragon fruit natural product is wealthy in enemy of oxidant because of the presence of betacyanin content furthermore. Red fleshed winged serpent natural product goes about as hostile to disease properties, against irritation and antidiabetics and furthermore winged serpent natural product further develops hair and skin wellbeing, upgrade craving, and assists with keeping up with the cholesterol levels (4).

Fig no 1- Dragon Fruit (5)

VARIETIES OF PITAYA FRUIT:

1. White-fleshed pitaya with yellow peel (Selenicereus megalathus)

Fig no 2- White-fleshed pitaya with yellow peel (6)

2. Red-fleshed pitaya with red peel (Hylocereus polyrhizus)

Fig no 3 - Red-fleshed pitaya with red peel (7)

3. White-fleshed pitaya with red peel (Hylocereus undatus)

Fig no 4 - white-fleshed pitaya with red peel

CULTIVATION (8):

Plantings at a high density of between 1100 and 1350 plants per hectare can be done commercially. It can take up to five years for a plant to reach full commercial production capacity. When can yields of 20 to 30 tonnes per hectare be expected, Hylocereus has custom-made to measure in dry conditions, as expected; 7 Tropical climates with a reasonable amount of rainfall, After flowering, the dragon fruit sets on the cactus-like trees 30–50 days later, with 5–6 harvest cycles possible every year United States.

PLANT PROFILE

VERNACULAR CLASSIFICATION (9):

Table no 01 - Vernacular classification of Dragon fruit

| | |
|---|---|
| English | Strawberry Pear |
| Hindi | Dragon Fruit. |
| Spanish | Junco tapatio |
| German | Distelbirne, |
| French | Pithaya rouge |
| Chinese | fire dragon fruit |

SYNONYMS:

Selenicereus Mon acanthus, red pitaya, pitahaya.

TAXONOMICAL CLASSIFICATION (10):

Table no 02 - Taxonomical Classification of Dragon Fruit

| | |
|---|---|
| Kingdom | Plantae |
| Division | Magnoliophyte |
| Class | Liliopsida |
| Sub-order | Caryophyllidae |
| Family | Cactaceae |
| Genus | Hylocereus |
| Species | polyrhizus |
| subclasss | Caryophyllidae |

CULTIVATION:

The most common propagation method in dragon fruit cultivation is by cutting and also by seeds. But seeds take longer time and will not continue with mother plant characteristics. This method is not suitable for commercial cultivation. About 20 cm length cuttings, from a quality mother plant should be used for planting. Pile these cuttings a day before potting (11).

COLLECTION

The plant start yielding after 12-15 months from the date of planting and the fruit epicarp colour from green to red. Proper time of harvesting was found after seven days of colour transition. The plants yield the fruits in the months between June – September and harvest could be done 3-4 times in a month. Present farm gate price ranged between INR 80.00- 120.00 per kg (12).

MORPHOLOGICAL CLASSIFICATION

ROOT (13):

- Dragon fruit has root that is epiphytic, sticking or propagating in other plants.
- Dragon fruit roots are generally shallow, ranging from 20-30 cm. however, before the production of this fruit plant extends its roots to a depth of 50-60 cm, following the length of the brown stems embedded in the soil.
- The roots of this plant are very drought resistant and cannot stand the puddle long enough

Fig no 05- Roots of Dragon Fruit

TRUNK & BRANCHES (14):

The cross section of the dragon fruit tree rod is triangular, extending to a maximum length of about 9 meters green to dark green.
Dragon dragon fruit plants contain water in the form of mucus and wax-coated when adult. The trunk is long and triangular in green.
Trunk and branches overgrown with hard thorns but very short so not conspicuous. Location of the spines on the edge of the stem and branch.

Fig no 06 - Trunk &Branches of Dragon Fruit

FLOWERS (15):

Flower dragon fruit plants are located on the trunk tendrils, trumpet-shaped, and white.
Dragon fruit plants have beautiful flowers yellowish white color so that often people maintain dragon fruit plants for ornamental purpose.
Flower dragon fruit plants are blooming perfectly at night with a length can reach 29 cm

Fig no 07- Flowers of Dragon Fruit

SEEDS (16):

Seeds are small round shape with black color. Seed skin is very thin, but not hard.
Propagation of plants using seeds is rarely used because it takes a long time until the plant produces.

Fig no 08 - Seeds of Dragon Fruit

TRADITIONAL USES

- Pitaya has been used as a traditional medication and consumption purposes in central America, where it is also common for pitayas to be grown in family gardens.
- The leaves and flowers of pitaya were used by the ancient Mayas for the medicinal use as a diuretic and healing agent.
- Mayas also utilizes the pitaya fruits as a diuretic, hypoglycaemic, against heart disease, wound disinfectant, and tumour dissolution, and

as a cure for dysentery.

- In addition, the flowers can be consumed as it is or by drinking it as a tea, the seeds possess a laxative effect, the fruit has shown an effect on gastritis, and the stalk can also be used for kidney problems .
- Regular consumption of prebiotics may help for reduce the risk of digestive tract infections and diarrhoea.
- Prebiotics promote the growth of good bacteria, which researchers believe may outcompete the bad (17)

NUTRITIVE VALUES (18):

Table no 03 - Nutritive values of Dragon Fruit

| TYPES OF NUTRIENTS | AMOUNT |
|---|---|
| Moisture | 84-86 g/100 g |
| Protein | 0.93-1.33g/100 g |
| Fat | 0.40-1.01g/100 g |
| Vitamin C | 1.0-6.3mg/100 g |
| Glucose | 4.63-6.39 g/100 g |
| Fructose | 2.16-4.0 6 g/100 g |
| Sorbitol | 0.33 g /100 g |
| Calcium | 7.6-15.6 mg/100 g |
| Sodium | 5.0-13.5 mg/100 g |

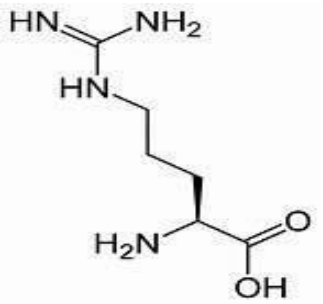
- Calories: 103
- Protein: 0.6 g
- Fat: 0.2 g
- Carbohydrates: 27.4 g
- Fiber: 5.6 g
- Iron: 0.324 milligrams (mg)
- Magnesium: 12.6 mg
- Vitamin C: 7.7 mg
- Vitamin E: 0.2 mg

CHEMICAL CONSTITUENTS

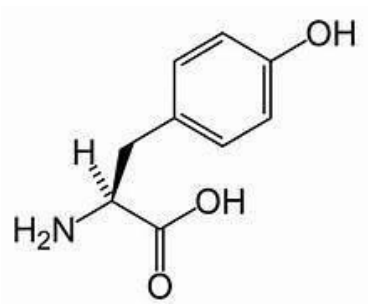
The Chemical Constituents present in Dragon fruit of Every Part are as follows (19):

Tab no 04 - Chemical Composition of Dragon Fruit

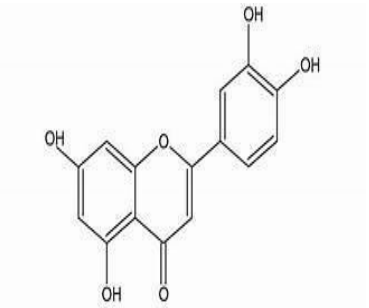
| PARTS OF PLANT | CHEMICAL COMPOSITION |
|---|---|
| Pulp | Carbohydrates, proteins and amino acids, alkaloids, terpenoids, steroids, glycosides, flavonoids, tannins, and phenolic compounds, saponins, oils |
| Fruit | Flavonoids, Betacyanin (responsible for red or purple colour), Polyphenols, Carotenoids and Vitamin C. -amyrin (15.87%),B -amyrin (13.90%), octacosane (12.2%), -sitosterol (9.35%), octadecane (6.27%), 1-tetracosonal (5.19%), Stigmast-4-en-3-one (4.65%), and Campestrol (4.16%). |
| Flowers | Gallic acid, DPPH (1,1-diphenyl-2-picrylhydrazyl), potassium persulfate, and neocuproine (2,9-dimethyl-1,10-phenanthroline), phenolic acid, amino acid and vitamin standards |
| Trunk & Branches | Ascorbic acid, Gallic acid, Prolin, Aspartic acid, Cystein, Alanine, Valline |
| Seeds | Vitamin C, Beta Carotene, Fibre, Caretenoids |
| pulp | Phenolics, Flavonoids, Carenoids, Gallic acid, Xanthophylls (Leutin, B-Cryptoxanthin |
| Root | Betacynin, Lycopenene, Phenolic acid, Organic acids |




Arginine (1)

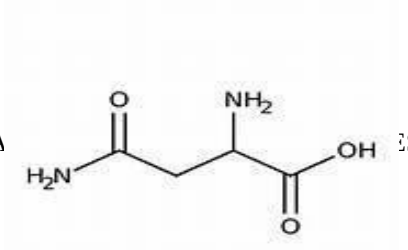


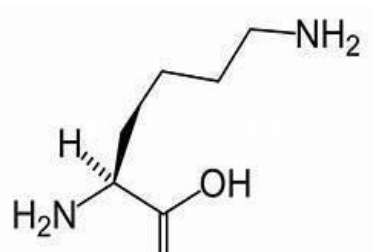

Tyrosine (2)

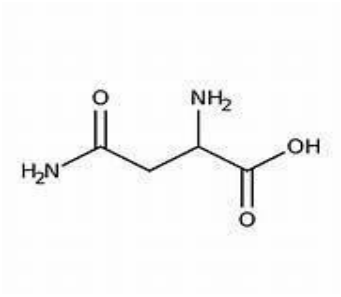



Luteolin (3)

CHEMICAL CONSTITUENTS



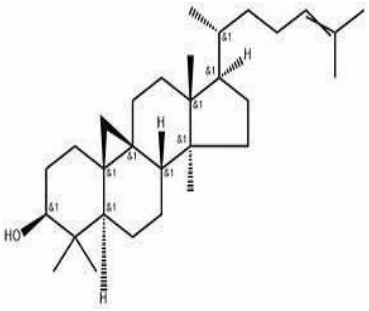





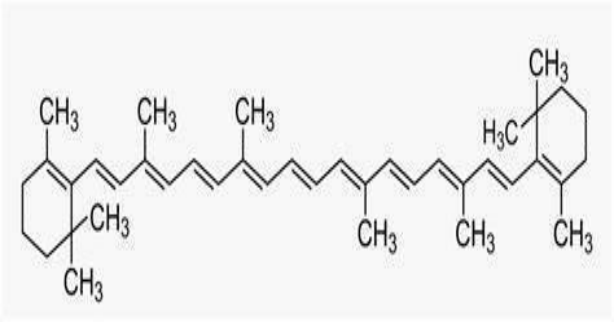

Gallic acid (4)

Asparginine (5)

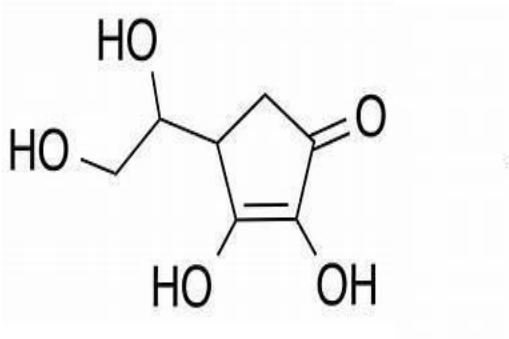
Lysine (6)



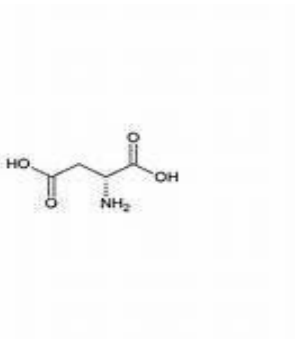
Cycloartenol (7)



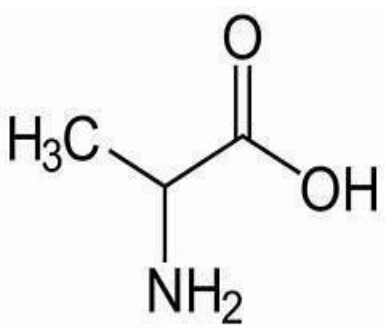

B – Carotene (8)




Ascorbic acid (9)




Ascorbic acid (10)




Alanine (11)

Fig no 09 - Structure of identified phytochemicals from various parts of dragon Fruit (20)

CHEMICAL TEST

Phytochemical present in Dragon Fruit:

Tab no 05 - Chemical Test of Dragon Fruit

| Component | Reagent | Note | Result of fruit extract |
|---|---|---|---|
| Protein | Biuret test | Purple blue | Positive |
| Steroids | Liebermann Burchard test | Yellow ppt | Positive |
| Carbohydrates | Molisch test | Violet ring | Positive |
| Alkaloid | Mayer's reagen | White ppt | Positive |
| Phenolic compounds | Ferric chloride test | White ppt | Positive |
| Tannins and Flavonoids | Lead acetate | Yellow white ppt | Positive |
| Tannins | Fast stirring | Dense foam for long time | Positive |

PHARMACOLOGICAL ACTIVITIES

In the treatment of different diseases, medicinal herbal plants have demonstrated pharmacological activity,

dragon fruit have many pharmacological activities listed below:

ANTIMICROBIAL ACTIVITY (21,22):

Antimicrobial activity White dragon fruit flesh ethanolic extract was detected as around 85% of mixed oligosaccharides occur. In contrast to inulin, these oligosaccharides had greater tolerance to human salivary α- amylase. This is not digested in the stomach, but functions as prebiotics that help the stomach. Bifidobacteria and Lactobacilli, which are healthy bacteria, are increasing. Acetone extracts (70 % concentration) of Hylocereus peel have high antimicrobial activity, particularly against Salmonella typhi. Using the micro titre process, anti-bacterial analysis was performed. It was the minimum inhibitory concentration (MIC) of the bacterial species E. coli and Staphylococcus aureus was found to be 50µl

ANTIFUNGAL ACTIVITY:

The presence of polyphenol antifungal activity in extracts and fractions of flesh and peels of red pitaya fruits are two yeasts, Candida albicans, Rhizoctonia solani; four molds: Aspergillus flavus, Fusarium oxysporum, Botrytis cinerea, Cladosporium herbarum which is the research panel that include laboratory control strains obtained from the American Type Culture Collection (ATCC).

ANTIIMFLAMMATORY ACTIVITY (23):

Anti-inflammatory action has been performed on dragon fruit. The research was carried out by mixing dragon fruit skin and flesh and separating it with vacuum distilled water, water, and drying. Then the results of this will be used for the purposes of bioassay testing against Cyclooxygenase-2 (COX-2), and 5-Lipoxygenase (5- Lipox). The results of these studies have shown that extracts derived from dragon fruit flesh showed excellent results against the three enzymes in the bioassay test and showed a stronger inhibitory power on the Acetylcholinesterase enzyme compared to other enzymes. This has shown that dragon fruit has the ability to relieve inflammatory symptoms, it can be seen from the mechanismthat is directly related to cholinergic anti-inflammatory. In addition, the results shown by dragon fruit flesh on COX and Lipox enzymes also have an indication of a high potency that can cause blockages in the leukotriene and prostaglandin pathways. This shows that there are anti-inflammatory properties in the properties of dragon fruit. Extract from ethanol from red dragon fruit peel contains betalain which has the ability to inhibit the transcription factor NF-κB which will result in inflammatory genes such as TNF-α and IL-1β that will not be separated.

ANTICANCER ACTIVITY:

Various studies have shown that the flavonoids, betanin, and polyphenols in dragon fruit have an anticancer effect. The skin of dragon fruit that has been extracted with a mixture of water and ethanol solvent with a ratio of 50:50 has shown antiproliferative activity against human hepatocellular carcinoma cells in just one dose. Anticancer activity which is really precise is still being studied and cannot be known factually, however, previous research has resulted in the fact that the effect of polyphenol anticancer in dragon fruit may be mediated through factor suppression on nucleic-kappa B and by a mediated pathway.

ANTIPLATELATE ACTIVITY (24):

Dragon fruit has antiplatelet activity because it contains ethanol and ethyl acetate extracts which have inhibitory effects in concentration-dependent manner on platelet aggregations induced by various agonists.

ANTIFERTILITY ACTIVITY:

The topical quercetin content in the skin of red dragon fruit (Hylocereus polyrhizus) shows antiulcer activity. It can be proven from the results of total distress in 35% of cases within 2 to 4 days and in 90% of cases within 4 to 7 days. Quercetin is useful for reducing the frequency of relapses and relieving mild symptoms.

HEPATOPROTECTIVE ACTIVITY (25):

The extracts of dragon fruit do have a beneficial effect on poisoned rats. Due to its high antioxidant components coming from the above-mentioned intake of CCl4. In specific, triterpenes and flavonoids are phytochemical components that defend the liver against fat peroxidation, but with a subsequent improvement in Serum Glutamic- Pyruvic Transaminase (SGPT) and Serum Glutamic-Oxaloacetic Transaminase (SGOT), the silymarin capsule has little preventive function against liver injury.

CARDIOPROTECTIVE ACTIVITY:

The effectiveness of polyphenols in flesh owned by H. polyrhizus is Anti-thrombotic effect, which increases

its cardio protective properties further. In one study, rats were given two thermal processing methods for this dragon fruit were selected. The results of the analysis were that the cardio protective substances of red pitaya will be polyphenols and antioxidant material.

NEUROPROTECTIVE ACITIVITY (26,27):

As mentioned previously, dragon fruit has a myriad of benefits and one of them is related to the neuroprotective activity of nerve work. The phytochemical content in dragon fruit plays an active role in neuroprotective activity, especially when preventing neurodegenerative diseases. The phytochemical content in dragon fruit which has the potential to prevent neurodegenerative diseases while also playing an active role in neuroprotector activity is essential fatty acids.

## CONCLUSION

Due to its nutritional and medicinal properties dragon fruit brings numerous benefits to human health mostly for the control and management of the oxidative stress. All the different types of pitaya (i.e., spines, peels and pulp) contain bioactive compounds involved in a wide range of beneficial biological activities including antioxidants, antimicrobial, anticancer, antiinflammatory capacities these include betalains, flavonoids, polyphenols, terpenoid and steroids, saponins, alkaloids, tannins and carotenoids, which has been proven as effective, healthier, safer and sustainable alternatives to synthetic drugs for the treatment and prevention of many diseases such as diabetes, cancer, obesity, hyperlipidaemia and pathogenic agents such as virus, bacteria and fungi. Besides the pharmaceutical value of its compound the pitaya is also a national suit of colours with potential uses in the food and cosmetic industries.

Dragon fruit is beneficial for strengthening bones, teethes, carbohydrate metabolism, heart tissues, healthy blood circulationand tissue formation. In this review paper focused on the pharmacological activities and nutritional benefits of dragon fruit for human health.

circulationand tissue formation. In this review paper focused on the pharmacological activities and nutritional benefits of dragon fruit for human health. Few reports on dragon fruit peel available in literature all the majority type of compounds concentrated on phenolic compounds and presence and estimation. Isolation and characterization of colouring agents like betacyanins and anthocyanins. We like to explore a detail preliminary phytochemical compounds present in pitaya fruit peels (Hylocereus polyrhizus).

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